PC-2296

[Total No. of Pages :2

**SEAT No. :** 

## [6354]-401

# B.E. (Automobile Engineering) AUTOMOTIVE TESTING AND CERTIFICATION (2019 Pattern) (Semester - VII) (416481)

*Time : 2½ Hours]* 

[Max. Marks : 70

[9]

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right side indicate full marks.
- 3) Assume Suitable data if necessary.
- Q1) a) Explain the concept of proving ground testing and its role in vehicle development and validation. What types of tests are typically conducted on proving grounds? [9]
  - b) Explain the following.
    - i. Split-mu track
    - ii. External noise track
    - iii. Steering pad

### OR

- Q2) a) What is the coast down test, and how does it help in evaluating vehicle performance and aerodynamics? Discuss its importance in vehicle development. [9]
  - b) Explain the pass-by noise test and its significance in assessing the noise levels produced by vehicles during operation. How is this test conducted, and what are the regulatory standards involved? [9]
- (Q3) a) What are the Indian driving cycles, and how are they used for vehicle testing and certification in India? Discuss the characteristics and objectives of Indian driving cycles. [8]
  - b) Explain procedure of two wheeler testing on chassis dynamometer for emissions. [9]

*P.T.O.* 

- Q4) a) Explain the Non-road Transient Cycle (NRTC) and its importance in testing emissions from non-road vehicles and equipment. What types of vehicles are subject to NRTC testing? [8]
  - b) What is a chassis dynamometer, and how does it simulate real-world driving conditions for vehicles? Discuss the types of chassis dynamometers commonly used in vehicle testing. [9]
- Q5) a) Explain the phenomenon of wind noise in vehicles. What aerodynamic factors contribute to wind noise, and how can vehicle design be optimized to minimize wind noise? [8]
  - b) Explain the sources and characteristics of engine noise in vehicles. How does engine design, combustion process, and exhaust system configuration impact engine noise levels? [9]

Q6) a) Discuss the sources of noise and vibration in vehicles. How do engine operation, drivetrain components and road conditions affect noise and vibration levels? [8]

[9]

- b) Explain Briefly
  - i) Exhaust Noise
  - ii) Engine Noise
  - iii) Vehicle structure noise
- Q7) a) Explain the airbag test for vehicles. What parameters are evaluated during airbag testing, and how do airbags contribute to occupant safety in the event of a collision? [9]
  - b) What are the different types of tests performed on rear view mirrors? Explain any one. [9]

- Q8) a) Describe the safety glasses test for windscreen laminated and toughened safety glass. What are the requirements for safety glass in vehicles, and how is glass strength and integrity assessed? [9]
  - b) How are fuel tanks in vehicles tested for safety and integrity, considering factors for both metallic and plastic tanks? [9]



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[Total No. of Pages :3

**SEAT No. :** 

# [6354]-402

# B.E. (Automobile Engineering) MACHINE & VEHICLE DYNAMICS (2019 Pattern) (Semester - VII) (416482)

### *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.
- 5) Assume suitable data if necessary.
- *Q1*) a) Derive the differential equation of motion for forced vibration in spring damper mass system. [6]
  - b) In a vibratory system, a mass of 3 kg is suspended by a spring of stiffness 1200 N/m and it is subjected to harmonic excitation of 20 N. If the viscous damper is provided with the damping coefficient of 75 N-s/m, determine: [12]
    - i) the resonance frequency
    - ii) the phase angle at resonance
    - iii) the amplitude at resonance
    - iv) the frequency corresponding to peak amplitude
    - v) the damped frequency

### OR

Q2) a) Explain:

- i) Forced Vibrations
- ii) Resonance
- iii) Quality factor of the vibratory system
- iv) Bandwidth of the vibratory system
- b) The rotating machine, having total mass of 20 kg, is having an eccentric mass of 1.5 kg with eccentricity of 25 mm. The machine rotates at 720 r.p.m. If the amplitude of vibrations, which is 20 mm, lags the eccentric mass by 90°, determine: [10]
  - i) the natural circular frequency of the system;
  - ii) the damping factor; and
  - iii) the amplitude and phase angle when eccentric mass rotates at 1440 r.p.m

[8]

- (Q3) a) Explain earth fixed coordinate system and vehicle coordinate system with neat diagram. [9]
  - b) Explain:
    - i) Gradability
    - ii) Drawbar pull
    - iii) Rolling resistance
    - iv) Tractive effort

- Q4) a) Derive the equation for normal reactions acting on axles of a vehicle, when vehicle is on a slope and in rest state. [7]
  - b) Explain the different cases of dynamic axle loading with neat diagram and mathematical equations. [10]
- Q5) a) Explain automatic transmission with respect to torque versus speed ratio. [7]
  - b) Explain engine power limited acceleration. [10]

#### OR

- *Q6*) a) A car weighing 2000 kg travelling at a speed of 40 km/hr. The driver puts on the brakes with a steady brake force of 9000 N, when he sees a stop sign. Determine, the: [12]
  - i) Deceleration of the car.
  - ii) Stopping distance of the car.
  - iii) Time to stop the car.
  - iv) Energy dissipated during braking.
  - v) Brake power dissipated at point of brake application.
  - vi) Brake power dissipated average at the stop.

Neglect, aerodynamic, rolling and drawbar pull resistances.

b) Derive the generalized equation for braking performance of a vehicle on slope. [5]

[6354]-402

[8]

Q7)	a)	Expl	ain mathematical model of handling.	[9]
	b)	Expl	ain:	[9]
		i)	Yaw velocity	
		ii)	Neutral steer	
		iii)	Constant speed test	
			OR	
<b>Q</b> 8)	Wri	te sh	ort note on:	[18]
	a)	Sem	i-active suspension system	
	b)	Acti	ve suspension system.	

c) Excitation sources for vehicle ride model.



**PC-2298** 

SEAT No. :

[Total No. of Pages : 2

# [6354]-403

# B.E. (Automobile) INDUSTRIAL ENGINEERING (2019 Pattern) (Semester - VII) (416483)

Time : 2 Hours]		Hours] [Max. Ma	[Max. Marks : 50	
Instr	uctio	ns to the candidates :		
	1)	Answer Q1 or Q2, Q3 or Q4. Q5 or Q6, Q7 or Q8.		
	2)	Neat diagrams must be drawn wherever necessary.		
	3) 1)	Figures to the right side indicate full marks.		
	4)	Assume Suttable data ij necessary.		
<b>Q1</b> )	a)	Explain importance of Industrial engineering.	[7]	
	b)	Explain Five S technique of Productivity Improvement.	[6]	
		OR		
Q2)	a)	Explain briefly the factors affecting productivity	[7]	
	b)	Explain importance of Productivity.	[6]	
Q3)	a)	Explain objectives, scope of Work Study. What are human fa	ctors in	
	1.)	Write the stand on MOST Mean and One setion Services Techn	[v] (	
	D)	OR	ique)[ <b>o</b> ]	
<b>Q4</b> )	a)	What is Allowance? Explain any two types of Allowance.	[6]	
	b)	Explain factors affecting rate of working.	[6]	
Q5)	a)	What do you mean by plant Location? Mr. Vishal wants to start plant, for this suggests which are the different factors that he consider while selecting location for his new plant?	his new should [6]	
	b)	Explain the Selection criterion for material handling. OR	[7]	
<b>0</b> 6)	a)	Explain factors affecting plant layout	[6]	
20)	h)	Write different principles of material handling equipment	[ <sup>7</sup> ]	
	0)	while university principles of material handling equipment.	[/]	

*P.T.O.* 

Q7) :	a)	Explain the objectives of Production Planning and Control.	
1	b)	Explain the objectives of Inventory Control.	[6]
		OR	
<b>Q8</b> ) :	a)	Explain Just-in-Time system.	[6]
1	b)	Write a short note on Supply Chain Management (SCM)	[6]



**PC2299** 

[6354]-404

[Total No. of Pages :2

SEAT No. :

### **B.E.** (Automobile Engineering)

# ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

# (2019 Pattern) (Semester- VII) (Elective - III) (416484 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

<b>Q1</b> )	a)	Compare between K-Means and K-Nearest Neighbors (K-NN) as mac	hine
		learning algorithm.	[6]
	b)	How can you evaluate the performance of an SVR model, and what	t are
		the typical regression metrics used for evaluation?	[5]
	c)	What is the role of pruning in decision trees?	[6]
		OR	
Q2)	a)	When should you consider using a Random Forest for a machine learn problem?	ning <b>[6]</b>
	b)	Explain cost function in linear and logistic regression.	[5]
	c)	What is overfitting in decision trees, and how can it be mitigated?	[6]
Q3)	a)	How can missing values in a dataset be handled during data	pre-
		processing?	[6]
	b)	What is bias-variance tradeoff?	[6]
	c)	What is feature scaling, and how does it relate to data preprocessing	? <b>[6]</b>
		OR	
<b>Q4</b> )	a)	What is feature Engineering in machine learning?	[6]
	b)	What are the different strategies of Addressing Overfitting?	[6]
	c)	What is the difference between regularization and normalisation?	[6]
Q5)	a)	What are the different Elements of Reinforcement Learning.	[7]
	b)	Difference between Positive vs Negative Reinforced Learning.	[6]
	c)	Enlist the Properties of Markov Chain.	[5]
	,	·	

- *Q6*) a) In reinforcement learning, what are three main categories of algorithms based on their approach to solving problems? [7]
  - b) What are some applications of Convolutional Neural Networks? [6]
  - c) What is the difference between a convolutional and deep neural network?

[5]

- *Q7*) a) In What few ways AIML can be used in Enhancing Manufacturing by process optimization? [6]
  - b) Explain how AI and ML contribute to the functioning of AGVs? [5]
  - c) Discuss any Application of AI in Predictive Maintenance of Vehicles. [6]

- **Q8)** a) Enlist of Key aspects of autonomous vehicles. [6]
  - b) How does access control using facial recognition work? [5]
  - c) How AI and machine learning can be applied to traffic control using image-based classification? [6]



SEAT No. :

**PC2300** 

[6354]-406

[Total No. of Pages :2

[Max. Marks : 70

# **B.E.** (Automobile/Mechanical) INTERNET OF THINGS

## (2019 Pattern) (Semester- VII) (Elective - III) (402044E)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

### *Q1*) a) What is Open Integration Architecture (OIA)? [7]

b) What are the key standards considerations for designing an Internet of Things (IoT) architecture? [8]

#### OR

- Q2) a) What are some IoT-supported hardware platforms and programming languages commonly used for interfacing to read input from pins on IoT devices?
  - b) What is the difference between external gadgets, sensors, and actuators in the context of IoT devices? [8]
- Q3) a) What are the common IoT communication models, and how do they work? [7]
  - b) Why is protocol standardization important for the Internet of Things [8]

- Q4) a) Write the difference between SCADA and WSN protocol. [7]
  b) Advantages and limitations of Cloud computing. [8]
- Q5) a) What are the key differences between MQTT (Message Queuing Telemetry Transport) and REST (Representational State Transfer) protocols in the context of IoT and data communication? [7]
  - b) What are the key considerations for ensuring IoT security in consumer devices? [8]

- *Q6*) a) What are the key considerations in designing a SQL-based backend application? [7]
  b) What are the Pros and Cons of MongoDB? [8]
- *Q7*) a) How is IoT Utilized in Agricultural Applications? [7]
  - b) How does data aggregation play a crucial role in the implementation of IoT solutions for Smart Cities? [8]

- Q8) a) What are some examples of IoT applications that align with new trends in technology and offer innovative solutions? [7]
  - b) What are some modern-day IoT applications that play a significant role in environmental protection and sustainability? [8]



**PC2301** 

SEAT No. :

[Total No. of Pages : 4

# [6354]-407 B.E. (Automobile) FINITE ELEMENTS ANALYSIS (2019 Pattern) (Semester - VII) (Elective - IV) (416485 A)

*Time : 2½ Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.
- 5) Assume suitable data if necessary.
- Q1) a) A constant Strain triangle is defined by three nodes 1 (1.5, 2), 2(7,3.5) and 3 (4,7). Evaluate the shape function N1, N2 and N3 for interior point P (3.85, 4.8).



- -8- -
- b) What do you mean by Stress and Plane Strain condition and how it is used for conversion of 3D problem into 2D problem. [8]

**Q2**) a) Determine the Cartesian Coordinate of Point P ( $\xi = 0.5, \eta = 0.6$ ), shown in Fig. 2 [10]



b) What is 2D elements? Explain the different types of 2D element. [8]

Q3) a) Write a short note on P and H formulation in meshing, and how it use for improving the FEA results accuracy [9]

- b) Explain the following terminologies in element meshing. [8]
  - i) Aspect ratio
  - ii) Warp angle

### OR

<b>Q4</b> ) a)	Explain why element quality is checks in necessary in FEA?	[5]
b)	b) Write a short note on critical region in FEA model? Which are way to improve the FEA results accuracy in critical region	
c)	Explain the following terminologies in element meshing	[8]
	i) Jacobian	

ii) Stretch

[6354]-407

- Q5) a) Write the difference between linear and non-linear FEA analysis with respective its characteristic and feature. [10]
  - b) Explain Geometric Nonlinearity and Material Nonlinearity related to nonlinear problems. [7]

- *Q6*) a) Why is material modelling critical in nonlinear analysis? Explain any type of material model in nonlinear analayis. [10]
  - b) Write the general procedure for non-linear analysis solid mechanics. [7]
- Q7) a) A brick wall shown in fig 3 has thickness of 0.6m and thermal conductivity of 0.8W/m°K. The inner surface of wall is at 28°C and outer surface is exposed to cold air at -10 °C. The heat transfer coefficient at outer surface is 40 W/m°K. Determine the steady-state temperature distribution within the wall. Considered the two elements. [12]



b) What is the shape function? How it is used in thermal analysis to find the temperature distribution within the wall. [6]

**Q8)** a) The bar shown in Fig. 4 having uniform cross-section with cross-section area  $A = 50 \times 10^{-6} \text{ m}^2$ , length L = 1.5 m, modulus of elasticity  $E = 2 \times 10^{11} \text{ N/m}^2$  and density  $\rho = 7800 \text{ kg/m}^3$ . Estimate the natural frequency of bar. Model the bar by using two elements. [12]





b) Write the short notes on,

[6]

- i) Consistence mass matrix
- ii) Lumped mass matrix'?

\* \* \*

[6354]-407

PC2302

SEAT No. :

[Total No. of Pages : 2

### [6354]-409

# B.E. (Automobile Engineering) HYBRID AND ELECTRIC VEHICLE (2019 Pattern) (Semester - VIII) (416489)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Assume Suitable data jf necessary.
- 2) Answer Four questions from the following (Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 and Q.8.
- *Q1*) a) What are the primary functions of the motor in an 'Electric Vehicle (EV)'.[8]
  - b) Explain Torque-Speed characteristics of Electric Vehicle Motors. Also, show and explain constant torque, constant power and constant speed region in torque-speed curve. [9]

#### OR

- Q2) a) In permanent magnet motor drives, explain different magnet arrangements with neat sketches. Also, explain which arrangement is preferred E.V. Motors and why?[8]
  - b) Explain the significance of regenerative braking in the context of electric vehicle motors. [9]

### **Q3**) Explain following parameters of Li-Ion batteries in short: [18]

- a) Battery Capacity
- b) State of Charge (SOC),
- c) C- Rate
- d) State of Health (SOH),
- e) EV Battery Life
- f) Depth of Discharge (DOD).

- Q4) a) Why Lithium is preferred in energy storage device of electric vehicle? [6]
  - b) List different Lithium Chemistries used in 'Li-Ion Battery'. [6]
  - c) State different parameters used to compare different types of 'Li-Ion Batteries'. [6]

- Q5) a) What is the need of Battery Management System (BMS)? [8]
  - b) What are the functions of Battery Management System (BMS)? [9]

- *Q6*) a) What is a Battery Thermal Management System (BTMS)? [8]
  - b) Why is Battery Thermal Management System important in electric vehicle?[9]
- Q7) It is decided to design an E-Rickshaw with following specifications:- (1) Gross Vehicle Weight (GVW) = 680kg, (2) Maximum Speed = 45kmph, (3) Acceleration = 0 to 45kmph in 20 seconds, (4) Grade = 0°, (5) Radius of wheel = 0.2m, (6) Coe. of Drag = 0.44, (7) Gear Ratio = 9:1, (8) Air Density = 1.225kg/m<sup>3</sup>,(9)Front Area = 1.6m<sup>2</sup>, (10)Coe. of rolling resistance = 0.013, (11) Coe. of sliding friction = 0.3. Calculate :- (i) Motor Power in kW, (ii) Battery Pack Capacity in kwhr, (iii) Energy Efficiency in Watt-hour/km, (iv) Actual Max. Vehicle Speed in kmph, and (v) EV range (in km) for plane road at constant speed of 30kmph.

#### OR

Q8) It is decided to design an E-Scooter with following specifications:- (1) Gross Vehicle Weight (GVW) = 191kg, (2) Maximum Speed = 80kmph, (3) Acceleration = 0 to 40kmph in 4 seconds, (4) Grade = 0°, (5) Radius of wheel = 0.1524m, (6) Coe. Of Drag = 0.22, (7) Gear Ratio = 7.8:1, (8) Air Density = 1.225kg/m<sup>3</sup>, (9)Front Area 0.875m<sup>2</sup>,(10)Coe. of rolling resistance = 0.015, (11) Coe. of sliding friction = 0.3. Calculate :- (i) Motor Power in kW, (ii) Battery Pack Capacity in kwhr, (iii) Energy Efficiency in Watt-hour/km, (iv) Max. Vehicle Speed in kmph, and (v) EV range (in km) for plane road at constant speed of 60kmph.

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**PC-2303** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

# [6354] - 410

# **B.E.** (Automobile Engineering) **Automotive System Design** (2019 Pattern) (Semester - VIII) (416490)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hour*]

Instructions to the candidates:

# Answer four questions from the following.

<b>Q1</b> ) a)	Why a propeller shaft is made hollow?	[4]
----------------	---------------------------------------	-----

- A 3- speed gear box gives 3 forward speeds and one reverse with a top b) gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The centre distance between the shafts is to be 110 mm approximately. Gear teeth of module 3.25 mm. find the number of gear teeth. [6]
- Narrate the design procedure of live axles. [7] c)

<b>Q2</b> ) a)	Explain the characteristics of a propeller shaft.	[4]
b)	Brief the design procedure of final drive.	[6]

- Describe the design procedure of dead axle. [7] c)
- Q3) In a hydraulic braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is 4 cm<sup>4</sup>, cross sectional area of front piston 20 cm<sup>4</sup>.cross sectional area of the rear piston is 5 cm<sup>4</sup>. Distance moved by effort is 1 cm. Calculate the following. [18]
  - i) Front to rear brake ratio
  - ii) Total force ratio
  - iii) Distance moved by output
  - Cylinder movement ratio iv)
  - Total movement ratio. v)

### *Q4*) Explain the following;

- i) Brake fade.
- ii) Brake torque.
- iii) Brake balance.
- iv) Braking efficiency.
- v) Properties of friction lining.
- vi) Components used in hydraulic brake system
- Q5) a) one of the Semi elliptic type spring has leaves of 75 mm width and 10 mm thickness, effective length is 900 mm. If the stress is not to exceed 220.725 MPa, when the spring is loaded to 4905 N. Estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius? Take E=196.2 GPa. [10]
  - b) Explain about air springs.

OR

*Q6*) Explain the following;

- i) Nipping in leaf springs.
- ii) Brake fade and Brake torque.
- iii) Brake balance and Braking efficiency.
- iv) Components used in hydraulic brake system
- *Q7*) Design a Tensile Bar for Minimum Cost of the following materials. Assume Factor of Safety of 2.0 [18]

Material	Mass density	Yield strength	Material cost
	$(Kg/m^3)$	(MPa)	Rs/N
Steel	3000	16	130
Al alloy	3000	32	50
Magnesium alloy	2100	32	20

Length of the bar is 200mm and a constant tensile load on bar is of 5000N.

OR

- Q8) a) Explain about optimum and adequate design. [8]
  - b) Write a note on;
    - i) Design for natural tolerances.
    - ii) Statistical considerations in design.

### **b4 b4 b4**

2

[6354]-410

[17]

[10]

[7]

SEAT No. :

## **PC2304**

[6354]-415

## **B.E.** (Automobile Engineering)

# ALTERNATIVE FUELS AND EMISSION CONTROL

# (2019 Pattern) (Semester - VIII) (Elective - V) (416491A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

[Total No. of Pages : 2

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- Q1) a) Suggest the various additives for improvement of cetane number in vegetable oil.
  - b) Suggest and justify the important properties of vegetable oil. [9]

### OR

- (Q2) a) Explain the production method of vegetable oil with neat sketch. [8]
  - b) List and explain the different methods of using vegetable oil in IC engine.[9]
- **Q3**) a) Explain the production method of biogas fuel with help of neat diagram.[8]
  - b) Compare the Properties of LPG and CNG as alternative fuel for SI Engine.[9]

- *Q4*) a) Suggest and explain the modification required for CNG fuel to use in SI engine.[8]
  - b) Discuss the LPG as alternative fuel for CI engine with its advantages and disadvantages. [9]
- Q5) a) List and explain the main sources of emission form automobile vehicle.[9]
  - b) Explain with neat sketch constructional and operational features Flame Ionization detector for emission HC emission measurement. [9]

- *Q6*) a) Explain with neat sketch constructional and operational features of (NDIR) for measurement of CO concentration. [9]
  - b) Describe the negative effects of HC, CO and NOx emission on human being. [9]
- *Q7*) a) Explain with neat sketch working of positive crankcase ventilation (PCV) system. [6]
  - b) Suggest and explain the various causes' formation of different smoke in vehicle. [6]
  - c) Describe the function and working principle of catalytic convertor with its classification. [6]

- Q8) a) Analyze the effect of following design parameters on SI engine emission.[6]
  - i) Residual gas dilution
  - ii) Engine speed
  - b) Explain the working of exhaust gas recirculation system with its advantages.[6]
  - c) Describe the Laser Assisted Combustion with its advantages and drawbacks. [6]

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SEAT No. :

# PC2305

[Total No. of Pages : 2

### [6354]-416

# B.E. (Automobile Engineering) RENEWABLE ENERGY

## (2019 Pattern) (Semester - VIII) (Elective - V) (416491B)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- [Max. Marks : 70
- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

<b>Q1</b> ) :	a)	Describe with neat sketch the working of wind energy conversion system (WECS) with main components. [9	
1	b)	Draw and explain the working of Solar-wind hybrid system.	[9]
		OR	
Q2) :	a)	Elaborate on the concept of Wind farm with block/neat diagram.	[9]
1	b)	Classify wind -turbines used to Extract wind energy. Explain the differ types in brief.	ent [ <b>9</b> ]
Q3) :	a)	Describe a Hybrid conventional and geothermal power plant with n sketch.	eat [ <b>9</b> ]
1	b)	Classify prime movers for Geothermal energy Conversion. Explain a one with neat diagram.	any [ <b>8]</b>
		OR	
<b>Q4</b> ) :	a)	Describe a binary cycle liquid dominated geothermal power plant.	[9]
1	b)	Explain-Hydrothermal resources and Geothermal Resources.	[8]
Q5) :	a)	List the different sources of Biomass. Explain any four.	[9]
1	b)	Draw the sketches of any three types of biogas plants.	[9]

<b>Q6</b> )	a)	What are the different factors affecting the generation of biogas? [9		
	b)	How MHD systems are classified? Describe them in brief.	[9]	
Q7)	a)	What are advantages and limitations of Ocean Energy?	[9]	
	b)	Write a note on Off-shore and on-Shore ocean energy Convers Technologies.	sion [ <b>8</b> ]	
		OR		
Q8)	a)	Write a note on Small hydel power Plant.	[9]	
	b)	What are different types of ocean thermal energy conversion system (OT and Explain Open cycle OTEC System with neat sketch.	EC) [ <b>8</b> ]	

# $\odot$ $\odot$ $\odot$

# PC2306

SEAT No. :

[Total No. of Pages : 2

# [6354]-417

### **B.E.** (Automobile Engineering)

# TRANSPORT MANAGEMENT & AUTOMOBILE INDUSTRY (2019 Pattern) (Semester - VIII) (Elective - VI) (416492A)

<ul> <li>Time : 2<sup>1</sup>/<sub>2</sub> Hours]</li> <li>Instructions to the candidates: <ol> <li>Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.</li> <li>Neat diagrams must be drawn wherever necessary.</li> <li>Figures to the right indicate full marks.</li> </ol> </li> </ul>		[Max. Marks : 70
<i>Q1</i> ) a) b) c)	Explain Objectives of taxation. Why road tax is levied on vehicle. Explain one Time tax for Maharashtra State.	[6] [6] [6]
	OR	

<b>Q2</b> ) a)	Write short note on taxations.	[6]
b)	Explain the structure and method of Taxation.	[6]
c)	Who are the exempted from tax payment & why?	[6]
<b>Q3</b> ) a)	Explain different types of Traffic Signs.	[6]
b)	Explain the importance of insurance.	[5]
c)	What is third party insurance?	[6]

<b>Q4</b> ) a)	Explain types of motor vehicle insurance.	[6]
b)	Explain zero depth insurance.	[6]
c)	Distinguish between Insurance & Assurance.	[5]

- Q5) a) Explain the functions of good transport organization with the structure.[9]
  - b) Describe the schedule structure of good transport organization. [8]

Q6) a) Describe basic elements of transport system		Describe basic elements of transport system.	[8]
	b)	What is the procedure for transportation of petroleum product?	[9]
Q7)	a)	Explain seven quality tools.	[6]
	b)	Explain Bharat NCAP.	[6]
	c)	Explain Automotive Industry standards.	[6]

### OR

<b>Q8</b> ) a)	Explain Quality Circle.	[6]
b)	Explain JIT system.	[6]
c)	Benefits of ISO14001 certification.	[6]

# 

**PC2307** 

#### [6354]-418

[Total No. of Pages : 2

# **B.E.** (Automobile Engineering) **AUTOMOTIVE SAFETY**

## (2019 Pattern) (Semester - VIII) (Elective - VI) (416492B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- Neat diagrams must be drawn wherever necessary. 2)
- 3) Figures to right side indicate full marks.
- Compare the rear testing with side impact testing in a vehicle. [8] *Q1*) a)
  - b) Explain the proving-ground testing in a vehicle. [9]

#### OR

- *Q2*) a) Describe the component testing for a sports car. [8]
  - Explain the injury tolerance and deceleration curves in crashworthiness.[9] b)
- *Q3*) a) Discuss the vehicle seating configuration for a multi utility vehicle as per SAE norms. [10]
  - Describe the ergonomic development of a vehicle with human modelling b) predictions with the help of neat sketches. [8]

#### OR

- Explain the role of occupant packaging in vehicle design. [9] **Q4**) a) Describe the ergonomic development of a vehicle with human modelling b) predictions with the help of neat sketches. [9]
- Design a CRABI Infant Dummy for testing a vehicle. [9] **Q5**) a)
  - Discuss the simulation with pedestrian simulation tests. [8] b)

[Max. Marks : 70]

**SEAT No. :** 

<b>Q6</b> ) a)	(6) a) Design a Hybrid III Dummy as per percentile statures.	
b)	Write a short note on energy absorbing systems.	[8]
<b>Q7</b> ) a)	Explain the surround view camera system.	[9]
b)	Describe the working of lane departure warning system.	[9]
	OR	
<b>Q8)</b> a)	Explain the working of adaptive noise control.	[9]

# b) Discuss the working of anti-lock brake system. [9]

# 

### **PC-2308**

[6354]-420

# **B.E.** (Biotechnology) **BIOCHEMICAL ENGINEERING** (2019 Pattern) (Semester - VII) (415461)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

[Max. Marks : 70

Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- Neat diagrams must be drawn wherever necessary. 2)
- Figures to the right side indicate full marks. 3)
- **4**) Assume Suitable data jf necessary.

Explain in detail role and working of pH controller system. [9] *Q1*) a)

What are different types of sampling ports? Explain it's working in detail.[9] b)

### OR

- *Q2*) a) What is the effect of rheological properties in fermentation operation? State its importance. [8]
  - Draw a neat sketch of a fermenter and write functions and importance of b) various fittings and auxiliaries. **[10]**
- Describe effect of dissolved oxygen concentration on specific oxygen *.Q***3**) a) uptake rate. How is it correlated with Michelis-Menten kinetics curve?[9]
  - Describe with the help of TCA cycle biosynthetic routes for the b) production of amino acid. [8]

### OR

- Explain case study on Biosynthesis of cephalosporin C. **Q4**) a) [8]
  - b) What are different types of spargers? Draw neat diagrams and explain.[9]

**SEAT No. :** 

[Total No. of Pages :2

- Q5) a) Draw a neat diagram of a fermenter and explain in detail parameters affecting the oxygen transfer rate. [9]
  - b) Draw a flow chart and give objectives and considerations of scale up.[9]

- *Q6*) a) Give one example and describe a complete scale up from upstream to downstream processing of bioproduct. [9]
  - b) What is pilot plant? Why there is a need to develop a pilot plant before scale up? [9]
- Q7) a) What are types of immobilized cell reactors? Draw sketches and explain in detail. [9]
  - b) Give one detailed case study of semisynthetic process. [8]

- **Q8)** a) What are disposable reactors? Give Pros and cons over conventional reactors. [9]
  - b) What are advantages and disadvantages of using immobilized cells over whole cells? [8]



SEAT No. :

PC-5101

[Total No. of Pages : 2

# [6354] - 421R

## **B.E.** (Biotechnology) **BIOINFORMATICS**

## (2019 Pattern) (Semester - VII) (415462)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Solve Q1or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.
- 2) Figures to the right indicate full marks.
- 3) Assume Suitable data if necessary.
- Q1) a) Write note on Uniqueness of Polypeptide sequence and properties. [6]
  - b) Explain in detail about Primary, Secondary, Tertiary & Quaternary Structure of protein. [6]

c) Discuss about SWISS-PROT, TrEMBL

#### OR

Q2)	a)	Explain Ramchandran Plot.	[6]
	b)	Discuss about Secondary structure composition, backbone flexibil	ity, <b>[6]</b>
	c)	Write about Sequence Data File, Sample Sequence Data File.	[6]
<i>Q3</i> ) a) Describe the Various tools for protein Structure Jmol, PyMOL.		Describe the Various tools for protein Structure Visualization Ra Jmol, PyMOL.	asmol, <b>[9]</b>
	b)	Elaborate about Secondary protein databases.	[8]
		OR	
Q4)	a)	Discuss the concept of Proteomics, Secondary and tertiary struprediction.	ucture [9]

b) Write note on Basic Molecular Docking concept. [8]

*P.T.O.* 

[Max. Marks : 70

[6]

Q5)	(5) a) Explain Pairwise Sequence Alignment includes Sequence alig similarity, identity.		t, 6]
	b)	Write note on Scoring Matrices such as PAM and BLOSUM. [10	)]
		OR	
<b>Q6</b> )	a)	Explain in detail about Gap penalty concept and alignments statistica significance. [10]	al )]
	b)	Write in detail about Multiple Sequence Alignment - Clustal W. [8	<b>;]</b>
Q7)	a)	Define Phylogeney and explain phylogenetic trees [8	<b>;]</b>
	b)	Discuss on data phylogenetic software like PHYLIP, CLUSTAL [9	)]
		OR	
<b>Q</b> 8)	a)	Discuss about Phylogenetic data analysis including alignment, substitution parsimony. [8	n, 8]
	b)	Write note on Phylogenetics on the web. [9	)]

**be be be** 

[6354]-421R

**PC2310** 

[6354]-423

[Total No. of Pages :2

SEAT No. :

**B.E.** (Biotechnology)

## **ENVIRONMENTAL BIOTECHNOLOGY**

## (2019 Pattern) (Semester- VII) (Elective - III) (415463B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of a Calculator is allowed.
- 5) Assume suitable data if necessary.
- *Q1*) a) Enlist various methods used in Industrial effluent treatment. Explain the method of 'Neutralization' in detail. [9]
  - b) What are the general processes used in the paper and pulp industry? Explain the problems related to the processes. [9]

#### OR

- Q2) Which processes are followed by Tanning Industries to develop products? Write the characteristics of effluents of the Tanning industry. Describe the primary methods of effluent treatment. [18]
- (Q3) a) What are the effects of air pollution on human and health and ecosystem? [10]
  - b) What are the common methods of measurement of air pollutants. [7]

- Q4) a) What are the methods used for particulate outdoor Pollution control.Describe the functioning of Gravitational Settling Chamber. [10]
  - b) Explain the methods used for Indoor Air pollution control. [7]
- Q5) What are the common sources of hazardous solid waste? Which methods can be used to minimize the waste? [18]

- *Q6*) a) Write a note on Management of Solid Waste. [9]
  - b) Explain the methods in brief for medical solid waste management. [9]
- Q7) a) What are the Constraints and priorities of Bioremediation? Explain in situ Bio stimulation and Bio augmentation in detail. [10]
  - b) Explain any one case study for Bioremediation in detail. [7]

Q8) What is Bioremediation? How Bioremediation can be used for Recovery of metals from waste water and sludge? Describe the process in detail. [17]



**PC2311** 

### [6354]-424

# **B.E.** (Biotechnology)

# **GENOMICS**

### (2019 Pattern) (Semester- VII) (Elective - III) (415463 C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.

(1) a) How is transcriptome measured?	[6]
(1) a) How is transcriptome measured?	[(

- b) What is Volcano plot? [6]
- c) Write a short note on miRNA. [6]

#### OR

[6] *Q2*) a) Write a short note on qPCR. You have to measure expression of seed storage protein (SSP) gene b) after pollination. How would you detect the expression of SSP in given two samples of tissues? Give flow chart of the study plan. [6] Draw the diagram of RNA induced silencing complex (RISC) [6] c) [9] **Q3**) a) Write a note on DNA methylation and its significance. Explain the two methods of detecting changes in DNA methylations.[8] b)

#### OR

- *Q4*) a) Discuss the role of model organisms in Epigenetic studies. [9]
  - b) Write short notes on (4 marks each) [8]
    - i) Histone Acetylations
    - ii) Chromatin immunoprecipitation
- **Q5**) a) What are the applications of Pharmacogenomics? [8]
  - b) Give an overview of genomic technologies used in Pharmacogenomics.

[10]

[Total No. of Pages :2

SEAT No. :

[Max. Marks : 70

- *Q6*) a) Write notes on
  - i) Traditional medicine inspired PGX
  - ii) Drug metabolism
  - b) How will you detect that a patient will have right or adverse effect of drug using gene polymorphism? [8]
- Q7) a) Giving examples discuss the role of nutrients in epigenetic modifications. [8]
  - b) Discuss the applications of Personalized nutrition. [9]

- **Q8)** a) Design animal study showing "eating junk food gives risk of CVD". **[8]** 
  - b) How genome-diet interactions influence individuals response? [9]

[10]

**PC2312** 

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-426 B.E. (Biotechnology) NANOTECHNOLOGY (2019 Pattern) (Semester - VII) (Elective - IV) (415464 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

*Q1*) a) What are the requirements for a successful targeted drug delivery system? [6]

- b) Explain in detail about drug targeting and drug delivery system in to brain. [6]
- c) What is key role of nanoparticle in detection of infectious diseases?[6]

0	<b>)</b> 2) a)	Explain the strategies in de	etails of drug delivery system.	[6]
Y		Enpium me strategies m a		Lvl

- b) Explain in detail the application of nanotechnology in the field of cell therapy. [6]
- c) Discuss the advantages of nanotechnology in drug targeting and drug delivery. [6]
- Q3) a) Discuss in details about the polymer based sensor and electrochemical Nanosensors used for biomedical application. [10]
  - b) Mention the ideal characteristics of biosensors. Also discuss any two in details. [7]
| <b>Q4</b> ) | a) | Discuss the functioning of sensing substrates in nanodevices. [7]      |               |  |  |  |
|-------------|----|--|---------------|--|--|--|
|             | b) | Discuss in details the application of biosensors in different field. [ |               |  |  |  |
|             |    |  |               |  |  |  |
| Q5)         | a) | Explain in details the Concept of DNA biosensor.                       | [10]          |  |  |  |
|             | b) | Give IUPAC definition of biosensor and also discuss about it.          | [8]           |  |  |  |
|             |    | OR   |               |  |  |  |
| <b>Q6</b> ) | a) | Discuss advantages and disadvantages of optical sensors.               | [6]           |  |  |  |
|             | b) | Discuss the application of Biochips.                                   | [6]           |  |  |  |
|             | c) | Explain in detail DNA based biosensors.                                | [6]           |  |  |  |
|             |    |  |               |  |  |  |
| Q7)         | a) | Give the classification of biosensors based on biological receptor.    | [6]           |  |  |  |
|             | b) | Write a detail note on electrochemical biosensors.                     | [6]           |  |  |  |
|             | c) | Write down the application of mass based biosensors.                   | [5]           |  |  |  |
|             |    | OR   |               |  |  |  |
| <b>Q</b> 8) | a) | Explain in detail about the physicochemical techniques used in MEM     | S. <b>[9]</b> |  |  |  |
|             | b) | Discuss in detail the consideration for biosensor design.              | [8]           |  |  |  |

\* \* \*

Total No. of Questions : 8]

PC2313

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-427

# B.E. (Biotechnology) STEM CELL BIOLOGYAND REGENERATIVE MEDICINE (2019 Pattern) (Semester - VII) (Elective - IV) (415464 C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

[6]

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.

*Q1*) a) Explain the detail process of characterization of somatic stem cells. [6]

- b) Discuss the stem cell regeneration process in planaria. [6]
- c) Write note on facultative stem cells.

### OR

<b>Q2</b> ) a)	Write in detail about transdifferentiation involved in stem cells.	[6]
b)	Discuss the detail method of isolation of stem cells with neat sketch	.[6]

- c) Explain about the stem cell regeneration process in zebra fish. [6]
- Q3) a) Explain in detail about gene editing and ethical issues in gene editing.[9]
  - b) Discuss the guidelines framed by various organizations involved in stem cell therapy and culturing in India. [8]

- *Q4*) a) Write note on egg donation ethics. [9]
  - b) Discuss in detail about embryo ethics [8]

- Q5) a) Explain how the scaffold helpful in organ culture. [8]
  - b) Discuss the various types of scaffolds used in stem cell studies. [10]

OR

- *Q6*) a) Explain in detail about the computational tools involved to dissect stem cells. [10]
  - b) Describe in detail about in-vitro cultures of adult stem cells to analyse differentiation and properties. [8]
- *Q7*) a) Explain in brief about Cell replacement therapies and Drug screening.**[8]** 
  - b) Discuss about in-vivo transdifferentiation including cardiac fibroblasts into cardiomyocytes [9]

#### OR

- (Q8) a) Write note on In vitro transdifferentiation: fibroblast to neuron. [8]
  - b) By considering the property of regeneration and differentiation describe the various clinical applications of stem cells. [9]

### \* \* \*

SEAT No. :

# PC2314

[Total No. of Pages : 2

# [6354]-428

# **B.E.** (Biotechnology)

# **BIOPROCESS MODELLING AND SIMULATION**

# (2019 Pattern) (Semester - VIII) (415471)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data jf necessary.
- *Q1*) a) How models are classified based on state of the processes? Illustrate with one example of each. [9]
  - b) What are boundary conditions? Describe the necessity of boundary condition using horizontal plug flow reactor model. [9]

- Q2) a) Describe any batch process and give total and component continuity model equations for the same. [9]
  - b) Write a short note on rigid and stochastic process with one example. [9]
- Q3) a) Consider a perfectly mixed simple reactor with two components biomass and substrate. The biomass consumes substrate inside the reactor. Assuming volume of the reactor remains constant. Draw a neat sketch and write component balance equations for biomass and substrate.
  - b) Explain in detail types of product formation kinetics with profiles. [8] OR
- *Q4*) a) Write a short note on modelling a continuous culture in Chemostat with recycle. [8]
  - b) Differentiate between batch and fedbatch reactor and also give detailed approach to model these reactors. [9]
- Q5) a) Draw neat sketches and differentiate between agitated and sparged bioreactors. [9]
  - b) Write a short note on bubble column plug flow reactor with an appropriate modelling equations. [9]

Q6) a) Consider the gas liquid second order reaction inside the fluidised bed reactor as given below [9]

 $A(g \rightarrow l) + bB(l) \rightarrow R(s \text{ or } l \text{ or } g), -r_A = kC_AC_B$ 

Draw a neat sketch and write model equations giving total mass transfer resistance and rate of reaction.

- b) What is liquid and gas holdup inside the packed bed reactor? How does it affect the porosity inside the reactor? [9]
- Q7) a) Draw a neat sketch of a binary distillation process. State the assumptions and develop the equations describing rectification section, stripping section and overall binary distillation system. [9]
  - b) Develop the model equations for a single batch extraction process containing two immiscible liquid phases and Q as the rate of transfer in an extractor. [8]

#### OR

*Q8*) a) Consider a non-isothermal CSTR where liquid in a jacketed vessel is stirred by an agitator whose mass is significant compared with the reaction mass. The mass of the reactor wall and the mass of the jacket wall are also significant. Write energy equations for the following system neglecting radial temperature gradient in the agitator, reactor wall and jacket wall.[12]



b) Write a short note on challenges observed in modelling of various unit operations with one case study. [5]

# $\circ$ $\circ$ $\circ$

Total No. of Questions : 8]

SEAT No. :

**PC-2315** 

[Total No. of Pages : 2

[Max. Marks : 70

# [6354] - 429

# Final Year B.Tech. (Biotechnology) Plant Engineering and Project Costing (2019 Pattern) (Semester - VIII) (415472)

*Time : 2½ Hour]* 

Instructions to the candidates:

- 1) Answer Q1or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right side indicate full marks
- 4) Assume Suitable data if necessary

<b>Q1</b> )	a)	Discu	uss the method of preparation of	utility piping diagram.	[6]		
	b)	Give the importance of process piping diagram of equipment symbols used in P & ID diagram.					
	c) Discuss the concept isometric of piping with example,						
			OR				
Q2)	a)	Enlis diagr	t general practice followed in prep am of bioprocess plant.	aration of piping and instrumenta	ution [6]		
	b)	Draw	a symbolic representation of				
		i)	Plug valve				
		ii)	Needle valve				
		iii)	Vacuum pump				
		iv)	Pressure relief or Safety valve				
		v)	Pneumatic control valve	vi) Butterfly valve	[6]		
	c)	What	t is the importance of pipe sizing i	n bioprocess piping design? Expl	lain [ <b>6</b> ]		
<b>Q</b> 3)	a)	Discu	uss about the properties of steam	and its uses in bioprocess indu	stry [ <b>7</b> ]		
	b)	Write	e note on :	I	[10]		
		i)	Plant start up procedure				

ii) Plant shutdown procedure

*P.T.O.* 

**Q4**) a) What are the disadvantages of corrective maintenance? Discuss. [6] b) Write short note on: Water treatment process used in chemical/biochemical industry. [7] [4] Enlist the preventive maintenance advantages. c) **Q5**) a) Explain various methods of charging depreciation. [7] Discuss in short about capital recovery factor. [7] b) What are the factors affecting investment and production cost? Discuss.[4] c) OR Explain the Type of taxes and Insurance in details. **Q6**) a) [8] Discuss the different practical factors used in alternative-investment and b) replacement analysis? [10] OR Discuss in detail about CPM and PERT technique. [8] **Q7**) a) What is effect of inflation on profitability analysis? Discuss. b) [9] OR **Q8**) a) A company manufacturing a plant and equipment for Covid-19 vaccine is quoting a tender. The delivery date is fixed; The project, manager has listed down the activities in project as under: [10] Sr.No. Activity Immediate Precedence Activity Activity time in week 1 A 1 2 B 4

> 3 C 5 A 4 6 D Α 5 С E 7 6 F 8 D 7 9 G Β 8 Η 2 E,F,G

> Develop the, network. Calculate time estimates. Identify the critical path.

b) Comments on evaluation of breakeven point in manufacturing plant. [7]

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[6354]-429

**SEAT No. :** 

# PC2316

#### [6354]-431

# **B.E.** (Biotechnology)

# **MOLECULAR DIAGNOSTICS**

# (2019 Pattern) (Semester - VIII) (Elective - V) (415473B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to right indicate full marks.
- 3) Assume suitable data if necessary.
- Q1) a) Explain significance of Antigen antibody interactions in disease diagnosis.[9]
  - b) Write principle, different methods, advantages and limitations of ELISA.[9]

#### OR

- Q2) a) Describe working principle of Fluorescent Antibody test with example.[9]
  - b) Write short note on [9]
    - i) Monoclonal antibodies (MAb)
    - ii) Lateral flow assay (LFA).
- Q3) a) What are the molecular techniques used in plant disease diagnosis? [9]
  - b) How PCR used for detection of microbial pathogens? Give one example.[8]

#### OR

- Q4) a) Write working principle of Q-PCR for fungal disease diagnosis. Give examples. [9]
  - b) Describe microscopic methods used for detection of microbial pathogens with examples. [8]
- Q5) a) How can karyotyping be used to diagnose genetic disorders? Explain with examples. [8]
  - b) Illustrate Microbial strain typing methods and its applications in diagnostics. [10]

*P.T.O.* 

[Max. Marks : 70

[Total No. of Pages : 2

- *Q6*) a) What are genetic disorders? Give classification of genetic disorders with examples. [10]
  - b) Write short note on [8]
    - i) Trisomy 21 and
    - ii) FISH
- Q7) a) What is the application of proteomics in disease diagnostics? Describe proteomics methodology with examples. [8]
  - b) Design and draw a Point Of Care (POC) device for detection of microbial pathogen. [9]

#### OR

- Q8) a) Write working principle of enzyme-based biosensors and how it is designed? [8]
  - b) What is next-generation sequencing in pathogen identification? [9]

# $\circ$ $\circ$ $\circ$

SEAT No. :

# PC2317

### [6354]-432

# **B.E.** (Biotechnology)

# **BIO - THERAPEUTICS TECHNOLOGY**

# (2019 Pattern) (Semester - VIII) (Elective - V) (415473C)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to right indicate full marks.
- 3) Assume suitable data if necessary.
- Q1) a) With the help of flow chart discuss in detail production of monoclonal antibodies.[14]
  - b) Name any two monoclonal antibodies available in the market and the disease they are used for the treatment. [4]

#### OR

Q2)	a)	Recombinant Biotherapeutic protein is produced in a company. How wi you characterize the expressed protein to assess the identity, purity, an bioactivity? [10]	.11 id )]
	b)	Write a note on transgenic plants. [8	3]
<b>Q</b> 3)	a)	Describe the two tier system used for cell banking. [12	2]
	b)	Write a note on pharmaceutical validation. [5	5]
		OR	
<b>Q4</b> )	a)	With the help of labeled diagram show Clean room Design. [9	)]
	b)	How will you detect DNA and Endotoxins as impurities in Biotherapeutics.[8	8]
Q5)	a)	Justify targeted drug delivery is advantageous over normal drug delivery.[10	0]
	b)	Giving examples discuss the types of formulations with respect to physical forms.	al 3]

[Max. Marks : 70

[Total No. of Pages : 2

<b>Q6</b> )	a)	A new drug has poor stability. Discuss various options to in stability	mprove its [12]
	b)	Write a note on nanoparticles for drug delivery	[6]
Q7)	a)	What are the types of IPR in Biotechnology	[12]
	b)	Write a note on clinical trials	[5]
		OR	
<b>Q</b> 8)	a)	Write on Organization and functions of FDA	[12]
	b)	Write a note on CGMP	[5]



**PC2318** 

SEAT No. :

[Total No. of Pages : 2

#### [6354]-433

# **B.E.** (Biotechnology)

# MNAGEMENT AND ENTREPRENEURSHIP

# (2019 Pattern) (Semester - VIII) (Elective - VI) (415474A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

# *Q1*) a) With the example explain different techniques used for coordinating activities within an organization? [6]

- b) Explain the concept of communication in an organizational setting, highlighting its meaning. [6]
- c) What is meaning of Co-ordination? Explain its importance and techniques.

[6]

### OR

### *Q2*) a) Write a short note on.

- i) Leadership styles
- ii) Motivation theories. [8]
- b) Explain meaning, nature and characteristics of directing. [6]
- c) Discuss the benefits that can be achieved by establishing and maintaining strong coordination mechanisms. [4]

<b>Q3</b> ) a)	Explain the term entrepreneurship.	[5]
b)	What are the challenges faced by women in Entrepreneurship?	[6]
c)	Comment on : Identification of a business opportunity.	[6]

### OR

- *Q4*) a) State the different types of entrepreneur. Discuss any two in details.[10]
  - b) State the different functions of an entrepreneur. [7]

[Max. Marks : 70

Q5) a) Write a short note on:

[8]

- i) Ancillary Industry
- ii) Tiny Industry
- b) What is the role of small scale industry in Economic Development? [7]
- c) Write objectives of small scale industries. [3]

# OR

<b>Q6</b> )	a)	Discuss about the advantages of small scale industry toward econor development in India.	nic [ <b>6</b> ]
	b)	State and explain in brief steps to start Small Scale Industry.	[6]
	c)	Why there is need for support in small scale industry? Explain.	[6]
Q7)	a)	Discuss in detail about common mistakes done by entrepreneur in pro- formulation.	ject [6]
	b)	What are the contents of a project report for small scale industry?	[6]

c) Define a project and project identification. [5]

### OR

<b>Q8</b> ) a)	What is network analysis and how does it relate to project manage Discuss	gement?
b)	Write a short note on : Errors of Project Report.	[0] [6]

c) State and explain any one of the necessities for a project selection. [5]

# 1

**PC2319** 

**SEAT No. :** 

[Total No. of Pages : 2

#### [6354]-435

# **B.E.** (Biotechnology)

# **INDUSTRIAL ORGANISATION AND MANAGEMENT** (2019 Pattern) (Semester - VIII) (Elective - VI) (415474C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- **1**) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- Neat diagrams must be drawn wherever necessary. 2)
- Figures to the right indicate full marks. 3)
- Assume suitable data, if necessary. **4**)

#### Enlist various functions of inventory control. [6] *Q1*) a)

- What is safety stock? Why is safety stock necessary? [6] b)
- Differentiate between inspection and quality control. [6] c)

#### OR

What is inventory? What are the various benefits of having inventories?[6] *Q2*) a)

- Describe purchase procedure to be adopted for a large scale industry.[6] b)
- State the methods of purchasing. Explain any two methods. c) [6]
- Explain, "Advertising as a promotional Tool". Discuss its one case *Q3*) a) studies. [9]
  - Write an explanatory note on "Marketing Mix". [8] b)

#### OR

- What is marketing management? What are the functions of marketing?[8] **Q4**) a)
  - Explain various objectives of market research. [5] b)
  - Differentiate between marketing and selling. c) [4]

[Max. Marks : 70

<b>Q5</b> ) a)	What is antidumping duty? Explain in detail.	[9]
b)	Explain ISO along with its various types.	[8]
	OR	
<b>Q6)</b> a)	Explain in detail export procedure.	[7]
b)	State the different International trade models and explain any t	wo models. [10]
<b>Q7)</b> a)	State and explain the various employee benefits under Empl Insurance Act.	oyees state [9]
b)	State the various restrictions for the use of Boiler under the Bo	oiler Act.[9]
	OR	
<b>Q8)</b> a)	Explain in detail on the payment of gratuity Act 1972.	[8]
b)	Write a details note on : Payment of wages Act 1936.	[7]
c)	State the essential elements of valid contract.	[3]

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**PC-2320** 

[Total No. of Pages : 2

SEAT No. :

# [6354]-436

# **B.E.** (Chemical)

# **PROCESS DYNAMICS AND CONTROL**

# (2019 Pattern) (Semester - VII) (409341) (Paper - II)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of electronic pocket calculator is allowed.
- What is controller tuning? Explain various important criteria's used for *Q1*) a) controller tuning. [9]
  - A process with following transfer function : [9] b)

$$G_p(s) = \frac{10}{2s^2 + 3s - 4}$$

is controlled by a P-controller with gain  $K_c$ . Find the range of  $K_c$  for stable process control loop.

OR

(Q2) Draw the root-locus of a system with the following characteristic equation: [18]

$$1 + \frac{2.98(s+2.25)}{(s+1.45)(s+2.85)^2(s+4.35)}K_c = 0$$

Comment of the system stability.

- Q3) Derive the frequency response relations viz. A.R. and  $\phi$  relations of the following systems and indicate the nature of their graphs on Bode plot, [17]
  - a) Pure capacity system
  - **b**) First-order system

[Max. Marks : 70

*Q4*) State the step-wise procedure to obtain the Zeigler-Nichols controller settings for a feedback control loop and determine the controller parameters  $K_c$  and  $\tau_1$  for the following feedback control loop using the ZN-controller settings for the PI-controller. [17]



- Q5) Discuss the following selective control schemes with examples and process control diagrams: [17]
  - a) Override control for equipment protection.
  - b) Auctioneering control system.

#### OR

- *Q6*) Explain the adaptive control scheme with a neat block diagram. What is gain-scheduling adaptive control? [17]
- Q7) Describe in detail the working of PLCs and its programming procedure through a simple ladder diagram. [18]

#### OR

Q8) Write a short notes on :

[18]

- a) Control of adiabatic plug flow reactor system.
- b) Direct Digital Control (DDC)

# $\nabla \nabla \nabla \nabla$

[6354]-436

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[Total No. of Pages : 2

**SEAT No. :** 

#### [6354]-437

# B.E. (Chemical) CHEMICAL REACTION ENGINEERING - II (2019 Pattern) (Semester - VII) (409342)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Use of logarithmic tables slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Explain in detail adsorption isotherm. [9]
  - b) Derive the BET equation for determination of surface area of catalyst.[9]

#### OR

- **Q2**) a) Explain the characteristics of the catalyst. [9]
  - b) Explain the pore volume distribution in porous catalyst. [9]
- (Q3) a) Derive an expression for diffusion of gaseous in single cylindrical pore of catalyst. [9]
  - b) Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. [9]

- *Q4*) a) What is Thiele modulus? And give the significance of the Thiele modulus. [9]
  - b) Explain the selectivity for a porous catalyst in parallel and series catalytic reaction. [9]
- **Q5)** a) Write a note on integral and differential analysis of catalytic reactors.**[9]** 
  - b) Derive the expression for design equation for mixed flow reactor containing porous catalyst. [9]

**Q6**) a) The results of the kinetic runs on the reaction  $A \rightarrow R$  made in an experimental packed bed reactor using a fixed feed rate  $F_{Ao} = 10 \text{ kmol/h}$  are as follows. [9]

W, Kg catalyst-	1	2	3	4	5	6	7
X <sub>A</sub> -	0.12	0.2	0.27	0.33	0.37	0.41	0.44

i) Find the reaction rate at 40 % conversion,

or plug flow reactor.

ii) For feed rate of 400 kmol/h to large scale packed bed reactor, find the amount of catalyst needed for 40 % conversion.

[8]

b) What are the different steps involved in solid catalyzed reaction? Give the neat diagram. [9]

<b>Q7</b> ) a)	Derive the M-M kinetic equation.	[8]
b)	Explain the fluidized bed reactor in detail.	[8]
	OR	
<b>Q8</b> ) a)	Illustrate the features of M-M kinetic equation.	[8]
b)	Explain the procedure for determining the M-M kinetic con-	stants in batch



SEAT No. :

# PC-5105

[Total No. of Pages : 3

# [6354]-438R B.E. (Chemical) CHEMICAL ENGINEERING DESIGN (2019 Pattern) (Semester - VII) (409343)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Discuss mechanical design of shell and tube heat exchanger with necessary equations? [9]
  - b) Discuss on baffles in shell and tube Exchanger. [9]

#### OR

Q2) 35,000 kg/hr of an aqueous feed containing 1% dissolved solids is to be concentrated to 20% solids, in a single effect evaporator. The feed enters at 25°C. The steam chest is fed with saturated steam at 110°C. The absolute pressure maintained in the evaporator is such that the water will boil at 55°C. The boiling point elevation for the boiling solution (20% solids) is 15°C over that of water. Specific heat of feed solution can be taken as that of water.

From steam tables, the following data were taken:

Latent heat of vaporization of water at 55°C is 2370.8 kJ/kg. Specific heat of water vapor in the temperature range of 55 to 90°C can be assumed to be constant at 1.871 kJ/kg°C. Latent heat of steam at 110°C is 2230 kJ/kg. The overall heat transfer coefficient, under normal operating conditions would be  $2500 \text{ W/m}^2$ °C. Check whether it is suitable for the above duty. [18]

Q3) a) Describe approximate column sizing. [7]
b) Calculate the column diameter for a sieve plate column with the following specification for an acetone-Water system. [10]
Feed Stream : 10% W/W acetone in aqueous stream. 96 °C base Temperature. 56 °C Top Temperature

Maximum feed rate: 12000 kg/h, Minimum feed rate 70% of maximum Number of stages: 16, Slope of the bottom operating line: 5.0

Slope of top operating line : 0.58

Top product composition: 94 mole % Bottom product Composition : 50 ppm Essentially water, Reflux Ratio: 1.30. Column efficiency: 60%

At bottom conditions:

Vapour Density at the bottom : 0.74 Kg/m<sup>3</sup>. Liquid Density at the bottom :  $958Kg/m^3$ 

Surface tension at the bottom :  $58*10^{-3}$  N/m Molecular Wt. 18.4 k<sub>1</sub> at the bottom : 0.075

For top conditions : Vapour Density at the top :  $2.05 \text{ Kg/m}^3$ . Liquid Density at the top :  $754 \text{Kg/m}^3$ ,

Surface tension :  $23*10^{-2}$  N/m,  $k_1$  at the top : 0.09, take plate spacing 0.5 m and flooding 85%

#### OR

- Q4) a) Discuss on fluid allocation on tube side and shell side in shell and tube Exchanger. [7]
  - b) Calculate the column diameter for a sieve plate column with the following specification for an acetone-water system. [10]

Maximum feed rate: 10,500 kg/h Minimum feed rate 70% of maximum

Number of stages : 15 Slope of the bottom operating line : 5.0

Slope of top operating line : 0.57

Top product composition : 94 mole %, Bottom product Composition

Essentially water, Reflux Ratio : 1.35 Column efficiency. 60%

At bottom conditions :

Vapour Density: 0.72 Kg/m<sup>3</sup>, Liquid Density: 954 Kg/m<sup>3</sup>

Surface tension :  $0.057 \text{ Nm } k_1 : 0.075$ 

For top conditions : Vapour Density : 2.05 Kg/m<sup>3</sup>, Liquid Density : 753 Kg/m<sup>3</sup>

Surface tension : 0.023 N/m,  $k_1$  : 0.09

[6354]-438R

- Q5) a) Explain cornell's method for prediction of height of transfer units in details.[7]
  - b) Estimate  $H_{OG}$  using Cornell's Method. [10] Data :  $D_L = 1.9 \times 10^{-9} \text{ m}^2/\text{s}$  :  $D_V = 1.6 \times 10^{-5} \text{ m}^2/\text{s}$ .  $\mu_V = 0.015 \times 10^{-3} \text{ Ns/m}^2$ ,  $\mu_1 = 1 \times 10^{-3} \text{ Ns/m}^3 L_w^* = 16 \text{ kg/s.m}^3$ ;  $K_3 (60\% \text{ flooding}) = 0.85$   $\psi_h = 80, \ \phi_h = 0.1 \text{ N}_{OG} = 8$ ;  $\rho v = 1.3 \text{ kg/m}^3$ ,  $M_{avg} = 29$ ,  $\rho_L = 998 \text{ kg/m}^3$ ,  $D_C = 1.5 \text{m}$ . The liquid phase is assumed to have water - like properties OR
- Q6) a) Explain Onda's method for prediction of height of transfer units in details.

[7]

- b) Estimate using Onda's method using the following data : [10] Liquid Flow rate 16.6 kg/m<sup>2</sup>s, Gas flow rate 0.79 kg/m<sup>2</sup>s Critical surface, tension 0.06 N/m, Surface tension for liquid 0.07 N/m Viscosity of liquid 0.001 Nm/s<sup>2</sup>, Interfacial area (a) 194 m<sup>2</sup>/m<sup>3</sup> Density of liquid 990 kg/m<sup>3</sup>, Temperature : 20°C, Pressure: 1.013,  $\rho_v = 1.21 \text{ kg/m}^3$ Diffusivity in liquid :  $1.7 \times 10^{-9} \text{ m}^2$ /s, Diffusivity in gas :  $1.45 \times 10^{-5} \text{ m}^2$ /s Diameter of packing material: 38 mm, k<sub>5</sub> : 5.23 Viscosity of gas :  $0.018 \times 10^{-3} \text{ Ns/m}^2$ Molecular weight of liquid : 18, Molecular weight of gas : 29
- Q7) a) What are codes and standards and their importance in piping design.[6]
  - b) Water flows through a pipeline @ 1kg/s., over a distance of 2 km. The impressed head of water = 9.8 m. What is the diameter of pipeline if  $\rho = 1000 \text{ kg/m}^3 \& \mu = 1 \text{ mNs/m}^2$  [12]

#### OR

- *Q8*) a) What do you mean by economic Pipe diameter? [6]
  - b) Sulphuric acid solution having density 1850 kg/m<sup>3</sup> is flowing through a pipeline at a rate of 2 kg/s. Calculate the optimum diameter of the pipeline. Stainless steel pipe is to be used. [12]

[6354]-438R

**PC2323** 

#### [6354]-439

### **B.E.** (Chemical)

# **ENVIRONMENTAL ENGINEERING**

# (2019 Pattern) (Semester- VII) (Elective - III) (409344 A)

Time : 2<sup>1</sup>/<sub>2</sub> Hours] [Max. Marks : 70 Instructions to the candidates: 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 2) Neat diagrams must be drawn whenever necessary. Figures to the right indicate full marks. 3) Assume suitable data, if necessary. *4*) Explain with a neat sketch *Q1*) a) [12] Venturi Scrubber i) Fabric filter ii) Cyclone Separator iii) Write an explanatory note on centrifugal scrubber. [6] b) OR Q2) Explain any two process with a neat sketch used to Control of Sulphur Dioxide Emission. [18] Write note on following water pollutants *Q3*) a) [12] Detergent i) ii) Sediments iii) Thermal Discharge iv) Plant nutrient Write a short note on Oxygen Sag Curve. [5] b) OR Write a short note on Chemical Oxygen Demand (COD). **Q4**) a) [9] Write a short note on Biochemical Oxygen Demand (BOD). [8] b)

[Total No. of Pages :2

**SEAT No. :** 

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OR

- Q6) Explain with a neat sketch any two types of sedimentation tank used in wastewater treatment. [18]
- Q7) Explain in detail recovery of materials from process effluents. [17]

#### OR

<b>Q8</b> ) a)	Ex	plain the detail classification of Solid Waste.	[9]
b)	Wr	ite and explanatory note on	[8]
	i)	Sanitary land filling	

ii) Incineration



**PC2324** 

#### [6354]-440

# **B.E.** (Chemical)

# **MEMBRANE TECHNOLOGY**

# (2019 Pattern) (Semester- VII) (Elective - III) (409344 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[Total No. of Pages :2

**SEAT No. :** 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Explain in details application of pore flow theory for microfiltration membrane.[10]
  - b) Derive an equation for transport through microporous and dense membranes. [7]

#### OR

- *Q2*) a) Derive a Ferry-Rankin equation. [10]
  - b) Explain in details with neat sketches diffusion coefficients, sorption coefficients. [7]
- *Q3*) a) What is fouling of membrane? Give any one examples. [10]
  - b) Explain in details about boundary layer film model. [7]

- Q4) a) Explain in details methods of reducing concentration polarization. [10]
  - b) What is temperature polarisation? Explain in details with neat sketches.[7]
- Q5) a) Define reverse osmosis. And explain in details with suitable sketches application of reverse osmosis for waste water treatment. [10]
  - b) Explain the applications of ultrafiltration membrane for separation of oilwater emulsions. [8]

- *Q6*) a) Explain in details application of reverse osmosis membrane for desalination of sea water desalination. [10]
  - b) Explain in details application of microfiltration membrane for Sterile filtration of pharmaceuticals. [8]
- Q7) a) Define membrane distillation? Give types of membrane distillation. Explain any one with suitable example. [10]
  - b) Describe in details application of membrane for separation for natural gas. [8]

- *Q8*) a) Distinguish between membrane reactor and membrane bioreactor with suitable example. [10]
  - b) Explain in details about coupled transport membranes, with suitable examples. [8]



# PC2325

# [6354]-441

SEAT No. :

[Total No. of Pages :2

# **B.E.** (Chemical)

# **INDUSTRIAL PIPING**

# (2019 Pattern) (Semester- VII) (Elective - III) (409344 C)

Time : 2 <sup>1</sup> / <sub>2</sub> Hours]		[Max. Marks : 7	'0	
Instr	uctio	ns to the candidates:		
	1)	Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.		
	2)	Figures to the right indicate full marks.		
	3)	Neat diagram must be drawn whenever necessary.		
	4)	Assume suitable data, if necessary.		
Q1)	a)	Describe the cathode protection for piping systems. [9	)]	
	b)	Explain the piping layout consideration of [9	)]	
		i) Heat Exchangers		
		ii) Storage Tank		
		OR		
Q2)	a)	Discuss piping isometrics and bill of material.	)]	
	b)	Which are the factors considered when the designer is locating equipment in the plot plan?	1t ]	
Q3)	a)	Discuss the complex pipelines systems in series and parallel configuration	1. <b>)]</b>	
	b)	Write a note on pipeline storage capacity. [8	<b>}]</b>	
		OR		
<b>Q</b> 4)	a)	Discuss the various steps and design parameters for slurry pipelines.	)]	
	b)	Write the design procedure for the dispersed flow. [8	<b>\$]</b>	
Q5)	a)	Discuss piping arrangements and factors considered in the piping design of the heat exchanger.	n ]	
	b)	Discuss various empirical correlations for the flow of oil, gasoline, an hydrocarbon. [8	d 8]	

- *Q6*) a) Discuss piping design strategies for cryogenic materials. [9]
  - b) Discuss various empirical correlations for the flow of oil. [8]
- Q7) a) A steam pipe with 100 mm I.D. and 110 mm O.D. is covered with an insulating material having thermal conductivity 1.0 W/(m. K). The steam temperature is 473 K and the ambient temperature is 293 K. Taking the convective heat transfer coefficient between the insulation surface and air as 8.0 W/ (m<sup>2</sup> .K), find the critical radius of insulation. For this value (r<sub>c</sub>), calculate the heat loss per meter of pipe and outer surface temperature. Neglect the resistance of the pipe wall. [9]
  - b) Derive the relation for the critical radius of insulation of a sphere having radius R. [9]

#### OR

*Q8*) Write a short note on

- a) Purpose and selection of insulation
- b) Hot and cold insulation in piping
- c) Insulation for piping system

[6354]-441

[3×6=18]

PC2326

#### [6354]-442

# **B.E.** (Chemical)

# **PETROLEUM REFINING**

# (2019 Pattern) (Semester- VII) (Elective - III) (409344D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[Total No. of Pages :2

**SEAT No. :** 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to right indicate full marks.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Assume suitable data, if necessary.
- *Q1*) a) What is the coking process? Describe the coking process with a schematic diagram.
  - b) What is the different conversion processes used in refineries? Describe thermal cracking with a schematic diagram. [9]

#### OR

- **Q2**) a) Describe the process of Hydro treating with typical schematic diagram.[9]
  - b) Describe the mechanism and working of the reforming process with a schematic diagram. [9]
- **Q3**) a) Explain the manufacturing of Bitumen with a schematic diagram. [9]
  - b) What is the feedstock's for lubricating oils? Explain the desirable properties of these feedstock's. [8]

Q4) a) Descri	be the solvent extraction	process with a typical	diagram. [9]	]
---------------	---------------------------	------------------------	--------------	---

- b) Explain in detail about various properties of lube oil. [8]
- Q5) a) Why sulfur is undesirable in the refinery? Describe sulfur recovery in the refinery with neat schematic diagram. [9]
  - b) What are various supporting processes used in the refinery? Discuss FCC techniques with a schematic diagram. [8]

- Q6) a) Write in detail about the thermal cracking of H<sub>2</sub>S. [9]
  - b) Discuss the environmental pollution aspects in the refinery. [8]
- Q7) a) What is the blending operation and explain the line blending operation?[9]
  - b) What are the recent advances in the transportation techniques used in refineries? [9]

- (Q8) a) Explain the effect of additives on the quality of refinery products. [9]
  - b) Write in details about housekeeping strategies used for petroleum and petroleum products. [9]



Total No. of Questions : 8]

PC2327

SEAT No. :

[Total No. of Pages : 2

# [6354]-443 B.E. (Chemical) CHEMICAL PROCESS SYNTHESIS

# (2019 Pattern) (Semester - VII) (Elective - IV) (409345 A)

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<b>[9</b> ]
[8]
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blem
[8]
[9]
[9]

*Q6*) Explain with sketches the concept of heat integration of sequences of simple Distillation Column. [18]

<b>Q7</b> ) a)	Explain the intensification of hazardous materials.		[8]
b)	Write in brief on:		[10]
	i)	Explosion hazard in Chemical industry.	
	ii)	Effect of toxic release on society.	
		OR	
<b>Q8</b> ) a)	Exp	blain the attenuation of hazardous materials on human health.	[9]

b) Write in brief role of safety engineer in chemical industry. [9]

\* \* \*

Total No. of Questions : 8]

PC2328

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-444

# B.E. (Chemical) INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP (2019 Pattern) (Semester - VII) (Elective - IV) (409345 B)

*Time : 2½ Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Explain the role of EDII and NIESBUD in Entrepreneurship development. [9]
  - b) Describe the role of central and State government in promoting entrepreneurship development [9]

#### OR

<b>Q2</b> ) a)	Describe failed entrepreneurship ventures and turnaround	ventures with
	typical examples.	[9]

- b) Write a note on fiscal and tax concessions available for entrepreneurship development. [9]
- Q3) a) Write an explanatory note about five competitive forces (Porter). [9]
  - b) Explain verbal and nonverbal communication skills in managerial work.[8]

#### OR

<b>Q4</b> ) a)	Discuss the management roles and theories of Henry Mintzberg	[9]
b)	Explain the hierarchy of needs given by Abraham Maslow.	[8]

**Q5**) a) Describe the Six Sigma concept and enlist its requirements and advantages.

[9]

b) Elaborate on computer based project management. [8]

- Q6) a) Describe the resource management and the crashing techniques. [9]
  - b) Elaborate on handling multiple projects with typical examples. [8]

### Q7) Write a note on following : [18]

- a) Business-to-Business marketing
- b) Promotion and Pricing
- c) Product and Brand Management

#### OR

- Q8) a) Describe the principles, and techniques used in analyzing and interpreting the data for marketing decisions [9]
  - b) Describe the role of marketing in society and the firm [9]

\* \* \*

[6354]-444

Total No. of Questions : 8]

PC2329

SEAT No. :

[Total No. of Pages : 2

# [6354]-445 B.E. (Chemical) GREEN TECHNOLOGY (2019 Pattern) (Semester - VII) (Elective - IV) (409345 C)

<i>Time</i> : 2 <sup>2</sup>	[Max. Marks : 70]
Instructi 1) 2) 3) 4) 5)	ions to the candidates: Answer five questions. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks. Use of logarithmic tables, electronic pocket calculator and steam tables is allowed. Assume suitable data if necessary.
<b><i>Q1</i></b> ) a)	Explain Life Cycle Assessment in detail. [8]
b)	Discuss Environmental Management Systems. [8]
	OR
<b>Q2</b> ) Wi	rite notes on: [16]
a)	Heterogeneous Catalysts
b)	Homogeneous Catalysis
<b>Q3</b> ) Ex En	plain with example and applications of renewable resources: Biomass ergy, Fossil Fuels, Energy from Biomass. [18]
	OR
<b>Q4</b> ) a)	Discuss Solvent-free Systems with example. [9]
b)	Explain Water-based Coatings in detail. [9]
<b>Q5)</b> a)	Explain the Design for Energy Efficiency in Chemical industry with example. [9]
b)	Explain applications of Sonochemistry in Green Chemistry. [9] OR

Q6)	a)	Explain the concept of Designing greener processes for Conventio Reactors.	nal <b>[9]</b>
	b)	Explain the Microwave-assisted Reactions.	[9]
Q7)	a)	Explain the Greening in Leather Manufacture and Tanning industry.	[9]
	b)	Write in brief on electrochemical Synthesis with example.	[9]
		OR	
Q8)	a)	Explain an integrated approach to a greener chemical industry in detail.	.[9]
	b)	Write note on Green Chemical Supply Strategies.	[9]

# \* \* \*
Total No. of Questions : 8]

**PC2330** 

SEAT No. :

[Total No. of Pages : 2

# [6354]-446 B.E. (Chemical) ADVANCED SEPARATION PROCESSES (2019 Pattern) (Semester - VII) (Elective -IV) (409345 D)

Time : 2½ Hours]

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1*) a) What are the advantages of reactive distillation and where it is suitable to explore for separation purpose. Explain with suitable examples. [10]
  - b) Explain characteristics of the complexing agents used in chemical-complexation. [8]

#### OR

<b>Q2</b> ) a)	Explain in detail separation based on reversible chemical complexation.
	[10]

- b) Explain reactive extraction process with applications. [8]
- Q3) a) What is fouling and concentration polarization? Discuss the methods of controlling fouling.[7]
  - b) Explain the principle, working and applications of reverse osmosis technique with design principles. [10]

#### OR

- Q4) a) What is working principle and mechanism of pervaporation? Discuss the flux equation along with applications. [7]
  - b) Explain dialysis and electrodialysis with neat sketches and its applications. [10]

Q5)	Expl	lain in details with neat diagram:	[18]
	a)	Pressure Swing Adsorption (PSA) and	
	b)	Temperature Swing Adsorption (TSA)	
		OR	
<b>Q6</b> )	a)	Explain Liquid chromatography.	[8]
	b)	Give industrial examples of chromatography.	[10]
Q7)	a)	Give the floatation techniques classification on the basis of mechan of separation and size of material separated.	nism [ <b>10]</b>
	b)	What are molecular sieves? State its applications.	[7]
		OR	
<b>Q</b> 8)	a)	Explain Ultracentrifuge in details.	[7]
	b)	Explain zone electrophoresis and its industrial applications in detail.	[10]

# \* \* \*

Total No. of Questions : 8]

PC2331

SEAT No. :

[Total No. of Pages : 2

#### [6354]-447

### **B.E.** (Chemical)

### **PROCESS MODELLING AND SIMULATION**

### (2019 Pattern) (Semester - VIII) (409349)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q. 5 or Q. 6, Q. 7 or Q. 8.
- 2) Neat diagrams must be wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) Developed the Mathematical model for Triple effect evaporator. Draw Neat Labeled Diagram and also state the assumption. [17]

#### OR

- Q2) Developed the Mathematical model for cooling tower. State all the assumption.[17]
- Q3) a) Develop a mathematical model for flash Distillation. Use usual notification.Write assumptions. Draw neat figure. [10]
  - b) Develop a mathematical model for drying equipment. State all the assumption. [8]

#### OR

Q4) Develop a mathematical model to find the final fraction of Solute extracted form solvent in Three Stage Counter Current Liquid-Liquid Extraction. Write assumptions. Draw neat figure. [18]

**Q5**) Consider a CSTR where an irreversible, first-order endothermic reaction takes place. Let  $C_A$  denote the concentration of the species A in the reactor, TR and Tin denote the temperatures of the reactor and of the inlet stream, respectively, Q, is the heat added to/removed from the reactor,  $CA_0$  is the concentration of A in the inlet stream, V is the volume of the reactor, k0, E,  $\Delta H$  are the pre-exponential constant, the activation energy, and the enthalpy of the reaction and Cp and  $\rho$  are the heat capacity and fluid density in the reactor. Develop a model that describes the evolution of the concentration and temperature in the reactor, using a systematic modeling approach that also outlines all assumptions made. [18]

#### OR

- *Q6*) Develop a mathematical model for Plug Flow Reactor. In Which Second Order endothermic reaction is Occurring. Use usual notification. Write assumptions. Draw neat figure. [18]
- *Q7*) Develop a mathematical model for Effluent Treatment Plant. [17]

#### OR

*Q8*) Describe in detailed about Transient analysis of staged absorbers. [17]



PC-2332

SEAT No. :

[Total No. of Pages : 3

[Max. Marks : 70

# [6354]-448

### **B.E.** (Chemical)

# PROCESS ENGINEERING COSTING & PLANT DESIGN (2019 Pattern) (Semester - VIII) (409350)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates :* 

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculate is allowed.
- 5) Assume suitable data if necessary.
- *Q1*) a) Provide a checklist of items for a new facility and complete estimation of the fixed capital investment.[8]

#### OR

- b) The total capital investment for a conventional chemical plant is \$15,00,000 and the plant produces 3 million kg of product annually. The selling price of the product is \$0.82| kg. Working capital amounts to 15 percent of the total capital investment. The investiment is from company funds and no interest is charged. Delivered raw materials costs for the product are \$0.09|kg; labor, \$0.08|kg; utilities, \$0.05|kg; and packaging, \$0.008|kg. Distribution costs are 5% of the total product cost. Estimate the following : [10]
  - i) Manufacturing cost per kilogram of product
  - ii) Total product cost per year
  - iii) Profit perkilogram of product before taxes
  - iv) Profit per kilogram of product after income taxes as 35% of gross profit.
- **Q2**) a) Define following terms :
  - i) Profitability
  - ii) Rate of return on investment
  - iii) Payout period
  - iv) Turnover ratio

[8]

- b) The annual direct production costs for a plant operating at 70 percent capacity are Rs. 2,80,000 while the sum of the annual fixed charges, overhead costs and general expenses is Rs. 2,00,000. What is the break even point in units of production per year if total annual sales are Rs. 5,60,000 & product sell at Rs. 40/ unit. What were annual gross earnings and net profit for this plant at 100 percent capacity in 1988 when cooperate, income taxes required a 15% tax on the first Rs. 50,000 to Rs. 75,000 and 34% on annual gross earnings above Rs. 75,000, also 5% on gross earning from Rs. 1,00,000 to Rs. 3,35,000? [10]
- Q3) a) Explain in brief optimization solution methodology : Procedure with two or more variables [8]
  - b) Explain in brief : Optimum production rates in plant operation. [9]

#### OR

- **Q4**) a) Find the values of x, y and z that minimize the function  $x + 2y^2 + z^2$  subject to the constraint that x + y + z = 1, making use of the Lagrangian Multiplier.[10]
  - b) Explain breakeven chart for production schedule. [7]
- Q5) a) Draw and explain composite diagram prepared for pinch technology analysis.[8]
  - b) Explain in brief parameters to be optimized in optimal design of sieve plate distillation column operating at minimum reflux ratio. [10]

#### OR

- Q6) a) Write a note on optimization of energy saving for pumping of liquids.[8]
  - b) Explain in brief preparation of techno economic feasibility report of urea manufacturing plant. [10]
- Q7) a) State applications of CPM and PERT. [6]
  b) Explain in brief factors to be considered in preparation of the plot plan as a proper plant layout. [8]
  - c) Explain process Engineering. [3]

OR

[6354]-448

2

Q8) a) Draw a network for a house construction project. The sequences of activities with their predecessors are given in the Table below : [9]

Name of	Staring &	Activity	Predecessor	Time duration
Activity	finished			
	events			
A	(1,2)	Prepare the house	_	4
		plan		
В	(2,3)	Construct the house	А	58
С	(3,4)	Fix the door	В	2
D	(3,5)	Wiring the house	В	1
Е	(4,6)	Paint the house	С	1
F	(5,6)	Polish the doors	D	1

b) Describe in brief start up & shut downs of a project.

[8]



[6354]-449

[Total No. of Pages : 2

**SEAT No. :** 

# **B.E.** (Chemical Engineering)

# ENERGY AUDIT AND CONSERVATION (2019 Pattern) (Semester - VIII) (Elective - V) (409351A)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.
- *Q1*) Write in detail about the instruments for Audit and Monitoring Energy and Energy Savings.[17]

#### OR

- Q2) a) Provide in detail the important points to cater before writing Energy Audit Report. [9]
  - b) Write a note on impact of renewable energy on energy audit recommendations. [8]
- Q3) Write a detailed note on new energy conservation technologies in use nowadays.[18]

#### OR

*Q4*) Write a note on motivation of implementing energy conservation measures. Also provide the evaluating costs and benefits of conservation measures.[18] Q5) Write a note on :

- a) Human aspect of energy conservation
- b) Involvement tree

#### OR

- *Q6*) Give in detail about the organization of energy conservation programs at various level of organization i.e. plant level, division level and corporate level. [17]
- *Q7*) Provide in details the guidelines for improving potential energy conservation in boilers. [18]

#### OR

- *Q8*) a) Provide in detail the Energy conservation checklist. [9]
  - b) Write a note on guidelines for housekeeping under the motivation of energy conservation. [9]

# x x x

### [6354]-450

#### **B.E.** (Chemical)

### CHEMICAL PROCESS SAFETY

### (2019 Pattern) (Semester - VIII) (Elective - V) (409351B)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume Suitable data if necessary.
- *Q1*) a) Interpret Flammability Diagram. How is it used to Avoid Flammable Atmospheres. [9]
  - b) Explain following terms briefly: [9]
    - i) Flammability limits
    - ii) Fire point
    - iii) detonation
    - iv) Deflagration
    - v) Mechanical Explosion

#### OR

- **Q2**) a) With the help of diagram, describe the Fire Triangle. [9]
  - b) With the help of graph of concentration of flammable liquid Vs. temperature, Explain various flammability properties of fluid. [9]
- *Q3*) a) How disaster Happens? Outline the process to tackle disaster. [9]
  - b) Flammable liquid is being pumped out of a drum into a bucket using a hand pump. Describe an appropriate grounding and bonding procedure.[8]

[Max. Marks : 70

[Total No. of Pages : 2

SEAT No. :

Q4)	a)	Explain working of ventilation and sprinkler systems for preventing fi and explosions.	ires [9]
	b)	Discuss in brief about explosion proof equipment's and instruments.	.[8]
Q5)	a)	What are the objectives of hazard survey? How these surveys conducted?	are [ <b>9</b> ]
	b)	Explain the stages in hazards identification and risk assessment procedu	ure. <b>[9]</b>
		OR	
Q6)	a)	Explain in detail about Process hazards Checklists.	[9]
	b)	What is HAZOP? Explain in details.	[9]
Q7)	a)	Describe the role of chemical engineers in preventing hazards.	[9]
	b)	What is role of computers in Safety Management?	[8]
		OR	
Q8)	a)	Explain emergency shutdown systems.	[9]
	b)	Write short notes on :	[8]
		i) tackling disasters	

ii) plan of emergency

x x x

[6354]-451

[Total No. of Pages : 2

SEAT No. :

# B.E. (Chemical Engineering) COMPUTATIONAL FLUID DYNAMICS (2019 Pattern) (Semester - VIII) (Elective - V) (409351C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary.
- Q1) a) Consider the problem of source-free heat conduction in an insulated rod whose ends are maintained at constant temperatures of 100 °C and 500 °C respectively. The one-dimensional problem sketched in following figure is governed by [9]



Calculate the steady state, temperature distribution in the rod using Finite Volume Method. Thermal conductivity k equals 1000 W/m/K, cross-sectional area A is  $10 \times 10^{-3}$  m<sup>2</sup>.

b) Explain FVM solution methodology for unsteady state 1-D diffusion equation. [9]

OR

- Q2) a) Explain the Conservativeness and transportiveness in FVM analysis.[9]
  - b) Explain FVM solution methodology for steady state 2-D diffusion equation. [9]

*P.T.O.* 

Q3)	a)	Exp	plain in detail k- $\omega$ model for turbulent modeling.	[7]
	b)	Der	ive RANS equations for turbulent flows.	[10]
			OR	
<b>Q4</b> )	a)	Wh	at is turbulence? Explain in detail any four characteristics features	5. <b>[9]</b>
	b)	Der	ive Reynold's averaged continuity equation.	[8]
<b>Q</b> 5)	a)	Dra mul	w a Sketch and explain different flow patterns observed in vert tiphase flows with heating.	ical [9]
	b)	Exp	plain the following in detail with suitable diagrams:	[9]
		i)	Slug Flow	
		ii)	Plug Flow	
		iii)	Annular flow	
			OR	
<b>Q6</b> )	a)	Dif pha	ferentiate with reasoning between discrete phase modeling, continu se modeling.	ious [ <b>9</b> ]
	b)	Cla	ssify multiphase flows and explain different flow patterns.	[9]
Q7)	a)	Enl	ist and explain different stages of CFD analysis.	[8]
	b)	Wri	te short notes on :	[9]
		i)	Scope of CFD	
		ii)	Post processing in CFD Simulation	
			OR	
<b>Q</b> 8)	a)	Wri	te short notes on :	[8]
		i)	Mesh Generation	
		ii)	CFD solvers	
	b)	Clas	ssify the PDEs obtained in the CFD modeling? Explain any one type	:. <b>[9</b> ]

# x x x

# [6354]-451

2

# SEAT No. :

[Total No. of Pages : 2

### [6354]-452

# **B.E.** (Chemical)

### **ADVANCED MATERIALS**

### (2019 Pattern) (Semester - VIII) (Elective - V) (409351D)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Q1) a) Explain in details about the improvement properties of ceramic materials. [10]

b) Explain in details about grain boundary engineering of ceramic materials.[7]

#### OR

- Q2) a) Give types of ceramic materials? Discuss in details application of ceramic materials with suitable examples. [10]
  - b) How do we enhance the properties of ceramic material? Discuss in details about microstructural design. [7]
- Q3) a) What is polymerisation? Explain in details about condensation polymerisation. [9]
  - b) Describe in details about fibre winding techniques of polymer composites.[8]

OR

- *Q4*) a) Give advantages and disadvantages of ceramic composite? And Explain in details about reinforcing mechanisms. [9]
  - b) Short notes on polymer composite [8]
    - i) Mechanical behaviour.
    - ii) Laminates.

- Q5) a) What is metal composite? Explain in details any one fabrication methods.[10]
  - b) What are various advanced ceramic composites? Give advantages and disadvantages and its properties. [8]

OR

- Q6) a) Give short notes on Mechanical behaviour and properties of metal composites. [10]
  - b) Short notes on : [8]
    - i) Reinforce ceramics
    - ii) Chemical compatibility
- Q7) a) Describe in details about role of nanoparticles in carbon composites.[10]
  - b) Explain in details any one application of carbon composites. [8]

#### OR

- Q8) a) What is nanomaterial? Explain in details methods of synthesis of nanomaterials. [10]
  - b) Explain in short properties and characterisation of nanomaterial. [8]

# x x x

# [6354]-453 B.E. (Chemical) CATALYSIS

(2019 Pattern) (Semester - VIII) (Elective - VI) (409352A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.
- 5) Assume suitable data, if necessary.
- Q1) Explain the mechanism of adsorption and its isotherms in detail. [16]

#### OR

Q2)	Writ	e short notes on the following.	[16]
	a)	Adsorption theories and concept of active site.	
	b)	Gas - solid catalytic reactions.	
Q3)	a)	Explain mechanism of catalyst poisoning.	[9]
	b)	Explain major steps involved in catalyst preparation and formation	. [9]
		OR	
<b>Q4</b> )	a)	Explain the pore volume distribution in the catalyst.	[9]
	b)	Explain mass transfer in the catalysis.	[9]
Q5)	Writ	e short notes on the following.	[18]
-	a)	Modification of zeolites.	
	b)	Size and shape selectivity of zeolites.	
		<u>O</u> P	

OR

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

<b>Q6</b> ) a)	Explain the structure of Zeolites in details.	[9]
b)	Explain the catalyst cracking in detail.	[9]
<b>Q7</b> ) a)	Write short note on lipases and microbes as catalyst.	[9]
b)	Give the features of MM kinetic equation.	[9]
	OR	
<b>Q8</b> ) a)	Explain inhibition in biocatalyst.	[9]

b) Give the kinetics of noncompetitive inhibition of enzyme reaction. [9]

# 

#### [6354]-454

# **B.E.** (Chemical Engineering)

### NANOTECHNOLOGY

### (2019 Pattern) (Semester - VIII) (Elective - VI) (409352B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Explain different types of optical microscopy. [12]
  - b) What will be the limit of resolution of a microscope if its numerical aperture is 0.12 and the wavelength of the light used is 6000 Å [5]

#### OR

- Q2) Explain with neat diagram, construction and working any one electronic microscope. [17]
- Q3) a)Explain Quantum dot & Quantum well?[10]
  - b) Explain Heisenberg uncertainty principle and its application. [7]

#### OR

Q4) Explain in detail Extrinsic semiconductors and intrinsic semiconductors.[17]

Q5) a) Discuss the various nanostructured materials for Photocatalysis along with their properties. [10]
b) Enlist and explain colloidal properites of nanoparticles. [8]

OR

<b>Q6</b> )	) Write note on.		
	a)	Surface tension.	
	b)	Colloidal stability.	

c) Photocatalysis.

*P.T.O.* 

[Total No. of Pages : 2

**SEAT No. :** 

[Max. Marks : 70

of Dagos

- *Q7*) a) Discuss Nano-biotechnology and explain how nanostructure mediated drug delivery helps for treatment of various diseases? [10]
  - b) Write briefly on the commercial process of nanotechnology and its application in chemical engineering. [8]

[18]

#### OR

- **Q8**) Discuss applications of nanotechnology in:
  - a) Wastewater treatment
  - b) Drug delivery
  - c) Surface coatings

# 0

#### [6354]-455

**B.E.** (Chemical)

FUEL CELL TECHNOLOGY

## (2019 Pattern) (Semester - VIII) (Elective - VI) (409352C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- Q1) a) Discuss various hydrocarbon-based fuel cells with typical examples. [10]
  - b) At equilibrium how electric potentials are related to the chemical potentials of fuel and oxidizer stream in a fuel cell? Describe its importance in the design of a fuel cell. [8]

#### OR

- Q2) a) What are the criteria for selecting anodic materials of a proton exchange membrane fuel cell system. [9]
  - b) Describe  $H_2$  production from renewable sources and its storage techniques.
- *Q3*) a) Describe in detail the osmotic drag coefficient, back diffusion flux and fuel crossover for PEMFC. [9]
  - b) Describe various anodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working.

#### OR

- Q4) a) Write a detailed note on steam reforming needed in a hydrogen fuel cell. [9]
  - b) Write a detailed note on the internal reforming needed in a hydrogen fuel cell. [8]
- *Q5*) a) Describe the treatment of electrolyte interface for SOFC with a typical schematic diagram. [9]
  - b) Describe procedure of modeling electrochemical potential. [8]

*P.T.O.* 

[9]

[Total No. of Pages : 2

[Max. Marks : 70

SEAT No. :

- Q6) a) Describe the concept of an Ohmic over potential for SOFC. [9]
  - b) Describe the life cycle analysis of the fuel cell with a neat schematic diagram. [8]
- *Q7*) a) Describe microbial and enzymatic fuel cells with their advantages and limitations. [12]
  - b) Discuss the configuration of fuel cell systems with fuel processors. [6]

#### OR

**Q8**) Write a note on.

[3×6=18]

- a) Recent development in harnessing hydrogen
- b) Membrane electrolyte materials
- c) Impurities reduction in reforming

# 1

Total No. of Questions : 8]

PC2340

[6354]-456

# B.E. (Chemical Engineering) PETROCHEMICAL ENGINEERING (2019 Pattern) (Semester - VIII) (Elective - VI) (409352D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) Write in details about the various separation and purification techniques used in the Petrochemical industry. [17]

#### OR

- Q2) Write a descriptive note on furnaces used in petrochemical plants? Also describe any two furnaces. [17]
- *Q3*) Describe the manufacturing process of Amine by suitable diagram. [18] OR
- Q4) Describe the manufacturing process of Ketone by suitable diagram. [18]
- Q5) With neat sketches explain in detail about production of Nylons along with its engineering problems. [17]

#### OR

- Q6) Write a short note on bulk, emulsion and suspension with example. [17]
- Q7) Explain recent trends in petrochemical plants & refineries in India. [18]OR
- Q8) Write a brief note on Safety consideration in petrochemical plants. [18]

# 1

SEAT No. :

[Total No. of Pages : 1

[Max. Marks : 70

Total No. of Questions : 8]

**PC-2341** 

[Total No. of Pages : 3

[Max. Marks : 70

**SEAT No. :** 

# [6354] - 457

# B.E. (Civil Engg.) FOUNDATION ENGINEERING (2019 Pattern) (Semester - VII) (401001)

*Time : 2½ Hour]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data, if necessary and mention it clearly.
- 5) Use of non-programmable calculator is allowed.
- *Q1*) a) Define pre-consolidation pressure. How it is determined? [6]
  - b) Explain Square root of time fitting method for determination of coefficient of consolidation. [6]
  - c) In a consolidation test void ratio decreased from 0.75 to 0.70, when the load was changed from 50 KN/m<sup>2</sup>. Compute compression index of volume change. [5]

#### OR

- Q2) a) What are the different types of foundation settlement? Explain in detail.[5]
  - b) Explain laboratory consolidation test with [6]
    - i) Neat sketch with procedure
    - ii) Different consolidation parameters obtain during test.
  - c) A soil stratum is 10 m thick with pervious stratum on top and bottom. Determine the time required for 50% consolidation. Given that coefficient of permeability  $=10^{-7}$  cm/s, coefficient of compression = 0.0003 cm<sup>2</sup>/gm, void ratio = 2 and time factor = 0.197. [6]

*P.T.O.* 

#### Q3) a) What is negative skin friction? Explain with figure.

- b) A group of 16 piles of 50 cm diameter is arranged with a centre to centre spacing of 1.0m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m<sup>2</sup>. Bearing resistance may be neglected for the piles (Adhesion factor 0.6). Determine the ultimate load capacity of the pile group. [6]
- c) Enlist the methods of determining pile capacity. Explain any two methods in short. [6]

#### OR

- Q4) a) What methods you can use for determining pile capacity. Explain any two methods in short. [6]
  - b) A group of 9 piles, 10 m long is used as a foundation for bridge pier. The piles used are 30 cm diameter with centre to centre spacing of 0.9 m. The subsoil consists of clay with unconfined compressive strength of  $1.5 \text{ kg/cm}^2$ . Determine the efficiency neglecting the bearing action. Assume adhesion factor = 0.9. [6]
  - c) How do you classify pile according to different criteria? [5]
- Q5) a) What is Caisson? How Caissons are classified based on methods of construction? [6]
  - b) Sketch and describe the various components of well foundation, indicating functions of each component. [6]
  - c) What is pier? Explain methods of installation of pier. [6]

#### OR

- Q6) a) What is mean by shallow foundations? What are the principles of design of footing? [6]
  - b) What is mean by raft foundation? Explain any two types of raft foundation? [6]
  - c) How do you find out the bearing capacity and depth of well foundation? What are the forces acting on well foundations? [6]

OR

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2

Q7) :	a)	What is sheet pile wall? Differentiate between cantilever sheet pile wall and anchored sheet pile wall.	vall <b>[6]</b>
	b)	Explain vibro-floatation of soil improvement.	[6]
	c)	Write a short note on problems and its solution Black cotton soil?	[6]
		OR	
<b>Q</b> 8)	a)	Explain Cofferdams types and its applications	[6]
	b)	Explain stone column techniques of soil improvement.	[6]
	c)	What is diaphragm wall? Explain with neat sketch construction	n of



[6]

diaphragm wall.

Total No. of Questions : 8]

SEAT No. :

**PC-2342** 

[Total No. of Pages : 2

[*Max. Marks* : 70

# [6354] - 458

# B.E. (Civil Engineering) TRANSPORTATION ENGINEERING (2019 Pattern) (Semester - VII) (401002)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.
- 2) Figures to the right indicate full marks.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data if necessary.
- 5) Neat diagrams must be drawn wherever necessary.
- Q1) a) The horizontal curve of radius 180 m is having design speed of 60 kmph. The design coefficient of lateral friction is 0.15. [6]
  - i) Calculate required super elevation if full lateral friction is assumed to develop.
  - ii) Calculate required coefficient of friction if super elevation is not provided.
  - b) Draw a neat cross section of MDR in cutting in rural area. [6]
  - c) Define Camber, Shoulder, Kerb, Right of way, Width of formation, and Sight Distance. [6]

#### OR

- Q2) a) The speeds of overtaking and overtaken vehicles are 80 kmph and 50 kmph respectively on a two way traffic road. The average acceleration during overtaking can be assumed as 0.99 m/s<sup>2</sup> [6]
  - i) Calculate safe overtaking sight distance
  - ii) What is minimum length of overtaking zone?
  - b) What is effect of gradient on overtaking sight distance? [6]
  - c) What is overturning effects? Explain with a neat sketch. [6]

*P.T.O.* 

- Q3) a) Explain role of bituminous binder in construction of highway. [6]
  - b) Define Elongation Index (EI). How EI is determined in the laboratory.[6]
  - c) Explain significance of Marshall method of bituminous mix design. [5]

#### OR

- Q4) a) Explain in brief types of tests to be carried out to select the suitable grade of bitumen. [6]
  - b) What is Angularity number? Give its significance in highway construction. [6]
  - c) What is significance of aggregate gradation in design of non bituminous layer of flexible pavement? [5]
- Q5) a) Explain basic concepts in analysis of various stresses in Rigid Pavements.[6]
  - b) Differentiate temperature stresses and wheel load stresses. [6]
  - c) What is dowel bar in rigid pavement? Explain its role with respect to functioning stresses. [6]

#### OR

- *Q6*) a) Classify different types of joints in rigid pavements and mention objectives of each.
  - b) What are the factors causing warping stresses in cement concrete pavements? Explain. [6]
  - c) Differentiate rigid pavement and flexible pavement with a neat sketch.[6]

#### OR

- Q7) a) Discuss various factors that engineer will consider in site selection for a bridge on a major river? [8]
  - b) Define Abutment. State the various types of abutments. [4]
  - c) What are the requirements of an ideal permanent way? [5]

#### OR

- (Q8) a) What are the advantages and disadvantages of temporary bridges? [8]
  - b) Differentiate between skew bridge and submersible bridge. [4]
  - c) What are the types of R.C.C bridges? Draw sketch of any one with neat labeling. [5]

# 

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[6354]-459

### **B.E.** (Civil)

### **COASTAL ENGINEERING**

### (2019 Pattern) (Semester- VII) (Elective - III) (401003A)

*Time : 2^{1/2} Hours ]* 

Instructions to the candidates:

- *1*) Attempt Q. No.1 or Q. No.2, Q. No.3 or Q. No.4, Q. No.5 or Q. No.6, Q. No.7or Q. No.8.
- 2) Figures to the right indicate full marks.
- Assume suitable data, if necessary. 3)
- Neat diagrams must be drawn wherever necessary. **4**)
- Elaborate in detail dynamic theory of tides. *Q1*) a)
  - Classify the tides in detail based on the position of Earth, Sun, and the b) Moon and based on the frequency of occurrence. Draw the neat diagrams wherever necessary. [9]

#### OR

- Define tide. What are the basic characteristics of tides? Explain the *Q2*) a) process of generation of tides? What affects tides in addition to Sun and Moon? [9]
  - Write a detail note on tidal power and discuss the issues in establishing a b) tidal power plant in a country like India. [9]
- Draw a schematic profile of near shore zone showing the sediment *Q3*) a) transport along with proper titles of different parts and elaborate in detail the mechanism of near shore sediment transport. [8]
  - Differentiate between the offshore and nearshore sediment transport. What **b**) is sediment budget? Give expression to determine the sediment budget for longshore sediment transport. [9]

#### OR

- Elaborate the effect erosion on construction of coastal structures and **Q4**) a) their stability on shoreline and beaches. [8]
  - Define erosion and accretion due to waves. Write a note on following b) coastal erosion features [9]
    - i) Notch
    - Sea Arch ii)
    - Cliff iii)

[Total No. of Pages :2

SEAT No. :

[Max. Marks : 70

[9]

- Q5) a) Draw the representative diagrams of sea walls, revetments, bulkheads and explain each of them in depth along with their functions. [9]
  - b) What is the concept breakwater? How it useful for shore protection? Explain following types of breakwaters in details [9]
    - i) Submerged breakwaters
    - ii) Floating breakwaters
    - iii) Attached breakwater

#### OR

- *Q6*) a) Draw the figures and explain Artificial Beach Nourishment and beach dewatering (or beach drain) as shore protection measures. [9]
  - b) What is mean by shore protection, enlist various types of shore protection structure and explain the necessity of shore protection. [9]
- Q7) a) What are the causes of pollution in coastal zone? Discuss the various issues for disposal of waste/dredged spoils in the coastal zones. [8]
  - b) Write short note about the estuaries, wetland and lagoons, coastal dunes. [9]

#### OR

- Q8) a) How the oil spills and contaminants cause the pollution in sea water? What are the primary reasons of oil pills? What are remedial measures to reduce the pollution caused by the oil spills? [8]
  - b) What is a coastal zone? Draw a schematic diagram of coastal zone representing beach profile, surf zone, offshore zone and explain each term in detail. [9]

SEAT No. :

[Total No. of Pages : 3

#### [6354]-460

### **B.E.** (Civil Engineering)

# ADVANCED DESIGN OF CONCRETE STRUCTURES (2019 Pattern) (Semester - VII) (Elective - III) (401003B)

Time : 3 Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.
- 4) Use of non-programmable electronics calculator is allowed.
- 5) Assume suitable data, if necessary.
- 6) Assessment will be based on complete solution and not on final answer.
- 7) IS 456:2000, IS 3370, IS 1893 and IS 13920 are allowed in the examination.
- *Q1*) a) Explain with neat sketches the different types of retaining wall. [4]
  - b) Design a steam of cantilever retaining wall to retain earth embankment 3 m high above ground level. The unit weight of earth is  $18 \text{ kN/m}^3$  and its angle of repose is  $30^\circ$ . The embankment is horizontal at its top. The safe bearing capacity of a soil is  $100 \text{ kN/m}^2$  and the coefficient of friction between soil and concrete as 0.5. Use M20 and Fe-415 bars. [13]

#### OR

- **Q2**) Design a L- shaped retaining wall to retain a backfill of 3.2 m. The backfill is horizontal; and is subjected to a surcharge of 10 kN /m<sup>2</sup> acting over a length of 2 m starting from 1 m from the face of the wall. The unit weight of the soil is  $17 \text{ kN /m^3}$ , angle of repose =  $30^\circ$ , SBC of soil =  $180 \text{ kN/m^2}$ , good foundation is available at a depth of 1.0 m. Sketch the details of reinforcement in the wall and base slab. [17]
- *Q3*) a) Explain with neat sketch the Movement joints, Constructions joints and temporary open joint for water tank. [6]
  - b) A circular tank has an internal diameter of 10 m and has maximum height of water as 4 m. The wall the tank is restrained at the base. Determine the values of maximum hoop tension and its location, and the maximum bending moment by any method. [12]

[Max. Marks : 70

- Q4) A rectangular water tank 4.5 m long 2.25 m wide and 2.25 m high has its wall rigidly jointed at the vertical edges and pin jointed at there horizontal edges. Design the tank if it is supported an all sides under the wall. Use M-20 concrete and Fe-415 steel. [18]
- **Q5**) Design a shear wall of Length 4.16 m and thickness 250 mm subject to the following forces. Assume  $f_{ck} = 25$  and  $f_y = 415 \text{ N/mm}^2$  and the wall is a high wall with the following loading: [17]

Loading	Axial force(kN)	Moment(kN.m)	Shear (kN)
1. DL + LL	1950	600	20
2. Seismic load	250	4800	700



OR

**Q6**) Design a shear wall of length 6.2 m and thickness 350 mm subject to the following forces. Assume  $f_{ck} = 30$  and  $f_y = 500 \text{ N/mm}^2$  and the wall is a high wall with the following loadings: [17]

Loading	Axial force(kN)	Moment(kN.m)	Shear (kN)
1. DL + LL	1950	600	20
2. Seismic load	250	4800	700



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Q7) Analyze the Multi storied building frame by Portal method for lateral load; Flexural rigidity of all members is same analyze the beam DEF using proper Substitute frame if it is subjected to vertical ultimate dead and live load of intensity 24 KN/M and 20 KN/M on DE an 20 KN/M and I6KN/M on EF respectively, Calculate maximum span moment for DE and Support moment at E, Design the beam DEF for combined effect of vertical and horizontal loads, adopts 20 % redistribution of moments for vertical loads. Use M-25 and Fe-415.

#### OR

- Q8) A symmetrical three storey RC school building located in Zone V with following data: [18]
  - a) Plan Dimensions =  $7m \times 7m$ .
  - b) Storey Height = 3.5 m.
  - c) Total weight of beams/storey = 130kN.
  - d) Total weight of columns/storey = 50kN.
  - e) Total weight of walls/storey = 530 kN.
  - f) Live load = 130 kN.
  - g) Weight of terrace floor = 655 kN. Assuming Hard Rock, determine total base shear for 5% damping using seismic coefficient method.

### 1

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SEAT No. :

[Total No. of Pages :2

### [6354]-461

#### **B.E.** (Civil)

# INTEGRATED WATER RESOURCE

### PLANNING AND MANAGEMENT

### (2019 Pattern) (Semester- VII) (Elective - III) (401003 C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Draw neat diagram wherever necessary.
- 4) Use of logarithmic table, slide rule and electronic pocket calculator are allowed.
- 5) Assume suitable data if necessary, stating it clearly.

<b>Q1</b> )	a)	What is ground water pollution? How it can be prevented & controll	ed? [6]
	b)	What are various cost effective water methods of water quality monitor for basins?	ing [6]
	c)	Explain benefits of Industrial waste water treatment?	[5]
		OR	
Q2)	a)	What is Environmental Impact Assessment (EIA)? Explain the st involved in EIA?	eps [6]
	b)	State the Objectives and Functions of CPCB?	[6]
	c)	State polluter pays principle?	[5]
Q3)	a)	What is water scarcity? Explain its effects?	[6]
	b)	Write a note on importance of water to the Indian economy?	[6]
	c)	Write a note on cash flow diagram and discount rate?	[6]
		OR	
<b>Q4</b> )	a)	State seven steps of water planning process.	[6]
	b)	Explain sustainability principles for water management.	[6]
	c)	State and explain the measures of preventing water scarcity.	[6]

[Max. Marks : 70

-----

Q5)	a)	Explain municipal corporation laws regarding water supply and drainag	ge. [ <b>6]</b>	
	b)	Write a short note on Water allocation priorities.	[6]	
	c)	State the role and functions of CWC.	[6]	
	OR			
<b>Q6</b> )	a)	State four principles related water sector reform Dublin Principles (199	2). [ <b>6]</b>	
	b)	Explain importance of arbitration in IWRPM.	[6]	
	c)	Write a short note on Inter-Basin Water Transfer.	[6]	
Q7)	a)	Explain the role of dam in flood control and its importance in IWRP	М. [ <b>6]</b>	
	b)	Write a short note on flood forecasting and disaster relief.	[6]	
	c)	Explain application of soft computing in flood control.	[5]	
OR				
Q8)	a)	Explain the role of dam in power generation and its importance in IWRP	М. [ <b>6]</b>	
	b)	Compute the volume of water required to generate $4750 \text{ kW-hr}$ of elect energy for one day if the average head is 95.0 m and efficiency of t power plant is $0.85.(T = 24 \text{ hr}).$	ric :he [ <b>6]</b>	
	c)	State applications of QGIS in IWRPM.	[5]	

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[Total No. of Pages : 3

**SEAT No. :** 

# B.E. (Civil Engineering) FINITE ELEMENT METHOD (2019 Pattern) (Semester-VII) (Elective -III) (401003 D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7, or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary and clearly state.
- Q1) a) Derive shape functions for 4 nodded rectangular element in natural coordinate system using Lagrange interpolation function. [9]
  - b) Write displacement polynomial for CST and LST elements. [8]

#### OR

- Q2) a) Derive shape function for 9 nodded rectangular element in natural coordinate system using Lagrange interpolation function. [9]
  - b) Derive shape function for 8 nodded Screndipity element in natural coordinate system. [8]
- (Q3) a) Write a short note on 3D tetrahedron and hexahedron element. [8]
  - b) Determine the Cartesian coordinate (x, y) of the any point P ( $\xi=0.5, \eta=0.6$ ) as shown in figure 1. [9]



- Q4) a) State the basic theorems of isoparametric formulation also state the advantages of isoparametric formulation.[8]
  - b) Obtain Jacobian matrix for the quadrilateral element as shown in figure 2 using isoparametric formulation. [9]





Q5) Analyse the beam as shown in figure 3 using finite element method. Take EI = constant. [18]



Q6) For the truss as shown in figure 4 using finite element method, determines deflections at loaded joints. The joint B is subjected to 50 kN horizontal force towards left and 80 kN force vertically downward. Take cross sectional area of all members 1000 mm<sup>2</sup>, Young modulus is 200 Gpa.



Fig. 4

*Q7*) Analyze the portal frame as shown in figure 5 using finite element method. Take EI constant. Neglect axial deformation. [18]

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Fig. 5

OR

**Q8**) Analyze the balcony grid as shown in figure 6 using finite element method. Take EI =1600 kN.m<sup>2</sup> and GJ =800kN.m<sup>2</sup> [18]



Fig. 6

**PC2347** 

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

# [6354]-463 **B.E.** (Civil) DATAANALYTICS

(2019 Pattern) (Semester-VII) (401003 E) (Elective -III)

Instructions to the candidates:

- Solve Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6 Q.7 or Q.8. 1)
- Figures to the right indicate full marks. 2)
- Neat diagrams must be drawn wherever necessary. 3)
- Assume suitable data, if necessary. *4*)

#### What is sampling? What are sampling methods? [6] *Q1*) a)

- Write the difference between covariance and correlation. [6] b)
- Discuss Data Sampling, its types, methods of sampling and ideal sample c) size selection with relevant examples. [6]

#### OR

Calculate rank correlation coefficent from the following data: (Q2) a) [6]

X	10	20	30	30	40	45	50
у	15	20	25	30	40	40	40

- Write merits and demerits of Rank Correlation Coefficient. [6] b)
- From following information find the correlation coefficient between c) advertisement expenses and sales volume using Karl Pearson's coefficient of correlation method. Calculate the coefficient of correlation between the import values and export values [6]

Firm	1	2	3	4	5	6	7	8	9	10
Advertisement	11	13	14	16	16	15	15	14	13	13
Exp. (Rs. In										
Lakhs)										
Sales Volume	50	50	55	60	65	65	65	60	60	50
(Rs. In Lakhs)										

[Max. Marks : 70

*P.T.O.* 

## **SEAT No. :**

[Total No. of Pages : 3

- Q3) a) A factory has machine that dispenses 80 ml of the fluid in a bottle. An employee believes the average amount of fluid is not 80 ml. Using 40 sample, he measures the average amount dispensed by the machine is 78 ml with std. dev. of 2.5.
  - i) State null hypothesis (Ho) and alternative hypothesis (Ha)
  - ii) At 95% confidence interval level, is there enough evidence to support the idea that machine not working properly?
  - b) The sales data of an item in six shops before and after a special promotional campaign are: [7]

Shops	А	В	С	D	Е	F
Before the campaign	53	28	31	48	50	42
After the campaign	58	29	30	55	56	45

Can the campaign be judged to be a success? Test at 5 per cent level of significance. Use paired t-test. As per t table t < -2.015.

## OR

- Q4) a) The job market is being studied in several neighborhoods. Let x represent total number of jobs in a given neighborhood and y represents entry level jobs in the same neighborhood. A sample six neighborhood gave the following information. [10]
  - i) Find out the linear regression model using least square method.
  - ii) For a neighborhood with 40 jobs, how many jobs are predicted at entry level?

Х	16	33	50	28	50	25
У	2	3	6	5	9	3

b) Explain Student's t-test method with an example. In which condition will you select Student's t-test? [7]

- What is predictive analysis? Discuss with at least five real-time *Q*5) a) applications. [9]
  - Explain with suitable examples: [9] b)
    - i) Data analytics life cycle.
    - ii) Data cleaning.

b)

iii) Data transformation.

Fit a straight line of the form

#### OR

Enlist and explain needs of data Analytics lifecycle. Explain in detail.[9] *Q6*) a)

[9]

- 0 2 3 4 5 1 6 Х 2 8 8 -4 -1 11 14 у
- Define and explain types of machine learning: supervised, unsupervised, **Q7**) a) reinforced learning. [5] Explain with an example "Decision Tree" and its classifications. [6] b)
  - What are stopping criteria for k-means clustering. [6] c)

## OR

- **Q8**) a) Define Machine learning and explain different types of machine learning and its components. [5]
  - Explain in detail Regression and Regression Analysis in Machine learning b) [6]
  - How you formulate SVM for a regression problem statement? [6] c)



## PC2348

SEAT No. :

[Total No. of Pages : 4

## [6354]-464

## B.E. (Civil)

## **OPERATION RESEARCH**

## (2019 Pattern) (Semester-VII) (Elective-III) (401003 F)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary and clearly state.
- 4) Use of electronic calculator is allowed.
- Q1) a) Four wagons are available at four stations. The mileages between various stations are given below: [8]

	Stations					
Wagons	1	2	3	4		
А	30	33	28	20		
В	60	30	27	26		
С	70	40	15	65		
D	16	17	20	30		

How the wagons are to be transported, so as to minimize the total mileage covered.

b) Determine transportation cost of the following transportation model by using North - West Corner method and VAM: [9]

	Des	tinati		
Origin	Х	Y	Ζ	Supply
А	2	7	4	25
В	3	3	7	35
С	5	4	1	40
D	1	6	2	70
Demand	35	45	90	170

Q2) a) A marketing manager has 4 salesman & 4 sales districts. Considering capacity of salesman & nature of district, the marketing manager estimate that sales per month for each salesman in each district as in the following table:

	Districts					
Salesman	1	2	3	4		
А	32	38	40	28		
В	40	24	28	21		
С	41	27	33	30		
D	22	38	41	36		

Find the assignment of salesman to district, so that it will result in maximum sales.

b) Determine transportation cost by using Row minima, Column minima and Least cost cell method: [9]

	W	areho			
Factory	Р	Q	R	S	Suppply
А	10	8	7	12	250
В	12	13	6	10	250
С	18	10	12	14	500
Demand	350	250	250	150	1000

*Q3*) a) For the following Primal, construct the Dual:

[4]

Max.Z =  $40x_1 + 85x_2$ Subject to:  $5x_1 + 20x_2 \le 400$  $10x_1 + 15x_2 \le 450$ And  $x_1, x_2 \ge 0$ 

b) Write the rules for constructing the Dual programming. [5]

c) Use Simplex method to Minimize  $Z = 7x_1 + 3x_2 - 5x_3$  [8] Subject to:  $x_1 + 2x_2 + 3x_3 \le 26$  $x_1 + x_2 + x_3 \le 18$  $2x_1 + x_2 + x_3 \le 22$ 

And  $x_1, x_2, x_3 \ge 0$ 

2

**Q4)** a) Use Simplex method to Maximize  $Z = 200x_1 + 160x_2$ 

Subject to: 
$$6x_1 + 16x_2 \le 240$$
  
 $10x_1 + 13x_2 \le 242$   
 $12x_1 + 6x_2 \le 252$ 

And 
$$x_1, x_2 \ge 0$$

[8]

b) Use Big M method to Maximize  $Z = 3x_1 - x_2$  [9]

```
Subject to: 2x_1 + x_2 \le 2x_1 + 3x_2 \ge 3x_2 \le 4And x_1, x_2 \ge 0
```

**Q5)** a) Use Golden section method to Maximize  $f(x) = 60x - x^2$  in the interval of (0, 100). Carry out first 5 iterations only. [9]

b) Use Lagrange's multiplier technique to find  $f(x) = 3x_1^2 + 4x_2^2 - 5x_1 \cdot x_2 - 8x_2$ subject to  $x_1 + x_2 = 4$  [9]

OR

- **Q6)** a) Use Dichotomous search method to Minimize  $f(x) = 24x 0.2x^2$  in the range of (20, 120). Solve up to first 3 iterations only. [9]
  - b) Use Fibonacci method to Minimize  $f(x) = x^3 x$  in the interval of (0, 1) within 5% accuracy. [9]
- Q7) a) The following figure shows route map of various villages. The man has to start from village 'A' and reach to village 'B' by travelling shortest path and visiting as much as possible villages. Help him to plan his journey by using dynamic programming technique.



b) A financer can invest his money in three different fields. The total finance available with him are 6 money units. The returns are depending upon the level of investment as shown below. [9]

Investment	Field 1	Field 2	Field 3
0	0	0	0
2	6	4	8
4	10	12	12
6	14	14	16

Use dynamic programming and determine the maximum return and allocation to various fields.

[3]

#### OR

- **Q8)** a) What are the characteristics of Game theory?
  - b) A cost of machine is Rs.24000. It's resale value and operating cost for the next 6 years are as follows: [6]

Year	1	2	3	4	5	6
Resale value	21500	19000	16500	14000	11000	8000
Operating cost	1800	2100	2500	3100	3800	4500

Determine an optimal Replacement policy.

c) Consider the following  $4 \times 4$  game, which represents the payoff matrix of player A, solve using dominance properties. [9]

			В					
		1	2	3	4			
	1	3	2	4	0			
	2	3	4	2	4			
A	3	4	2	4	1			
	4	3	4	3	4			

Determine the value of game. Also find the probability of selecting strategies by player A and player B.

\*\*\*\*

PC2349

SEAT No. :

[Total No. of Pages : 2

## [6354]-465 B.E. (Civil) AIR POLLUTION AND CONTROL (2019 Pattern) (Semester - VII) (Elective - IV) (401004A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

- *Instructions to the candidates:* 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
  - 2) Figures to the right side indicate full marks.
  - 3) Draw neat figures wherever necessary.
  - 4) Assume suitable data if necessary.
  - 5) Use of scientific calculators is allowed.

<b>Q1</b> )	a)	Enlist various methods of sampling particulate matter and explain a one in detail.	any <b>[6]</b>
	b)	Explain the purpose of ambient air sampling.	[6]
	c)	Write a short note on High volume sampler with sketch.	[6]
		OR	
Q2)	a)	Write in a tabular form National ambient air quality stand (NAAQS)specified by central pollution control board (CPCB).	ard <b>[6]</b>
	b)	Explain Stack monitoring in details with a neat sketch.	[6]
	c)	Convert 80 $\mu$ g/m <sup>3</sup> of SO <sub>2</sub> in ppm. Assume temperature 25°C and press at 103.193 kPa.	ure [6]
Q3)	a)	State the Basic equation of Emission estimation.	[6]
	b)	Explain types of air quality models.	[6]
	c)	Deliberate the strengths and limitations of AERMOD model USEPA	.[6]
		OR	
<b>Q4</b> )	a)	Write a short note on air quality modelling.	[6]
	b)	Explain Emission inventory framework developed by CPCB.	[6]
	c)	Compare the physical, statistical and deterministic air quality models	.[6]

- Q5) a) Calculate the minimum size of the particle that will be removed with 100% efficiency from a settling chamber for the following data: [6]
  - i) Horizontal velocity -0.25 m/s
  - ii) Particle Density 2500 kg/m<sup>3</sup>
  - iii) Chamber: Length -7.5 m, height -1.5 m
  - iv) Viscosity of air  $-1.9 \times 10^{-5}$  kg/m s. (v) Gas Density -1.0888 kg/m<sup>3</sup>

The settling chamber will be operated under quiescent conditions.

- b) Write a note on electrostatic precipitator on mechanism, working principle & applications. [6]
- c) Explain the measures for controlling the emission from mobile sources.[5]

## OR

- *Q6*) a) State the working principle, advantages and disadvantages of fabric filter as a particulate control equipment. [6]
  - b) Describe the factors responsible for selection of particulate control equipment. [6]
  - c) What is carbon sequestration? Enlist the types, explain any one. [5]
- Q7) a) Enlist methods for odour pollution control. Explain any one in detail.[5]
  - b) Explain sick building syndrome with causes and its preventive measures.

[6]

c) What is active and passive sampler? Explain with advantages and disadvantages. [6]

#### OR

- Q8) a) What are the causes and effects of indoor air pollution? [5]
  - b) Explain use of plants for indoor air quality improvement. [6]
  - c) Enumerate the odorous materials with respect to following industries[6]
    - i) Fertilizer
    - ii) Petroleum
    - iii) Chemical

## \* \* \*

**PC2350** 

SEAT No. :

[Total No. of Pages : 3

## [6354]-466

## B.E. (Civil)

# ADVANCE DESIGN OF STEEL STRUCTURES (2019 Pattern) (Semester - VII) (Elective - IV) (401004B)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat sketches must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Take  $f_{x} = 250$  and  $f_{z} = 410$  grade of steel wherever not given.
- 5) Take ultimate stress in bolt,  $f_{\mu\nu} = 400 \text{ N/mm}^2$
- 6) Assume suitable data if necessary.
- 7) Use of electronic pocket calculator, relevant IS codes and Steel table are allowed.
- 8) Use of cell phone is prohibited in the examination hall.
- Q1) a) What are light gauge sections in the context of steel structures, and how do they differ from traditional structural steel sections? [5]
  - b) Determine the allowable load for a column made from a light gauge section with a box profile measuring 120×120 mm with thickness of 1.6 mm. The column's effective length is 3 meters, and the material has a yield strength of 235N/mm<sup>2</sup>. [12]

- Q2) a) Explain the advantages and disadvantages of using light gauge sections in steel structures. [5]
  - b) Two  $180 \times 80$  mm channel sections with folded lips are joined by their webs to function as a beam. The plate thickness is 2.5 mm, and the lip depth is 25 mm. The beam spans effectively for 4.1 meters. Calculate the permissible load that the beam can support, considering a material yield strength of 235 N/mm<sup>2</sup>. [12]

- Q3) a) What are the key advantages of using tubular structures in engineering construction. [5]
  - b) Design a hollow circular steel section to carry axial tensile load of 200 kN. Its length is 2.5 m. It is at right angle with other member. Also design welded connection. [13]

### OR

- Q4) a) Explain the role of standard codes in the design of tubular structures.[5]
  - b) Design a hollow circular steel section to carry axial compressive load of 150 kN. Its length is 1.8 m. It is at right angle with other member. Also design welded connection. [13]
- Q5) a) Explain the advantages of using castellated beams in construction and structural design. [5]
  - b) A simply supported beam carries total load including dead load and live load of 10 kN/m over the span of 11 m. Design castellated beam assuming compression flange is fully restrained. [12]

#### OR

- *Q6*) a) Provide an overview of the codal provisions relevant to the design of castellated beams for bending and shear. [5]
  - b) Design castellated beam for a simply supported beam carries live load of 9 kN/m and dead load of 6 kN/m over a span of 12 m. Assume compression flange of beam is laterally supported throughout the span.
    [12]

Q7) Finde the collapse load W for the portal frame as shown in figure 1. [18]



OR

Q8) Analyses the gable frame loaded and supported as shown in figure 2 and find plastic moment capacity  $M_p$ . Assume uniform cross section for all members of the frame. [18]



\* \* \*

**PC2351** 

SEAT No. :

[Total No. of Pages : 4

## [6354]-467 B.E. (Civil)

# STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS (2019 Pattern) (Semester - VII) (Elective - IV) (401004C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

[6]

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data if necessary.
- 4) Use of electronic pocket calculator is allowed in the examination.
- 5) Use of cell phone is prohibited in the examination hall.

Q1) a) Write a short note on Sampling Distribution of the Mean and the Central Limit.[5]

- b) Explain with an example Z test.
- c) Write a short note on different types of samples with suitable examples on each. [6]

OR

- Q2) a) Write a short note on Data sampling, its types, methods of sampling and ideal sample size selection with relevant examples. [5]
  - b) Explain with an example Chi Square test. [6]
  - c) Write a short note on Process of sampling and explain what is the meaning of "Null Hypothesis". [6]
- **Q3**) a) Explain in detail assumptions of Z test of Hypothesis. [6]
  - b) Suppose that sweets are sold in packages of fixed weight of the contents. The producer of the packages is interested in testing that average weight of contents in packages in 1 kg. Hence a random sample of 12 packages is drawn and their contents found (in kg) as follows: 1.05, 1.01, 1.04, 0.98, 0.96, 1.01, 0.97, 0.99, 0.98, 0.95, 0.97, 0.95.

Using the above data what should he conclude about the average weight of contents in the packets? Use Student T Test. [6]

*P.T.O.* 

c) The figures given below are (a) the theoretical frequencies of a distribution and (b) the frequencies of a normal distribution having the same mean, standard deviation and the total frequency as in (a).

OR

- i) 1, 5, 20, 28, 42, 22, 15, 5, 2.
- ii) 1,6,18,25,40,25,18,6,1.

Apply the  $\chi$  2 test of goodness of fit.

[6]

[6]

[6]

Q4) a) Explain:

i)

- Hypothesis and hypothesis testing
- ii) Null Hypothesis
- iii) One and two-sided hypothesis
- b) The demand for a particular spare part in a factory was found to vary from day-to-day. In a sample study the following information was obtained.

Days	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
No.of	1124	1125	1110	1120	1126	1115
Parts						
Demanded						

Test the hypothesis that the number of parts demanded does not depend on the day of the week. Apply Chi square Test. [6]

- c) In order to start new S.T. bus to a certain remote village it is required to get the average fare of i 400 daily. Reports on number of passengers for 21 days revealed that the average daily collection of fare from the passengers was i 390 with standard deviation of i 40. Do these data support the demand of people for starting new bus to the village? [Use 5% l.o.s.] Use Student T Test. [6]
- Q5) a) Explain Correlation Analysis and its application to Civil Engineering. [6]
  - b) Find the lines of regression for the following data:

X	10	14	19	26	30	34	39
у	12	16	18	26	29	35	38
and actimate $y$ for $y = 14.5$ and $y$ for $y = 20.5$							

and estimate y for x = 14.5 and x for y = 29.5.

c) Determine regression line for price, given the supply, hence estimate price when supply is 180 units, from the following information: x = supply. y = Price. n = 7,  $\sum (x-150) = 119$ ,  $\sum (y-160) = 84$ ,  $\sum (x-150)2 = 2835$ ,

 $\sum (y-160)2 = 2387$ ,  $\sum (x-150)\sum (y-160) = 525$ . Also, find correlation coefficient between price and supply. [6]

OR

**Q6**) a) Explain Regression analysis and its applications to civil Engineering. [6]

x	2	3	5	7	9	10	12	15
у	2	5	8	10	12	14	15	16

b) Obtain regression lines for the following data:

Find estimate of

- i) Y when X = 6 and
- ii) X when Y = 20
- c) If the two lines of regression are  $9x + y \lambda = 0$  and  $4x + y = \mu$  and the means of x and y are 2 and -3 respectively, find the values of  $\lambda,\mu$  and the coefficient of correlation between x and y. [6]

**[6]** 

- Q7) a) Explain K-S test for goodness of fit. [5]
  - b) For the tabulated values of x and y given below fit a linear curve of the type y = mx + c. [6]

x	1.0	3.0	5.0	7.0	9.0
у	1.5	2.8	4.0	4.7	6.0

c) If the relation between x and y is of the type y = a bx. Using following values of x and y, find he values of constants a and b for the best fitting curve.

X	2.1	2.5	3.1	3.5	4.1
у	5.14	6.788	10.29	13.58	20.578

## Q8) a) Explain one and two-sided analysis of variance.

b) If X and Y are connected by the relation  $ax^2 + by^2 = X$ , find the value of a and b by rearranging the relation into linear form by using least square criteria for following data. [6]

[5]

X	1	2	3	4	5
у	3.35	5.92	8.43	10.93	13.45

c) Fit a curve  $y = ax^b$  using the following data: [6]

X	2000	3000	4000	5000	6000
у	15	15.5	16	17	18

### \* \* \*

**PC2352** 

SEAT No. :

[Total No. of Pages : 3

## [6354]-468 B.E. (Civil) AIRPORT AND BRIDGE ENGINEERING (2019 Pattern) (Semester - VII) (Elective - IV) (401004D)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Draw neat diagrams wherever necessary.
- 4) Assume suitable data if necessary.
- 5) Use of scientific calculators is allowed.

) a) What is BIM (Building Information Modelling) for airport engineering Explain in detail.[6]	ng? <b>[6]</b>
b) State and explain the factors affecting the design of Airport capacity.[6	.[6]
c) What is airport drainage? What are the functions and basic requirement of airport drainage? [6	ents [6]
OR	
a) Write note on. [6	[6]

- i) Augmented reality
- ii) Virtual Reality
- b) Explain planning and design of airport pavement. [6]
- c) Discuss in brief the necessity of airport drainage. [6]

## *Q3*) a) Describe the following terms with neat diagram. [6]

- i) Runway marking
- ii) Taxiway marking
- b) Why lighting and marking of airport is required? Enlist parameters Considered for heliport planning. [6]
- c) Explain marking of heliport with neat sketch. [5]

- *Q4*) a) Explain vertical take-off and landing (VTOL), short take-off and Landing (STOL). [6]
  - b) Explain with sketch various markings on runways. [6]
  - c) What is heliport? State the various helicopter characteristics. [5]
- **Q5**) a) Define bridge? What are the characteristics of an ideal site for a bridge? [6]
  - b) Define following terms related to bridge. [4]
    - i) Effective span
    - ii) Freeboard
  - c) The catchment area of a stream is of sandy soil with thick vegetation Cover and the area of the catchment is 12000 hectares. The length of the Catchment is 25 km and the fall in level from the critical point to the Bridge site is 180 meters. Calculate the peak run off for designing the Bridge, if the severest storm as recorded yielded 18 cm for rainfall of 4 hours. Area factor = 0.70 and Coefficient to account for Losses due to absorption = 0.20 [8]

- Q6) a) Give the detail classification of bridge. [4]
  - b) What are the different component parts of bridge explain with typical Cross section of bridge. [6]
  - c) Calculate peak storm discharge from a catchment of 80,000 hectare The run off coefficient is 0.80 length of catchment is 65 km. the difference between the critical point and bridge is 150 m. The Rainfall in 8 hrs is 20 cm and area factor is 0.6 [8]

- Q7) a) Explain with neat sketch the following:
  - i) Bascule bridge
  - ii) Suspension bridge
  - b) Define culvert mention 2 types of Culvert, Describe any one culvert with neat sketch. [6]

[6]

c) State the purpose of providing bearing in bridges. Enlist different types of bearing.
 [5]

- *Q8*) a) Differentiate between temporary and permanent bridges with example.[6]
  - b) Discuss any three types of movable Span bridges. [6]
  - c) State the requirements of an ideal bridge bearings. [5]



SEAT No. :

## PC2353

[Total No. of Pages : 3

## [6354]-469

## B.E. (Civil)

## DESIGN OF PRESTRESSED CONCRETE STRUCTURES (2019 Pattern) (Semester - VII) (401004 E) (Elective - IV)

Time : 3 Hours]

Instructions to the candidates:

- [Max. Marks : 70
- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) IS1343 : 2012 and IS456 : 2000 code of practice are allowed.
- 6) Assume suitable data if necessary.
- Q1) a) A post-tensioned prestressed beam of rectangular section 250mm wide is to be designed for an imposed load of 10 kN/m, uniformly distributed on a span of 10 m. The stress in the concrete must not exceed 15N/mm<sup>2</sup> in compression or 1.2 N/mm<sup>2</sup> in tension at any time and the loss of prestress may be assumed to be 15%. [10]

Calculate:

- i) The minimum possible depth of the beam
- ii) For the section provided, the minimum prestressing force and the corresponding eccentricity
- b) A pre-tensioned T-section has a flange which is 300mm wide and 200mm deep. The rib is 150mm wide and 350mm deep. The effective depth of the cross section is 500mm. If  $f_{ck} = 50 \text{ N/mm}^2$ ,  $f_{pu} = 1600 \text{ N/mm}^2$ , and the area of pre-stressing steel  $A_{ps} = 200 \text{ mm}^2$ . Calculate the ultimate flexural strength of the section using IS1343 code provisions. [8]

- **Q2)** a) The end block of a post tensioned beam is  $350 \text{mm} \times 500 \text{mm}$ . The pre-stressing force 900 kN with the tendon placed centrally at the ends. A bearing plate of  $200 \text{mm} \times 200 \text{mm}$  is provided. Check the bearing stresses developed in concrete having strength, at transfer equal to 40 MPa. [10]
  - b) A pre-tensioned pre-stress concrete beam of rectangular section is to be design for ultimate moment of 125 kN/m. Design the section using M40 grade of concrete and  $f_{pu} = 1600$ N/mm<sup>2</sup>. [8]

- Q3) a) A slab spanning 8m in is to be designed as a one-way prestressed concrete slab with parallel post tensioned Cables carrying an effective force of 420kN. The deck slab is required to support a udl of 10kN/m<sup>2</sup>. The permissible stresses in concrete should not exceed 15N/mm<sup>2</sup> in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss ratio 0.8.
  - b) Evaluate the importance of serviceability considerations in determining the spacing of post-tensioning cables for two-way slabs with suitable example. [7]

#### OR

- Q4) a) A slab spanning 6m is to be designed as a one-way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 420kN. The deck slab is required to support an udl of 15kN/m<sup>2</sup>. The permissible stresses. in concrete should not exceed 15N/mm<sup>2</sup> in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss ratio 0.8. [10]
  - b) Discuss the key factors influencing the determination of cable spacing in post-tensioned one-way slabs. [7]
- *Q5*) a) Explain the P line and C-line concept for finding the stresses in a section of prestressed continuous beam. [7]
  - b) Design a post tensioned flat slab for the following data. [10]
    - i) Centre to centre distance between columns = 6m in both directions
    - ii) Column size 600mm
    - iii) Square Floor is to be used for a shopping mall
    - iv) Live load- $3 \text{ kN/m}^2$
    - v) Floor finish- $1kN/m^2$
    - vi) Materials-M40, multistrand cables
    - vii) Slab with drop

Q6) Design a post tensioned fiat slab for the following data.

a) Centre to center distance between columns = 10m in both directions

[17]

- b) Column size 800mm
- c) Diameter floor is to be used for a pharmaceutical company
- d) Live load  $5kN/m^2$
- e) Floor finish  $-1kN/m^2$
- f) Materials M40, multistrand cables
- g) Slab with drop
- Q7) Fig.1 shows a two span continuous beam. Corresponding to the cable profile provided locate the pressure line due to prestress alone. The prestressing force in 1000kN.[18]



- Q8) A continuous prestressed concrete beam ABC (AB=BC=10m) has a uniform rectangular cross section with a width of 100 mm and depth of 300mm. The cable carrying an effective prestressing force of 360kN is parallel to the axis of the beam and located at 100 mm from the soffit. [18]
  - a) Determine the secondary and resultant moment at the central support B.
  - b) If the beam supports an imposed load of 1.5 kN/m, calculate the resultant stresses at top and bottom of the beam at B. Assume density of concrete as 25kN/m<sup>3</sup>.
  - c) Locate the resultant line of thrust through beam AB.



**PC2354** 

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-470 B.E. (Civil) FORMWORK AND PLUMBING ENGINEERING

# (2019 Pattern) (Semester - VII) (Elective - IV) (401004 F )

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data if necessary and refer IS 12183 for numerical.

<i>Q1</i> ) a)	Explain in detail about slip formwork.	[8]
1.)		r <i>e</i> 1

- b) Explain the design consideration of formwork in details. [5]
- c) Draw the neat sketch of RCC wall formwork with its component parts.[4]

Q2)	a)	Write in brief about "Mivan" Formwork with its advantages disadvantages.	and [ <b>8</b> ]
	b)	Draw the neat sketch of slab formwork with its component parts.	[5]
	c)	Enlist the Environmental load on formwork.	[4]
Q3)	a)	Explain in details about sustainable practices in plumbing.	[9]
	b)	Role and responsibilities of plumbing designer.	[9]
		OR	
<b>Q4</b> )	a)	Explain the prevention of waterborne disease.	[9]
	b)	Explain in detail role of plumber.	[9]
Q5)	a)	What are the different friction loss in pipe?	[8]
	b)	Enlist the types of water distribution systems in buildings explain one with Sketch.	any <b>[9]</b>

- *Q6*) a) Explain the different type of valves in plumbing system. [8]
  - b) Enlist the types of drainage systems in buildings explain any one with sketch. [9]
- (Q7) a) Write a short note on different methods of pipe sizing in building. [8]
  - b) Explain drainage air test and drainage water test procedure. [6]
  - c) Write the number of water fixture unit for WC, wash basin, bath tub and shower. [4]

#### OR

- Q8) a) Calculate the total number of fixture unit for the G +1 residential building having 2 bath room shower, 1 kitchen sink with 15 mm tap, 2 water closet, 2 bath tub, 3 wash basin.[8]
  - b) Explain in detail about manhole in sewer line with neat sketch. [6]
  - c) Write down the different water supply demand based on population projection for different type of building as per Indian Standard. [4]

#### \* \* \*

PC2355

#### [6354]-471

**B.E.** (Civil Engineering) DAMS AND HYDRAULIC STRUCTURES

(2019 Pattern) (Semester - VIII) (401011)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks for the sub-questions.
- 4) Assume suitable data if necessary and state them in your answer clearly.
- 5) Use non-programmable pocket size electronic calculator is allowed.

Q1) a) Define spillway and explain anyone type of spiliway with proper sketch.[5]

- b) Explain main components of spillway. [5]
- c) Explain energy dissipation device and its importance. [7]

#### OR

- (Q2) a) Explain ski jump bucket with suitable diagram. [5]
  - b) Differentiate between controlled and uncontrolled spillway. [5]
  - c) Design an ogee spillway for concrete gravity dam, for the following data.[7]
    - i) Average river bed level = 160 m
    - ii) Slope of D/S = 0.75 H: 1V, u/s face is vertical
    - iii) Spillway crest RL = 265 m
    - iv) Design discharge =  $5750 \text{ m}^3/\text{s}$
    - v) Spillway length is 6 spans with a clear length of 7 m each. Pier thickness= 2m.

<b>Q3</b> ) a)	Enlist different causes of failure of earthen dams and explain any one.	[5]
b)	Define earthen dam & explain in details limitations of earth dam.	[5]
c)	Explain various seepage control measures in earthen dam.	[8]

#### OR

- *Q4*) a) Explain the function of hearting and rock toe in earthen dam. [5]b) Define phreatic line for an earth dam & explain phreatic line for an earth
  - dam with horizontal filter at the downstream. [5]
  - c) Explain Swedish slip circle method of stability analysis of an earth dam.[8]

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

Q5)	a)	Explain the advantage and disadvantages of lining of canals.				
	b)	lain the components of canal system with neat sketch.	[5]			
	c)	Explain design of canal by Kennedy's theory.				
			OR			
<b>Q6</b> )	a)	Explain necessity of canal lining.				
	b)	What are the drawbacks of Kenned's theory.				
	c)	te short note on.	[7]			
		i)	canal regulators			
		ii)	canal escapes			
Q7)	a)	Dra	w a labelled sketch of diversion headworks.	[5]		
	b)	npare bligh's and lane's creep theories of seepage.	[5]			
	c)	Explain in brief:				
		i)	inlet and outlet			
		ii)	aqueduct			
			OR			
Q8)	a)	Explain the importance of exit gradient.				
	b)	Explain lane's creep theories of seepage.				
	c)	Explain in brief:				
		i)	Level crossing			
		ii)	Super passage			



**PC-2356** 

#### SEAT No. :

[Total No. of Pages : 4

# [6354]-472

## B.E. (Civil)

# QUANTITY SURVEYING CONTRACT AND TENDERS (2019 Pattern) (Semester - VIII) (401012)

*Time : 3 Hours] Instructions to the candidates:*  [Max. Marks : 70

[9]

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume Suitable data if necessary.
- *Q1*) a) Explain in detail concept of long wall short wall and Centre line method with the help of example.[8]
  - b) Workout the quantity for the following items of work
    - i) PCC (1:4:8) for foundation
    - ii) Footing in stone masonry for substructure.



*P.T.O.* 

**Q2)** a) Prepare bar bending schedule fig show the L s/c and c/s of RCC beam. Also determine the % of steel in the beam ( assume density of steel is  $7860 \text{ kg/m}^3$ ) [8]



- b) Explain in details about factors to be considered during preparation of detailed estimate. [9]
- Q3) a) Calculate the quantity of earthwork for percolation tank from following data: Use trapezoidal method [8]
  - i) Top width 3m
  - ii) R.L of top of embankment 102m
  - iii) side slopes upstream & downstream side 1:2 (v:h)
  - iv) refer table

Chainage in M	0	30	60	90	120	150
R.L. of G.L in M	100.50	98.00	95.50	96.00	97.00	99.75

b) Calculate for an embankment by mean area method, workout the quantities of earthwork for an embankment 100m long and 10m wide at a top. Side slope is 2:1 and depth of each 20 m and are 0.6, 1.2, 1.4, 1.6, 1.5m **[9]** 

- Q4) a) Calculate the quantities of earthwork for 200 m length for a portion of road in an uniform ground, the height of banks at two ends being 1.0m and 1.60m. The formation width is 10 m and side slope 2:1 (H:V). Assume that there is no transverse slope. Use 3 different methods [9]
  - b) Explain different methods to workout quantity of earthwork for Road and canal. [8]
- Q5) a) Define specification & explain its necessity and enlist types of specification. [9]
  - b) Carryout rate analysis for 2.5 cm thick Cement concrete 1:3:6 flooring[9] The following rates for material and labor may be consider for rate analysis

Cement = Rs. 300 per bag

Sand = Rs. 1400 Per Cum.

Aggregate = Rs. 1400 Per Cum.

Bricks = 4500 per 1000 Nos.

Steel = Rs. 38500 per M.T.

Labour rate Per day

Head mason = Rs. 600

Mason = Rs. 450

Mazdoor = Rs.350

Bhishti = Rs. 300

#### OR

- *Q6*) a) Using the standard format, conduct the rate analysis for the following item of work Cement concrete 1:2:4 for RCC Roof slab with 1.5% steel[9]
  - b) Write a detailed specification for BBM in CM 1:6 for superstructure.[9]
- *Q7*) a) Define valuation. Explain various factors affecting value of property.**[6]** 
  - b) Explain the concept of free hold and lease hold property. What are the reasons under which the property is leased and what are the liabilities of lessor and lease? [6]

- c) Define :
  - i) Scrap value
  - ii) Salvage value
  - iii) Sentimental value
  - iv) Distressed value

## OR

- Q8) a) A building is constructed at a cost of 5lakhs. The life of building may be assumed to be 80 years and the scrap value of building to be 10 % of building cost. Determine the depreciation in 40<sup>th</sup> year. Use straight line method, constant percentage method and sinking fund method assuming 8% compound interest. [6]
  - b) Explain with example :

[6]

[6]

- i) Obsolesce
- ii) Duel rate Y. P.
- iii) Earned Value
- c) A plot of land is situated along a highway. The plot has an area of 20,000 sqm with a single frontage of width 40m along highway. The front 30m along the plot from the edge of highway is kept reserved for providing gardening and other green purpose, also the remaining 3 sides of the plot is prohibited from any sort of construction under law. Assuming that the prevailing rate of land varies between Rs. 20/- sqm to Rs.25 sqm. Find the value of the property. [6]

**PC2357** 

[Total No. of Pages : 3

[Max. Marks : 70

**SEAT No. :** 

## [6354]-473 B.E. (Civil)

**EARTHQUAKE ENGINEERING** 

## (2019 Pattern) (Semester - VIII) (Elective - V) (401013A)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures in bold to the right, indicate full marks.
- 3) Neat diagrams should be drawn where ever necessary.
- 4) IS 1893 is permitted in the examination.
- 5) Any additional data needed may be suitably considered and clearly mentioned in the solution.

Q1) Find the Eigen values and Eigen vectors for the system shown in Fig. 1. [18]





Q2) Calculate the natural frequencies and plot the mode shapes for the system shown in Fig. 2. [18]



Fig. 2

Q3) The design details of a six storey budding shown in Fig. 3 are as follows.[17]

- a) Location of the building zone II
- b) Imposed load on the floor  $4 \text{ kN/m}^2$
- c) Additional load on the terrace slab  $3 \text{ kN/m}^2$
- d) Soil type below the foundation soft soil.

Analyze the building along the X-direction using the seismic coefficient method and obtain the total base shear and the distribution of lateral forces along the height of the building.





OR

Q4) For the problem in Q.3, analyze the building along the Y-direction using the seismic coefficient method and obtain the total base shear and the distribution of lateral forces along the height of the building. [17]

Q5) Perform dynamic analysis in accordance with IS: 1893 and obtain the design lateral forces for the building shown in Fig 4. The live load on the floor is 4.0 kN/m<sup>2</sup>. The building is located in zone IV and rests on hard soil. The dynamic properties of the building are as follows. [18]

Storey	Natural	Mode 1	Mode 2	Mode 3
level	period, s			
1	0.81	1.0	1.0	1.0
2	0.76	-0.20	0.55	-0.79
3	1.1	0.77	0.39	-0.32





- *Q6*) For the problem in Q.5, perform dynamic analysis in accordance with IS: 1893 and obtain the design lateral forces for the building if it located in zone V. The building supports an additional superimposed dead load of 2 kN/m<sup>2</sup> on all the floors along with the imposed load.
- Q7) a) Explain the concept of ductility in concrete structures and its importance in seismic design. [10]
  - b) What are shear walls? How are they effective against lateral loads? [7]

OR

- (Q8) a) Explain with neat sketches different lateral load resisting systems. [7]
  - b) Explain the significance of building configuration in seismic design and provide examples of how different configurations affect seismic performance. [10]

**PC2358** 

# [6354]-474

## B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

## (2019 Pattern) (Semester - VIII) (Elective - V) (401013B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right, indicate full marks
- 3) Neat diagrams should be drawn whereever necessary
- 4) IS 1343, IRC 6, IRC 112, Bridge Rules and steel table are permitted in the examination.

Q1) Design the intermediate prestressed post-tensioned concrete girder shown in Fig. 1.[18]



The live load on the deck slab is IRC Class AA tracked wheel loading. The following material properties shall be considered for the design.

- a) M-45 grade concrete for the deck slab and M-50 grade for the girders;
- b) Ultimate tensile of the steel used in the girders is 1560 MPa;
- c) Compressive strength of concrete at transfer is 35 MPa;
- d) The loss in the prestress may be taken as 10%. Any additional data required may be suitably considered.

OR

Q2) For the problem data given in Q.1, design the intermediate prestressed post-tensioned concrete girder, if the live load on the deck slab is IRC Class AA wheel loading.[18]

[Max. Marks : 70

[Total No. of Pages : 3

**SEAT No. :** 

*P.T.O.* 

Q3) A railway welded plate girder bridge is to be designed for the given data: [17]

- a) Span 12.0 m
- b) Total load for bending moment = 1850 kN
- c) Total load for shear force = 1100 kN
- d) CDA = 0.66
- e) Yield stress of steel 250 N/mm<sup>2</sup>
- f) Design the cross section and the end stiffeners.

Assume suitably if additional data is required.

## OR

- Q4) For the data given in Q.3, design the cross section and the intermediate transverse stiffeners. [17]
- Q5) The schematic of a BG railway bridge is shown in Fig. 2. The details for bridge are as follows. [18]
  - a) Spacing of stingers = 2.15 m;
  - b) Weight of sleeper per meter on each girder = 0.45 kN/m;
  - c) Weight of rail per meter = 0.5 kN/m;
  - d) EUDL for bending moment = 2190 kN;
  - e) EUDL for shear force = 1980 kN;
  - f) Impact factor CDA = 0.33;
  - g) Intensity of wind load =  $1.25 \text{ kN/m}^2$
  - h) Racking force = 3.8 kN/m.

Design the stringers and the bracings for the stringers.



[6354]-474
- **Q6**) For the problem given in Q.6, design the members  $L_1-U_1$ ,  $L_1-L_2$ ,  $U_1-L_1$ , and  $U_2-L_2$ . [18]
- *Q7*) The following details pertain to a railway steel bridge. Design a suitable steel bearing.[17]
  - a) Load from the truss girder = 2145 kN;
  - b) Permissible pressure on bearing block =  $2.75 \text{ N/mm}^2$
  - c) Permissible bending stress =  $150 \text{ N/mm}^2$
  - d) Permissible bearing stress =  $75 \text{ N/mm}^2$
  - e) Permissible shear stress = 85 MPa.

- Q8) a) Explain the design procedure for a reinforced elastomeric bearing. [8]
  - b) What is the function of a roller bearing? Explain the design procedure.[9]



Total No. of Questions : 8]

PC2359

SEAT No. :

[Total No. of Pages : 3

### [6354]-475

### B.E. (Civil)

### **IRRIGATION AND DRAINAGE**

## (2019 Pattern) (Semester - VIII) (Elective - V) (401013C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Answers to the all questions should be written in single answer-book.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, jf necessary.
- *Q1*) a) Explain characteristic curves of centrifugal pump. [6]
  - b) What is the NPSH of centrifugal pump? Distinguish between available NPSH and required NPSH. [6]
  - c) Enlist component parts of lift irrigation system. Explain how to calculate power requirement of centrifugal pump in lift irrigation. [6]

- Q2) a) What is the general information required for the design of a drip irrigation system? [6]
  - b) Draw a neat sketch of centrifugal pump and explain component parts.[6]
  - c) What are the advantages and disadvantages of drip irrigation system.[6]
- **Q3**) a) Explain the steps for sprinkler irrigation system design. [9]
  - b) Determine the system capacity for a sprinkler irrigation system to irrigate 20 hectares of a crop. Design moisture use rate is 7mm/day. Moisture replaced in soil at each irrigation is 7.5 cm. Irrigation efficiency is 75 %. Irrigation period is 11 days in a 14-day interval. The system is to be operated for 19 hours per day. [8]

**Q4)** a) A sprinkler irrigation system is to be designed to irrigate 9 hectares of vegetables crops in deep silt loam soil in moderate dry climate. The field is flat. Determine the irrigation period, the net depth of water per application, the depth of water pumped per application and the required system capacity in hectare-cm per day. Assuming that the system is operated for 15 hours each day, determine the pump capacity in lit/sec.[6]

Assume following data:

Limiting application rate = 1.35 cm/hr

Moisture holding capacity of the soil = 9.7 cm/meter depth

Root zone depth = 65 cm

Irrigation to be stated at 50 % moisture depletion.

- b) Explain how to calculate power requirement of the pump in sprinkler irrigation system. [6]
- c) Explain with neat sketch Fertilizer Applicator in sprinkler irrigation system.[5]
- Q5) a) Explain influence of salts on the physical properties of soil. [5]
  - b) Explain different engineering practices for salinity management. [6]
  - c) Estimate the leaching requirement when the electrical conductivity (EC) of the saturation extract of the soil is 11 mmhos/cm at 25 percent reduction in the yield of cotton. The EC of irrigated water is 1.5 mmhos/cm. [6]

- Q6) a) What is leaching fraction? Explain how to compute leaching fraction. [6]
  - b) What is sodicity? Explain how to calculate SAR? [5]
  - c) A quantity of 100 ml of gypsum solution, having 29 meq/l concentration as calcium, on reacting with 6.5 gm of an alkali soil showed 30 meq/1 of Ca+Mg concentration in the filtrate. Estimate the gypsum requirement in meq/100 gm soil. [6]

- Q7) a) Explain steps involved in land forming in surface drainage.
  - b) It is required to design surface drainage for a new agricultural farm to drain out irrigation tail-water and seasonal rainfall runoff. The maximum rainfall intensity at the site in 30 years record is 40mm/h. The tertiary drain would have to carry runoff from 6.5 ha land. The secondary drain would have to carry thrice of tertiary, and the main drain to carry discharge of five secondary drains (of similar flow). Determine the design discharge capacity of the [8]
    - i) tertiary
    - ii) secondary and
    - iii) main drain
  - c) Enlist different types of drain pipes used for subsurface drainage and brief about anyone. [4]

- *Q8*) a) Explain different surface drainage system layouts. [6]
  - b) What is composite drainage system? [3]
  - c) Determine the required drain spacing (L) for the basic design criteria q = 10 mm/d, H= 0.85 m, pipe with outer diameter = 0.3 m and wet entry perimeter (u) = 0.45 m, K<sub>1</sub> = 3.5 m/day, K<sub>2</sub> = 2.0 m/day. W= 1.5 m, D = 3 m. Refer Fig. 8(c). Use Hooghoudt's formula. Take only two trials. [9]



 $\bigcirc$   $\bigcirc$   $\bigcirc$ 

3

Total No. of Questions : 8]

**SEAT No. :** 

**PC2360** 

### [6354]-476 **B.E.** (Civil)

# **DESIGN OF PRECAST AND COMPOSITE STRUCTURES**

# (2019 Pattern) (Semester - VIII) (Elective - V) (401013D)

*Time* :  $2^{1/2}$  *Hours*]

Instructions to the candidates:

- Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8. *1*)
- 2) Figures in bold to the right, indicate full marks.
- IS 15916, IS 11384, IS 800 and IS 3935 are allowed in the examination. 3)
- The designs should comply with the latest codal provisions. **4**)
- If necessary, assume suitable data and indicate clearly. 5)
- Use of electronic pocket calculator is allowed. **6**)
- *Q1*) a) Explain prefabricated load carrying members and types. [8]
  - Explain the connection design procedure for precast roof and floor slab.[9] b)

#### OR

- Explain precast beam handling and erection stresses. *Q2*) a)
  - Explain construction and design principle of column using IS code. [9] b)
- **Q3**) a) State the advantages of composite construction.
  - b) Design a simply supported composite beam with 10m span shown (dotted line) in the figure 1. The thickness of slab is 125 mm. The floor is to carry an imposed load of 3.0 kN/m<sup>2</sup>, partition load of 1.5 kN/m<sup>2</sup> and a floor finish load of 0.5 kN/m<sup>2</sup>. Assume grade of concrete M25, grade of steel 250 N/mm<sup>2</sup> and density of concrete as 24 kN/m<sup>3</sup>. (Check for flexure only) [11]



OR

*P.T.O.* 

[Max. Marks : 70

[8]

[6]

[Total No. of Pages : 2

<b>Q4</b> )	a)	Write a short note on "Composite Construction".	[6]
	b)	Explain types of profile deck with the help of neat sketches.	[11]
Q5)	a)	Explain types of shear connectors with the help of neak sketches.	[9]
	b)	Explain load bearing mechanism of shear connectors.	[9]
		OR	
<b>Q6</b> )	a)	Explain the design criteria of shear connectors.	[9]
	b)	Explain the concept of full and partial shear connection.	[9]
Q7)	a)	What are the various advantages of composite columns.	[9]

b) Explain with help of neat sketches partially and fully encased concrete encased column. [9]

OR

Q8) Calculate plastic resistance of a steel section made of ISHB 250 encased in concrete. The height of the column is 3.0m and is pin ended. Grade of reinforcement steel is Fe416 and its area is assumes as 0.5% of gross area of concrete. Concrete grade M30. [18]



Total No. of Questions : 8]

**PC2361** 

#### [6354]-477

### **B.E.** (Civil)

HYDROPOWER ENGINEERING

### (2019 Pattern) (Semester - VIII) (Elective - V) (401013E)

*Time* :  $2^{1/2}$  *Hours*]

Instructions to the candidates:

- *1*) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- Figures to the right side indicate full marks. 2)
- Neat diagrams must be drawn wherever necessary. 3)
- Assume suitable data, if necessary. **4**)
- Use of logarithmic tables, slide rule, miller charts, electronic pocket calculator 5) (non-programmable) and steam tables is allowed.

#### *Q1*) a) Explain load curve with neat sketch. [5]

#### Explain different heads acting on Turbines. [6] b)

- In a power station annual factors are as under, Load factor=60%, capacity c) factor = 50% and use factor = 60%. The power plant has maximum demand of 450000kW. Find [6]
  - i) Annual Energy Production.
  - ii) Reserve capacity above peak point.
  - Hours per year the plant is not in use. iii)

#### OR

- What is sedimentation in reservoir? How it is caused? *O2*) a) [5]
  - The thermal power plant consists of  $2 \times 60$  MW units running for 8000 **b**) hours and one 30MW unit running for 2000 hours per year. Energy produced by power plant is  $876 \times 10^6$  kWh per year. Determine plant load factor and plant load use factor. Assume maximum demand is equal to the plant capacity. [6]

#### Define the terms c)

- Utilization factor i)
- ii) Plant capacity factor
- Plant use factor iii)

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

[6]

- Q3) a) What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? [5]
  - b) Explain underground powerhouse and types of layouts of underground powerhouse with neat sketches. [6]
  - c) Discuss different methods of designing penstock. What is meant by economical diameter. [6]

- Q4) a) Explain the three main divisions of power house structure with neat sketch.[5]
  - b) Draw typical layout of power house and explain in brief. [6]
  - c) Define Power house. Explain any four electrical equipment for the power house. [6]
- Q5) a) What is draft tube? What are the functions of draft tube? Explain different types with figures. [9]
  - b) Define Reaction turbine and Impulse turbine with Example. Differentiate between reaction and impulse turbine. [9]

OR

- *Q6*) a) Explain Classification of turbines on the basis of discharge, flow selection and speed. [9]
  - b) Define Turbine. Write short notes on [9]
    - i) Governing of turbines
    - ii) Water hammer in turbines
- Q7) a) What are the provisions related to licensing in case of hydroelectric power generation as per electricity act 2003. [9]
  - b) Write short note on tariff for electrical energy and types of tariffs for hydropower plants. [9]

OR

- Q8) a) Explain the concept of carbon credit. Give its significance. Write long term plans to reduce CO<sub>2</sub> [9]
  - b) What are the factors governing the pricing of electricity? [9]

### $\bigcirc$ $\bigcirc$ $\bigcirc$

Total No. of Questions : 8]

SEAT No. :

# PC2362

[6354]-478 B.E. (Civil)

# STRUCTURALAUDITAND RETROFITTING OF STRUCTURES (2019 Pattern) (Semester - VIII) (Elective - V) (401013F)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat sketches must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- 5) Use of electronic pocket calculator is allowed.
- 6) Use of cell phone is prohibited in the examination hall.
- *Q1*) a) Differentiate between local and global techniques used in Structural Health Monitoring. Provide examples of scenarios where each technique is particularly beneficial.
  - b) Define and elaborate on the concepts of active and passive monitoring, highlighting their roles in SHM. [9]

#### OR

- Q2) a) Explain the principles and applications of remote and wireless SHM techniques. Provide a detailed example of how these techniques are applied in real-world situations. [9]
  - b) Discuss the key components of instrumentation, data acquisition, and data processing in the context of SHM. [9]
- Q3) a) Explain in detail the concept and application of moisture barrier systems as a method of retrofitting structures. Discuss the specific scenarios where this technique is most effective. [8]
  - b) Elaborate on the use of shortcreting as a method of retrofitting. Discuss its advantages and potential challenges. [9]

#### OR

- Q4) a) Provide a detailed explanation of the concept and process of base isolation in retrofitting. Discuss how it enhances the seismic resilience of structures.[8]
  - b) Discuss the unique challenges and considerations associated with the retrofitting of historical structures. Emphasize the importance of preserving historical integrity. [9]

[Max. Marks : 70

[Total No. of Pages : 2

*P.T.O.* 

- Q5) a) Provide an overview of the various types of FRP and elaborate on their distinctive properties. Discuss situations where each type is particularly beneficial in retrofitting applications. [9]
  - b) How is FRP retrofitting carried out using FRP plates? What are the steps involved and how does the application of FRP plates improve the structural behavior of elements? [9]

- Q6) a) Explain the significance of adhering to national and international code provisions in FRP retrofitting. Highlight specific provisions related to safety and performance standards. [6]
  - b) Compare and contrast the use of FRP wrapping and FRP bars in retrofitting. Highlight specific scenarios where each application is most effective. [12]
- Q7) a) Elaborate on the procedure for shear strengthening of RC beams using FRP. Discuss the specific design considerations and how this retrofitting technique enhances structural performance. [8]
  - b) Explain the provisions outlined in ACI 440 concerning the retrofitting of RC beams using FRP for flexural strengthening. [9]

#### OR

- Q8) a) Discuss the steps involved in retrofitting RC beams for flexural strengthening using FRP plates. Include considerations for material selection and application techniques. [8]
  - b) Explain the provisions outlined in ACI 440 related to the retrofitting of RC beams using FRP for shear strengthening. [9]

### $\circ$ $\circ$ $\circ$

PC2363

# [6354]-479 B.E. (Civil) TQM & MIS

### (2019 Pattern) (Semester - VIII) (Elective - VI) (401014A)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Figures to the right indicates full marks.
- 3) Neat figures must be drawn wherever necessary.
- 4) Assume suitable data, if required.
- *Q1*) a) What do you understand by quality audit? State the types and objectives of quality audit. [9]
  - b) State the reasons for implementing a quality system that conforms to ISO standard. [8]

#### OR

- *Q2*) a) What do you understand by Checklist? Prepare a checklist for formwork activity. [8]
  - b) Write a short note on- Quality Management System & Quality Audit.[9]
- **Q3**) a) Define quality circle. Explain the benefits and limitations of the same. [8]
  - b) Explain the concept of cost of quality(COQ). Describe its various categories using suitable diagrams. [9]

#### OR

<b>Q4</b> ) a)	What is benchmarking? State the objectives and limitate benchmarking.	tions of [ <b>8</b> ]
b)	Explain CONQUAS with a suitable example.	[9]
<b>Q5</b> ) a)	Explain with example 5S technique. Also state the benefits.	[9]
b)	Explain in brief 'Failure Mode Effect Analysis (FMEA)'	[9]

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

. . . . .

<b>Q6</b> ) a)	Explain zero defects with suitable example.	[9]
b)	Explain Two Inter-National Quality Awards.	[9]
<b>Q7</b> ) a)	Explain subsystems of MIS in brief.	[9]
b)	Differentiate Between Data and Information.	[9]
	OR	

Q8) a) Explain advantages and limitations of MIS in implementation on construction site. [9]
b) Define Decision Support System. Explain Various Components of DSS.

Define Decision Support System. Explain Various Components of DSS.
 [9]

# 

**PC2364** 

#### [6354]-480

#### B.E. (Civil)

# ADVANCED TRANSPORTATION ENGINEERING (2019 Pattern) (Semester - VIII) (Elective - VI) (401014B)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to right indicate full marks.
- 3) Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.
- 4) Assume suitable data if necessary.
- 5) Neat diagrams must be drawn wherever necessary.

<b><i>Q1</i></b> ) a)	Write a short note on Non-Motorized Transport system in de countries.	eveloped [9]
b)	Explain the pedestrian facility design as per IRC 11-2015	[9]
	OR	
<b>Q2</b> ) a)	Explain Mobility & NMT in sustainable urban development.	[9]
b)	Write a short note on Pedestrian Level of Service.	[9]
<b>Q3)</b> a)	Explain Greenshield's and Greenberg's logarithmic traffic stream	n model. <b>[9]</b>
b)	What is level of service as per HCM and Indo-HCM?	[8]

#### OR

- Q4) a) The normal flow of traffic on crossroads A and B are 400 and 250 vehicles per hour respectively. The saturation of flow for roads A and B are estimated as 1250 and 1000 vehicles per hour respectively. The all-red time for pedestrians to cross is 12 seconds. Design a two-phase traffic system by Webster's method. [9]
  - b) Explain the Concepts of delay and queuing in traffic streams. [8]

*P.T.O.* 

# SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

- Q5) a) State the various flexible pavement design methods. Discuss in detail any one method. [10]
  - b) Explain surface unevenness and measuring road roughness as per IRC SP:16-2019 [8]

- *Q6*) a) Explain the application of IITPAVE software in the design and analysis of flexible pavements. [10]
  - b) Write a short note on distresses in flexible pavement and recommended rectification as per IRC 82: 2015 [8]
- Q7) a) A cement concrete pavement has a thickness of 18 cm and lane width of 7.2 m. Design the tie bars using the data given below: [9]

Allowable working stress in steel =  $1750 \text{ kg/cm}^2$ 

Unit weight of Cement Concrete =  $2400 \text{ kg/cm}^3$ 

Maximum value of friction coefficient = 1.5

Allowable bond stress in deformed bars =  $24.6 \text{ kg/cm}^2$ 

b) Write a short note on expansion joints and contraction joints in rigid pavements. [8]

#### OR

- Q8) a) Explain the procedure for the design of rigid pavements as per IRC 58: 2015
  - b) Write a short note on: [8]

[9]

- i) Flexible overlay over rigid pavements
- ii) Rigid overlay over flexible pavements

# 1

**PC2365** 

#### [6354]-481

### **B.E.** (Civil)

# **GEO SYNTHETIC ENGINEERING** (2019 Pattern) (Semester - VIII) (Elective - VI) (401014C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- Figures to the right indicate full marks. 2)
- Assume suitable data if necessary. 3)
- Use of electronic pocket calculator is allowed in the examination. *4*)
- 5) Neat diagrams must be drawn wherever necessary.
- *Q1*) a) Describe the mechanism of filtration and drainage function. [9]
  - Discuss the importance of geo synthetics in prevention of drainage and b) erosion control. [9]

#### OR

- Write down design step for erosion control of embankment by using *Q2*) a) geosynthetic material. [9]
  - **b**) Explain the basic mechanisms involved in the separation and filtration functions with the help of neat sketches. [9]
- What is the main aim of using geosynthetics in civil engineering projects? *Q3*) a) [9]
  - What benefits come with using geosynthetics in pavement design? [8] **b**)

#### OR

- What are the benefits of using the geotextile layer or layers in the **Q4**) a) construction of unpaved roads? [9]
  - Explain the pavement design process of Giroud and Noiray. [8] b)
- *Q*5) a) What benefits does reinforced earth offer? [9] What are the different mechanisms for soil reinforcement? Explain briefly. b) [9]

*P.T.O.* 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

- Q6) a) Write a note on:
  - i) Gabion wall
  - ii) Geo-grid reinforced soil wall
  - b) List and describe the different reinforced earth wall facing components. Which is the most cost-effective? [9]
- *Q7*) a) Illustrate how the use of Geo-grids can raise the carrying capacity of the soil beneath a footing.[9]
  - b) Compose a brief note about ground improvement's consolidation process. [8]

- *Q8*) a) Write down the importance of ground instrumentation and monitoring system in soil improvement. [9]
  - b) Describe the function of geosynthetic materials in the stability of soil.[8]

# ()

[9]

PC2366

#### [6354]-482

### B.E. (Civil)

# STRUCTURAL DESIGN OF FOUNDATIONS (2019 Pattern) (Semester - VIII) (Elective - VI) (401014D)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic calculator is allowed.

#### *Q1*) a) Classify the pile foundation with significance.

- b) A circular pile with 0.35m diameter and 10m length penetrates a deposit of clay having cohesion  $5 \text{ kN/m}^2$  and mobilizing factor of 0.8. Calculate the ultimate frictional resistance of the pile. [6]
- c) When laterally loaded piles should be used? How modulus of subgrade reaction and relative stiffness is determined in laterally loaded piles? [6]

#### OR

- Q2) a) What is negative skin friction? How it is calculated for single pile embedded in two layers of clay.
  - b) Explain steps for conducting static pile load test. [5]
  - c) In a 16 pile group, the pile diameter is 45cm and center to center spacing of the square group is 1.5m. If  $c=50 \text{ kN/m}^2$ , determine whether the failure would occur with the pile acting individually or as a group? Neglect bearing at the tip of the pile. All are 10m long. Take m=0.7 for shear mobilization around each pile. [6]
- Q3) a) Explain in which conditions well foundation is useful for safe foundation?Enlist the forces acting on a well foundation. [6]
  - b) Define shift and tilt of well foundation. Enlist any four ways to rectify the tilt. [6]
  - c) Describe the components of Well foundation with neat sketch. [5]

[5]

*P.T.O.* 

[Max. Marks : 70

[Total No. of Pages : 2

SEAT No. :

- Q4) a) Explain procedure for design of Well foundation by IRC method. [5]
  - b) Write a note on Pneumatic Caisson Foundation with neat sketch. [6]
  - c) Explain the procedure of sinking of well. [6]
- Q5) a) What is the natural frequency of the foundation soil system? Explain Barken's method for its determination. [6]
  - b) What is requirements of machine foundation. [6]
  - c) State the criteria for design of foundation for Reciprocating type of machine (IS 2974 Part I: 1960) [6]

- *Q6*) a) State the criteria for design of foundation for Impact type of machine (IS 2974 Part II: 1966) [6]
  b) Using Barken's expression for natural frequency and the amplitude of vibrations, calculate the change in the percentage amplitude in terms of r if the soil mass participating in the vibrations is 23% of m. Also calculate this change for r=0.3 and r=2. [6]
  - c) Explain the bulb of pressure concept. [6]
- *Q7*) a) Write the assumptions made for the design of reinforced earth wall. Write steps involved in design of reinforced earth wall. [9]
  - b) Write the steps of stability analysis of gravity retaining wall. [9]

### OR

- Q8) a) Explain Flexible and rigid earth retaining structures with a neat sketches?[9]
  - b) Design cantilever retaining wall for the following data: [9]

Total height of wall is 5.5 m, depth of foundation is 1.8m, density of soil is 19 kN.m<sup>3</sup>, angle of internal friction is 30°, SBC of soil 285 kN/m<sup>2</sup>, coefficient of friction between base & soil is 0.5, level backfill. Assume M20 & Fe415 material. Check the stability of retaining wall.

# 1

PC2367

SEAT No. :

[Total No. of Pages : 2

### [6354]-483

### **B.E.** (Civil Engineering)

# **GREEN STRUCTURES AND SMART CITIES**

### (2019 Pattern) (Semester - VIII) (Elective - VI) (401014E)

*Time : 2½ Hours]* 

[*Ma*.

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Your answers will be valued as a whole.
- 4) Assume suitable data, if necessary.
- 5) Use of electronic pocket calculator and steam table is allowed.

*Q1*) Answer the following.

- a) What is the Energy Conservation Building Code (ECBC-2017) and what are its objectives? [6]
- b) What is the Overall Thermal Transfer Value (OTTV) and why is it important in building design and construction? [5]
- c) What are the key considerations that need to be taken into account when designing and installing comfort systems in buildings? [6]

### OR

- *Q2*) Answer the following.
  - a) How does BIPV technology impact the energy efficiency and overall performance of a building? [6]
  - b) What is the role of government and regulatory bodies in promoting the adoption of ECBC 2017? [6]
  - c) What are some of the challenges associated with implementing low OTTV design strategies in buildings? [5]

*Q3*)Answer the following.

- a) What are the key benefits of smart cities for residents, businesses, and the environment? [6]
- b) How can data be used to improve the efficiency and effectiveness of smart city systems? [5]
- c) How can city planning contribute to sustainable development and the achievement of the Sustainable Development Goals? [6]

[Max. Marks : 70

**Q4**) Answer the following.

- a) What are the key phases/stages involved in a smart city project, and what are the objectives of each phase? [6]
- b) What are the key differences between primary energy demand and final energy demand? [5]
- c) How can statistical analysis help us to identify patterns and trends in data, and what are some of the common methods used for this purpose?
   [6]
- *Q5*) Answer the following.
  - a) What are the challenges that conventional cities face in terms of sustainability and efficient resource use? [6]
  - b) What are the potential benefits of upgrading conventional cities to smart cities? [5]
  - c) What role can green spaces and urban agriculture play in improving the quality of life in conventional cities? [6]

#### OR

- *Q6*) Answer the following.
  - a) How can human error be reduced in situations where reliability is important? Give suitable example. [6]
  - b) How can reliability on the predictability scale be improved in complex and dynamic systems? Give suitable example. [6]
  - c) How has the "100" smart cities initiative contributed to the sustainable development of Indian cities? [5]

*Q7*) Answer the following.

- a) What are the key components of the Swachh Bharat mission and how are they being implemented under the smart cities program? [7]
- b) Give an overview of the smart city projects implemented in Indore, Madhya Pradesh, and how they have transformed the city's governance and service delivery. [7]
- c) What are some of the potential benefits of achieving SDG 11? [5] OR

*Q8*) Answer the following.

- a) What is SDG 11, and why is it important? [5]
- b) Discuss the role of municipal bonds in financing smart city projects in India. [7]
- c) What are the future prospects for using AI in smart city development, and how can it help to build more sustainable and efficient cities? [7]

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[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-484

# B.E. (Civil Engineering) RURAL WATER SUPPLY & SANITATION (2019 Pattern) (Semester - VIII) (401014F) (Elective VI)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.
- 4) Assume suitable additional data, if necessary.
- *Q1*) a) Explain in detail: Various components of Rural Water Supply Scheme.[6]
  - b) Discuss in detail: Advantages and disadvantages of single village WS Scheme. [6]
  - c) Explain in detail: Concept of retrofitting in the context of water supply schemes. [5]

- Q2) a) Explain in detail advantages and disadvantages of Multiple Village Rural WS scheme. [6]
  - b) Explain in detail: Recuperation Test for Rural WS project. [6]
  - c) Enlist any 04 types of reservoirs used in WS scheme. Explain any one in detail. [5]
- Q3) a) Enlist any 04 softwares available for designing of Rural WS scheme.Explain any one in detail. [6]
  - b) Explain in detail water hammer effect. including its control. [6]
  - c) Explain in detail techno-economical aspects of water distribution system. [6]

- Q4) a) Explain in detail what is meant my most economical diameter of a pipe.
  - b) Explain in detail requirement of residual hydraulic pressure in the water distribution network. [6]
  - c) Explain in detail the role of multi-disciplinary teams for Rural Water Supply. [6]
- Q5) a) Discuss in detail the applications of water quality analyzers in water supply schemes.[6]
  - b) Discuss in detail Application of PLC and SCADA for Multi Village WS scheme. [6]
  - c) Explain in detail use of GIS in designing rural WS scheme. [5]

- *Q6*) a) Enlist any 04 types of pressure measuring devices. Explain any one in detail.
  - b) Explain in detail the success story of Malakapur Village. [6]
  - c) Explain in detail use of advanced techniques proves to be economical in long run, for the sustainable water supply scheme. [5]
- (Q7) a) Explain in detail importance of Construction drawings for WS scheme.

[6]

[6]

- b) Explain in detail the methods or tools that can be used to effectively train the villagers on various aspects of water supply operation and maintenance.
   [6]
- c) Explain in detail various maintenance aspects of WS scheme and it's documentation requirements. [6]

#### OR

- Q8) a) Explain in detail how can be the data collection through SCADA systems or IoT devices, assist in preventive maintenance efforts. [6]
  - b) Enlist various types of maintenance of WS scheme. Explain villagers' role in maintenance and documentation of the same. [6]
  - c) What are the potential risks or consequences of neglecting preventive maintenance in water supply systems? Explain in detail. [6]

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**PC-2368** 

SEAT No. :

[Total No. of Pages : 4

# [6354]-485

# B.E. (Computer Engineering) DESIGN AND ANALYSIS OF ALGORITHMS (2019 Pattern) (Semester - VII) (410241)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Figures to the right indicate full marks.
- Q1) a) You are given a set of tasks, each with a deadline and a penalty for missing the deadline. The objective is to schedule these tasks in a way that minimizes the total penalty incurred. However, you can only work on one task at a time, and once a task is started, it must be completed before moving on to the next task. Additionally, you can't start a task after its deadline has passed. Design a greedy algorithm to efficiently schedule these tasks to minimize the total penalty and prove its correctness. [8]
  - b) Suppose we have a knapsack with a maximum weight capacity of 15 units, and we have the following items with their respective weights (Wi) and values (Vi):

Objects	Weight	Value
01	8	10
O2	6	8
O3	4	3
O4	2	4

Use greedy approach to maximize the total value of items we can put into the knapsack without exceeding its weight capacity. [8]

c) With respect to dynamic programming, what do you understand by optimal substructure? [2]

- **Q2**) a) We are given the sequence  $\{4, 10, 3, 12, 20, \text{ and } 7\}$ . We are given with five matrices of the size  $4 \times 10$ ,  $10 \times 3, 3 \times 12$ ,  $12 \times 20, 20 \times 7$  respectively. Use dynamic programming to solve chain matrix multiplication. **[10]** 
  - b) Under what situation do you think the dynamic programming approach for solving a knapsack problem might struggle to find the optimal solution? Briefly explain. [4]
  - c) Enlist the uses of writing control abstraction for any algorithmic strategies.[4]

n	3	)	a)	C	onsider	a ara	nh re	nrecented	hv	the ad	iacenci	matrix	aiven	helow	
$\boldsymbol{\mathcal{U}}$	J	)	a)	C	Jonsider	a gra	phie	presenteu	Uy	ule au	Jacency	/ mauix	given	DEIOW	٠

	A	B	C	D	E	F	G
A	0	1	1	0	0	0	0
В	1	0	0	1	1	0	0
C	1	0	0	0	0	1	1
D	0	1	0	0	0	0	0
E	0	1	0	0	0	0	0
F	0	0	1	0	0	0	0
G	0	0	1	0	0	0	0

Use a recursive backtracking algorithm to colour this graph with three colours R,G,B [8]

b) Consider three items along with respective weights and value as

	Weight	Value
<b>O</b> <sub>1</sub>	10	12
<b>O</b> <sub>2</sub>	8	10
0 <sub>3</sub>	6	8

Assume the Knapsack capacity m = 14. Solve this 0/1 Knapsack problem using LC branch and bound method. [9]

OR

*Q4*) a) We have a salesman who needs to visit four cities (A, B, C, D) and return to the starting city. The distances between these cities are as follows :

Distance from A to B: 10 units

Distance from A to C: 15 units

Distance from A to D: 20 units

Distance from B to C: 35 units

Distance from B to D: 25 units

Distance from C to D: 30 units

Find the shortest possible route that visits each city exactly once and returns to the starting city. Use branch and bound method to find the optimum route for traveling salesman, assume A as a starting point of the tour. [8]

- b) Write a short note on LC branch and bound method. [5]
- c) What are the drawbacks of branch and bound method? [4]

<b>05</b> ) a)	What are the advantages and disadvantages of ·	[8]
$\mathbf{y}$	what are the advantages and disadvantages of .	լօյ

- i) Aggregate Analysis
- ii) Accounting Method
- b) What are approximation algorithms? Based on the approximation ratio, classify the approximation algorithms. [9]

#### OR

- *Q6*) a) Why potential function method cannot be used for analysing binary counter? Explain [8]
  - b) Comment on the following statements : [9]i) "The knapsack problem is NP-hard"
    - ii) "Boolean Satisfiability Problem (SAT) is NP-complete"
    - iii) "Minimum spanning tree is tractable problem"

- Q7) a) Write a Rabin-Karp string matching algorithm. Let input to the algorithm be Original text "t" of length n and pattern text being matched is "p" of length m. What is the expected runtime and worst–case runtime of this algorithm? [10]
  - b) Briefly explain performance measures speedup, efficiency, throughput, contention, and latency of rnultithreaded algorithms. [8]

Q8) a) Consider the graph represented by an adjacency matrix : [10]

	А	B	С	D	E	F	G
A	0	1	1	0	0	0	0
В	1	0	0	1	1	0	0
C	1	0	0	0	0	1	1
D	0	1	0	0	0	0	0
E	0	1	0	0	0	0	0
F	0	0	1	0	0	0	0
G	0	0	1	0	0	0	0

Show stepwise process how the distributed breadth first search algorithm works on the above graph.

b) If we have two matrices of the order m x n and n x p then what will be the time complexity of multiplying these matrices in conventional approach and in multithreaded approach. Discuss. [8]



PC-2369

### [6354]-486

# B.E. (Computer Engineering) MACHINE LEARNING (2019 Pattern) (Semester - VII) (410242)

#### *Time : 2 <sup>1</sup>/<sub>2</sub>Hours]*

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Draw neat diagram wherever necessary.
- 4) Assume suitable data, if necessary.

<b>Q1</b> )	a)	Explain Lasso Regression. Explain how Lasso Regression is used feature selection.	for [6]
	b)	Define different regression models.	[6]
	c)	Describe the bias-variance trade-off and its relationship to under fitt and overfitting.	ing [6]
		OR	
Q2)	a)	Explain the advantages of RMSE over MSE as an evaluation metric.	[6]
	b)	What do you mean by least square method? Explain least square meth in the context of linear regression.	hoc [6]
	c)	Write a short note on Stochastic gradient descendent algorithms.	[6]
Q3)	a)	Explain kernel methods which are suitable for SVM.	[6]
	b)	What are advantages and disadvantages of K-NN?	[6]
	c)	What are different distance metrics are used in K-NN?	[5]

*P.T.O.* 

SEAT No. :

[Total No. of Pages : 2

What is Multi Class Classification? Explain the variants of Multi Class **Q4**) a) Classification. [5] What are different techniques used for outlier handing? b) [6] c) With suitable diagram, Explain Random forest Algorithm with example.[6] **Q5**) a) Why K-medoid is used? Explain K-medoid algorithm. [5] b) Why density based clustering is used? Explain any one. [6] c) Cluster the following eight points (with (x, y) representing locations) into three clusters: [6] P1(1, 3), P2(2, 2), P3(5, 8), P4(8, 5), P5(3, 9), P6(10, 7), P7(3, 3), P8(9, 4), P9(3, 7) Use K-Means Algorithm to find the three cluster OR **Q6**) a) What is isolation factor model? [5] b) Explain Hierarchical Clustering with an example. [6] c) Micro-Average Precision and Recall, Micro-Average F-score, [6] **Q7**) a) Explain Recurrent Neural Networks with an example. [6] What are different activation function used in NN? b) [6] What is multilayer perceptron? Describe with diagram. [6] c) OR **Q8**) a) Explain building blocks of RBF networks. [6] What is personalized recommendation? What is content based b) recommendation? [6] Explain the Convolution Neural Network (CNN) with suitable example.[6] c)



2

Total No. of Questions : 8]

SEAT No. :

**PC-2370** 

[Total No. of Pages : 2

# [6354]-487

# B.E. (Computer Engineering) BLOCKCHAIN TECHNOLOGY (2019 Pattern) (Semester - VII) (410243)

Time : 2<sup>1</sup>/<sub>2</sub> Hours] [Max. Marks : 70 Instructions to the candidates : 1) Solve questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 2) Neat diagrams must be drawn wherever necessary. 3) Figures to the right indicate full marks. 4) Assume suitable data, if necessary. Discuss in brief Bitcoin and Ethereum cryptocurrencies. *Q1*) a) [8] Explain following: [9] b) Proof of work i) ii) Proof of stake and Proof of activity iii) OR *Q2*) a) List and explain types of Blockchain. [8] Explain Byzantine general problem scenario. Explain the problem and its b) probable consequences. [9] Differentiate between Coinbase and Binance. [9] **03**) a) What is Metamask? Discuss any one application of Metamask. [8] b) OR List and explain types of crypto wallet. **Q4**) a) [8] Write a note on Bitcoin. **[9**] b)

*P.T.O.* 

- Q5) a) What is Swarm, and how does it address the need for decentralized storage in the Ethereum network? [9]
  - b) What is Ethereum? Define smart contracts and give an example of a realworld scenario where a smart contract could be beneficial. [9]

- *Q6*) a) State and explain the various components of Ethereum. Explain the various types of Ethereum Networks. [9]
  - b) Explain Decentralized Messaging Platform Whisper and its purpose in the Ethereum ecosystem. [9]
- Q7) a) With the help of neat diagram explain how blockchain can be used for any supply chain application. [9]
  - b) Explain the use of blockchain technology in the government sector. 'Which are the different blockehain based applications proposed for it? [9]

#### OR

- Q8) a) Explain how blockchain and IOT can work together. [9]
  - b) List out the applications of blockchain Technology in different areas. Explain any 2 in detail. [9]

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**PC2371** 

# [6354]-488

#### [Total No. of Pages : 2

**SEAT No. :** 

# **B.E.** (Computer) **PERVASIVE COMPUTING** (2019 Pattern) (Semester-VII) (410244 A) (Elective -III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates: [Max. Marks : 70

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- Assume suitable data, if necessary. 3)
- *Q1*) a) Describe the applications of context aware computing. [8]
  - Explain context aware computing. What are challenges in context aware b) computing. [9]

#### OR

- *Q2*) a) Write a short note on ICT system awareness. [8]
  - How do context aware systems optimize resource allocation based on b) user context. [9]
- *03*) a) Discuss the hurdless while designing intelligent system interaction. [9]
  - Explain reactive type intelligent system model in detail. [9] b)

- Draw and explain Environment Model based intelligent system **Q4**) a) Architecture. [9]
  - What is interaction multiplicity? State different types of interaction b) multiplicity. [9]
- What is HCI? State importance, advantages and disadvantages of HCI.[9] **Q5**) a)
  - What is difference between interaction design and UX design. b) [8]

- *Q6*) a) What do you mean by interaction design? Discuss the need of it in pervasire environment. [8]
  - b) State different challenges in designing privacy protection for wearable devices. [9]
- Q7) a) What are the new access control methods for context aware wearable technology? [9]
  - b) How pervasive computing can be useful in handling social digital divide. [9]

- *Q8*) a) Explain secure resource delivery in detail. [9]
  - b) Describe role of ethics in designing of secure pervasive computing. [9]



**PC2372** 

[6354]-489

[Total No. of Pages :2

SEAT No. :

# **B.E.** (Computer Engineering) MULTIMEDIA TECHNIQUES

## (2019 Pattern) (Semester- VII) (Elective - III) (410244B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data necessary.
- Q1) a) Enumerate three interfaces used for transmitting analog video signals and provide a detailed explanation of one of them. [5]
  - b) What is Versatility? Explain the benefits of using digital encoding for video representation. [6]
  - c) What are the constraints or shortcomings of CRT? Explain a standard electronic signal for a single scan line in NTSC composite video? [6]

#### OR

- Q2) a) What are the commonalities between PAL and SECAM videos, based on their color encoding and lines per frame rate? Explain the NTSC video in detail.
  - b) Explain the advantages of digital representation for video. [6]
  - c) Explain the role of High Dynamic Range (HDR) technology in Ultra High-Definition TV. [6]

*Q3*) a) What is JPEG standard? Draw and explain JPEG encoder? [5]

- b) Explain any three commonly used numerical distortion measures in image compression. [6]
- c) Illustrate the steps involved in the creation of a coding tree for the word "HELLO" using the Shannon-Fano algorithm? [6]

- Q4) a) Explain dictionary-Based Coding and write the steps of LZW Compression for string "ABABBABCABABBA". [5]
  - b) What are advantages and disadvantages of Arithmetic Coding as compared to Huffman Coding. [6]
  - c) Explain the following wavelet transforms [6]
    - i) Continuous Wavelet Transform (CWT)
    - ii) Discrete Wavelet Transform (DWT)

- Q5) a) Enlist the commonly used input devices in immersive experience systems and explain any one. [6]
  - b) What are the challenges and misconceptions associated with the practices of AR, VR, and MR explain in detail. [6]
  - c) What is the role of Tracking and localization in AR? Explain the functional requirements for the augmented reality ecosystem. [6]

- *Q6*) a) List the different categories of head-mounted displays and explain the Mobile VR with an appropriate instance. [6]
  - b) What are the applications and challenges associated with AR displays, and what is their potential for future development? [6]
  - c) Explain the role of Immersive Technologies in the following applications. **[6]** 
    - i) Remote Collaboration
    - ii) Education and Training
- Q7) a) Explain the services required for using M-IoT to enhance road safety systems? [6]
  - b) What are the key functions of AI based software and describe how AI achieves high levels of accuracy. [6]
  - c) Describe the potential challenges that could arise during the implementation of AR technology and describe how AR can be employed for employee training.
     [6]

- *Q8*) a) Explain the significance of immersive experiences in developing academic applications. [6]
  - b) Draw and explain the layers of the Internet of Things (IoT) architecture. [6]
  - c) Explain the importance of Big Data and AI technology in the medical field? [6]



Total No. of Questions : 8]

**PC2373** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-490 B.E. (Computer Engineering) CYBER SECURITY AND DIGITAL FORENSICS (Elective -III) (2019 Pattern) (Semester-VII) (410244 C)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

- Instructions to the candidates: 1) Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7, or Q.8.
  - 2) Neat diagrams must be drawn wherever necessary.
  - 3) Figures to the right indicate full marks.
  - 4) Assume suitable data, if necessary.

Q1) a) What are the typical steps followed by computer forensics specialists in an investigation? Explain any 2 in detail. [8]

b) In what ways can business benefit from computer forensics technology explain in details? [9]

#### OR

- **Q2)** a) Explain in details different computer forensics services. [9]
  - b) Why is data backup & recovery important in computer forensics? [8]
- Q3) a) What are the typical steps involved in the collection of digital evidence?[9]
  - b) What are the different approaches for validating forensic data? [9]

- Q4) a) Why collect evidence? collection options in digital evidence. explain in details? [9]
  - b) Discuss the various legal aspects of collecting and storing digital evidence. [9]
- Q5) a) What are same common network tools, used in network forensics. [9]
  - b) Describe the process of seizing digital evidence at a crime or incident scene? [8]

- **Q6**) a) What is the honeynet project, how does it contribute to network forensics? [9] Give in detail the different techniques to hide data in digital forensics?[8] b) [9] **Q7**) a) Write short note on. Tools for email forensics i) Computer forensics hardware tools ii) Explain the process for validating and testing forensics software. b) [9] OR
- Q8) a) What is function email server show does it store of mange e-mail data?[9]

[9]

- b) Write short note on.
  - i) Computer forensics software tools
  - ii) E-mail Investigations

###
**PC2374** 

[6354]-491

[Total No. of Pages :2

SEAT No. :

### **B.E.** (Computer Engineering)

### **OBJECT ORIENTED MODELING & DESIGN**

#### (2019 Pattern) (Semester- VII) (Elective - III) (410244D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- Q1) a) What is an Actor, a Use Case, Use case diagram, Explain various relationships in use case diagram with example. [5]
  - b) Draw State Diagram for cash Despenser and explain concurrency. [5]
  - c) Draw an ACTIVITY diagram for describing how selling two wheeler to a customer take place at a dealers Place. Customer can enquire about the two wheeler model available, a sale person is assign to show the customer the vehicles, the sale person show the available two wheelers, customer choose the model for purchase, he can optionally take, accessories like rear-guard etc,ask for a quotation and choose to purchase a vehicle if interested Explain notation used in a sentence each. [8]

#### OR

- *Q2*) a) Write the Use case description for Buying a beverage [5]
  - b) Model a SEQUENCE diagram for 'Rent a Car'. Use Case in an online web based car rental application. Here are some of the assumptions. The customer needs to first choose the type of the car he wants to rent. The car database is maintained in the system organized into type like family car, sports car etc. Based on the car available, the rates of rental are shown, the booking is then made, confirmed, the booking details stored in the system and user is issued an electronic confirmation of the booking.
  - c) Draw Sate diagram for telephone line connection. Give the meaning of Event, State and transition in the diagram. [8]

<b>Q3</b> ) a)	Illustrate different reuse things that can be considered during modelling a system. [5]
b)	What are the different Software Control Strategy used in system design.[5]
c)	Illustrate what is Subsystem along with ways in which Subsystems can
,	communicate. [7]
	OR
<b>Q4</b> ) a)	While designing a system explain how data storage management is
	designed. [5]
b)	How Global Resources are Handled while System design [5]
c)	What are the different architecture styles followed in Software design.
	Draw Architecture of ATM system. [7]
<b>Q</b> 5) a)	How adjustment of inheritance is done in class design. Explain. [5]
b)	Explain the tasks involved in design optimization. [5]
c)	What is the importance of adjustment of inheritance? Discuss the steps
	doing it. [7]
	OR
<b>Q6</b> ) a)	What are the steps involved in class design. Explain How to bridge the
	gap from high level requirement to low level services. [5]
b)	Discuss how you identify use cases and actors with respect to use case
	diagrams? [5]
c)	Explain the following terms in relation to class design [7]
	i) Refactoring
	ii) Reification.
<b>Q</b> 7) a)	Explain three important parts of design pattern. [5]
b)	What is communication pattern? Explain any one communication pattern
,	in detail. [5]
c)	What is Design Pattern? Explain different types of design Patterns. [8]
	OR
<b>Q8</b> ) a)	Explain counted pointer example in detailed. [5]
b)	What is view handler pattern? Explain in detail.[5]
c)	Write short note on [8]
	1) Client Dispatcher server
	ii) Publisher subscriber

#### [6354]-492

[Total No. of Pages : 2

**SEAT No. :** 

### B.E. (Computer Engineering) DIGITAL SIGNAL PROCESSING (2019 Pattern) (Semester - VII) (Elective - III) (410244E)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Find the Z-transform of the following discrete time signal and find the ROC [8]

i) 
$$x(n) = (-\frac{1}{5})^n u(n) + (\frac{1}{2})^{-n} u(-n-1)$$

ii) 
$$x(n) = (n+0.5)(\frac{1}{5})^n u(n)$$

- b) State and prove the convolution property of Z-transform. [6]
- c) Explain IZT with Power Series Methods.

#### OR

- Q2) a) An LTI system is described by equation. [8] y(n) = x (n) + 0.8 x (n - 1) + 0.8 x (n - 2) - 0.49 y (n - 2).Determine the transfer function of the system. Sketch the poles and zeros on the z - plane.
  - b) Find the impulse response of the system described by the difference equation, [6]

$$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1).$$

- c) Explain Residue Method for inverse Z-Transform. [4]
- **Q3)** a) Find the magnitude response and impulse response of a system described by the difference equation. -y(n) 1/2 y(n 1) = x(n) 1/4 x(n 1)[10]
  - b) Define Unilateral Z -transform. What are the different characteristics of it? State Time Delay & time Advance property of unilateral Z -transform.[7]

[4]

**Q4**) a) Explain the method of simple geometric construction to obtain the phase & Frequency response of DT system given by. y(n) = 2x(n) + x(n-1)

[10]

- b) State and prove the following properties of DFT: [7]
  - i) Time reversal property
  - ii) Complex conjugate property
- **Q5**) a) Realize the following FIR system with minimum number of multipliers.[10]  $h(n) = \{-0.5, 0.8, -0.5\}$ 
  - b) Compare FIR and IIR filters.

[8]

#### OR

- Q6) a) What is the Principle of Impulse Invariant method? Explain the mapping between S Plane to Z Plane for Impulse Invariant method. Explain transformation of analog filter into a stable digital filter using this method.
   [10]
  - b) Write a short note on Commonly used Windows and their functions to design the filter. [8]
- *Q7*) a) Explain Direct form, cascade Form and parallel form of IIR System.[10]
  b) Discuss ADSP 21XX Features, what is use of DAG1 and DAG2. [7]

#### OR

Q8) a) Explain SHARC DSP Processor. [10]
b) Discuss OMAP (Open Multimedia Application Form), How can a student use an OMAP. [7]

### 1

**PC2376** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-493 B.E. (Computer Engineering) INFORMATION RETRIEVAL (2019 Pattern) (Semester - VII) (Elective - IV) (410245 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1)	a)	List out the General-Purpose Data Compression techniques and expl with suitable example.	lain <b>[6]</b>
	b)	Describe in detail Invalidation List, Garbage Collection, Docum	ient
		Modifications in document deletion.	[6]
	c)	Write a short note on.	[6]
		i) Modeling and coding	
		ii) Arithmetic Coding	
		OR	
Q2)	a)	Explain software Architecture of the IR system in detail.	[6]
	b)	Explain in details:	[6]
		i) Decoding performance	
		ii) Document Reordering	
	c)	Describe data compression with Huffman coding.	[6]
Q3)	a)	Explain categorization and filtering with any two detailed examples.	[7]
	b)	Describe passage retrieval and ranking with example.	[5]
	c)	Explain the Information-Theoretic Model in detail.	[5]
		OR	
<b>Q4</b> )	a)	Explain probabilistic Classifiers & Generalized Linear Models.	[7]
	b)	Explain Relevance Feedback Technique with suitable diagram.	[5]
	c)	Describe Language Models and Smoothing.	[5]

<b>Q</b> 5)	a)	Exp and	plain Measuring effectiveness like Traditional effectiveness me the text retrieval conference (TREC) with suitable examples.	asure [6]
	b)	Wr	ite a short note on:	[6]
		i)	Nontraditional effectiveness measures.	
		ii)	Measuring efficiency	
	c)	Exp	plain query scheduling with suitable examples.	[6]
			OR	
<b>Q6</b> )	a)	Wr	ite a short note on:	[6]
		i)	Minimizing adjudication effort.	
		ii)	Using statistics in evaluation	
	b)	Exp	plain caching with suitable examples.	[6]
	c)	Dif	ferentiate between Redis and Memcached.	[6]
Q7)	a)	Des	scribe Map reduce with suitable examples.	[6]
	b)	Wr	ite a short note on:	[6]
		i)	The structure of the web	
		ii)	Python Scrapy	
	c)	Des	scribe web crawler with its components.	[5]
			OR	
Q8)	a)	Des	scribe Parallel Query Processing with suitable examples.	[6]
	b)	Exp	plain the following term:	
		i)	Static ranking	
		ii)	Dynamic ranking	[6]
	c)	Wr	ite a short note on Evaluation web search.	[5]

### \* \* \*

**PC2377** 

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

SEAT No. :

[Total No. of Pages : 2

#### [6354]-494

### B.E. (Computer Engineering) GPU PROGRAMMING AND ARCHITECTURE (2019 Pattern) (Semester - VII) (Elective - IV) (410245 B)

Instr	ructi	ons to the candidates:	
	<i>1</i> )	Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.	
	2)	Figures to the right indicate full marks.	
	3)	Assume suitable data if necessary.	
	4)	Draw diagrams if necessary.	
<b>Q1</b> )	a)	What is the importance of CUDA error handling APIs.	[9]
	b)	What issues can be faced in parallel programming.	[9]
		OR	
Q2)	a)	What is defensive programming? Explain in brief.	[9]
	b)	Explain different CUDA error handling tools.	[9]
Q3)	a)	Draw and explain OpenCL architecture.	[9]
	b)	Explain kernel programming model.	[8]
		OR	

<b>Q4</b> ) a)	Explain OpenCL memory hierarchy.	[9]
b)	What is pipe memory object?	[8]

- **Q5**) a) How MPI communication is done on GPU? [9]
  - b) Explain GPU streams in detail. [9]

[Max. Marks : 70

#### **b.** :

<b>Q6</b> ) a)	What is task parallelism and data parallelism?	[9]
b)	Explain the term MPI.	[9]
<b>Q7</b> ) a)	Explain any one OpenCL application in detail.	[9]
b)	How OpenCL can be used for heterogeneous computing?	[8]
	OP	
	OK	
<b>Q8)</b> a)	Write a short note on Efficient Neural training and Inferencing.	[9]

b)	Explain OpenCL application design process.	[8]
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**PC2378** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-495 B.E. (Computer Engineering) MOBILE COMPUTING (2019 Pattern) (Semester - VII) (Elective - IV) (410245 C)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be brawn wherever necessary.
- 4) Assume suitable data if necessary.

<b>Q1</b> ) a)	List and explain functionality of serving GPRS support node and C	lateway
	GPRS Support node.	[6]
b)	Compare various IEEE 802.11x standards.	[6]

c) Explain the protocol architecture of IEEE802.11. [6]

#### OR

Q2)	a)	Expl	ain GSM Architecture in details.	[6]
	b)	Expl	ain different architectures of WLAN.	[6]
	c)	Writ	e a short note on	[6]
		i)	HSCSD data service	
		ii)	GPRS data service	
Q3)	a)	Expl	ain GSM radio interface.	[6]
	b)	Expl	ain the process of call origination and call termination in GSM.	[6]

c) Differentiate between hard and soft handoff. [5]

[Max. Marks : 70

<b>Q4</b> )	a)	Define Handover. List and explain the types of handover.	5]
	b)	Explain the following term [6	5]
		i) Cell Dragging	
		ii) Umbrella cell concept	
	c)	With neat diagram explain call termination procedure.[5]	5]
Q5)	a)	Explain agent advertisement in Mobile IP? [6	5]
	b)	Write a short note on[6]	5]
		i) MANET	
		ii) VANET	
	c)	Explain 3G Wireless Standards [6	5]
		OR	
<b>Q6</b> )	a)	Explain Agent advertisement and discovery registration in mobile network	k. 5]
	b)	Explain in Details IPv6. [6	5]
	c)	Explain in details Wireless Application Protocol (WAP) [6	5]
Q7)	a)	Write a short note on Long Term Evolution (LTE) in 4G.	5]
	b)	Write a short note on VoLGA architecture. [6	5]
	c)	Explain 3G and 4G technologies for GSM and CDMA. [5	5]
		OR	
Q8)	a)	Explain the 4G LTE architecture with a neat diagram. [6	5]
	b)	Write a short note on: Evolution from UMTS to LTE.	5]
	c)	Explain role of 5G in IoT. [5	5]

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[6354]-495

2

PC2379

SEAT No. :

[Total No. of Pages : 2

### [6354]-496

### B.E. (Computer Engineering) SOFTWARE TESTING & QUALITY ASSURANCE (2019 Pattern) (Semester - VII) (Elective - IV) (410245 D)

Time : 24	/2 Hours] [Max. Mar.	ks : 70
1) 2) 3) 4)	Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Figures to the right side indicate full marks. Assume suitable data if necessary. Neat diagrams must be drawn wherever necessary.	
<b>Q1</b> ) a)	Identify the importance of Regression testing & explain it.	[6]
b)	Explain any two non functional testing.	[6]
c)	Can you explain statement coverage & Branch coverage testing?	[6]
	OR	
<b>Q2</b> ) a)	Explain any two functional testing.	[6]
b)	Explain in detail performance testing with example.	[6]
c)	What do you think about dynamic techniques?	[6]
<b>Q3</b> ) a)	Differentiate between quality assurance & qualits contorl.	[6]
b)	Can you clarify different levels of cmm.	[6]
c)	Illustrate selenium's IDE and explain indetail.	[5]
	OR	
<b>Q4</b> ) a)	Why software has defects? explain in detail.	[6]
b)	Explain in detail reliability of quality Process.	[6]
c)	Explain Important Aspects of quality management.	[5]

<b>Q5)</b> a)	Illustrate selenium tool suite in detail.	[6]
b)	Construct different automated festing process.	[6]
c)	Explain Robotic process Automation in details.	[6]
	OR	
<b>Q6</b> ) a)	What is performance testing. What is use of it.	[6]
b)	How would you explain selenium web driver? Explain it	[6]
c)	Construct different automated testing process.	[6]
<b>Q7</b> ) a)	Can you explain how to maintain SQA.	[6]
b)	Compare Run charts and control chart in detail.	[6]
c)	Explain six sigma characteristics in details.	[5]
	OR	
<b>Q8</b> ) a)	Compare flow charts and control chart in detail.	[6]
b)	Explain in detail total quality management.	[6]
c)	Compare the Ishikawa's flow chart and histogram tool.	[5]

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SEAT No. :

[Total No. of Pages : 2

### [6354]-497 B.E. (Computer) COMPILERS

#### (2019 Pattern) (Semester - VII) (Elective - IV) (410245 E)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.
- **Q1**) a) What is Three Address Code? Generate Quadruple, Triple, Indirect Triple form for following expression.  $A = B^{*}(C+D)/E$ . [8]
  - b) Why is intermediate code needed in compilers? Explain the steps involved in generating intermediate code for an assignment statement.
     x = a + b\*(c -d) [6]
  - c) What is a syntax-directed translation scheme? Explain its components.[4]

#### OR

- Q2) a) What is syntax tree? Construct syntax tree and postfix notation for the following expression: (a+(b\*c)^d-e/(f+g) [8]
  - b) Explain how synthesized and inherited attributes are evaluated in S and L attributed grammars. [6]
  - c) Compare and contrast bottom-up and top-down evaluations in terms of efficiency and ease of implementation. [4]
- *Q3*) a) Write SDD for if...else, if...then... else and while...do statement. [9]
  - b) Define Static, Stack, and Heap memory allocation schemes with their merits and limitations. [8]

#### OR

- Q4) a) Explain different parameter passing mechanisms, such as pass by value and pass by reference with example also discuss the process of returning values from functions. [9]
  - b) What is activation record? Write the various fields of Activation Record.[8]

[Max. Marks : 70

Q5)	a)	Discuss various issues in code generation. [4]
	b)	Explain peephole optimization with suitable example. [4]
	c)	Consider the following program code:
		Prod = 0;
		I = 1;
		Do{
		Prod = prod + a[i] * b[i];
		I = i + 1;
		while (i < = 10);
		i) Partition in into blocks
		ii) Construct the flow graph [9]
		OR
<b>Q6</b> )	a)	What is control and data flow analysis? Explain with example. [4]
	b)	Draw the syntax tree and DAG for the following expression: [9]
		(a*b) + (c-d)* (a*b)+b
	c)	Explain the importance of register allocation and assignment in code
		generation. [4]
07)	-)	Write showt water an Data flame and the set of the state flame and have a
$Q^{\prime})$	a)	write short note on Data flow equations and iterative data flow analysis.[6]
	b)	What is compile-time evaluation, and why is it important in optimization? [4]
	c)	What is code optimization? Explain machine dependent and independent
		code optimization. [8]
		OR
Q8)	a)	Why there is need of code optimization? Explain following optimizations with example. [6]
		i) Dead code elimination
		ii) Code movement
	b)	Explain the concept of variable propagation in compiler optimization
		along with example. [4]
	c)	What is common sub-expression and how to eliminate it? Explain with
	,	example. [8]

\* \* \*

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SEAT No. :

### PC2381

#### [6354]-498

### B.E. (Computer Engineering) HIGH PERFORMANCE COMPUTING (2019 Pattern) (Semester - VIII) (410250)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- o the canalaates:
- Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
   No. 41
- 2) Neat diagrams must be drawn wherever necessary.
- Q1) a) Explain it with the help of algorithm for all-to-all broadcast on hypercube.[6]
  - b) Describe One-to-All Broadcast and All-to-One Reduction on Rings. [6]
  - c) Explain how non-blocking communication is finalised. [5]

#### OR

- Q2) a) Explain Prefix-Sum Operations on eight-node hypercube with help of diagram.[6]
  - b) Explain All-to-All Broadcast and Reduction on a Ring with help of algorithm. [6]
  - c) What is non-blocking communication? Explain isend, irecv methods. [5]
- Q3) a) With help of example, explain Effect of Granularity on Performance. [6]
  - b) Describe a situation where fine-grained parallelism might be more appropriate than coarse- grained parallelism for improving scalability. [6]
  - c) Describe Sources of Overhead in Parallel Programs and comments on how to avoid it. [5]

#### OR

- Q4) a) What are the key factors that can limit the scalability of a parallel application, and how can they be addressed? [6]
  - b) Explain Isoefficiency Metric of Scalability and Describe a scenario where an isoefficiency value of 1 would indicate perfect scalability. [6]
  - c) Enlist performance Metrics for Parallel Systems and explain any two. [5]

[Max. Marks : 70

[Total No. of Pages : 2

Q5)	a)	Explain the concept of parallel processing in CUDA architecture at how it differs from traditional CPU-based computing.	nd <b>8]</b>
	b)	Explain the distinction between global memory and shared memory CUDA. How are they used differently?	in 6]
	c)	Describe how communication managed and synchronized in CUDA.	<b>4</b> ]
		OR	
<b>Q6</b> )	a)	Explain CUDA memory model with help of CU DA memory hierarchy.[	8]
	b)	Explain processing flow of CUDA along with CUDA C functions used.[	6]
	c)	Enlist and explain applications of CUDA.	4]
Q7)	a)	Explain parallel Bubble sort with help of algorithm.	8]
	b)	Explain Kuberbets framework with help of diagram.	6]
	c)	Explain how Document classification works in Distributed Computing.[	<b>4</b> ]
		OR	
Q8)	a)	Explain parallel Merge sort with help of algorithm.	8]
	b)	Explain the concept of container orchestration in Kubernetes. How do it simplify application deployment and management?	es 6]
	c)	Elaborate use of AI/ML in Parallel Computing.	4]



**PC-2382** 

[Total No. of Pages : 2

**SEAT No. :** 

### [6354] - 499

# B.E. (Computer Engineering) Deep Learning

### (2019 Pattern) (Semester - VIII) (410251)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn whenever necessary.
- 4) Make suitable assumption whenever necessary.
- *Q1*) a) How would you describe the architecture of a typical Convolutional Neural Network (CNN)? Explain the main components and their roles. [6]
  - b) What is the purpose of pooling layers in Convolutional Neural Networks? Explain how max pooling and average pooling contribute to down-sampling the input data. [6]
  - c) How do data augmentation and dropout regularization techniques contribute to training CNNs? [6]

#### OR

- Q2) a) What role does padding play in Convolutional Neural Networks? How does it impact the size of the output feature maps? [6]
  - b) Explain typical process involved in training a Convolutional Neural Network, including the key steps and optimization techniques used? [6]
  - c) Explain the purpose of LRN in enhancing the performance of CNNs.[6]
- Q3) a) Explain the concept of unfolding computational graphs in the context of recurrent networks. [6]
  - b) Explain the challenge of long-term dependencies in the context of recurrent neural networks, including the issues of vanishing and exploding gradients.

[6]

c) What are some common performance metrics used to evaluate the effectiveness of recurrent neural networks? [5]

*P.T.O.* 

[Max. Marks : 70

OR

- Q4) a) Describe the architecture and usage of Bidirectional RNNs. What advantages do they offer in sequence modeling tasks? [6]
  - b) What are Leaky Units, and how do they contribute to handling multiple time scales in the context of recurrent neural networks? [6]
  - c) What are Echo State Networks (ESNs), and how do they address the challenge of long-term dependencies? [5]
- Q5) a) How do deep generative models differ from discriminative models in terms of their learning and inference mechanisms? [6]
  - b) How are Deep Belief Networks structured, and how do they leverage the concept of restricted Boltzmann machines in theft architecture? [6]
  - c) What is a Generative Adversarial Network (GAN), and how does it work? [6]

#### OR

- *Q6*) a) Explain the concept of latent variables in deep generative models and their role in capturing complex data distributions. [6]
  - b) What are the fundamental characteristics of Boltzmann Machines, and how do they model probabilistic dependencies among variables? [6]
  - c) How can GANs be used in generating realistic images, such as human faces or artistic images? [6]

#### OR

- Q7) a) Explain objectives and challenges of deep reinforcement learning in comparison to traditional reinforcement learning methods. [6]
  - b) Describe the concept of Deep Q-Networks (DQN) and how they combine Q-learning with deep neural networks. [6]
  - c) Explain how dynamic programming algorithms, such as policy iteration and value iteration, are used in reinforcement learning. [5]

#### OR

- Q8) a) What are the key components of an Markov Decision Process, and how do they relate to the decision-making process of an agent? [6]
  - b) How do Deep Q Recurrent Networks extend the capabilities of Deep Q-Networks in handling sequential decision-making problems? [6]
  - c) How can reinforcement learning be applied to learn to play Tic-Tac-Toe?

[5]

# 

### [6354]-499

PC2383

[6354]-500

B.E. (Computer Engineering) NATURAL LANGUAGE PROCESSING

#### (2019 Pattern) (Semester - VIII) (Elective - V) (410252 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4. Q5 or Q6 and Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data necessary.

<b>Q1</b> )	a)	Write a note on Generative Models of Language.	[4]
	b)	Describe LDA for topic modeling with example.	[8]
	c)	Describe HMM with help of example.	[6]
		OR	
Q2)	a)	Write a note on Latent Semantic Analysis (LSA).	[4]
	b)	Explain BERT.	[8]
	c)	What is Smoothing? Explain Laplace/Add-1 smoothing with example	e. <b>[6]</b>
Q3)	a)	Define following w. r. t. Information Retrieval	[6]
		i) Term Frequency	
		ii) Inverse Document Frequency	
	b)	Explain Information Retrieval architecture with neat diagram.	[8]
	c)	Describe co-reference resolution with example.	[4]
		OR	
Q4)	a)	Explain Entity Extraction and Relation Extraction w. r. t. NER.	[6]
	b)	Explain Cross Lingual Information Retrieval with example.	[8]
	c)	Describe Vector Space Model for Information Retrieval.	[4]

*P.T.O*.

[Total No. of Pages : 2

**SEAT No. :** 

<b>Q5)</b> a)	Describe Lesk algorithm and Walker's algorithm for Word Sense [10]
b)	Write a note on SpyCy Library. [7]
	OR
<b>Q6</b> ) a)	Explain following Lexical Knowledge Networks: [10]
	i) TreeBanks
	ii) PropBanks
	iii) WordNet
	iv) IndoWordNet
	v) VerbNets
b)	List tools available for development of NLP applications. Write features of any 3 tools. [7]
<b>Q7</b> ) a)	Explain Rule Based Machine Translation and Statistical Machine Translation with suitable diagram and example. [10]
b)	Explain Question Answering system with neat diagram. [7]
	OR
<b>Q8)</b> a)	Write a note on-Sentiment Analysis.[10]

b) Explain Natural Language Generation with reference architecture. [7]



### [6354]-501 **B.E.** (Computer Engineering) **IMAGE PROCESSING** (2019 Pattern) (Semester - VIII) (Elective - V) (410252 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* Instructions to the candidates: [Max. Marks : 70

- Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1)
- 2) Neat diagram must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

<i>Q1</i> ) a) Explain Image Segmentation with its application? [0	[6]
--	-----

- Discuss various steps involved in Canny Edge detection algorithms? [6] b)
- Explain Region Splitting and Region Merging method in region based c) segmentation. [6]

#### OR

<b>Q2</b> ) a)	Explain Hough Transform with suitable example.	[6]
b)	Explain Watershed Segmentation method in image segmentation.	[6]
c)	Write the short note on K-means clustering algorithm.	[6]

For the image shown below, perform the Huffman coding algorithm. [6] **Q3**) a)

(3	3	3	2)
2	3	3	3
3	2	2	2
(2)	1	1	0)

b)	Write short note on Object Recognition methods?	[6]
c)	Describe Image Compression Model?	[6]

*P.T.O.* 

[Total No. of Pages : 2

**SEAT No. :** 

<b>Q4</b> )	a)	Explain Run length encoding with example.	[6]
	b)	Explain Arithmetic Coding Compression method with example.	[6]
	c)	Explain Wavelet based Image Compression technique.	[6]
Q5)	a)	Explain any three noise models?	[6]
	b)	Compare the Image Enhancement and Image Restoration.	[6]
	c)	Write short note on Blind Deconvolution technique.	[5]
		OR	
<b>Q6</b> )	a)	Explain Image degradation model with diagram.	[6]
	b)	Explain Wiener Filter used in Image Restoration.	[6]
	c)	Explain Inverse Filtering?	[5]
Q7)	a)	"Role of Image Processing in Medical Imaging", Justify?	[6]
	b)	Explain in detail the Computer Tomography?	[6]
	c)	Explain Remote Sensing Process and it's any two advantages.	[5]
		OR	
<b>Q</b> 8)	a)	What are Medical Image Modalities?	[6]
	b)	Explain Coordinate System for Photogrammetry.	[6]
	c)	Explain Multispectral and Hyper spectral Imaging in Remote Sensing	?[5]

### $\circ$ $\circ$ $\circ$

PC2385

[6354]-502

### **B.E.** (Computer Engineering) SOFTWARE DEFINED NETWORKS

### (2019 Pattern) (Semester - VIII) (Elective - V) (410252 C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- Figures to the right side indicate full marks. 2)
- 3) Neat diagram mast be drawn wherever necessary.
- 4) Assume suitable data if necessary

<b>Q1</b> )	a)	Explain the SDN strategies to centralize Management in the data center	:[6]
	b)	Write a short note on VLANs-EVPn-VxLAN-NVGRE?	[6]
	c)	What short note on Traffic Engineering?	[6]
		OR	
Q2)	a)	Explain the data center architecture components.	[6]
	b)	Explain SDN Use Cases in Data Centre.	[6]
	c)	Explain the following terms with respect to data center demands, Add Moving, Deleting, Failure recovery, and Multitenancy.	ing, [ <b>6</b> ]
Q3)	a)	What is mininet? Explain its basic commands.	[6]
	b)	What is SDN Programming? What are Current Languages and tools u in SDN Programming.	ised [6]
	c)	What are the applications of SDN?	[5]
		OR	
Q4)	a)	What is the Composition of SDN?	[6]
	b)	Explain Northbound Application Programming Interface.	[6]
	c)	Explain in detail Network Function Virtualization (NFV)?	[5]

[Max. Marks : 70

**SEAT No. :** 

[Total No. of Pages : 2

*P.T.O.* 

Q5)	a)	Discuss any one NFV deployment case study.	[6]
	b)	What is an in-line Network Function?	[6]
	c)	Explain Southbound Application Interface in detail.	[6]
		OR	
<b>Q6</b> )	a)	Explain NVF architecture.	[6]
	b)	What are the challenges of NVF?	[6]
	c)	Distinguish between SDN Vs NVF.	[6]
Q7)	a)	Explain Bandwidth Calendaring (BWC)?	[6]
	b)	What is IETF SDN Framework?	[6]
	c)	Explain Juniper SDN Framework	[5]
		OR	
Q8)	a)	Write in brief about Floodlight Controller?	[6]
	b)	Explain ODL (Open Daylight) controller?	[6]
	c)	Write a short note on Data Center Orchestration.	[5]

 $\circ$   $\circ$   $\circ$ 

PC2386

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

#### [6354]-503

### B.E. (Computer Engineering) ADVANCED DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - VIII) (Elective - V) (410252 D) (Theory)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary
- 4) Assume suitable data if necessary

Q1) a) What is Multirate signal processing? and what are the advantages of Multirate signal processing? [6]

- b) Explain the polyphase structure of Decimator and Interpolator [6]
- c) Explain the process of reducing the sampling rate by a factor D [5]

#### OR

Q2)	a)	Explain the design steps involved in the implementation of Multi- sampling rate converter.	rate [6]
	b)	Write a short note on AR Lattice and ARMA Lattice -Ladder filter	[6]
	c)	Explain the process of Interpolation by factor I	[5]
Q3)	a)	Discuss problems in power spectrum estimation and application.	[6]
	b)	Write down the applications of DCT and WT in spectral estimation?	[6]
	c)	Write a short note on Harr wavelet & Dubecheis wavelet.	[6]

#### OR

<b>Q4</b> ) a)	Compare various non-parametric methods of power spectrum.	[6]
b)	Define Short Time & Fourier Transform (STFT).	[6]
c)	Write a short note on 'The Periodogram'.	[6]

*P.T.O.* 

- **Q5**) a) Explain Vector Quantization based Coders for speech coding. [5]
  - b) What is the process for segmentation and speech recognition. [5]
  - c) Explain LPC Based synthesizer using Block schematic. [8]

#### OR

- Q6) a) Discuss phase vocoder in speech coding of speech processing. [5]
  - b) Write a short note on Harmonic coding in speech coding. [5]
  - c) Explain the steps involved in Text to speech conversion. [8]
- Q7) a) Define sampling & quantization & represent the Image as 2D signal. [8]
  - b) What are the different types of order statistic filter in Image processing.[9]

#### OR

- *Q8*) a) Enlist the types of Computerized process in Processing of Image. And give the application of Image processing. [8]
  - b) Define Image smoothing, Sharpening and explain Low Pass, High Pass filtering in Image processing. [9]

 $\bigcirc$   $\bigcirc$   $\bigcirc$ 

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

### [6354]-504

#### [Total No. of Pages : 2

[Max. Marks : 70

SEAT No. :

### B.E. (Computer Engineering) PATTERN RECOGNITION

### (2019 Pattern) (Semester - VIII) (Elective - VI) (410253(A))

Inst	ructi	ons to the candidates:	
	<i>1</i> )	Attempt Q.1 or Q.2, & Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.	
	2)	Neat diagram must be drawn wherever necessary.	
	3)	Figures to the right indicate full marks.	
Q1,	) a)	Analyze string Generation in pattern recognition.	[6]
	b)	What are the applications of stochastic method in pattern rec	ognition.[6]
	c)	Explain in detail elements of normal grammar.	[5]
		OR	
Q2)	) a)	What is stochastic grammar and its application.	[6]
	b)	Explain in detail random forest.	[6]
	c)	Explain in detail the elements of formal grammar.	[5]
Q3)	) a)	Explain minimum spanning tree with example.	[6]
	b)	Describe partition clustering in detail.	[6]
	c)	Explain in detail the single linkage, complete linkage and averalgorithm.	rage linkage [5]
		OR	
Q4,	) a)	Explain in detail k-Mean Algorithm.	[6]
	b)	What is clustering algorithm based on graph theory.	[6]

c) Explain word's method in details. [5]

Q5)	a)	Explain Bellman's optimality principle and dynamic programming.	[6]
	b)	Explain Dynamic time warping.	[6]
	c)	Explain measures based on correlations.	[6]
		OR	
<b>Q6</b> )	a)	What is Edit distance? Explain with example.	[6]
	b)	Explain Bellman ford algorithm with example.	[6]
	c)	Illustrate the Pearson correlation coefficient and the Spearman correlation coefficient.	rank [ <b>6</b> ]
Q7)	a)	Explain IRIS scanner and give its application.	[6]
	b)	Explain in details of biometric.	[6]
	c)	What is application of pattern recognition techniques in object recogni	tion. [ <b>6</b> ]
		OR	

<b>Q8</b> ) a)	Explain the steps involve in Genetic algorithm for pattern classific	ation.[6]
b)	Write a note on fuzzy pattern classifiers.	[6]
c)	What is facial recognition and explain any three applications.	[6]

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#### [6354]-505

[Total No. of Pages : 2

**SEAT No. :** 

### B.E. (Computer Engineering) SOFT COMPUTING

### (2019 Pattern) (Semester - VIII) (Elective - VI) (410253(B))

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- *Q1*) a) Explain in detail Hill climbing algorithm and its limitations. [7]
  - b) What is the evolutionary strategy? How does it help to solve problems?[5]
  - c) List out the features of biological evolution of Evolutionary Computing. Explain applications of Evolutionary Computing. [6]

#### OR

- Q2) a) Summarise three steps of evolutionary programming. List out possible mutation operators for the same. [9]
  - b) Explain basic flow of Particle Swarm Optimization. Describe applications of particle swarm optimization. [9]
- Q3) a) What are the different properties associated with Fuzzy sets? [5]
  - b) Define Classical sets. What are the different operations on classical set?[5]
  - c) What is Defuzzification? Compare Fuzzification and Defuzzification approaches with suitable examples. [7]

#### OR

- *Q4*) a) Explain how fuzzy relation is converted into a crisp set relation using lamda cut process. [5]
  - b) Write short note on fuzzy membership function and state its importance in fuzzy logic. [5]
  - c) Explain in detail the architecture and operation of Fuzzy Logic Control (FLC) System. [7]

*P.T.O.* 

#### [Max. Marks : 70

Q5) a) With a neat flowchart, explain the operation of a simple genetic algorithm.

[9]

b) Compare traditional algorithms with genetic algorithms. Explain various applications of GA. [8]

#### OR

- Q6) a) Explain in detail about the various operators involved in genetic algorithm. [6]
  - b) Write a note on Holland classifier systems. [5]
  - c) What is genetic programming? Compare genetic algorithm and genetic programming. [6]
- **Q7**) a) What is a Hybrid System? List and explain types of Hybrid systems.**[9**]
  - b) Soft computing techniques give best solution to complex problems. Justify'. [9]

#### OR

- (Q8) a) Mention the characteristics and properties of Neuro-fuzzy hybrid systems.[8]
  - b) Explain in detail the application of fuzzy logic systems to image processing applications. [10]

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#### [6354]-506

[Total No. of Pages : 2

## B.E. (Computer Engineering) BUSINESS INTELLIGENCE

### (2019 Pattern) (Semester - VIII) (Elective - VI) (410253C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.

- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

<b>Q1</b> ) a)	Discuss the need for Data Grouping & Sorting, Filtering Reports for BI. [6]
b)	What are the important BI reporting practices? [6]
c)	Explain how multi-dimensional Data Model is suitable for analysis with a suitable example. [5]
	OR
<b>Q2</b> ) a) b)	Discuss the Scatter chart and Combination chart with diagram used for report. [6] What is data integration? Explain the two methods used for the same.[6]
c)	What is binning? How it is used for report creation? [5]

Q3) a) How Mean, Median and Mode are used during data cleaning. [6]
b) What is data transformation? Why it is needed? Explain any one technique with example. [6]
c) Explain the need of data cleaning and different methods. [6]

#### OR

<b>Q4</b> ) a)	Explain the working of PCA. Its application.	[6]
b)	Explain the data discretization. What are two methods?	[6]
c)	What is data reduction? Explain Dimensionality Reduction Compression.	and Data [6]

[Max. Marks : 70

*P.T.O.* 

SEAT No. :

<b>Q5</b> ) a)	Explain the	e advantages and	disadvantages	of Naïve	Bayes	Classifier.[6]
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b) How the classification and clustering are different. Discuss with example.

[6]

c) Discuss the Parameter Tuning and Optimization. [6]

#### OR

- *Q6*) a) What is clustering? Explain K-mean clustering with a suitable example.[6]
  - b) What is the Apriori Algorithm? Discuss the applications of Apriori algorithm with example. [6]
  - c) What is logistic regression? Discuss the types of logistic regression [6]
- Q7) a) What are the advantages & Benefits of Business Intelligence in ERP.[5]
  - b) What is the role of Analytics in Business Intelligence? [6]
  - c) Write short note on KNIME, Rapid Miner. [6]

#### OR

- *Q8*) a) Discuss the use of Business Intelligence in Finance. [5]
  - b) Justify BI is useful for Telecommunications services. [6]
  - c) Write short note on Business Intelligence and inventory management system. [6]

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SEAT No. :

[Total No. of Pages : 2

#### [6354]-507

### B.E. (Computer Engg.) OUANTUM COMPUTING

### (2019 Pattern) (Semester - VIII) (Elective - VI) (410253-D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.
- Q1) a) How does the distinction between a classical bit and a quantum bit (qubit) lead to enhanced efficiency in Deutsch's algorithm compared to classical algorithms?
  - b) What is the concept of deferred measurement in quantum computing and illustrate the Controlled-U operation, as well as express its equivalence in terms of quantum circuit components? [9]

#### OR

- Q2) a) Demonstrate how the utilization of universal quantum gates allows for the expression of any arbitrary unitary matrix within a d-dimensional Hilbert space as a composition of two-level unitary matrices.
  - b) What constitutes a universal quantum gate set, and how does the selection of such a set impact the efficiency and precision of quantum algorithms? [9]
- *Q3*) a) Provide mathematical representations and explanations for the following terms:
  - i) Fourier Transform
  - ii) Discrete Fourier Transform
  - b) Illustrate the circuit diagram for the Quantum Fourier Transform (QFT), and provide an explanation of its operation when applied to a set of qubits?

[Max. Marks : 70

[8]

- Q4) a) The quantum Fourier transform finds broad applications, including period-finding and discrete logarithms. Could you specify the input operation provided to these algorithms and describe the output they produce?
  - b) Provide concise notes on the following: [9]
    - i) Essential components of the quantum circuit model of computation.
    - ii) The exponential growth of complexity in quantum systems.
- Q5) a) In the quantum phase estimation procedure, could you clarify the number of registers utilized and elaborate on the criteria guiding the selection of qubits (t) within the state? [9]
  - b) Discuss the constraints associated with Kitaev's phase estimation algorithm when applied to the order-finding application. [9]

#### OR

- Q6) a) Outline the procedural steps of the phase estimation algorithm when applied to order-finding scenarios. [9]
  - b) Elaborate on how the efficient quantum Fourier transform algorithm can be employed to solve the hidden subgroup problem. [9]
- (*Q7*) a) Explain the following terms with respect to Quantum Machine Learning.[9]
  - i) Quantum-Like Learning
  - ii) Computational Intelligence
  - b) Illustrate and provide an explanation for a hybrid feedforward quantum neural network, incorporating both quantum and classical components.[9]

#### OR

- *Q8*) a) Explain how quantum cryptography deals with the secure exchange of quantum information. [9]
  - b) How can quantum machine learning be applied across various domains? Provide an example of an application, highlighting the use of a specialized quantum device designed for simulating small quantum systems. [9]

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[6354]-508

[Total No. of Pages :2

SEAT No. :

### **B.E.** (Electrical Engineering)

### POWER SYSTEM OPERATION & CONTROL

#### (2019 Pattern) (Semester- VII) (403141)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[4]

**[6]** 

[6]

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of non-programmable calculator is allowed.

#### Q1) a) Explain the concept of automatic generation and control in a power system.

- b) Explain the droop characteristics of the speed governor system. [6]
- c) Explain with a block diagram the working of a proportional plus integral load frequency controller for an isolated power system. [8]

#### OR

<b>02</b> ) a)	List out the reasons for limiting the frequency deviations.	[4]
$\mathfrak{L}^{-}$	List out the reasons for minung the requere, at rations.	r.,

- b) Write a short note on
  - i) Speed governing model.
  - ii) Turbine model.
- c) Draw a schematic diagram illustrating the two-area load frequency scheme label and functions of the key components. [8]

# Q3) a) Explain the incremental cost curve of a thermal generating unit with a neat diagram. [3]

- b) Define the following term
  - i) Minimum up time
  - ii) Minimum down time
  - iii) Spinning reserve
- c) Explain with mathematical formulation, the economic load dispatch without transmission loss and including equality constraints of meeting load.

<b>Q4</b> )	a) b)	Define term loss coefficient ( $\beta_{mn}$ ). [ The fuel cost of a two generators are given by [	3] 61
	<i>c</i> )	$C_1 = 1.6 + 15P_1 + 0.1P_1^2$ (Rs/h)	~ <b>1</b>
		$C_2 = 1.8 + 25P_2 + 0.1P_2^2$ (Rs/h)	
		Where $P_1$ and $P_2$ in MW. The plant supplies a load of 250 MW. Find the economic load scheduling of two generators and the incremental function cost. Neglect losses.	he Iel
	c)	State various methods of unit commitment and explain the "Priority 1 method" of unit commitment with one example.	ist <b>8]</b>
Q5)	a)	What factors influence the magnitude and direction of power flow betwee interconnected utilities?	en <b>4</b> ]
	b)	What protocols or agreements govern for emergency power interchanget between utilities during grid emergencies?	ge 6]
	c)	What are power pools and how do they function in the context of region or multi-state power markets? [ OR	ial 8]
<b>Q6</b> )	a)	What factors contribute to an inadvertent power exchange betwee interconnected grids?	en <b>4</b> ]
	b)	Explain the economic interchange between interconnected utilities wi an example.	th 6]
	c)	What is energy banking and how does it facilitate power exchange betwee utilities?	en 8]
Q7)	a)	What is voltage collapse?	3]
	b)	What are common voltage stability indices used in power system analysi	s? 6]
	c)	State the procedure to draw a QV curve. What information does the Q curve provide?	V 8]
<b>Q</b> 8)	a)	How does variation in load demand affect voltage stability in the pow system?	er 4]
	b)	What is the PV curve and how is it used to analyze the voltage stability the transmission system?	in 7]
	c)	How does steady-state voltage stability differ from dynamic volta stability?	ge 6]

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[Total No. of Pages : 2

### [6354]-509

### **B.E.** (Electrical)

# **ADVANCED CONTROL SYSTEM**

### (2019 Pattern) (Semester - VII) (403142)

Time : 2½ Hours]

Instructions to the candidates :

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- Define the terms : *Q1*) a)
  - State i)
  - ii) State variables
  - State vector iii)
  - iv) State space
  - State equation v)
  - Define state transition matrix and its properties. Also derive the state **b**) transition matrix by Laplace transform. [8]

OR

**Q2**) a) For a given system 
$$A = \begin{pmatrix} -2 & 3 \\ 0 & 3 \end{pmatrix}$$
,  $x(0) = \begin{bmatrix} 10 \end{bmatrix}^T$  Obtain STM & find its solution. [8]

Consider the system defined by  $\frac{Y(S)}{U(S)} = \frac{3x^2 - 11s}{s^3 - 6s^2 + 11s - 6}$  Determine b) State space representation in Controllable canonical form & Observable canonical form. [10]

*P.T.O.* 

[Max. Marks: 70

[10]

SEAT No. :

- Q3) a) State and Explain Gilbert's tests for controllability and observability with suitable example.[8]
  - b) A system is described by  $x(t) = \begin{pmatrix} 0 & 1 \\ -12 & -7 \end{pmatrix} x + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u y(t) = \begin{bmatrix} 1 & -1 \end{bmatrix} x$ ,

Verify its Duality theorem.

OR

[9]

Q4) a) Explain the concept of State observers? Design a full order state observer with diagram.[8]

b) Consider system defined by 
$$x(t) = \begin{pmatrix} 0 & 1 \\ -0.16 & -1 \end{pmatrix} x + \begin{pmatrix} 0 \\ 1 \end{pmatrix} u$$
 Determine the

suitable state feedback gain matrix K such that system will have the close loop poles at S1 = 0.5 + j0.5, S2 = 0.5 - j0.5. [9]

- Q5) a) Show how mapping of left half of S-plane is done into the Z plane with stable and unstable Region with proper diagrams.[8]
  - b) Define sampling & reconstruction process and Explain the Shannon's Sampling theorem. [10]

OR

- *Q6)* a) Explain in detail basic building blocks of discrete time control system and State advantages of digital control system.[8]
  - b) Determine stability of system using Bilinear Transformation whose characteristic polynomial is  $Z^3 1.3Z^2 0.08Z + 0.24 = 0.$  [10]
- Q7) a) Describe a self-tuning regulator with suitable block-diagram and List out the properties of sliding mode control. [8]
  - b) Explain in details the terms, variable structure control, sliding phase, reaching phase and chattering with suitable diagram. [9]

OR

- **Q8**) a) If the system is given by  $\dot{x} = Ax + Bu$  and sliding surface is given by  $\dot{s} = Sx$ , prove that the closed loop system obtained by applying the equivalent control is  $\dot{x} = (I_n B(SB)^{-1}S)Ax$ . [8]
  - b) Explain the concept of sliding mode control and Draw block diagram of Model Reference Adaptive Control scheme and explain it. [9]

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[Total No. of Pages :2

SEAT No. :

# **B.E.** (Electrical Engineering)

## PLC AND SCADA

### (2019 Pattern) (Semester- VII) (403143A) (Elective - III)

Time	: 21/2	Hours] [Max. Marks : 70
Instructions to the candidates:		
	1)	Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
	2)	Figures to the right indicate full marks.
	3)	Neat diagrams must be drawn wherever necessary.
	<i>4</i> )	Assume suitable additional data, if necessary.
	5)	Use of non-programmable calculator is allowed.
<b>Q1</b> )	a)	Draw ladder diagram for following logic gates; [4]
		i) EXOR Gate
		ii) EXNOR Gate
	b)	Explain Off Delay timer (Toff) in detail along with its status bits operation,
		working, diagram and timing diagram. [6]
	c)	Draw and explain the ladder diagram for bottle filling plant. [8] OR
<i>O2</i> )	a)	Explain latching (OTL) and unlatching (OTU) instruction in detail with
~ /	,	the example. [4]
	b)	Write the rules that needs to be followed while drawing the ladder diagram?
		[6]
	c)	Draw and explain the ladder diagram for car parking. [8]
Q3)	a)	Write the role of PID controller in automation. [3]
	b)	Explain analog PLC operation and PLC analog signal processing in detail.
		[6]
	c)	Explain tank level controller using analog signals. [8]
		OR
<b>Q4</b> )	a)	Define following terms: [3]
		i) Setpoint (SP)
		ii) Process Variable (PV)
		iii) Controller Output (CO)
	b)	Write a short note on Variable Frequency Drive (VFD).[6]
	c)	Explain the temperature control using PLC with the help of block diagram.
		[8]
		Р.Т.О.

<b>Q5</b> ) a)	Write the desirable properties of SCADA.	[4]
b)	Draw the block diagram of SCADA and explain in detail.	[6]
c)	Write a short note on "Automatic Substation Control."	[8]
	OR	
<b>Q6</b> ) a)	Define the terms:	[4]
	i) SCADA	
	ii) HMI	
	iii) MTU	
	iv) RTU	
b)	Write advantages and disadvantages of SCADA system. Write an applications of SCADA System.	ny two [ <b>6</b> ]
c)	Explain SCADA generations in detail with block diagram.	[8]
<b>Q7</b> ) a)	Write any three applications of DCS.	[3]
b)	Differentiate between DCS and PLC.	[6]
c)	Explain Open System Interconnection (OSI) model in detail.	[8]
	OR	
<b>Q8</b> ) a)	Write any three applications of SCADA systems.	[3]
b)	Write a short note on Flexible Function Block (FFB).	[6]
c)	Explain DNP3 protocol of SCADA.	[8]

SEAT No. :

[Total No. of Pages : 2

## [6354]-511

### **B.E. (Electrical)**

## POWER QUALITY MANAGEMENT

### (2019 Pattern) (Semester-VII) (Elective-III) (403143 B)

Time	Time : 2½ Hours]				ks : 70
Instr	uction	is to t	he candidates:		
	1)	Solve	e Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.		
	2)	Neat	diagrams must be drawn wherever necessary.		
	3)	Figu	res to the right indicate full marks.		
	4)	Assu	me suitable data if necessary.		
Q1)	a)	Defi	ine voltage sag hence explain voltage sag characterist	tics.	[8]
	b)	Exp	lain impact of voltage sag on		[9]
		i)	Switchgear equipment's		
		ii)	Consumer equipment's		
		iii)	Drives		
			OR		
Q2)	a)	Exp	lain following mitigation techniques for voltage sag.		[8]
		i)	Dynamic Voltage Restorer		
		ii)	D Stacom		
	b)	Exp	lain 7 types of voltage sag.		[9]
Q3)	a)	Hov harn	v harmonics are produced hence explain voltage nonics.	verses cui	rrent [9]
	b)	Exp	lain various Harmonic indices.		[9]

Q4)	a)	Writ	te a note on	[9]
		i)	Harmonic Phase sequence	
		ii)	Triplen Harmonics	
	b)	Exp	lain harmonic generation in transformers with reference to	[9]
		i)	Inrush current	
		ii)	DC magnetization	
		Drav	w neat waveforms in both the conditions	
Q5)	a)	Disc	cuss effects of harmonics on	[9]
		i)	Motors	
		ii)	Telecommunication system	
		iii)	Metering equipment's	
	b)	Exp	lain tuned and detuned filters with neat diagram.	[9]
			OR	
Q6)	a)	Exp tool	lain principles of controlling harmonics hence state various comp s used for harmonic analysis.	uter [9]
	b)	Exp reso	lain what is resonance hence explain effect of series and sh nance on system performance.	unt [9]

- Q7) a) What are different transducers used for power quality monitoring, explain in brief.[8]
  - b) List various power quality monitoring instruments and briefly explain their use. [9]

- (Q8) a) Explain Power quality indices and standards for assessment of disturbances and waveform distortion. [8]
  - b) Explain various objectives of power quality monitoring hence explain various techniques of data collection? [9]

**~~~~** 

[6354]-511

### [6354]-512

[Total No. of Pages :2

### **B.E.** (Electrical Engineering) **HIGH VOLTAGE ENGINEERING**

### (2019 Pattern) (Semester- VII) (Elective - III) (403143C)

#### *Time : 2^{1/2} Hours ]*

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- Neat diagrams must be drawn wherever necessary. 3)
- Assume suitable data, if necessary. **4**)
- 5) Use of non - programmable calculator is allowed.
- *Q1*) a) Explain remedial actions for switching surges. [4]
  - Explain Reynold's and Mason's theory. b)
  - State & explain with diagram causes of power frequency over voltages c) & switching surges. [8]

#### OR

- Explain mechanisms of lightning strokes. [4] *Q2*) a)
  - Compare Simpson and Wilson theory of charge formation in clouds.[6] b)
  - What is insulation coordination? Explain statistical method of insulation c) coordination. [8]
- Draw series resonant circuit for generation of high AC voltage. *Q3*) a) [3]
  - What is cascading of transformer? State its merits & demerits. [6] b)
  - Explain with suitable Diagram Voltage Doubler circuits for producing c) high dc voltage. [8]

#### OR

- With circuit diagram explain working of Horn gap arrester. [3] **Q4**) a) Draw parallel resonant circuit for generation of high AC voltage and b)
  - compare it with series resonant circuit. [6] What is the principle of operation of a resonant transformer? List c) advantages over the cascade connected transformer. [8]
- **Q5**) a) What is dielectric loss and dielectric constant? [4]
  - Describe capacitance voltage transformer (CVT). **[6]** b)
  - Describe sphere gap arrangement for measurement of High Voltage. [8] c)

[Max. Marks : 70

[6]

SEAT No. :

<b>Q6</b> )	a)	Wri	te short note on Parcial Discharge measurement.	[4]
	b)	Exp	lain electrostatic voltmeter with neat diagram.	[6]
	c)	Exp	lain the generating voltmeter used for measuring high dc voltages	.[8]
Q7)	a)	Wri	te short note on shielding of High Voltage laboratory.	[3]
	b)	Disc	cuss following tests carried out on porcelain insulator:	[6]
		i)	50% Dry impulse flashover test	
		ii)	Impulse withstand test	
	c)	Des	cribe for bushing	[8]
		i)	Wet power frequency voltage withstand test	
		ii)	Momentary power frequency voltage withstand test	
		iii)	Visible discharge test.	
			OR	
Q8)	a)	Giv	e classification of H.V. Laboratories.	[3]
	b)	Wri	te a short note on Design and layout of HV laboratory.	[6]
	c)	Des	cribe earthing and shielding of high voltage laboratories.	[8]



### [6354]-513

### **B.E.** (Electrical)

### **ROBOTICS & AUTOMATION**

### (2019 Pattern) (Semester- VII) (403143D) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[Total No. of Pages :2

SEAT No. :

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume suitable data, if necessary.
- *Q1*) a) Explain Denavit Hartenberg (D-H) representation assigned for righthanded orthonormal coordinate frames. Write the algorithm tsteps) for D-H representation for deriving the forward kinematics for any manipulator.

[9]

- b) Explain the forward solution of robotic manipulator for PUMA Robot.[9] OR
- Q2) a) Explain the concept of inverse kinematics its importance and problems associated with it. [9]
  - b) Draw the link coordinate diagram and explain the arm matrix equation for the four-axis SCARA robot. [9]
- *Q3*) a) Explain absolute and incremental encoders along with the diagram. Explain based on construction, advantages, disadvantages, and applications.[9]
  - b) Explain construction, working of Piezo Electric sensor with neat diagram. Write advantages, disadvantages and application of the same. [8]

OR

- *Q4*) a) What is the significance (importance) of the sensors in robotics? Explain with any application. [9]
  - b) Explain the construction and working of LVDT along with its schematic diagram.
     [8]
- *Q5*) a) Explain 'Resolved motion position Control (RMPC) for controlling robot manipulator. [9]
  - b) Explain the concept of manipulator Jacobian, Jacobian inverse, and singularities in brief. [9]

- Q6) a) Explain Joint Position Control (JPC) with the help of a neat sketch. [9]
  - b) Explain the modelling of the D.C. motor with load with relevant equations and diagrams. [9]
- Q7) a) Explain the spray painting robot in detail with diagram. [9]
  b) Explain how robots can be used in home automation. [8]
  OR
  Q8) a) Explain how robots can be used in the defense and surveillance industry.
  - b) Explain the selection criteria of the robot for industrial applications. [8]

[9]



PC2397

SEAT No. :

[Total No. of Pages : 2

### [6354]-514 B.E. (Electrical Engineering) ALTERNATE ENERGY SYSTEMS (2019 Pattern) (Semester - VII) (Elective -IV)(403144 A)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data if necessary.
- 5) Use of non programmable calculator is allowed.
- *Q1*) a) Formulate an equation to determine the maximum power attainable from wind energy.[8]
  - b) Outline the key elements comprising wind power systems and provide a brief description of each. [10]

#### OR

- Q2) a) Define:
  - i) Cut in Speed
  - ii) Tip Speed Ratio
  - iii) Power Coefficient
  - iv) Pitch angle
  - b) Calculate the diameter of a wind turbine to generate 4.2 KW at wind speed of 7m/s and a rotor speed of 120 rpm. Assume power coefficient = 0.4, efficiency of electrical transmission = 0.95, efficiency mechanical transmission =0.9, Air density (at standard atm pressure and temp)  $1.2 \text{ kg/m}^3$  [10]
- **Q3)** a) What are the different methods used to convert biomass into usable energy, and could you delve into the details of one of these methods.[9]
  - b) Describe the power generation process using municipal waste, accompanied by a block diagram. [9]

[Max. Marks : 70

[8]

- Q4) a) What do you think about the biogas as a future fuel, What are the various factors that affects biogas generation. [9]
  - b) Explain any one gasifier in detail with neat diagram. [9]
- Q5) a) What factors should be considered when selecting the type of battery?[9]
  - b) Explain the working principle of battery, describe lead- acid battery with diagram. [9]

- *Q6*) a) Provide an explanation of pumped hydroelectric storage, accompanied by a diagram. [9]
  - b) State various methods of hydrogen production. Describe any one method with a diagram. [9]
- Q7) a) In the scenario of purchasing a solar water heating system for Rs. 30,000, with a down payment of Rs. 5,000 and annual end-of-year payments of Rs. 3,400 for 10 years, if the individual chooses to pay Rs. 3,200 annually and the remaining balance at the end, what is the value of the balance payment assuming a 10% interest rate?
  - b) Explain the concept of the time value of money and its significance? Additionally, what is meant by Net Present Value (NPV) [8]

[8]

#### OR

- Q8) a) Define and Explain with example.
  - i) Simple payback period
  - ii) Return on investment
  - iii) Net present value
  - iv) Time Value of Money
  - b) Illustrate a diagram depicting the connection of a renewable energy source to the grid? Also, list the various parameters necessary for synchronizing the renewable energy source with the grid. [8]

\* \* \*

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

### [6354]-515 B.E. (Electrical) ELECTRICAL AND HYBRID VEHICLE (2019 Pattern) (Semester - VII) (Elective - IV) (403144B)

	1) 2) 3)	Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Draw neat diagrams whenever necessary. Assume suitable data, if necessary.	
Q1)	a)	Explain any one energy management strategies for EV's.	[7]
	b)	Write a short note on electric bus with a suitable example.	[5]
	c)	Describe EV fleet management.	[6]
		OR	
Q2)	a)	Write a short note on Battery swapping system.	[6]
	b)	Draw and explain series hybrid configuration.	[6]
	c)	Mention merits and demerits of fuel cell vehicle.	[6]
Q3)	a)	Write a short note on vehicle dynamics.	[5]
	b)	State different drive trains configuration in HEVs and expain anyone.	[6]
	c)	Explain any one power management strategy used for HEV.	[6]
		OR	
Q4)	a)	Describe the HEV modelling considering forward approach and reve approach.	erse [6]
	b)	How fuel efficiency analysis is carried for PHEV.	[5]
	c)	Draw and explain HEV subsystem.	[6]

*P.T.O.* 

Q5)	a)	Which forces should be considered for EV design? State & explain along with equations.	n it [ <b>7</b> ]
	b)	Describe important considerations for sizing of power converter.	[6]
	c)	Write a short note on electric vehicle network.	[5]
		OR	
<b>Q6</b> )	a)	How to select size of EV motor? Which are the factors consider for it?	ered [6]
	b)	Draw and explain PMSM motor control for an EV application.	[7]
	c)	Discuss selection parameters for an EV's battery.	[5]
<b>07</b> )	a)	State revised guidelines mentioned for charging infrasturcture?	[7]
2''	b)	Explain in detail star labelling scheme for li-ion packs.	[5]
	c)	Write a short note on EV tariff.	[5]
		OR	
Q8)	a)	Describe challenges for EV charging infrastructure as per revi guidelines.	sed [7]
	b)	Discuss FAME-II policy.	[5]
	c)	Explain any one EV startup in detail.	[5]

\* \* \*

**PC2399** 

**SEAT No. :** 

[Total No. of Pages : 2

### [6354]-516 **B.E.** (Electrical) SPECIAL PURPOSE MACHINES (2019 Pattern) (Semester - VII) (Elective - IV) (403144C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. **1**)
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- Use of Calculator is allowed. *4*)
- Assume suitable data if necessary. 5)

*Q1*) a) Derive the emf equation for PMSM.

Explain the sensorless control of PMSM. Also Draw the block diagram b) for the same. [9]

#### OR

#### *Q2*) a) Write the applications of permanent magnet synchronous motor. [8]

Draw and explain the phasor diagram of permanent magnet synchronous **b**) motor. [9]

Draw and explain the basic control scheme of Switch Reluctance motor. **Q3**) a) [9]

Write the applications of Synchronous Reluctance Motor. [9] **b**)

#### OR

- Draw and explain the commutation scheme for the Switched Reluctance **Q4**) a) [9] motor.
  - A 4-phase, 8-pole Switched Reluctance motor has six rotor teeth. Find **b**) the step angle and the commutation frequency for a speed of 6000 rpm.[9]

*P.T.O.* 

[*Max. Marks* : 70

[8]

- Q5) a) Explain the construction and principle of operation of single stack variable reluctance stepper motor. [9]
  - b) With the block diagram explain the control scheme for SRM. [9]

- *Q6*) a) List the advantages and disadvantages of variable reluctance (VR) stepper motor.
  - b) Explain the Static and dynamics characteristics of stepper motor. [9]
- Q7) a) Derive the thrust equation for LIM. [8]
  - b) Explain the factors to be considered while selecting the specific magnetic loading and specific electric loading in the design of LIM. [9]

#### OR

- *Q8)* a) Explain the transverse edge effect and end effect considering the flux between the primary and secondary of LIM.[8]
  - b) Explain different types of linear Induction motors with their construction. [9]

\* \* \*

[6354]-516

**PC2400** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-517 B.E. (Electrical Engineering) HVDC & FACTS (2019 Pattern) (Semester - VII) (Elective - IV) (403144D)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of non-programmable calculator is allowed.

Q1) a) Explain the real and reactive power control in a VSC based HVDC system.
[8]
b) Explain HVDC light technology in detail.
[6]
c) Discuss the latest trends in VSC based HVDC system
[4]

#### OR

Q2)	a)	Discuss the structure of VSC based HVDC system. [4	]
	b)	What are the characteristics features of HVDC light system? Explain Control and Power transfer characteristics of VSC based HVDC system [8]	n 1. 5]
	c)	Explain HVDC plus technology in detail. [6	5]
Q3)	a)	Define FACTS controllers. Also state benefits of FACTS controllers.[3	<b>;]</b>
	b)	Give a brief review of challenges and needs of power Electronic convertors. [6	:s []
	c)	Explain AC controller based structures. [8	;]

[Max. Marks: 70

<b>Q4</b> )	a)	Give an idea about basic types of FACTS controllers.	[3]
	b)	Write a note on DC link converter topologies.	[6]
	c)	With suitable diagram explain back to back converter operation. State advantage and also applications.	e its [ <b>8</b> ]
Q5)	a)	Draw operating VI area of TCSC.	[4]
	b)	With a neat diagram explain operation of TCSC.	[6]
	c)	Explain principle of operation of STATCOM. Draw relevant pha diagram.	isor [ <b>8</b> ]
		OR	
<b>Q6</b> )	a)	Explain shunt operation provided by SVC.	[4]
	b)	Discuss VI characteristics and control schemes of SVC.	[6]
	c)	Compare SVC and STATCOM on the basis of response time, hardwarequirements, characteristics and operation.	are [8]
Q7)	a)	What is active power filter?	[3]
	b)	What are the constraints on the operation of UPFC.	[6]
	c)	Explain different operating modes of UPFC controllers by using relevel diagrams.	ant [8]
		OR	
Q8)	a)	Draw block diagram of UPFC.	[3]
	b)	With suitable diagram explain Interline Power flow controller.	[6]
	c)	Explain Power flow studies in UPFC embedded system with operation constraints.	onal [ <b>8</b> ]

\* \* \*

2

SEAT No. :

[Total No. of Pages : 2

**PC2401** 

[6354]-518

### B.E. (Electrical Engineering) SWITCHGEAR AND PROTECTION (2019 Pattern) (Semester - VIII) (403148)

[Max. Marks : 70 *Time* :  $2^{1/2}$  *Hours*] Instructions to the candidates: Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1) Figures to the right indicate full marks. 2) Neat diagrams must be drawn wherever necessary. 3) Assume suitable additional data, if necessary. *4*) Use of non-programmable calculator is allowed. 5) *Q1*) a) Explain following ratings of circuit breaker. [6] Making capacity i) **Breaking capacity** ii) iii) Short time rating State disadvantages of Air circuit breaker [4] b) State properties of  $SF_6$  gas [8] c) OR Write a note on Auto - reclosing [4] *O2*) a) Explain advantages of GIS over conventional substation [6] b) An 11 KV, 500 MVA, 3 sec CB suddenly closes on occurring of fault.[8] c) Determine Symmetrical breaking current i) Asymmetrical breaking current assuming 50% DC component ii) Peak making current iii) Short time current rating iv) Draw block diagram of PMU. [3] **Q3**) a) State and Explain Sampling Theorem. b) [6] State advantages and disadvantages of static relay. c) [8] OR State advantages of Numerical Relay. **Q4**) a) [3] Explain Antialising Filter with neat diagram. b) [6] Draw and explain block diagram of Numerical Relay. c) [8]

- Q5) a) What are the problems encountered in differential protection. [4]
  - b) Explain overload protection in case of three phase Induction motor. [6]
  - c) The neutral point of a 3 phase , 20 MVA, 11 KV alternator is earthed through a resistance of 5 ohm. The relay is set to operate when there is an out of balance current of 1.5 Amp. The CT's have a ratio of 1000/5. What is the percentage of winding protected? Also calculate the earthing resistance required to protect 90% of the winding. [8]

- Q6) a) A three phase power transformer having line voltage ratio of 400 V to 33 KV is connected in star delta. The CT's on 400 V side have current ratio as 1000/5. what must be the CT ratio on 33 KV side. Assume current on 400 V side to be 1000 A. [4]
  - b) Explain short circuit protection in case of three phase Induction motor.[6]
  - c) What is transverse protection of an alternator? What type of fault is this scheme of protection employed? With a neat sketch discuss the working principle of this scheme. [8]

<b>07</b> ) a)	) What do you mean by term Directional and Non - Directional over	current
$\mathcal{L}^{(1)}$	relay.	[3]
b)	) Explain the effect of Arc resistance on.	[6]
	i) Impedance relay	
	ii) MHO relay	
c)	) Draw block diagram of PLCC scheme used for transmission line pro	otection
	and briefly explain its components.	[8]
	OR	
<b>Q8)</b> a)	) Draw flowchart of Numerical algorithm.	[3]
b)	) Explain three stepped distance protection.	[6]
c)	) Draw the characteristics of the following distance relays in the R-X of	liagram
	and explain.	[8]
	i) Mho-relay	
	ii) Reactance relay	
	iii) Quadrilateral - relay	

iv) Impedance-relay



PC-2402

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-519

# B.E. (Electrical Engineering) ADVANCED ELECTRICAL DRIVES AND CONTROL (2019 Pattern) (Semester - VIII) (403149)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of non-prograinmable calculator is allowed.
- Q1) a) Compare VSI and CSI fed induction motor drive. [4]
  - b) Explain Plugging braking of Induction motor. What precautions are to be taken during plugging operation of Induction motor? [6]
  - c) Explain regenerative braking and multi quadrant operation of induction motor drives. [8]

#### OR

- (Q2) a) What is electrical braking? Explain difference between plugging and regenerative braking of induction motor. [4]
  - b) A 3-Phase, 400V, 50Hz, 4 pole 1370rpm star connected squirrel cage induction motor has the following parameters:  $Rs = 2\Omega$ ,  $Rr = 3\Omega$ ,  $Xs = Xr = 3.5\Omega$ ,  $Xm = 80\Omega$ . Motor is controlled by VSI at constant V/f ratio. Inverter allows frequency variation from 10Hz to 50Hz. For regenerative braking operation of VSI fed Induction motor determine:[6]
    - i) Speed for frequency of 30Hz and 80% of full load torque.
    - ii) Frequency for a speed of 1000 rpm and full load torque.
  - c) Explain the principle of vector control of Induction motor. [8]

- Q3) a) Explain with necessary diagram vector control of BLDC motor. [9]
  - b) Explain closed loop control of BLDC drive. Also judge the suitability of this motor for EV application. [9]

- Q4) a) Describe the construction and working of BLDC Motor. Draw speed-torque characteristics. [9]
  - b) Describe with necessary diagram vector control of BLDC motor. State the advantages of vector control. [9]
- Q5) a) Draw construction of synchronous reluctance motor and explain its operation.[8]
  - b) Draw neat diagram and explain vector control of PM synchronous motor. [8]

#### OR

- *Q6*) a) Explain different topologies of rotor construction used in PMSM. Also state application of each.
   [8]
  - b) Explain application of synchronous reluctance motor in EV. [8]
- (Q7) a) Explain requirement and choice of drives for steel rolling mills. Why four quadrant operations are needed in rolling mill drives? [10]
  - b) How drives are selected for Traction system. [8]

#### OR

- Q8) a) Write short note on any two :
  - i) Classes of motor duty.
  - ii) Requirements of drive for Solar and battery powered application.

[10]

- iii) Requirements of drive for Machine tools.
- b) With schematic diagram explain drives required in sugar industries. Will modern power converters be useful in sugar industry? Explain. [8]

### жжж

SEAT No. :

**PC2403** 

#### [6354]-520

B.E. (Electrical Engineering) DIGITAL CONTROL SYSTEM

### (2019 Pattern) (Semester - VIII) (Elective - V) (403150A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of a non-programmable calculator is allowed.
- Q1) a) Define complete observability of a linear Time Invariant Discrete time system. Explain Gilbert's Test for distinct eigenvalues and repeated eigenvalues.

b) Consider the system 
$$x(k + 1) = Gx(k) + Hu(k)$$
 [9]

where 
$$\mathbf{G} = \begin{bmatrix} 0 & 1 \\ -0.16 & 1 \end{bmatrix}, \mathbf{H} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Determine the state feedback gain K such that the system will have a closed loop at  $-0.5 \pm j0.5$  using a direct substitution formula.

#### OR

- Q2) a) Explain the effect of pole-zero cancellation on controllability and observability.[8]
  - b) Explain the pole placement design using Ackerman's Formula. [9]
- Q3) a) Explain full-order state observer and minimum-order state observer with a block diagram. [8]
  - b) Explain the compensator design by the separation principle. [9]

OR

*Q4*) a) Explain the state feedback control design using integral action. Draw a proper block diagram. [8]

b) Consider the system x(k + 1) = Gx(k) + Hu(k), y(k) = Cx(k) [9]

where 
$$G = \begin{bmatrix} 0 & 1 \\ -25 & -6 \end{bmatrix}, H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = \begin{bmatrix} 3 & 1 \end{bmatrix}$$

Determine the observer gain such that the system will have a closed loop at  $-3 \pm j4$  using a direct substitution formula.

[Max. Marks : 70

[Total No. of Pages : 2

*P.T.O.* 

Q5)	a)	Explain the following methods for discretizing analog controllers.	[9]
		i) Euler's backward method	
		ii) Trapezoidal method	
	b)	Explain the concept of pole-zero matching	[9]
		OR	
<b>Q6</b> )	a)	Explain the transformation of the state-space model to Jordan canoni form.	ical <b>[9]</b>
	b)	Explain Bilinear transformation with frequency warping.	[9]
Q7)	a)	Explain the digital position control system with a block diagram.	[9]
	b)	Explain computer program structure for simulation of discrete-time conto of continuous time plant.	trol <b>[9]</b>
		OR	
<b>Q</b> 8)	a)	Explain the digital temperature control system with a block diagram.	[9]

b) Explain the process of hybrid simulation. [9]



**SEAT No. :** 

**PC2404** 

### [6354]-521

## **B.E.** (Electrical Engineering) **RESTRUCTURING AND DEREGULATION**

### (2019 Pattern) (Semester - VIII) (Elective - V) (403150B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer Q1 or Q2, Q3 or Q4. Q5 or Q6 and Q7 or Q8. **1**)
- Figures to the righit indicate full marks. 2)
- 3) Neat diagrams must be drawn wherever necessary.
- *4*) Use of logarithmic tables slide rule, mollier charts electronic pocket calculator and steasm tables is allowed.

<b>Q1</b> )	a)	Describe the various stages in determination of tariff for integrated utility.[9	)]
	b)	Explain the rate of return regulation [8	5]
		OR	
Q2)	a)	Explain the objectives of "Electricity Act 2003". Also explain the guideline	s
		under this act. [9	'] -
	b)	Write a brief note on :National Electricity policy.   [8]	
Q3)	a)	Explain the following in detail [9	[י
		i) models based on energy trading or structural models	
		ii) wholesale competition	
		iii) retail competition	
	b)	Explain the following ISO models in detail. [9	[י
		i) Mini ISO	
		ii) Micro ISO	
		OR	
<b>Q4</b> )	Exp	lain the following: [18	;]
	a)	Renewable Energy Credits and Trading of Renewable Energy Credits.	
	b)	Carbon Credits and Trading of Carbon Credits.	
Q5)	a)	Explain Market power Electricity markets under imperfect competition.[9	<b>)</b> ]
- /	b)	Explain the following. [8	5]
	,	i) HHI Index	-
		ii) Entropy coefficient	

Lerner Index iii)

[Max. Marks : 70

[Total No. of Pages : 2

<b>Q6</b> ) a)	What are the rules that govern electricity markets? Specify the peculiarities of electricity as commodity. [9]
b)	Explain the following terms in context to electricity markets: [8]
	i) Market power mitigation
	ii) Effects of contract for differences.
<b>Q7</b> ) a)	Name the different transmission pricing methods and explain any two in detail.
b)	State and explain major components of transmission costs. [9]
,	OR
<b>Q8</b> ) a)	What do you understand by congestion in power network? Give the
~ · ·	reasons for congestion in power network. [9]
b)	Define and explain. [9]
	i) Total transfer capability (TTC)
	ii) Available transfer capability (ATC)
	iii) Transmission Reliability Margin (TRM)

 $\circ$   $\circ$   $\circ$ 

[6354]-521

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

**PC2405** 

#### [6354]-522

**B.E.** (Electrical Engineering)

#### **SMART GRID**

### (2019 Pattern) (Semester - VIII) (Elective - V) (403150C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of a non-programmable calculator is allowed.

<i>Q1</i> ) a)	What is Geographic Information System (GIS)?	[4]

- b) Explain the components of GIS? [6]
- c) Explain how automatic meter reading can make the system smarter? [8]

#### OR

Q2)	a)	Explain Introduction of smart maters?	[4]
	b)	Explain various components of smart substation?	[6]
	c)	Explain role of AMI in Smart Grid?	[8]
Q3)	a)	Write a note on 'Web based Power Quality Monitoring?	[8]
	b)	Explain the concept WAN related to smart grid?	[9]
		OR	
Q4)	a)	Explain cloud computing and its need?	[8]
	b)	Why cyber security is of prime importance in Smart grid & how it can achieved?	n be [9]
Q5)	a)	Write a note on 'protection & control of Micro grid'?	[9]
	b)	Explain concept of micro grid and its need and application?	[9]
		P	Г. <i>О</i> .

<b>Q6</b> )	a)	Compare Micro grid and Smart Grid?	[9]
	b)	Explain about protection and control of micro grid?	[9]
Q7)	a)	List different smart appliances and describe an integration of Appliances into grid for Home and Building Automation?	of smart <b>[8]</b>
	b)	Explain EMC and its importance in smart grid?	[9]

- Q8) a) Describe the power quality issues of grid connected renewable Energy Sources? [8]
  - b) Describe the concept, power quality conditioners related to smart grid?[9]



**PC2406** 

### [6354]-523

**B.E.** (Electrical Engineering)

### SENSOR TECHNOLOGY

### (2019 Pattern) (Semester - VIII) (Elective - V) (Open Elective) (403150D)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

<b>Q1</b> )	a)	Explain OPT3007 Light Sensor with its working principle, construction advantages and disadvantages.	n, )]
	b)	With the help of neat diagram explain 3D Depth sensor. [9	<b>)</b> ]
		OR	
Q2)	a)	Write short on "Light and Image sensing devices".	<b>)</b> ]
	b)	List different types of optical isolators. Explain any one of them. [9	<b>)</b> ]
Q3)	a)	Explain in detailed INA240 current sense amplifier. [8	3]
	b)	With the help of neat diagram Explain DRV5053 Hall effect based current sensor.	nt )]
		OR	
Q4)	a)	What is the principle of operation of LM35? Explain with neat diagram.[8	8]
	b)	Explain HDC2010 Humidity Sensor. [9	<b>)</b> ]
Q5)	a)	State and explain different position sensing methods for absolute an relative positions.	nd 3]
	b)	What are the different types of Encoders? Explain any one in detail. [9	<b>)</b> ]
		OR	

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

*P.T.O.* 

<b>Q6</b> )	a)	Write short note on Inductive position sensors.	[8]
	b)	Explain DRV 5032 Hall Effect Sensor.	[9]
Q7)	a)	What is GPS? Explain with neat diagram.	[9]
	b)	Explain smart sensor - film sensor.	[9]
		OR	
Q8)	a)	Explain application of sensors in drone.	[9]
	b)	Write short note on "compass gyroscope inclinometer".	[9]



### [6354]-524

[Total No. of Pages : 2

# B.E. (Electrical Engineering) EHVAC: TRANSMISSION

### (2019 Pattern) (Semester - VIII) (Elective - VI) (403151A)

### *Time : 2½ Hours]*

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of non-programmable calculator is allowed.
- *Q1*) a) State Electrostatic Field of a point charge properties. [4]
  - b) Write the short notes on design of cylindrical cage for corona gradients.[6]
  - c) Explain Field of line charges and their properties & charge potential relations for multi-conductor lines. [8]

### OR

<b>Q2</b> ) a)	Write the short notes on maximum charge condition on three pha	ase line.[4]
b)	Explain Electric shock and threshold currents.	[6]
c)	Explain design of cylindrical cage for corona gradients.	[8]
<b>Q3</b> ) a)	Discuss effect of high electrostatic field on Humans.	[3]
b)	Derive the expression for electrostatic induction on unenergi of a double circuit line.	zed circuit [6]
c)	Evaluate the horizontal, vertical and total value of electros	static field

Evaluate the horizontal, vertical and total value of electrostatic field components near the single circuit transmission line, which are energized by three phase voltages.

#### OR

- Q4) a) Discuss effect of high electrostatic field on Animals. [3]
  b) Derive the expression for electrostatic field of Double circuit 3 phaseA.C line. [6]
  c) Explain the concept of insulated ground wire and explain the purposes
  - c) Explain the concept of insulated ground wire and explain the purposes served by insulated ground wire. [8]

[Max. Marks : 70

*P.T.O.* 

SEAT No. :

- Q5) a) State and explain at least 1 formulae for power loss due to corona. [4]
  - b) Explain formation of corona & define terms. [6]
    - i) Corona inception voltage.
    - ii) Visual corona voltage.
  - c) Explain the corona formation and attenuation of travelling Waves due to corona loss. [8]

Explain charge-voltage diagram. [4] **Q6**) a) b) With the help of simple block diagram, explain the audible noise measuring circuit in EHV AC lines. [6] State and explain at least 4 formulae for power loss due to corona. [8] c) State the Classification of Cable. **Q7**) a) [3] b) Brief, the line insulation design based upon transient over voltages. [6] Name the materials used for insulation in EHV cables and state the c) properties of SF6 gas as an insulating materials used in cables. [8]

#### OR

- *Q8*) a) Write six properties of XLPE used in EHV cables. [3]
  - b) Define  $\tan \delta$  loss factor and derive an expression for insulation resistance of a cable. [6]
  - c) State and explain at least four factors to be considered in the design of EHV lines based upon the steady state limits. Also state their limiting value.

### 1

### [6354]-525

# **B.E.** (Electrical Engineering) **ILLUMINATION ENGINEERING**

### (2019 Pattern) (Semester - VIII) (Elective - VI) (403151B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of non-programmable calculator is allowed.
- Write a short note on. *Q1*) a)
  - Coefficient of utilization i)
  - ii) Beam angle.
  - What Factors should be considered for design of indoor illumination b) scheme. [6]
  - What is Polar Curve ? Describe its types. State its significance. c) [8]

#### OR

- Explain in brief about Lumen Method. [4] *Q2*) a) What is Beam angle and Field angle? What are types of light loss factor.[6] b) What are different components of flux are considered in zonal cavity c) method? Explain each of them. [8] What points are considered while designing illumination installation for *Q3*) a) Educational institute? [3] Explain following special purpose lighting scheme. b) [6] **Decorative lighting** i) Swimming Pool lighting ii) State and explain the advantages of good illumination schemes. c) [8] OR **Q4**) a) Classify Road according to BIS. [3] Explain illumination scheme for health care centres & hospitals. [6] b)
  - Define following terms c) [8] Luminous flux Mean spherical Candle power, Space to height ratio, Utilisation factor.

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

[4]

- Q5) a) Explain following terms with respect to road lighting
  - i) Uniformity ratio
  - ii) Field of vision
  - b) What are the key factors in designing an outdoor illumination scheme? Explain each in brief. [6]

[4]

c) Write a note on lighting provision for college libraries in Educational institutes. [8]

#### OR

<b>Q6</b> )	a)	With suitable diagram explain isolux diagram for designing outd illumination scheme.	loor [ <b>4</b> ]
	b)	What are the objectives of road Lighting. Give the details of road light codes in India?	ting [ <b>6</b> ]
	c)	With suitable diagram explain Beam lumen method for designing outd illumination scheme.	loor [8]
Q7)	a)	What is use of non lighting lamps.	[3]
	b)	What are intelligent LED Fixtures. Explain any 1 in detail?	[6]
	c)	Explain in detail Natural light conduiting?	[8]

#### OR

- *Q8*) a) Give applications of Organic lighting system. [3]
  - b) Explain construction & working of Fiber optic cables. State its 2 types.[6]
  - c) Explain working of LASERS arrangement with suitable diagram. State types of LASERs. [8]

### 0

### [6354]-526

[Total No. of Pages : 2

**SEAT No. :** 

# **B.E.** (Electrical Engineering) **ELECTROMAGNETIC FIELDS** (2019 Pattern) (Semester - VIII) (Elective - VI) (403151C)

#### *Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates: 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 2) Figures to the right indicate full marks. 3) Neat diagrams must be drawn wherever necessary. 4) Assume suitable additional data, if necessary. 5) Use of non-programmable calculator is allowed. Explain about Equipotential surfaces. [4] *Q1*) a) Derive the expression for Capacitors with multiple dielectrics. [6] b) Derive the expression for Coaxial capacitor. [8] c) OR [4] *Q2*) a) Write about Energy density in electrostatic field. Derive the expression for Energy stored in terms of D and E. [6] b) Derive the expression for Spherical capacitor. c) [8] Explain the terms: Scalar magnetic potential, Vector magnetic potential.[3] **Q3**) a) Derivations of Biot-Savart's law based on magnetic potential. [6] b) Poisson's Equations for Magnetostatic field. [8] c) OR **Q4**) a) Explain the Ampere's Circuital law. [3] Derive the expression Magnetic dipole. [6] b) Derivations of Ampere's law based on magnetic potential. [8] c) **Q5**) a) Explain the term Ohm's law employing mobility. [4] Brief about Polarization in Dielectrics. b) [6] Explain the Dielectric boundary conditions. [8] c)

[Max. Marks : 70

<b>Q6</b> )	a)	Write the Free space boundary conditions.	[4]
	b)	Brief about Relaxation time.	[6]
	c)	Explain the Boundary conditions for Magnetostatic fields.	[8]
Q7)	a)	Explain the terms: Time varying potentials, Time Harmonic Field.	[3]
	b)	Explain the Concept of uniform plane wave.	[6]
	c)	Write in detail about Concept Poynting theorem.	[8]
		OR	

<b>Q8</b> ) a)	Explain Faraday's law.	[3]
b)	Derive the expression for moving loop in time varying field.	[6]
c)	Derive the Maxwell's equations in point form and integral form harmonic field.	for [ <b>8</b> ]

#
**PC-4981** 

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70]

## [6354]-527

### **B.E.** (Electrical)

## ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (Open Elective)

## (2019 Pattern) (Semester - VIII) (403151D) (Elective - VI)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours ]* 

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4. Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

# Q1) a) Why is it important to build a knowledge base? What is knowledge base and examples? [4]

- b) What is a theorem of first-order logic? [6]
- c) What is a partial-order plan? Which planning is also known as partial order planning? What is total order and partial order planning? [8]

- Q2) a) What is reasoning under uncertainty? What are the 3 techniques in uncertainty reasoning? [4]
  - b) What is Bayesian networks and give with examples? What are the different types of Bayesian networks? [6]
  - c) What is uncertainty in probabilistic reasoning? What is probabilistic reasoning over time? [8]
- Q3) a) Which example of application uses machine learning? What is a real life application of machine learning with example? [4]
  - b) What is supervised learning vs unsupervised learning? What is an example of supervised learning a class? [6]
  - c) What does approximately refer to in Probably Approximately Correct learning? What is Probably Approximately Correct learnability in machine learning? [7]

<b>Q4</b> )	a)	What is an example of a multiclass classification? What is locally linembedding?	ear [ <b>4</b> ]
	b)	What is model selection and generalization in machine learning?	[6]
	c)	What is principal component analysis explain with an example?	[7]
Q5)	a)	What is linear regression model explain with example?	[4]
	b)	What is least square multiple regression model?	[6]
	c)	What is the difference between ridge and lasso regression? What is least angle regression?	the [ <b>8</b> ]
		OR	
<b>Q6</b> )	a)	What is a partial least square analysis? What is the difference betwee subset selection and shrinkage methods?	een [ <b>4</b> ]
	b)	What is shrinkage in multiple regressions?	[6]
	c)	What is logistic regression and its example? Which method gives the b fit for logistic regression model?	est [ <b>8</b> ]
Q7)	a)	What is an example of association rule in supermarket? What is the April algorithm?	iori [ <b>4</b> ]
	b)	How is unsupervised learning different from supervised learning? What an example of supervised unsupervised learning?	ıt is <b>[6]</b>
	c)	What is a cluster analysis example? What is the use of proximity matrix? OR	'[7]
<b>Q8</b> )	a)	What is the k-means algorithm for clustering?	[4]
	b)	What is the difference between soft K-means and Gaussian mixture mod	lel? [6]
	c)	What are the 5 elements of reinforcement learning? What is Tempo Difference Learning?	oral [ <b>7</b> ]



**PC2410** 

SEAT No. :

[Total No. of Pages :2

### [6354]-528

### **B.E.** (**E & TC**)

## **RADIATION AND MICROWAVE THEORY**

### (2019 Pattern) (Semester- VII) (404181)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer the Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data if necessary.

<b>Q1</b> )	a)	A 2 Watt power source is connected to the input of a directional coup	pler
		with $C = 20 dB$ , $D = 25 dB$ , and an insertion loss of 0.7 dB. Find	the
		output power at the output. Coupled and isolated ports Assume all	the
		ports to he matched.	[6]
	b)	Draw and explain circulator.	[6]
	c)	Explain the E - Plane Tee with the help of constructional diagram.	[6]
		OR	
Q2)	a)	Explain any one application of magic tee with releant diagram.	[6]
	b)	Explain construction & working of isolator.	[6]
	c)	Explain construction and working of H plane tee.	[6]
Q3)	a)	Explain the operation of two cavity klystron amplifier with r	neat
		constructional diagram.	[6]
	b)	List the limitations of conventional Tubes? Explain the Interelectr	ode
		Capacitance effect in tube.	[6]
	c)	Explain Reflex klystron with its constructional diagram.	[6]
		OR	
<b>Q4</b> )	a)	Explain with construction diagram & Operation of Helix type travell	ling
		wave tube (1 w 1).	[0]
	b)	Compare the 'O' type klystron tube & 'M' magnetron tube based or	n an
		three points	[6]
	c)	Explain the working of Cavity magnetron with constructional diagram	.[6]

Q5)	a)	Explain construction and working of Tunnel Diode with its characteristics.	VI [6]
	b)	Compare the IMPATT Diode with TRAPATT Diode	[6]
	c)	Explain the construction & working of Varactor diode	[5]
		OR	
<b>Q6</b> )	a)	With the help of constructional diagram explain the working of Schot Barrier Diode.	tky [ <b>6]</b>
	b)	Explain Gunn diode. With its construction and VI characteristics.	[6]
	c)	Draw constructional diagram and explain the PIN diode state application.	its [ <b>5</b> ]
Q7)	a)	Write short note on applications of Microwave system.	[5]
	b)	With the help of block diagram. explain the Impedance measurem using a slotted line.	ent [6]
	c)	Explain the measurement set up to measure VSWR using Tunable Pro Detector.	obe [6]
		OR	
<b>Q</b> 8)	a)	Explain how the unknown frequency and wavelength can be measu using the slotted line technique.	red [ <b>7</b> ]

- b) Explain radiation hazards and safety precaution to avoid them. [6]
- c) Two identical directional couplers are used in a waveguide to sample the incident and reflected powers. The output of the two couplers are found to be 2.5 mW and 0.25 mW. Determine the VSWR in the waveguide.[4]

SEAT No. :

**PC-2411** 

[Total No. of Pages : 2

[Max. Marks : 70

## [6354] - 529

## B.E. (Electronics & Telecommunication Engineering) VLSI DESIGN & Technology (2019 Pattern) (Semester - VII) (404182)

*Time : 2½ Hour]* 

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.

<b>Q1</b> )	a)	Writ class	te short note on PLDs and explain each device involved sification in brief.	in its <b>[8]</b>
	b)	Drav	w the block diagram of CPLD.	[9]
		Exp	lain the following blocks with respect to CPLD :	
		i)	Macrocell	
		ii)	Product term Allocator:	
			OR	
Q2)	a)	Drav	w block diagram of FPGA.	[9]
		Expl	lain FPGA with respect to the following points:	
		i)	Configurable Logic Blocks	
		ii)	Programing Techniques	
	b)	Com	pare FPGA with CPLD.	[8]
Q3)	a)	Expl	lain any two Non- Ideal Transistor I-V Effects.	[8]
	b)	Drav and	w CMOS logic for $Y = \overline{AB + C(D+E)}$ . Calculate W/L ratio for N PMOS as well as area needed on the chip.	MOS [10]

*P.T.O.* 

<b>Q4</b> )	a)	A CMOS logic is operating at 10 MHz and 3 V with the load of 100 pF. The static power dissipation is 100uW. Calculate the total power dissipation if the frequency is increased to 100 MHz. [6]			
	b)	Discuss need for transmission gate. Draw 4:1 Mux using TG.	[6]		
	c)	Draw 2 input AND and OR gate using CMOS.	[6]		
Q5)	a)	Explain ASIC Design flow	[6]		
	b)	Explain cell design specification	[6]		
	c)	Draw stick diagram for CMOS Boolean Equation : $Y = \overline{A+B}$	[6]		
		OR			
<b>Q6</b> )	a)	Explain LAMBDA rules used for CMOS layout Design	[6]		
	b)	Write short note on Cross talk	[6]		
	c)	Write SPICE code for CMOS invertor for AC analysis	[6]		
		OR			
Q7)	a)	What are the types of fault? Explain each in brief.	[7]		
	b)	Explain the following terms with respect to testability:	[10]		
		i) Fault coverage			
		ii) Fault Models			
		iii) Observability			
		iv) Controllability			
		v) Design for Testability			
		OR			
<b>Q</b> 8)	a)	What is need of BIST? Explain typical BIST in detail.	[8]		
	b)	Draw and explain the state diagram of TAP controller.	[9]		

## **F4 F4 F4**

[6354]-529

2

**PC-2412** 

**SEAT No. :** 

[Total No. of Pages : 2

## [6354]-530

## **B.E.** (E & TC)

## **CLOUD COMPUTING**

## (2019 Pattern) (Semester - VII) (404183)

*Time : 2 <sup>1</sup>/<sub>2</sub>Hours*]

[Max. Marks : 70]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right carry full marks.
- **4**) Assume suitable data, if necessary.

<b>Q1</b> )	a)	Describe	e Network	Virtualiz	ation	with	advanta	ages	and	disadv	vantages.	[6	]
												_	_

- Differentiate between Virtualization and Cloud Computing. b) [6]
- Draw and explain Bare Metal and Hosted virtualization techniques. [6] c)

#### OR

[6]

- Explain in detail advantages and disadvantages of Virtualization. [6] b)
- Write a short note on Applications of Virtualization. [6] c)
- *Q3*) a) Draw and explain Service Oriented Architecture (SOA). [6]
  - Explain the security issues and risks in virtualization. [6] b)
  - Describe the role of actors in NIST cloud computing reference c) architecture. [5]

- Write short note on following : [6] **Q4**) a)
  - i) Firewall
  - ii) Host Security
  - b) Describe steps involved in life cycle of cloud computing. [6]
  - Explain with example how data security provided in social media. [5] c)

<i>0</i> 5)	a)	Discuss the advantages and disadvantages of Google App Engine.	[6]
~ /	b)	Explain the following services of AWS :	[6]
	- /	i) Amazon Cloud-front	
		ii) Amazon RDS	
		iii) DynamoDB	
	()	Describe the different techniques for cost estimation in clo	hud
	()	computing.	<b>[6]</b>
		OR	
<i>06</i> )	a)	Explain the following cloud platforms:	[6]
~ /	,	i) Hadoop	
		ii) Force com	
	h)	Describe in brief various Azure Services	[6]
	(0)	Explain different communication services in cloud computing	[0]
	()	Explain unrefent communication services in cloud computing.	נסו
07)	a)	Discuss the advantages and disadvantages of Distributed Systems	[6]
Q7)	a) h)	Enlist the social networking convices provided even such and machile	
	D)	elaborate the fields where it is popular.	and [6]
	c)	Explain role of cloud computing in IoT.	[5]
		OR	
<b>Q</b> 8)	a)	Describe in brief the following Enabling Technologies of IoT.	[6]
		i) Communications Protocols	
		ii) Embedded Systems	
	b)	Write a short note on innovative applications of IoT.	[6]
	c)	Explain the challenges of Social Networking	[5]
	$\mathcal{C}$	Explain the chancinges of Boerar Pietworking.	[~]



PC2413

### [6354]-531

## B.E. (Electronics/E& TC) SPEECH PROCESSING

### (2019 Pattern) (Semester-VII) (Elective-III) (404184 A)

*Time : 2½ Hours] Instructions to the candidates:* 

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.

### *Q1*) a) Define the relation between formants and LPCs. [4]

- b) Draw the block diagram of Formant measurement using cepstrum and explain it. [8]
- c) What is auto correlation and how it is used to find pitch period of voiced speech? [6]

#### OR

- Q2) a) Draw block schematic for calculation of mel frequency cepstral coefficients and explain the steps required to calculate MFCCs.[9]
  - b) Compare mel scale and Bark Scale, frequency scales used for design of critical band filters. [5]
  - c) Explain the Levinson-Durbin recursion. [4]
- *Q3)* a) What is adaptive PCM? How can be SNR improved using ADPCM?[9]
  - b) With the help of block diagram, explain homomorphic speech processing. [8]

### OR

[8]

b) Explain in detail adaptive transform coder (ATC). [9]

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

.

- Q5) a) Explain in brief speaker recognition system. What are the different features used For speaker recognition. Explain in brief. [9]
  - b) Explain speech synthesis and compare speaker identification & speaker verification. [9]

- Q6) a) What is concatenative synthesis? State and explain sub types of concatenactive synthesis. [9]
  - b) Explain automatic speech recognition system for automatic telephone dialing system (use of statistical method). Explain feature extraction, training & testing phase. [9]
- **Q7)** a) Explain TTS synthesis using support vector machine. [8]
  - b) Explain training phase for Recurrent Neural Networks (RNN). Write two advantages & disadvantages of RNN. [9]

- *Q8*) a) Explain following performance parameters. **[8]** 
  - i) True positives
  - ii) True negatives
  - iii) False positive
  - iv) False negative
  - b) Describe how convolutional Neural networks can be used for automatic speech recognition. [9]

\*\*\*\*

**PC2414** 

[6354]-532

[Total No. of Pages :2

**SEAT No. :** 

## B.E. (Electronics and Telecommunication) PLC SCADA AND AUTOMATION

## (2019 Pattern) (Semester- VII) (404184B) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

<i>Q1</i> ) a)	How can you classify PLC timers? Give example of application	n of timers
	used in PLC.	[8]

- b) Explain about Data File Handling using PLC. [4]
- c) Explain the following terms in detail with respect to PLC. [6]
  - i) Input Scan Time
  - ii) Output Scan Time

#### OR

- Q2) a) How can you classify PLC counters? Give example of application of counters used in PLC. [8]
  - b) Draw a ladder diagram to satisfy the truth table of a NAND logic gate with three inputs and one output. [4]
  - c) Explain concept of P, PI, PD, PID control actions with respect to PLC.[6]
- **Q3**) a) Explain the term SCADA and list the components of SCADA system.[4]
  - b) Explain the functions of MTU and RTU in detail? [7]
  - c) Explain an application of SCADA system in Industrial Automation. [7]

- *Q4*) a) Define the following terms: [4]
  - i) MTU
  - ii) RTU
  - b) Draw & explain the architecture of SCADA. [7]
  - c) Explain an application of SCADA system in Industrial Automation. [7]

a)	Explain the need of DCS.	[4]
b)	Write on types of DCS.	[7]
c)	Explain the application of DCS in water treatment plant.	[7]
	OR	
a)	Explain the basic concept of DCS.	[4]
b)	Compare PLC, DCS and SCADA.	[7]
c)	Explain the DCS architecture.	[7]
a)	What is need of CNC system? Explain with block diagram.	[6]
b)	Explain PROFIBUS protocol in detail.	[6]
c)	What are the main components of NC machine?	[4]
	OR	
a)	What is TCP/IP? Explain.	[6]
b)	Explain MODBUS protocol in detail.	[6]
	<ul> <li>a)</li> <li>b)</li> <li>c)</li> <li>a)</li> <li>b)</li> <li>c)</li> <li>a)</li> <li>b)</li> <li>c)</li> <li>a)</li> <li>b)</li> <li>c)</li> </ul>	<ul> <li>a) Explain the need of DCS.</li> <li>b) Write on types of DCS.</li> <li>c) Explain the application of DCS in water treatment plant. OR</li> <li>a) Explain the basic concept of DCS.</li> <li>b) Compare PLC, DCS and SCADA.</li> <li>c) Explain the DCS architecture.</li> <li>a) What is need of CNC system? Explain with block diagram.</li> <li>b) Explain PROFIBUS protocol in detail.</li> <li>c) What are the main components of NC machine? OR</li> <li>a) What is TCP/IP? Explain.</li> <li>b) Explain MODBUS protocol in detail.</li> </ul>



**PC2415** 

### [6354]-533

[Total No. of Pages :2

SEAT No. :

# B.E. (Electronics/E & TC)

## JAVA SCRIPT

### (2019 Pattern) (Semester- VII) (Elective - III) (404184C)

#### *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data for writing program, if necessary.
- Q1) a) Explain the Mask out with respect to Functions in Java Script. [6]
  - b) Explain how function is used as object in Java Script. [6]
  - c) How Arrays can be used as Stacks and Queues in Java Script. [6]

### OR

- **Q2**) a) What is Anonymous Function ? Explain with example. [6]
  - b) Explain different types of Objects. [6]
  - c) List the various methods of Math object. Explain any one with Example.[6]
- *Q3*) a) What are Common character classes in Regular Expressions? [6]
  - b) Write a short note on Advanced Regular Expressions. [6]
  - c) List String Methods for Regular Expressions and explain any one of them. [5]

OR

- Q4) a) Explain search() and split() method used in regular expression with suitable example. [6]
  - b) Explain the repetition quantifiers in regular expression with suitable example. [6]
  - c) Describe the term Greedy Matching in regular expression with example.[5]
- Q5) a) List different DOM methods used for accessing elements. Explain any two with suitable example. [6]
  b) Explain in detail Netscape 4 event model. [6]
  - c) Describe how to create, insert and append nodes in DOM. [6]

[Max. Marks : 70

<b>Q6</b> )	a)	Describe the terms DOM and HTML elements.	[6]
	b)	Explain event and event handler with an example.	[6]
	c)	Describe different event model issues.	[6]
Q7)	a)	Describe with example the methods alert() and confirm() of V object.	Window [ <b>6</b> ]
	b)	Explain Common Window Properties Related to Frames.	[6]
	c)	Write a short note on Form Usability and Java Script.	[5]
		OR	

- Q8) a) Describe the term controlling window. Enlist different window methods with use.
  - b) Write a Java Script code for a simple calculator using Java script for operations like addition, multiplication, subtraction, division, square of a number etc.
  - c) List and explain different properties and methods used in location object. [5]



**PC2416** 

[6354]-534

[Total No. of Pages :2

SEAT No. :

## B.E. (Electronics & Telecommunications Engineering) EMBEDDED SYSTEM & RTOS

## (2019 Pattern) (Semester- VII) (404184 D) (Elective - III)

### *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) State the features of µCOS- II Real Time Operating System (RTOS).[4]b) What is intertask communication in RTOS? Explain the use of semaphore
  - for event signaling using following functions: [8] OSMBoxPost() and OSMBoxPend().
  - c) Explain with state diagram the states of a task in RTOS. [6]

### OR

- Q2) a) Explain the following  $\mu$ C/OS II functions [4]
  - i) OSInit()
  - ii) OSStart()
  - b) What are different task management functions? Explain following functions with reference to μCOS- II. [8]
    - i) OSTaskCreate()
    - ii) OSTaskDel()
    - iii) OSTaskSuspend()
  - c) Define clock tick in RTOS. Explain with functions any two time management services in μCOS- II. [6]
- *Q3*) a) Differentiate between BIOS and Boot - loader. [4] Draw a typical embedded Linux development set up and explain how it b) works. [8] Explain the various binary utilities in tool chain. [5] c) OR Explain the storage considerations in Embedded Linux. [6] **Q4**) a) Explain typical set up for embedded Linux application development.[7] b)
  - c) Explain in detail the role of GNU debugger.

[4]

Q5) a) What is Linux kernel configuration? Explain the steps in Linux kernel configuration. [6]
b) Explain the file structure used in Embedded Linux. [6]
c) Explain with diagram the architecture of Linux kernel. [6]

### OR

- Q6) a) With diagram, explain the functional blocks of Universal Boot loader.[6]
  - b) What are the various boot-loader challenges? Explain briefly. [6]
  - c) Which are different types of device driver? Explain the loadable kernel modules. [6]
- *Q7*) a) Explain the development platform of Arduino Uno with reference to IDE. Board details and application. [9]
  - b) Explain the embedded software development process and tool chain.[8]

- Q8) a) Explain the development platform of Raspberry Pi with reference to IDE, Board details and application. [9]
  - b) How the testing and debugging is done using tools like Simulator, Emulator and Logic analyzer? [8]

**PC2417** 

SEAT No. :

[Total No. of Pages :2

### [6354]-535

## **B.E.** (**E & TC**)

## **MODERNIZED IOT**

### (2019 Pattern) (Semester- VII) (Elective - III) (404184 E)

Time : 21/2 Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data if necessary.

<b>Q1</b> ) a)	Write a short Note on: [9]
	i) Z Wave
	ii) Bluetooth Low Energy
b)	Compare TCP and UDP transport layer protocol? [8]
	OR
<b>Q2</b> ) a)	Describe in detail the HTTP and MQTT session layer Protocol in IoT.[9]
b)	Write a short note on IPv4 and IPv6 protocols.[8]
<b>Q3</b> ) a)	Differentiate between Raspberry Pi and Arduino Board. [9]
b)	List out and explain any 8 Arduino functions in detail. [8]
	OR
<b>Q4</b> ) a)	Explain the DHT interfacing deployment in ESP8266. [9]
b)	Explain the connection of microcontrollers with mobile devices through
	Bluetooth. [8]
<b>Q</b> 5) a)	Draw and explain the Architecture of IIoT. [9]
b)	Explain in detail about the Industrial Internet Architecture Framework
	(IIAF)? <b>[9</b> ]
	OR
<b>Q6</b> ) a)	Briefly explain the application of IIoT in: [9]
	i) Healthcare
	ii) Logistics
b)	What is IIoT and How is it different from IoT? [9]
	P.T.O.

[Max. Marks : 70

Q7) a) Describe Photovoltaic Installation Monitoring and optimization of performance in solar energy plants. [9]

[9]

- b) Write a short note on:
  - i) Smart Grid
  - ii) Smart Parking

- **Q8**) a) Explain in detail the Air Pollution monitoring system in detail. [9]
  - b) Describe the Sportsmen care application for vital signs monitoring in high-performance centers and fields. [9]



**PC2418** 

**SEAT No. :** 

[Total No. of Pages : 2

[Max. Marks : 70

## [6354]-536 B.E. (Electronics & Telecommunication) DATA MINING

### (2019 Pattern) (Semester - VII) (Elective - IV) (404185 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams to be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

<i>Q1</i> ) a)	<i>Q1</i> ) a) Discuss Decision Tree Induction methods.			
b	Write in detail on the different methods of Frequent Item set M Methods?	ining] [9]		
	OR			
<b>Q2</b> ) a)	What are the steps and algorithm of FP growth algorithm?	[9]		
b	Describe different data visualization techniques.	[9]		
<b>Q3)</b> a)	What are the different steps in CART algorithm?	[9]		
b	Discuss K-Nearest Neighbor Classification algorithm with surexample.	itable [ <b>9</b> ]		
	OR			
<b>Q4</b> ) a)	Discuss the methodology of CART algorithm.	[9]		
b)	Write short notes on Support Vector Machines.	[9]		
<b>Q</b> 5) a)	What are the different types of outliers that occur in a dataset?	[9]		
b	Explain the different types of data in cluster analysis.	[8]		
	OR			

*P.T.O.* 

*Q6*) a) What is BDSCAN clustering algorithm. Explain with an example. [9]
b) Explain the differences between classification and clustering. [8]

<b>Q7</b> ) a)	Discuss page ranking technique in detail.		
b)	What are the steps involved in HITS algorithm.	[8]	

### OR

- Q8) a) Discuss web structure mining along with list of approaches used to structure the web pages to improve effectiveness of search engines and crawlers. [9]
  - b) Give the points of differences between Web usage mining and Web Structure mining. [8]

\* \* \*

**PC4424** 

**SEAT No. :** 

[Total No. of Pages : 2

## [6354]-537 B.E. (E & TC) ELECTRONIC PRODUCT DEVELOPMENT (2019 Pattern) (Semester - VII) (Elective - IV) (404185 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary.

*Q1*) a) Describe traditional software lifecycle with reference to Waterfall Model.[8]

b) Illustrate prototyping model and spiral model for software development.[9]

- **Q2**) a) Explain the following terminologies. [8]
  - i) Risk Abatement and Failure Preventions.
  - ii) Software Bugs and Testing
  - iii) Good Programming practice
  - b) Explain software design with any case study and design example. [9]
- **Q3**) a) How can we improve reliability over failure in PCBs? [9]
  - b) Explain configurations of routing topologies in PCB layout designing.[9]

Q4)	a)	Interpret the role of proper component placement in PCB. [9			
	b)	Explain assembly and materials required with factors affecting on costin of PCB.	ıg )]		
Q5)	a)	Explain techniques for Trouble shooting. [9	)]		
	b)	Define debugging process and explain steps of debugging. [9	)]		
		OR			
<b>Q6</b> )	a)	Explain the following terms with example. [9	)]		
		i) Prototyping and Testing			
		ii) Integration			
		iii) Manufacturing			
	b)	What are the different steps in the debugging? Differentiate debugging from troubleshooting.			
Q7)	a)	Explain with example what do you mean by preparation, presentat and preservation of documents.			
	b)	Write a short note on following: [9	)]		
		i) Layout of documentation			
		ii) Need of documentation			
		OR			
<b>Q</b> 8)	a)	What are the different methods of preservation of documents? Explain [8	1. 3]		
	b) Describe the need and types of documentation.				

## \* \* \*

2

**PC2419** 

**SEAT No. :** 

[Total No. of Pages : 2

## [6354]-538 B.E. (Electronics & Telecommunication) DEEP LEARNING (2019 Pattern) (Semester - VII) (Elective - IV) (404185 C)

*Time : 2½ Hours]* 

Instructions to the candidates:

- [Max. Marks : 70
- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic calculator is allowed.
- 5) Assume suitable data if necessary.
- *Q1*) a) What is activation function? Explain Sigmoid activation function used in deep learning.[6]
  - b) Define width and depth of neural networks. Explain the architecture of Neural Network. [6]
  - c) Explain the concept of Overfitting and Underfitting in deep learning. [6]

- (Q2) a) What is batch normalization used in neural network? Explain its working. [6]
  - b) What is regularization? How to reduce Overfitting using Dropout and Regularization? [6]
  - c) Explain with neat diagam of Restricted Boltzmann Machines (RBM).[6]
- Q3) a) Explain convolutional operation of CNN with example. [6]
  - b) Explain pooling layer of CNN. [6]
  - c) Explain the terms padding & Striding. [5]

<b>Q4</b> )	a)	What is weight initialization? Describe the various weight initialization techniques. [6]			
	b)	Explain the function of full connected layer of CNN.			
	c)	Write a short note on deep CNN architecture. AlexNet. [	5]		
Q5)	a)	a) What is A Recurrent Neural Network (RNN)? How it is used in NLP?			
	b)	How Name Entity Recognition Problem is fixed using Bidirectional R Explain with the help of suitable diagram.			
	c)	Write a short note on Generative Adversarial Network.	6]		
	OR				
Q6)	a)	Explain the term long short term memory (LSTM) used in RNN. [	6]		
	b)	Write a short note on Back Propagation Through Time (BPTT). [	6]		
	c)	Explain the difference between LSTM and GRU? [	6]		
Q7)	a)	Explain in detail the structure of an image classification using deep learnin	ıg. <b>9</b> ]		
b) What is NLP? How NLP is used for text preprocessing?					

[8]

08	?) a	1)	Explain spam	mail classific	cation application	ations using	NLP.	[9]
	/ .	·/						L 1

b) What is sentiment analysis? Describe the various use cases of sentiment analysis. [8]

## \* \* \*

detail.

PC-5123

SEAT No. : [Total No. of Pages : 2

## [6354]-539 B.E. (E & TC Engineering) LOW POWER CMOS

## (2019 Pattern) (Semester - VII) (Elective - IV) (404185D)

Time : 2½ Hours]

Instructions to the candidates:

- [Max. Marks : 70
- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn whenever necessary.
- 4) Assume suitable data, if necessary.
- Q1) a) Explain the process of sizing an inverter chain. Discuss how gate sizing impacts both the delay and power consumption of the chain? [8]
  - b) Define a self-gating flip-flop and explain how it works. Discuss its advantages in reducing power consumption compared to traditional flip-flops. [9]

- Q2) a) Transistor network restructuring and partitioning are important techniques in modern VLSI design. Explain the concept of transistor network restructuring. How does it help optimize the overall circuit performance and power consumption? [9]
  - b) Discuss the importance of cell sizes and spacing in a low-power digital cell library. How do these factors influence the overall performance and power consumption of the digital system? [8]
- Q3) a) Compare and contrast the steepest descent algorithm and the generic-based algorithm for power optimization in digital circuits. Discuss their applications in minimizing power dissipation during circuit design and their advantages and disadvantages.
  - b) What is Domino logic? Discuss the advantages and disadvantages of Domino logic in terms of power dissipation and performance. [9]

- *Q4*) a) Define glitching power in digital circuits. How do glitches occur and why is estimating glitching power critical for accurate power analysis?[9]
  - b) Discuss the process of signal probability calculation and how it can be used in estimating dynamic power dissipation. Provide a brief explanation of the relationship between signal probabilities and power consumption in CMOS circuits. [9]
- Q5) a) Describe the techniques used for gate-level power estimation in software. How does this method assess. the power consumption of individual gates and logic operations within the software? [8]
  - b) Discuss the importance of instruction-level power analysis. How do different types of instructions affect the power consumption of a system? Provide examples of how instruction-level analysis can be used to optimize power. [10]

- *Q6*) a) Explain power management techniques that can be employed at software level to reduce power dissipation. Discuss dynamic voltage and frequency scaling (DVFS) and its impact on software power consumption. [8]
  - b) Discuss the role of hardware-aware software optimizations in co-design. How can software developers leverage knowledge of the underlying hardware architecture to im prove power efficiency? [10]
- Q7) a) Discuss the working principle of adiabatic logic circuits. How do these circuits aim to reduce power consumption, and what are the key components involved in adiabatic switching? [9]
  - b) Discuss the techniques used in battery-aware synthesis to optimize power consumption and prolong battery life. How do factors like voltage scaling and power gating play a role in battery-aware design? [8]

- Q8) a) Discuss variation-tolerant design techniques. How do these techniques help in minimizing the impact of process variations on circuit reliability and performance. [9]
  - b) Explain how power estimation and optimization are integrated into the CAD tools for low-power synthesis. How do these tools help in achieving the trade-off between performance, area, and power (PPA)? [8]

**PC2420** 

**SEAT No. :** 

[Total No. of Pages : 2

## [6354]-540 B.E. (E &Tc) SMART ANTENNAS (2019 Pattern) (Semester - VII) (Elective - IV) (404185 E)

Time : 2½ Hours]

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.
- *Q1*) a) Define Smart Antenna'? What is need of Smart Antenna? Explain Switched Beam Smart Antenna.[6]
  - b) What is the mutual coupling effect in a smart antenna array? How to achieve maximum directivity considering mutual coupling effect? [6]
  - c) Explain the architecture of a smart antenna system with suitable diagram. [6]

- Q2) a) What are the different configurations of smart antennas, and explain how the choice of antenna configuration impacts the performance and capabilities in wireless communication systems? [6]
  - b) Explain following terms in the context of Smart Antenna; [6]
    - i) Beam steering
    - ii) Degree of freedom
  - c) What are the features of a smart antenna system? Explain benefits of smart antennas. Also mention few applications of smart antennas in wireless systems. [6]
- Q3) a) How does the Root MUSIC and Cyclic MUSIC algorithm contribute to the beamforming capabilities of smart antennas? Differentiate the key principles and differences between these two MUSIC algorithms. [7]
  - b) Explain in the linear prediction method for spectral estimation. [4]
  - c) What is Direction-of-arrival (DOA) estimation? Explain ESPRIT algorithm for DOA estimation? [6]

- *Q4*) a) What is Eigen structure assignment? With the help of example explain the significance of Eigen structure method for smart antenna design. [7]
  - b) Explain the fundamental principle and applications of the Maximum Entropy Method. [5]
  - c) Explain in detail about Spectral estimation by Bartlett's method? [5]
- Q5) a) What is Linearly Constrained Minimum Variance (LCMV)? Explain how LCMV helps in enhancing the quality of a signal in the presence of interference? [6]
  - b) What do you mean by Adaptive Algorithms for Beam forming? Explain any one Adaptive beamforming algorithm in detail. [6]
  - c) Explain in detail the concept of Direct Matrix Inversion (DMI) in the context of smart antenna. [6]

- *Q6*) a) Explain the concept of Classical Beam former and Statistically Optimum Beam-forming Weight Vector. [6]
  - b) Explain in detail sample matrix inversion (SMI) beamforming algorithm for smart antenna applications. [6]
  - c) Explain how to achieve Minimum Mean Square Error (MMSE) using beamforming algorithms? [6]
- Q7) a) Compare SISO, SIMO, MISO, MIMO systems with respect to BER, throughput, link range, bandwidth, transmit power & quality of signal received at output. [6]
  - b) What is hybrid antenna array? What are key challenges need to be addressed in the design and implementation of hybrid antenna array. [5]
  - c) Explain the concept of massive MIMO with suitable diagram. Also list out applications of massive MIMO. [6]

### OR

- *Q8*) a) Explain in detail, how the incorporation of MIMO technology improves the performance of smart antenna systems. [6]
  - b) Explain following MIMO configurations: [6]
    - i) SIMO
    - ii) MIMO
  - c) What are the key advantages and challenges associated with implementing MIMO in smart antennas? [5]

\* \* \*

SEAT No. :

## **PC2421**

### [6354]-541

## **B.E.** (**E&TC**)

### FIBER OPTIC COMMUNICATION

### (2019 Pattern) (Semester - VIII) (404190)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

[Total No. of Pages : 2

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.
- Q1) a) What are the requirements of material selection for photodetectors. [5]
  - b) Draw the structure of APD and explain its working.List its advantages and drawbacks. [6]
  - c) Explain different types of noise in the receiver. [6]

- *Q2*) a) Draw structure of p-i-n photodiode and explain its operation in brief. Plot the responsivity curve as function of wavelength for p-i-n photodiodes.[6]
  - b) A given APD has a quantum efficiency of 65% at a wavelength of 900 nm.Suppose 0.5 micro watt of optical power produces a multiplied photocurrent of 10 micro A.Find multiplication factor. [6]
  - c) Explain receiver structure in detail. [5]
- Q3) a) Let the data rate of 20mb/s and BER of 10-9. For the receiver PIN photodiode operating at 850 nm, the required receiver input signal is -42dBm .The LED is used as a source can couple 50uW(-13dBm) average optical power into a fiber flylead with a 50 um core diameter. Assume 1dB loss occurs when the fiber flylead is connected to the cable and another 1dB connector loss at the cable-photo detector interface. System margin of 6dB.Let attenuation per km is 3.5dB/km. Estimate link length. [7]
  - b) Write short note on optical coupler, circulator and isolator. [6]
  - c) Illustrate fiber grating with the help of a neat diagram. [5]

- Q4) a) An optical fiber transmission system is to be designed to operate on 8km length without repeaters. The rise time of the chosen components are source LED : 8ns, Fiber cable: intermodal : 5ns/km, Intramodal: 1ns/km, Detector PIN :6ns Estimate maximum bit rate that may be achieved on the link when using NRZ and RZ formats.
  - b) Enlist types of optical amplifiers.Explain EDFA in detail. [6]
  - c) Illustrate the significance of WDM components with suitable block diagram.
     List the formulas for fused-Biconical coupler. [6]
- *Q5*) a) Define network topology. State and explain types of network topologies with suitable diagrams. [5]
  - b) What is Fiber Distributed Data Interface (FDDI) and its features?Explain with diagram FDDI with respect to ring structure, Reference Model, frame and topology used.
  - c) Write short note on Active Optical network and Passive optical network.[5] OR
- *Q6*) a) Define Optical Network. Explain the term optical node & light path with a suitable diagram relative to optical network. [5]
  - b) What is FTTX? What are the different categories of FTTX?Explain FTTX with respect to architecture. [6]
  - c) Explain SONET with the help of structure, state advantages and applications.[7]
- Q7) a) Describe OTDR with the help of a block diagram. Explain a typical trace of losses on OTDR. [7]
  - b) Explain intermodal dispersion measurement technique. [5]
  - c) Draw and explain EYE diagram measurement set up. [5]

- Q8) a) What is attenuation?Describe with necessary experimental arrangement for the measurement of the signal attenuation in an optical fiber by cutback technique. [7]
  - b) Consider a long optical fiber with core refractive index  $n_1=1.460$ . Suppose that an engineer uses OTDR to locate a break in the fiber. If the break is located 15km away, What is the return time of an OTDR test pulse? [4]
  - c) List the widely used optical measuring instruments and explain any three measuring instruments in detail. [6]



[6354]-541

SEAT No. :

## **PC2422**

### [6354]-542

[Total No. of Pages : 2

[Max. Marks : 70

## B.E. (E&TC Engineering) BIOMEDICAL SIGNAL PROCESSING

## (2019 Pattern) (Semester - VIII) (Elective - V) (404191A)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) a) Draw a schematic anatomy of the brain with the major functional components. Articulate the functions of the brain. [9]
  - b) Which is the major drawback of EEG recording? Explain EEG frequency spectrum in short also draw representative frequency patterns from the four spectral groups in the EEG. [9]

### OR

- *Q2*) a) What do you mean by 10/20 international system? Draw the positioning of EEG electrodes according to the international 10/20 system also state the Significance of EEG in clinical diagnostics of neurological disorders.[10]
  - b) Which are the internationally accepted methods of testing the brain activity that are commonly applied in clinical measurements? Explain Somatosensory-Evoked Potentials recordings in short. [8]
- Q3) a) Which are the main types of the muscles? Illustrate the process of contraction and relaxation with in a muscle. [8]
  - b) Which are the major characteristics of muscles that are evaluated using EMG. Paraphrase the significance of EMG signal. [9]

- Q4) a) Which are the sources of noise in EMG signal? Explain time domain analysis of an EMG signal.[8]
  - b) Write a short note on processing and feature extraction of EMG and it's[9]
    - Frequency Domain Analysis
    - Wavelet Domain Analysis

- Q5) a) Define the term, 'Blood Pressure'; State its types also illustrate the instrument used to measure Blood Pressure? [8]
  - b) What is the significance of Electro-oculogram? Comment on the measurement of EOG. Draw Detecting vertical and horizontal motion of the eyes using EOG. Enlist main applications of an EMG. [10]

- *Q6*) a) What do you mean by the respiratory signals? State the significance of respiratory signal measurement .Which instruments are used to measure respiratory signal ?Draw Airflow signal.[8]
  - b) Enlist the other biomedical signals and the main biomedical signals? What is MEG? Compare MEG and EEG? What are the advantages and limitations of MEG over EEG? [10]
- Q7) a) Draw and explain the biomedical signal acquisition and its bioelectrical signal recordings. [9]
  - b) Enlist the digital filters used to remove the noise from biomedical signals. Paraphrase the type of noise in biomedical signals in detail. [8]

### OR

Q8) a) Write the selection criteria for the filter to remove the Artifacts from the Biomedical signal. Draw and explain Adaptive noise canceller for Cancellation of 50 Hz signal in ECG. [9]

[8]

- b) Write short note on.
  - Optimal and adaptive filters,
  - Weiner filters.



SEAT No. :

## PC2423

### [6354]-543

[Total No. of Pages : 2

[Max. Marks : 70

## B.E. (E&TC Engineering) INDUSTRIAL DRIVES & AUTOMATION

## (2019 Pattern) (Semester - VIII) (Elective - V) (404191B)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4. Q5 or Q6 and Q7 or Q8.
- 2) Neat diagrams and waveforms must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of nonprogrammable calculator is allowed.
- 5) Assume suitable data if necessary
- Q1) a) Draw the closed loop speed scheme for control below and above base speed of the separately excited DC Motor. [9]
  - b) Explain with neat block schematic the control circuit of battery fed chopper controlled DC series motor drive system. [8]

### OR

- **Q2)** a) A separately excited chopper controlled DC motor drive is considered for a paper winder in a winding-unwinding controller. The motor ratings and the parameters are: 200KW, 6000V, 2400 rpm,  $R_a=0.05 \Omega$ ,  $L_a=0.005 H$ ,  $K_b=2.32V/rad/sec$ ,  $B_1=0.05 N-m/rad/sec$ ,  $J=100 Kg-m^2 R_f=30\Omega$ ,  $L_f=20H$ , Input=460V, Three phase 60Hz. Design the chopper power circuit with current capacity of 2 p.u. for short duration and DC link voltage ripple factor of 1% for dominant harmonic. **[9]** 
  - b) Discuss the impact of the choice of current controller on dynamic performance of DC motor drive system. [8]
- Q3) a) Explain sub synchronous speed operation and super synchronous speed operation for Induction Motor. [9]
  - b) What do you mean by slip power recovery scheme? Explain any one scheme for the same. [9]

- Q4) a) Explain methods of power factor improvement in induction motor. [9]
  - b) A 50 Hz, 8 Pole three phase induction motor has full lad slip of 4% . The rotor resistance is  $0.001\Omega$ / phase and standstill reactance is  $0.005\Omega$ / phase. Find the ratio of [9]
    - i) maximum torque to full load torque
    - ii) speed at which maximum torque occurs

- Q5) a) Explain self controlled Synchronous motor drive employing load commutated thyristor inverter. [9]
  - b) Draw and explain voltage source inverter drive with open loop control. Explain variable frequency control of multiple synchronous motors. **[8]**

- *Q6*) a) Explain with neat diagram variable frequency control mode of synchronous motor. [9]
  - b) A synchronous motor is controlled by load commutated inverter. Which in turn is fed from line commutated converter. Source voltage is 6.6 kV, 50 Hz. Load commutated inverter operates at a constant firing angle  $\alpha$ =140 and when rectifying  $\alpha$ =0. DC link inductance resistance R=0.1 $\Omega$ . Drive operates in self controlled mode with constant v/f ratio. Motor has details 8 MW three phase 6600 V, 6 pole 50 Hz unity power, factor star connected X=2.8  $\Omega$  R=0 $\Omega$ . Determine source side converter firing angles for following: [8]
    - i) Motor operation at the rated current and 500 rpm what will be the power developed by motor.
    - ii) Regenerative braking operation at 500 rpm and rated motor current also calculate power supplied to the source.
- Q7) a) What is stepper motor? Give the classification of stepper motors. Explain the operation of variable reluctance motor with neat diagram. [9]
  - b) Explain unipolar drive circuit and bipolar drive circuit for stepper motor with neat diagram. [9]

- *Q8*) a) Explain with neat diagram microprocessor based closed loop control of stepper motor. [9]
  - b) What is limitation of stepper motor in open loop mode? Explain with neat diagram closed loop control of stepping motor. [9]



SEAT No. :

[Total No. of Pages : 2

**PC2424** 

### [6354]-544 B.E. (E&TC Engineering) ANDROID DEVELOPMENT

#### (2019 Pattern) (Semester - VIII) (Elective - V) (404191C) *Time : 2<sup>1</sup>/<sub>2</sub> Hours*] [Max. Marks : 70 Instructions to the candidates: Answer Q1 or Q2, Q3 or Q4. Q5 or Q6 and Q7 or Q8. 1) Neat diagrams must be drawn wherever necessary. 2) 3) Figures to the right side indicate full marks. *4*) Use of electronic pocket calculator is allowed. Assume suitable data if necessary 5) Explain basic building blocks of Android Application. [9] *Q1*) a) Explain Android API levels. [8] b) OR *Q2*) a) Explain the structure of Android project. [9] Explain components of communication in Android. b) [8] Write the procedure to link the activities using intents. *Q3*) a) [9] Explain Components of screen and Adapting Display Orientation. [9] b) OR Explain the procedure for replacing fragments. **Q4**) a) [8] Explain about Absolute and Relative Layouts. [10] b) Explain Android Menus. [9] **Q5**) a) Explain 2D and 3D Graphics in Android. [8] b)

*P.T.O.* 

<b>Q6</b> ) a)	Explain Text View in detail. [			
b)	Explain	[8]		
	i) Grid View			
	ii) Image Switcher view			
<b>Q7</b> ) a)	Write the steps for Inserting data and updating data into the da	atabase.[9]		
b)	Explain about saving data to internal and external storage. [9			
	OR			
<b>Q8</b> ) a)	Write short note on Database opeartions	[9]		
b)	Write Short Note on			
	i) Google Maps			
	ii) Monitoring a location			

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PC-4973

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-545

# **B.E.** (Electronics and Telecommunication) **EMBEDDED SYSTEM DESIGN**

# (2019 Pattern) (Semester - VIII) (404191D) (Elective - V)

#### *Time : 2\frac{1}{2} Hours ]* [Max. Marks : 70 Instructions to the candidates : Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8. 1) 2) Figures to the right indicate full marks. Illustrate 12C and CAN Modules in STM32F4 Microcontroller. *Q1*) a) [8] Discuss in detail GPIO Port functions. [9] b) OR Explain the classification of API and also illustrate the API naming Rules. *Q2*) a) [8] Elaborate HAL Data Structures in Details. [9] b) Explain the concept of thread management in FreeRTOS. *Q3*) a) [9] What is the process for configuring FreeRTOS using STM32CubeMX? b) [9] OR What are synchronization primitives and how are they used in FreeRTOS? **Q4**) a) [9] Write C code for a task in FreeRTOS that toggles an LED every second.[9] b) Design an Embedded system for Image transfer between PC and **Q5**) a) STM32F4. [8] Elaborate how to install Touch GFX for Graphical User Interface (GUI).[9] b)

<b>Q6</b> )	a)	What are the benefits of using a GUI library like TouchGFX?				
	b)	How do you configure the SPI interface on the STM32F4 microcontro and What are the steps involved in initializing a graphical LCD?	oller [9]			
Q7)	a)	What is the overall architecture of Android?	[9]			
	b)	What are some advantages of using Android over other mobile opera systems?	ting <b>[9]</b>			
		OR				
<b>Q8</b> )	a)	Articulate requirements of Android.	[9]			
	b)	Describe Loading and interfacing methods in Embedded Systems.	[9]			



**PC2425** 

# [6354]-546 B.E. (E&TC Engineering) MOBILE COMPUTING

(2019 Pattern) (Semester - VIII) (Elective - V) (404191 E)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.
- *Q1*) a) Compare MANET and VANET?
  - b) Explain with suitable data flow diagram, client initialization via DHCP.[6]
  - c) What is hybrid routing? Explain zone routing protocol (ZRP) with suitable diagram. [6]

#### OR

- **Q2**) a) List and explain the applications of MANET.
  - b) Compare proactive routing protocols with reactive routing protocols.[6]
  - c) How does Ad Hoc On-Demand Distance Vector Routing (AODV) route the data? What are its advantages (any 1) and disadvantages (any 1)?[6]
- Q3) a) Explain
  - i) Indirect TCP
  - ii) Snoop TCP
  - iii) Mobile TCP
  - b) Explain transaction-oriented TCP with suitable diagram. What are its advantages and disadvantages? [8]

OR

- *Q4*) a) Explain the modifications of Indirect TCP. What are its advantages and disadvantages? [9]
  - b) Explain need of Mobile IP and elaborate IP Packet Delivery? [8]

*P.T.O.* 

[Total No. of Pages : 2

**SEAT No. :** 

[9]

[6]

[6]

[Max. Marks : 70

0

Q5)	a)	Exp] distr	lain Rayleigh distribution. How mean and variance of Rayleig ibution is calculated?	gh <b>6]</b>
	b)	Wha dete	t is non-coherent detection? Explain with neat diagram, noncoherection of FSK.	ent 6]
	c)	Expl	ain Ricean Fading in detail? [	6]
			OR	
<b>Q6</b> )	a)	Desc fadin	cribe multipath propagation with neat diagram. What is ISI in multipang channels?	ith 6]
	b)	Com used	pare wideband and narrowband channels. List any two channel model in each channel.	els 6]
	c)	Expl	ain BER Fading in detail? [	6]
Q7)	a)	Expl	ain [	9]
		i)	Palm OS	
		ii)	Symbian OS	
		iii)	iOS	

b) What is M-commerce? List out benefits of M-commerce. Briefly explain any three applications of M-commerce. [8]

#### OR

*Q8*) a) What is a mobile payment system? Explain payment process using credit card. List advantages and disadvantages of M-commerce. [9]

[8]

- b) Write short note on
  - i) B2C
  - ii) B2B

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**PC2426** 

#### SEAT No. :

[Total No. of Pages : 2

# [6354]-547

# **B.E.** (E & TC)

#### **SYSTEM ON CHIP**

#### (2019 Pattern) (Semester - VIII) (Elective - VI) (404192(A))

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, & Q.5 or Q.6, & Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Draw neat diagram wherever necessary.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Write the truth table and symbol of 2i/p AND and OR gates. Write a Verilog code for gate instantiation of these gates. [5]
  - b) Write a Verilog design code for 4:1 Multiplexer along with comments.[5]
  - c) Explain the different types of operators supported in Verilog with examples. [8]

#### OR

- *Q2*) a) Write the truth table and symbol of Buffer and NOT gate. Write a Verilog code for gate instantiation of these gates. [5]
  - b) Write a Verilog design code for 1 -bit Full Adder. [5]
  - c) List any five differences between Tasks and Functions. Explain continuous assignments in Verilog with an example. [8]

# *Q3*) a) What is floor planning? Explain the Abutted floor planning technique with the help of an appropriate figure. [5]

- b) Explain the different rules of partitioning. [5]
- c) Write short notes on: [8]
  - i) Coarse placement
  - ii) Legalization
  - iii) Keep-out margin

[Max. Marks : 70

Q4)	a)	Write any five differences between Abutted and Non-abutted floor plan techniques. [5	n []
	b)	Explain the two partitioning methods with appropriate figures. [5	[]
	c)	Write short notes on: [8	5]
		i) Netlist	
		ii) Fixed-die routing	
		iii) Variable-die routing	
Q5)	a)	What are VLIW Processors? Explain in detail with the help of an appropriate figure. [8]	n 5]
	b)	Explain the following: [8	;]
		i) Instruction Decoder and Interlocks	
		ii) Execution Unit	
		OR	
Q6)	a)	Provide a detailed description of Superscalar Processors. [8]	;]
	b)	Explain the following: [8	;]
		i) Mean Request Rate Buffers	
		ii) Branch Prediction	
Q7)	a)	Explain the Type I ST bus protocol. [5	;]
	b)	Write a short note on SOC (On-Die) memory systems. [5	[]
	c)	Explain the AMBA architecture with the help of an appropriate figure.[8	<b>;]</b>
		OR	
Q8)	a)	Explain the Type II ST bus protocol. [5	[]
	b)	Write a short note on Board based (Off-Die) memory systems. [5	[]
	c)	Explain Cache memory, its performance, partitioning and multi-leve Cache with an appropriate figure. [8]	:1 ;]

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PC2427

SEAT No. :

[Total No. of Pages : 2

# [6354]-548

# **B.E.** (E & TC)

# NANO ELECTRONICS

# (2019 Pattern) (Semester - VIII) (Elective - VI) (404192B)

<i>Time</i> : 2 <sup>1</sup> /	[Max. Marks : 70	
Instructi	ons to the candidates:	
1)	Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.	
2)	Neat diagrams must be drawn wherever necessary.	
3)	Figures to the right indicate ftill marks.	
4)	Assume suitable data if necessary.	
<b><i>Q1</i></b> ) a)	What is cluster? Explain Carbon nano tubes.	[8]
b)	Explain Nano material and its types.	[8]
	OR	
<b>Q2</b> ) a)	Explain properties of CNT.	[8]
b)	Explain Semiconductor Nano particles.	[8]
<b>03</b> ) a)	Explain Photolithography process in detail	[9]
<b>y</b> b)	Explain Electron Beam Lithography with neat diagram	[9]
0)	Explain Election Deam Ennography with heat diagram.	[7]
	OR	
<b><i>Q</i>4</b> ) a)	Explain Nano electronics for communication.	[9]
b)	Explain Atomic Lithography with neat diagram.	[9]
<b>Q</b> 5) a)	What are molecular switch ? Explain Redox switch.	[9]
b)	Explain MEMS.	[9]

<b>Q6</b> ) a)	Define Nano machine? Explain Nano Tubes Actuators.	[9]
b)	Explain types of Super Molecular Switches.	[9]
<b>Q7</b> ) a)	What are Nano sensor? Explain Optical Sensor.	[9]
b)	Which are types of Nano Sensor? Explain Nano biosensor.	[9]
	OR	

<b>Q8)</b> a)	What is use of Nano technology in Electronics?	
b)	Explain Transformation.	[9]

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### **PC2428**

SEAT No. :

[Total No. of Pages : 2

#### [6354]-549

# **B.E.** (E & TC)

### **REMOTE SENSING**

### (2019 Pattern) (Semester - VIII) (Elective - VI) (404192C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- *Q1*) a) Write a list of three categories of satellite data products. With help of diagrams and suitable example explain any one satellite data product.[8]
  - b) Explain the preprocessing techniques applied on satellite imagery in remote sensing? [8]

#### OR

- Q2) a) Explain the elements of visual interpretation used in remote sensing with suitable illustrations. [8]
  - b) Elaborate the major differences between NDVI, NDWI and NDSI with its equations. [8]
- Q3) a) Explain microwave remote sensing, its types and its advantages over optical remote sensing.[8]
  - b) Explain principles of radar, its equation and derive range resolutions of SLAR. [10]

#### OR

- Q4) a) Explain the principle of altimeter with a suitable diagram and its applications.
  - b) Explain various instruments / sensors used in microwave remote sensing with suitable examples. [10]

- *Q5*) a) Explain the working principle behind the GNSS technology, its features and applications. [10]
  - b) Explain the vulnerabilities of GNSS and its signal structure. [8]

#### OR

- *Q6*) a) Explain ground based augmentation system and space based augmentation system. [10]
  - b) Explain the concept of Differential GPS and Location Based Services and its use cases. [8]
- *Q7*) a) Brief the application of remote sensing in development of Land Information System with use cases and methodology. [10]
  - b) Brief the application of remote sensing in coastal and near sea shore management with use cases and methodology. [8]

#### OR

- *Q8*) a) Brief the application of remote sensing in managing Smart cities with use cases and methodology. [10]
  - b) Brief the application of remote sensing in natural disasters monitoring and mitigating with use cases and methodology. **[8]**

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[6354]-549

**PC2429** 

SEAT No. :

[Total No. of Pages : 2

# [6354]-550 B.E. (E & TC)/(Electronics) DIGITAL MARKETING

### (2019 Pattern) (Semester - VIII) (Elective - VI) (404192D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- *Q1*) a) Explain different types of search engine marketing tools used by business organizations. [9]
  - b) Discuss the benefits of keyword planner along with it's functions. [8]

#### OR

- **Q2**) a) Discuss different types of google Ads used in Digital marketing. [9]
  - b) Explain the methods of mobile advertising frequently used by users for marketing. [8]
- Q3) a) List the benefits of social media marketing. Also explain in detail types of Facebook marketing. [9]
  - b) Discuss on You Tube ads and Youtube analytics in detail. [8]

#### OR

- Q4) a) Discuss the steps involved in You Tube Monetization. [9]
  - b) Discuss the concept for B2B and B2C perspective. [8]
- **Q5)** a) Write short note on Web Forms and Lead generation. [9]
  - b) Explain the concept of LinkedIn advertising and explain briefly LinkedIn message pitching. [9]

<b>Q6</b> ) a)	) List the various steps involved in planning e-mail campaign.	[9]
b	b) Discuss the steps involved in Web Forms Lead importing.	[9]
<b>Q7</b> ) a)	Discuss concept of Affiliate. marketing in detail.	[9]
b	b) Explain OTT platforms. List its advantages & disadvantages.	[9]
	OR	

<b>Q8</b> ) a)	Elaborate on Visual search and chat bots.	[9]
b)	Explain automated and smart bidding in detail.	[9]

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**PC2430** 

[6354]-551

[Total No. of Pages : 2

**SEAT No. :** 

# B.E. (Electronics Engineering) VLSI DESIGN

### (2019 Pattern) (Semester - VII) (404201)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- Q1) a) Sketch the diagram and explain in detail Random Access Memory Organization. Describe the SRAM and its peripherals. [9]
  - b) Explain the classification of memory. Enlist the performance parameters and timing parameters of semiconductor memory. [8]

#### OR

- Q2) a) Draw the schematic of DRAM cell with necessary peripherals and explain read-write cycles with the help of timing diagram. [9]
  - b) Write short notes on
    - i) One Transistor DRAM cell
    - ii) Sense amplifier
- **Q3**) a) Explain in detail about the Block Placement and channel definition. **[8]** 
  - b) Discuss the two complementary ways to improve clock distribution. Explain in detail about H-tree and balanced tree clock network. [9]

#### OR

- Q4) a) Explain in details about Interconnect Properties and Wiring Plans of transistor in chip design. Describe Switchbox Routing in detail. [9]
  - b) Discuss any two properties of ideal power distribution network. Explain in detail about different types of Packages in VLSI chip design. [8]

[Max. Marks : 70

[8]

Q5) a) Use Shannon's expansion theorem around a and b for the function

Z = abcd'ef' + a'b'c'def' + b'cde'f

so that it can be implemented using a minimum number of 4-variable functions. Rewrite Z to indicate how it will be implemented using 4- variable function generators and draw a block diagram. Indicate the function generated by each function generator. [9]

b) Sketch the block diagram of TAP controller and explain it in detail. [9]

OR

- **Q6**) a) Explain carry chains and cascade carry chains in FPGA with neat sketch.[9]
  - b) Explain in detail about Dedicated Memory in FPGAs. List out the benefits of boundary scan. [9]
- *Q7*) a) Sketch the Schematic and Stick Diagram of the following circuits: [10]
  - i) CMOS NOR Gate
  - ii) CMOS EX-OR Gate
  - b) Explain the concept of constant-field scaling and constant voltage scaling in detail. [8]

[10]

#### OR

- *Q8*) a) Describe the following:
  - i) Layout Design rule
  - ii) Device Modeling
  - b) Explain the circuit extractors and hierarchical circuit extractors in detail.[8]

#### $\circ$ $\circ$ $\circ$

SEAT No. :

### PC-2431

[Total No. of Pages : 2

# [6354]-552

# **B.E.** (Electronics Engineering) **Advanced Power Electronics**

# (2019 Pattern) (Semester - VII) (404202)

Time :	2 <sup>1</sup> / <sub>2</sub> Hours] [Max. Marks : 70
Instruc	tions to the candidates :
	<ol> <li>Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.</li> <li>Figures to the right indicate full marks.</li> </ol>
<b>Q1</b> ) aj	Explain Basic characteristics of DC motors. Operating modes, and Motor performance parameters. [8]
b	) Explain Microprocessor based control of dc drives. [9]
	OR
<b>Q2</b> ) a)	Elaborate 1φ converter drives for separately excited DC motors for continuous & discontinuous operations. [8]
b	) Compare converter fed drive & chopper fed drive. [9]
<b>Q3</b> ) a	Explain Induction motor Characteristics in details. [9]
b	Elaborate Variable frequency Square wave VSI Drivers with suitable waveforms. [9]
	OR
<b>Q4</b> ) a	Elaborate Variable frequency CSI Drivers with suitable waveforms. [9]
b	Explain Variable frequency SPWM VSI Drives with suitable waveforms.[9]
<b>Q</b> 5) a	Explain Brushless DC drives. Give its advantages and disadvantages [8]
b	Explain different types of Stepper motor drives in details. Give its advantages and disadvantages. [9]
	OR
<b>06</b> ) a	Write a short note on Servo motor drive. [8]
ی پر پر b	Elaborate Synchronous reluctance motor drive in details with suitable diagrams. [9]

*P.T.O.* 

- Q7) a) Explain Working of wind power system. Elaborate Standalone wind energy systems and Grid connected wind energy systems. [9]
  - b) Explain different types of wind generator Control of wind turbines. [9]

#### OR

- *Q8)* a) Elaborate working of solar power system. Explain different types of photovoltaic system. [9]
  - b) Explain a Case study to implement solar power system, Selection of Solar panel, inverter, battery, charge controller metering of solar based system. [9]



SEAT No. :

PC-2432

[Total No. of Pages : 2

# [6354]-553

# B.E. (Electronics Engineering) ELECTRONIC SYSTEM DESING (2019 Pattern) (Semester - VII) (404203)

Time	e : 2½	2 Hou	urs]			[Max. Marks : 70
Instr	uctio	ns to	the candidates :			
	1)	Ans	wer Q1 or Q2, Q3 o	or Q4. Q5	or Q6	, Q7 or Q8.
	2) 2)	Figi	ures to the right sid	e indicate	e full n	narks.
	3)	Assi	ume Sullable aala ij	necessai	<i>ry</i> .	
<b>Q1</b> )	a)	Dra	w and explain inte	erfacing	of LE	D with microcontroller. [6]
	b)	Exp	plain the selection	n criter	ia of	microcontroller for particular DAS
		app	lication.			[6]
	c)	Wri	te short note on :			[8]
		i)	LIN Bus			
		ii)	FlexRay Bus			
		,	•		OR	
<i>Q</i> 2)	a)	Dra	w and explain int	erfacing	of Ke	yboard with microcontroller. [6]
~ ′	b)	Wh	at are different fac	tors to b	e cons	idered in selection of microcontroller?
	/	Exp	olain it in details.			[6]
	c)	Wri	te short note on :			[8]
	- /	i)	SPI Bus			L - J
		ii)	I2C Bus			
		,				
Q3)	a)	Wit	h neat diagram ex	xplain st	ep by	step stages of software development
		in e	electronic product	•		[8]
	b)	Wri	te a note on :			[8]
		i)	Compiler		ii)	Simulator
		iii)	Emulator		iv)	Assembler
					OR	
<b>Q4</b> )	a)	Wri	te short note on :			[8]
		i)	ICE			
		ii)	IDF			
	<b>b</b> )	II) W/le	at one the feetunes	of sime	1.4.0.40	what is the value of do over entation in
	0)	vv fi	duct design & des	s of sinu	nators	, what is the fole of documentation in
		pro	duct design & de	velopine	:11 <b>l</b> /	[ð]
						Р.Т.О.

Q5)	a)	What is need of conducting compliance test? Explain different EMI/EM standards related to conducted and radiated emissions.	4C [ <b>8</b> ]
	b)	What are the different PCB design issues of analog circuits? Explain details.	in [ <b>8]</b>
		OR	
<b>Q6</b> )	a)	Explain the following terms with neat diagram	[8]
		i) Shielding	
		ii) Guarding	
	b)	Explain rules of PCB Design for mixed signal circuits.	[8]
Q7)	a)	Write a short note on [	[6]
		i) Humidity test	
		ii) Shock test.	
	b)	Explain Logic Analyzer with the help of neat block diagram?	[6]
	c)	Explain the importance of DC analysis with example.	[6]
		OR	
Q8)	a)	What is need of environmental testing? Explain vibration testing we suitable example.	ith [ <b>6]</b>
	b)	Write a short note on	[6]
		i) Monte carlo analysis	
		ii) Sensitivity analysis.	
	c)	Explain the significance of the following specifications of DSO	[6]
		i) Memory depth	
		ii) Sampling rate	
		iii) Band width	



[6354]-553

SEAT No. :

# PC2433

#### [6354]-556

## **B.E. (Electronics Technology) INTERNET OF THINGS**

### (2019 Pattern) (Semester-VII) (404204 A) (Elective-III)

Time : 2½ Hours]

[Max. Marks:70

[Total No. of Pages : 2

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.
- *Q1*) a) What is WSN? Explain in detail basic components of WSN. [6]
  - b) State the difference between PaaS and SaaS. [6]
  - c) Explain with neat diagram how WSN can be used in Smart Home application. [8]

#### OR

Draw and explain the basic architecture of cloud computing.	[6]
	Draw and explain the basic architecture of cloud computing.

- b) Difference between Public cloud and Private cloud. [6]
- c) List out the applications of WSN. With the help of neat diagram explain any one application of WSN. [8]
- Q3) a) Write the features of Arduino UNO board. Explain functions of following keyword with suitable example.[8]
  - i) PinMode()
  - ii) AnalogRead()
  - iii) DigitalWrite()
  - b) Draw the interfacing diagram of LED with Raspberry Pi. Also write the program for blinking LED with a delay of one second and draw its flowchart.

- Q4) a) List and elaborate features of Raspberry Pi. Why Raspberry Pi is more successful than other? What is SoC available for Raspberry Pi? [8]
  - b) Explain the sensor DHT 11. Draw the interfacing diagram of DHT11 with Arduino Board. Also write the program for same. [8]
- Q5) a) What are different types of data analytics? Explain each type by giving appropriate example. [8]
  - b) Define Big Data. What are the characteristics of Big data? Explain any two types of Big Data.
     [8]

#### OR

Q6) a) Draw and explain in detail architecture of Big data Solution.	[8]
--	-----

- b) Explain the following terms: [8]
  - i) Precision and Error limits
  - ii) Data Dispersion
- Q7) a) Explain the Smart Health care monitoring system using IoT. [9]
  - b) Explain how wearable technologies are partnering with smart cities to address social issues. [9]

#### OR

- *Q8*) a) Write short note on IoT for Industrial Automation. [9]
  - b) Explain case study of air pollution monitoring using IoT with neat diagram. [9]

# •**;•;•;•;•;•**;•

**PC2434** 

#### [6354]-557

# **B.E. (Electronics Engineering)**

## **SOFTWARE DEFINED RADIO**

### (2019 Pattern) (Semester-VII) (Elective-III) (404204 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- Figures to the right indicate full marks. 2)
- Assume suitable data if necessary. 3)
- Draw and explain OFDM transmitter and receiver in SDR [8] *Q1*) a)
  - What is Multi Rate DSP? Explain Multi Rate Algorithm in detail. b) [8]

#### OR

- Explain frequency offset estimation and correction in signal processing. *Q2*) a) [8]
  - Describe decimation and interpolation in multirate DSP. b) [8]
- With an example explain the role of computational platform in **Q3)** a) implementation of cognitive radio system. [9]
  - Describe the historical development of Cognitive Radio and explain two b) applications where Cognitive Radio technology is beneficial. [9]

OR

#### Explain the term with diagram. **04)** a)

- i) Cognitive Cycle
- **Cognitive Radio** ii)
- iii) White space in spectrum
- b) Briefly explain the importance of IEEE 1900.x standards in Cognitive Radio. How do these standards contribute to in the field of Cognitive Radio? [9]

*P.T.O.* 

[9]

[Total No. of Pages : 2

[Max. Marks:70

**SEAT No. :** 

Q5)	a)	What is Spectrum Brokering? Explain Spectrum Brokering ServicesInformation Modelling.[9]
	b)	Draw and explain the architecture of cognitive radio. [9]
		OR
Q6)	a)	Draw and explain Publish-Subscribe CRN Architecture. [9]
	b)	Explain Topology Aware CRN Architectures. Also explain Statistical Characterization of Node Locations. [9]
Q7)	a)	Explain how cognitive radio can be used in disaster management. [9]
	b)	Write a note on: [9]
		i) Bandwidth requirements in cognitive radio
		ii) White space assessment in cognitive radio
		OR
Q8)	a)	Explain the economic value of spectrum and optimum utilization, of spectrum in cognitive radio. [9]

b) Explain Public Safety Communication, TETRA and C2000. [9]



PC2435

SEAT No. :

[Total No. of Pages : 2

### [6354]-558

# B.E. (Electronics Engineering) TESTING AND VERIFICATION FOR SOC DESIGN (2019 Pattern) (Semester-VII) (Elective-III) (404204 C)

*Time : 2½ Hours]* 

[Max. Marks:70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

Q1)	a)	Explain with neat block diagram simulation process for design verification. [9]
	b)	Explain fault simulation for test generation with diagram. [8]
		OR
Q2)	a)	Explain concurrent fault simulation using fault simulation problem diagram. [9]
	b)	With CMOS implementation of NAND gate explain gate level MOS network. [8]
Q3)	a)	Explain the difference between structural and functional test. [9]
	b)	Write short note on redundancy identification. [9]
		OR
Q4)	a)	Write definitions common to all ATPG algorithms. [10]
	b)	Explain D-calculus and D-algorithm in brief. [8]
Q5)	a)	Write a note on Ad-Hoc DFT methods. [8]
	b)	Write short note on scan design with neat diagram. [9]

Q6)	a)	Explain four scan design rules. [8	8]
	b)	Explain automated scan design with flowchart. [9	<b>)</b> ]
Q7)	a)	What is memory BIST? Explain counter test technique for RAM BIS [10]	Г. Э]
	b)	Explain Boundary Scan Description Language. [8	8]
		OR	
Q8)	a)	Is any factor responsible for the selection of scanning Memory BIS? yes, then explain 4 in brief. [10	If D]
	b)	How to configure a system for BIST? [8	8]



PC2436

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

# [6354]-561 B.E. (Electronics Engineering) MOBILE COMMUNICATION (2019 Pattern) (Semester - VII) (Elective - IV) (404205 A)

Instructi 1) 2) 3)	ions to the candidates: Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat figures must be drawn wherever necessary. Figures to the right indicate full marks.	
4) 4)	Use of calculator is allowed. Assume suitable data if necessary.	
<b><i>Q1</i></b> ) a)	What is mean by Equalizers? Classify the equalizers.	[6]
b)	Explain with neat diagram BPSK receiver.	[6]
c)	With neat diagram explain the operation of RAKE receiver.	[8]
	OR	
<b>Q2</b> ) a)	Differentiate between equalizer and diversity techniques.	[6]
b)	Explain in any two space diversity methods.	[6]
c)	Explain with neat diagram the working of QPSK Transmitter Receiver.	and [ <b>8</b> ]
<b>Q3</b> ) a)	What are the different logical channel in GSM & explain each channel	el. <b>[8]</b>
b)	Explain in details call processing of Mobile terminated call in AMPS	5. <b>[8]</b>
	OR	
<b>Q4</b> ) a)	Draw and explain GSM Architecture in details.	[8]
b)	Explain in details Mobile Station originated call setup porcedure.	[8]

*P.T.O.* 

Q5)	a)	Explain generic architecture of TD-SCDMA.	[8]
	b)	Write short note on EVDV.	[8]
		OR	
<b>Q6</b> )	a)	Draw and explain GSM Time Hierarchy.	[8]
	b)	Explain in details Interference-Mitigation Techniques of radio network.	[8]
Q7)	a)	Draw and explain the Distributed Central Switching Office for CCS.	[6]
	b)	With neat diagram explain network architecture for UMTS.	[6]
	c)	Draw the layer architecture of protocol SS7 and explain it.	[6]
		OR	
Q8)	a)	Write note on development in wireless network.	[6]
	b)	Compare wireless network & fixed telephone network.	[6]
	c)	Draw and explain X.25 protocol in details.	[6]

\* \* \*

PC2437

SEAT No. :

[Total No. of Pages : 2

# [6354]-562 **B.E.** (Electronics Engineering) **EMBEDDED SYSTEMS** (2019 Pattern) (Semester - VII) (Elective - IV) (404205 B)

Time : 2 Instruct	1/2 Hours][Mations to the candidates:	ıx. Marks : 70
1) 2) 3) 4)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks.	
	Assume suitable tutta if necessary.	
<b>Q1</b> ) a)	Describe Interrupt service Routine & Latency in RTOS.	[6]
b)	Explain memory management in embedded system.	[6]
c)	Explain : Mutex & Mutual exclusion in RTOS.	[6]
	OR	
<b>Q2</b> ) a)	Describe semaphore & pipe in RTOS?	[6]
b)	Write the significance of Task & Task schedules in RTOS.	[6]
c)	What is clock Tick? Explain Response & Recovery in Embe	dded RTOS. [6]
<b>Q3</b> ) a)	Write the features & drawbacks of Embedded Linux RTO	S. <b>[6</b> ]
b)	Write the features of Microclos RTOS. Explain in brief.	[5]
c)	Compare operating system with RTOS.	[6]
	OR	
<b>Q4</b> ) a)	Write the overview of QNX Neutrino & Microclos RTOS.	[6]
b)	Describe the selection criteria of RTOS sep any embedded	l system. [6]
c)	Write advantages & disadvantages of QNX Neutrino & Vx	words RTOS [ <b>5</b> ]
		<i>P.T.O.</i>

Q5)	a)	Explain project management issues in the development of embedde system.	ed 6]
	b)	Explain the significance of Incircuit Emulator in embedded system.	5]
	c)	Enlist & explain software tools used in the development of embedde system.	ed 6]
		OR	
<b>Q6</b> )	a)	Explain any two software tools use in embedded system development.[	6]
	b)	Development of embedded system-Describe the process in detail.	6]
	c)	Explain Design metrix of embedded system.	5]
Q7)	a)	Describe the case study of embedded system in Adaptive cruise contro	ol. 6]
	b)	Explain the embedded system in transmission.	6]
	c)	Explain the case study of Automatic vending machine components & i working.	ts 6]
		OR	
Q8)	a)	Describe the case study of embedded system of smart card.	6]
	b)	What are coding steps used in Adaptive cruise control.	6]
	c)	Brief TCP/IP N/W using RTOS for transmission of data.	6]

# \* \* \*

2

**PC2438** 

SEAT No. :

[Total No. of Pages : 2

#### [6354]-564

# B.E. (Electronics ) PROCESS INSTRUMENTATION (2019 Pattern) (Semester - VIII) (404210)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicate full marks
- 4) Assume suitable data, jf necessary
- 5) Use of non-programmable scientific calculator is allowed
- Q1) a) In an application of Ziegler-Nichols Method, a process begins oscillation with a 30% proportional band in an 11.5min period. Find the nominal three-mode controller settings. [9]
  - b) State the equation and Explain with neat circuit diagram OP-AMP realization of P+D control mode. [8]

#### OR

- **Q2**) a) A proportional derivative controller has a 0.4 to 2.0 V input measurement range, a 0 to 5V output, Kp = 5% per % and Kd = 0.08% per (%/min). The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. [9]
  - b) Describe Ultimate cycle method of process loop tuning with steps for tuning. State equations for PI mode and three mode controller. [8]

*Q3*) a) Explain the combined feedback and feedforward control scheme with a neat block diagram. [9]

b) Explain ratio controller with suitable application. [8]

[Max. Marks : 70

Q4)	a)	Explain the split range control scheme with suitable example.	[9]
	b)	Compare feedback and feedforward control system considering suit example.	able [8]
Q5)	a)	Explain Model Predictive Control (MPC) in detail.	[9]
	b)	Explain Model Reference Adaptive Control (MRAC) in detail.	[9]
		OR	
<b>Q6</b> )	a)	What is Adaptive Control? Why do we need adaptive control? Exp Programmed or Scheduled Adaptive Control System.	olain <b>[9]</b>
	b)	Explain Internal Model Control (IMC) in detail.	[9]
Q7)	a)	Explain how control structure is selected for a particular process con application.	1trol <b>[9]</b>
	b)	What is process operability? Explain important factors that influence procoperability.	cess. [9]
		OR	
<b>Q8</b> )	a)	Explain the following aspects of control for safety	[9]
		i) Basic process control system (BPCS)	
		ii) Alarms	
		iii) Safety interlock system (SIS)	
		iv) Safety relief valves	
		v) Containment	
	b)	Explain hierarchy of control structure with the help of typical process con hierarchy.	ntrol [9]
		$\circ$ $\circ$ $\circ$	

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SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

# **PC4976**

#### [6354]-566R

# **B.E. (Electronics Engineering) BIOMEDICAL ELECTRONICS**

### (2019 Pattern) (Semester - VIII) (404211A) (Elective - V)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, and Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

Q1)	a)	Explain Nerve Cell and Nerve potential.	[6]
	b)	Explain types of EEG signals and its significance.	[6]
	c)	Explain Neural Communication in Human Body.	[6]
		OR	
Q2)	a)	Draw and explain 10-20 electrode system for EEG recording.	[6]
	b)	Explain Brain Structure in detail.	[6]
	c)	Draw and explain block diagram of EEG Machine.	[6]
Q3)	a)	Describe operation Blood pressure measurement in detail.	[9]
	b)	Write short note on Instrumentation system for ECG acquisition.	[8]
		OR	
Q4)	a)	List different types of stress tests. Explain the difference between bec and central monitoring systems.	dside [9]
	b)	Explain cardiac Pacemaker in detail.	[8]

*P.T.O.* 

Q5)	a)	Explain different methods for blood cell counting.	[9]
	b)	Explain working of Electron Microscope.	[8]
		OR	
Q6)	a)	Write short note on Dialysis System.	[9]
	b)	Discuss Electrical safety of Bio medical Instruments.	[8]
Q7)	a)	Write a note on Laser applications in Biomedical Electronics.	[6]
	b)	Explain Ultrasonic Doppler Machine.	[6]
	c)	Explain Two - Dimensional Echocardiogram.	[6]
		OR	
Q8)	a)	Explain Implantable units in BIo medical electronics.	[6]
	b)	Write a note on components of Biotelemetry system.	[6]
	c)	Describe working principle of PET. What are its common applications	.[6]



[6354]-566R

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

## **PC2440**

#### [6354]-568

# **B.E. (Electronics Engineering)** AUDIO VIDEO ENGINEERING

### (2019 Pattern) (Semester - VIII) (404211C) (Elective - V)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagrams must be drawn wherever necessary.

a)	Disuses in brief Wi-Fi TV with diagram.	[6]
b)	Write a short note on Camcorder and Webcam	[6]
c)	Compare 4K and 8K standers of UHDTV	[6]
	OR	
a)	Explain the working of IP TV with its architecture.	[6]
b)	Write a short note on video projectors.	[6]
c)	Describe in brief 3D TV in detail.	[6]
a)	Draw and explain block diagram of digital TV Receiver.	[9]
b)	Compare EDTV, SDTV and HDTV.	[8]
	OR	
a)	Draw and explain block diagram of DTH.	[9]
b)	Explain different video compression standards in detail.	[8]
	<ul> <li>a)</li> <li>b)</li> <li>b)</li> <li>c)</li> <li>a)</li> <li>b)</li> &lt;</ul>	<ul> <li>a) Disuses in brief Wi-Fi TV with diagram.</li> <li>b) Write a short note on Camcorder and Webcam</li> <li>c) Compare 4K and 8K standers of UHDTV <ul> <li>OR</li> </ul> </li> <li>a) Explain the working of IP TV with its architecture.</li> <li>b) Write a short note on video projectors.</li> <li>c) Describe in brief 3D TV in detail.</li> </ul> <li>a) Draw and explain block diagram of digital TV Receiver.</li> <li>OR</li> <li>b) Compare EDTV, SDTV and HDTV.</li> <li>OR</li> <li>a) Draw and explain block diagram of DTH.</li> <li>b) Explain different video compression standards in detail.</li>

*P.T.O.* 

- Q5) a) Explain PA system installation plan for auditorium having large capacity.[6]
  - b) Explain working principle of cone type loudspeaker with neat diagram.[6]
  - c) Explain with neat diagram working of condenser microphone? State its applications. [6]

#### OR

- *Q6*) a) Draw and explain the block diagram of PA system. [9]
  - b) Discuss with block diagram, working of cordless microphone PA System.[9]
- *Q7*) a) Explain the recording process of compact disc with necessary diagram.[5]b) Compare DVD and Blue Ray DVD on the basis of their working. [6]
  - c) Draw and explain the block diagram of MP3 player. [6]

#### OR

- Q8) a) Explain in detail Dolby 5.1 sound system and also state its advantages.[5]
  - b) Differentiate between CD and DVD. [6]
  - c) Draw and explain the block diagram of a CD player. [6]

#### $\circ \circ \circ$

PC2441

SEAT No. :

[Total No. of Pages : 2

#### [6354]-569

#### **B.E.** (Electronics)

#### **AUTOMOTIVE ELECTRONICS**

#### (2019 Pattern) (Semester - VIII) (Elective - V) (404211D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.
- 2) Figures to the right side indicate full marks.
- *Q1*) a) Explain Torque table and Dynamometer testing. [9]
  - b) Explain Fuel map/Table and Ignition map/Table. [9]

#### OR

- Q2) a) Explain Criteria to choose the right microcontroller/processor for various automotive applications. [9]
  - b) Explain the architecture of an 8/16-bit microcontroller, focusing on Ports, Timer/Counters, Interrupts, Watchdog timers, and PWM. [9]
- Q3) a) Discuss the need for maps in automotive applications. Outline the procedure for generating fuel maps/tables and ignition maps/tables. [9]
  - b) Describe the role of tool chains in facilitating the development and debugging of automotive applications. [8]

#### OR

- *Q4*) a) Explain the Integration of Global Positioning Systems (GPS) Integration of General Packet Radio Service (GPRS) in telematics solutions. [9]
  - b) Explain the D2B and DSI communication protocol. [8]

*P.T.O.* 

- Q5) a) Explain a step-by-step method of developing a control system model for an automotive subsystem using Simulink. [9]
  - b) Explain modelling and simulation of any one Automotive System. [9]

#### OR

- *Q6*) a) Explain the characteristics and parameters of each model and their significance in simulating and controlling automotive systems. [9]
  - b) Discuss the advantages of MBD over traditional design approaches in terms of efficiency and productivity. [9]
- Q7) a) Explain how computer vision techniques such as pattern recognition, feature extraction, and learning are used to develop real-time algorithms for ADAS applications. [9]
  - b) Describe the advancements in airbag technology and the integration of additional passive safety features in modern vehicles. [8]

#### OR

- Q8) a) Explain the technology and trends in connected cars and the evolution towards autonomous vehicles. [9]
  - b) Explain Basic wiring system and Multiplex wiring system. [8]


**PC2442** 

SEAT No. :

[Total No. of Pages : 2

#### [6354]-570

### **B.E.** (Electronics)

# RENEWABLE ENERGY SYSTEM & DSM (2019 Pattern) (Semester - VIII) (Elective - VI) (404212A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to right indicate full marks.
- Q1) a) Explain the concept of wind energy conversion and its significance in renewable energy generation. Discuss the basic components of a wind energy conversion system and their respective functions.
  - b) Define the relationship between power and wind speed in wind turbines. Describe the concept of Tip Speed Ratio (TSR) and its importance in maximizing power output from wind turbines. [9]

- **Q2)** a) Discuss the operation of wind turbines at maximum power. Explain the factors that influence maximum power operation and how wind turbine controllers adjust turbine operation to achieve optimal performance. [9]
  - b) Identify and describe the different types of wind turbines, including horizontal- axis and vertical-axis designs. Compare and contrast their advantages. disadvantages, and applications in various wind conditions.[8]
- Q3) a) Describe biogas plants, including floating and fixed dome types. Discuss their design, operation, and applications for decentralized energy production in rural and urban settings. [9]
  - b) Explore municipal solid waste management strategies for biomass utilization. Discuss methods for collecting, sorting, and processing organic waste to extract energy through composting, anaerobic digestion, or incineration. [9]

- Q4) a) Discuss the role of biomass in a diversified energy portfolio and its potential for contributing to energy security and rural development. Evaluate the challenges and opportunities associated with scaling up biomass utilization for sustainable energy production on a regional or national level.
  - b) Explain anaerobic digestion as a biomass conversion technology. Describe the process of anaerobic digestion, including feedstock preparation, microbial digestion, and biogas production. [9]
- Q5) a) Explain tidal energy and its characteristics. Discuss the factors that influence tidal patterns, such as lunar cycles, geographic location, and coastal topography. [9]
  - b) Describe methods for estimating tidal energy potential at a given site. Discuss factors such as tidal range, water depth, flow velocity, and energy extraction efficiency that affect the feasibility and output of tidal energy schemes. [8]

- Q6) a) Outline the process of developing a tidal power scheme. Discuss key considerations such as site selection, environmental impact assessment, turbine technology, grid integration, and project financing. [9]
  - b) Discuss wave energy and its characteristics. Explain how waves are formed and describe the factors that influence wave energy potential, including wave height, period, and direction. [8]
- Q7) a) Define Demand-Side Management (DSM) and explain its relevance in the context of electricity supply and consumption. Discuss how DSM helps utilities manage electricity demand, reduce peak loads, and improve system efficiency.
  - b) Describe the objectives of load shape management in the context of DSM. Discuss how utilities use load shape objectives to optimize electricity supply, balance generation and demand, and meet customer needs efficiently. [9]

#### OR

- Q8) a) Explain the Electricity Act and regulatory framework governing DSM initiatives. Discuss the role of regulatory agencies in promoting DSM, setting targets, establishing incentives, and ensuring compliance with DSM policies.
  - b) Discuss technology options for DSM in lighting, space cooling (ceiling fans, AC systems), refrigeration, and water cooling. Describe energy-efficient technologies, smart controls, and automation systems used to optimize energy consumption and demand. [9]

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[6354]-570

PC2443

SEAT No. :

[Total No. of Pages : 2

#### [6354]-571

**B.E.** (Electronics)

# WIRELESS SENSOR NETWORK

# (2019 Pattern) (Semester - VIII) (Elective - VI) (404212B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- [Max. Marks : 70
- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- Q1) a) Explain in detail BLE protocol standard along with its architecture. [6]
  - b) Write short note on 6LoWPAN protocol. [6]
  - c) Along with architecture explain Zigbee protocol in detail. [8]

#### OR

- (*Q2*) a) Explain in detail protocol stack of WSNs along with its diagram. [6]
  - b) Write short note on wireless HART protocol. [6]
  - c) Explain IEEE 802.15.4 protocol standard along with its architecture.[8]
- Q3) a) Draw and explain multi-hop wireless sensor network architecture. State the advantages and disadvantages of multi-hop wireless sensor networks.[8]
  - b) Explain range-based localization and range free localization in wireless sensor networks. [8]

- Q4) a) What is localization in wireless sensor networks? Explain localization precision and localization accuracy. [8]
  - b) What is routing in wireless sensor networks? Explain full-network broadcast routing protocol with flow diagram. [8]

- **Q5**) a) Explain the following terms:
  - i) In-Network Processing
  - ii) Data Aggregation
  - b) Explain the different constraints regarding security issues in wireless sensor networks. [8]

- *Q6*) a) Explain random clustering and geographic clustering technique in WSN along with diagram. [8]
  - b) Explain physical layer, data link layer, network layer and transport layer attacks in WSN. [8]

*Q7*) a) Explain early WSN deployments in brief. Explain the requirement analysis in WSN. [6]

- b) Explain link/path problems and topology problems in deployments of wireless sensor networks. [6]
- c) Explain the top-down design process of deployment of WSN. [6]

#### OR

- *Q8*) a) What is meant by deployment of wireless sensor networks? Explain typical life cycle of wireless sensor network application. [6]
  - b) Explain node problems and global problems in deployments of wireless sensor networks. [6]
  - c) Explain the bottom-up implementation process of deployment of WSN. [6]

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# **PC2444**

#### [6354]-572

[Total No. of Pages : 2

SEAT No. :

# B.E. (Information Technology) INFORMATION AND STORAGE RETRIEVAL (2019 Pattern) (Semester - VII) (414441)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) Calculate precision and recall for the following example: [6]

The set of relevant documents for query q is  $Rq=\{d3, d7, d8, d11, d14, d19, d23, d25\}$  where q is an information request. Using a new information retrieval algorithm, the documents are retrieved as follows, The retrieved answer set is  $S=\{d1, d2, d3, d7, d9, d10, d14, d20, d23, d24, d25\}$ 

b) Explain in detail the term NDCG. Explain with suitable example. [6]

c) What are various techniques used to specify query in information visualization? [6]

OR

- Q2) a) What are User oriented measures used in performance evaluation of IR systems? Explain them in detail. [9]
  - b) What is relevance Judgement? Explain the term group relevance judgements, pseudo relevance feedback. [9]
- *Q3*) a) What is distributed IR? Explain the architecture of distributed IR in detail.[8]
  - b) What is Collection Partitioning with respect to distributed IR? Explain in detail. [9]

OR

<b>Q4</b> ) a)	Explain in detail the working of MULTOS data model.	[8]
----------------	---	-----

b) Explain distributed IR Query Processing. [9]

*P.T.O.* 

<b>Q5)</b> a)	What is Web Crawler? Explain Crawler-Indexer Architecture with no diagram.	eat [ <b>9]</b>
b)	What is role of Crawler in web searching? Write short note on Searching the Web?	ng [ <b>9</b> ]
	OR	
<b>Q6</b> ) a)	Write a note on characterizing the web.	[9]
b)	Explain Web Scrapping with a suitable example.	[9]
<b>Q7</b> ) a)	Define Recommender system. Explain in brief Collaborative Filtering.	[9]
b)	Write short notes on Challenges in XML Retrieval.	[8]
	OR	
<b>Q8</b> ) a)	Compare Text -centric and Data -centric XML retrieval.	[8]
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b) Explain in detail Content Based Recommendation of Documents. [9]



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PC2445

[6354]-573

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# B.E. (Information Technology) SOFTWARE PROJECT MANAGEMENT (2019 Pattern) (Semester - VII) (414442)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Write short note on Risk management. [9]
  - b) With the neat sketch explain formulating a network model. [9]

#### OR

- *Q2*) a) Difference between forward pass and backward pass. [9]
  - b) Describe with an example how the effect of risk on project schedule is evaluated using PERT. [9]
- Q3) a) Explain the different types of contracts? List the various typical terms of a contract? [8]
  - b) Explain in detail about creating the framework for monitoring & control.[9]

#### OR

- Q4) a) What are the techniques used in visualizing progress, explain in detail?[8]
  - b) What is Software Configuration Management? Explain Tasks in SCM Process. [9]
- **Q5**) a) What is Leadership? Write a note on Leadership styles. [9]
  - b) Describe the Oldham-Hackman Job Characteristics Model. [9]

*P.T.O.* 

- Q6) a) List the factors that are involved in making a team. Explain the characteristics. [9]
  - b) Write down the stages of team formation model. What are the methods used to improve motivation? [9]
- Q7) a) Explain best practices for Agile management. [6]
  b) Write short note on fundamental components of Azure DevOps. [6]
  c) Explain Metrics in Agile Practice and Metrics for Project Management.[5]

- (*Q8*) a) Explain Agile Project Management in Azure DevOps and TFS. [6]
  - b) Write a short note on: [6]
    - i) Traceability
    - ii) Visibility
    - iii) Collaboration
  - c) Explain application lifecycle management (ALM) process in detail. [5]

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PC-2446

SEAT No. :

[Total No. of Pages : 2

# [6354]-574 B.E. (Information Technology) DEEP LEARNING (2019 Pattern) (Semester - VII) (414443)

*Time : 2½ Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) What is Recurrent Neural Network (RNN)? Draw and Explain Simple Recurrent Neural Network. Explain four types of RNN with proper diagram.
  - b) Explain in detail the following advantages of RNN over other types of Neural Network. [9]
    - i) Ability To Handle Variable-Length Sequences
    - ii) Memory of Past Inputs

### OR

- Q2) a) Discuss how the RNNs suffer from the problem of vanishing gradients. And how is it overcome with Long Short-Term Memory Network (LSTM)? [9]
  - b) What is meant by Recursive Neural Network? How is it different from Recurrent Neural Network? [8]
- **Q3)** a) What is Autoencoder? Elaborate its two networks Encoder and Decoder. [5]
  - b) How do autoencoders differ from other unsupervised learning techniques like PCA or clustering algorithms? [5]
  - c) Explain the following listed hyperparameters and methods which are used to optimize the training of autoencoders : [8]

i) Activation functions ii) Loss functions iii) Learning rate iv) Batch size v) Early stopping vi) Initialization

- Q4) a) Explain the working of denoising autoencoder. In what way, it differ from regular autoencoders? [5]
  - b) What is a contractive autoencoder? How does it differs from regular autoencoders? List the most appropriate applications of contractive autoencoders. [8]
  - c) Differentiate between Undercomplete Autoencoder and Sparse Autoencoder. [5]

<b>Q5</b> ) a)	What is a DenseNet?	Why do we need	Densenet? List it's adv	antages.[5]
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- b) What is transfer learning in CNN? [7]
- c) Categorize Domain Adaptation methods Homogeneous DA, Heterogeneous DA. [5]

OR

- Q6) a) What are the representation learning challenges? [5]
  - b) "Is Densenet good for image classification?" Extend your idea about it. [5]
  - c) What is the general framework of Transfer Learning? [7]
- Q7) a) Explain content based, collaborative and hybrid recommender system with pros and cons. [9]
  - b) State different applications of Deep Learning? With suitable diagram explain use of CNN for image classification. [9]

- Q8) a) State applications of NLP. Why RNN is preferred as compare to CNN for Natural Language Processing? State different NLP tasks where RNN is used.
  - b) State and Explain different centrality measures used in social network analysis. [9]

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SEAT No. :

**PC2447** 

#### [6354]-575

# B.E. (Information Technology) MOBILE COMPUTING

# (2019 Pattern) (Elective-III) (Semester-VII) (414444 A)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1)* a) Discuss the evolution of Wireless networks from 1 G to 3G, List out the advances in 2G, 2.5 G and 3 G Networks. [10]
  - b) Discuss in detail the advancements in 4G and 5G networks. [7]

#### OR

**Q2)** a) Discuss the evolutions of Mobile Communication Technologies in detail [10]

- b) Outline the advantages of advancements in 4G networks over earlier generations. [7]
- Q3) a) Illustrate the process of IP packet delivery with Encapsulation and tunnelling. [10]
  - b) Discuss the process of agent advertisement and discovery. [7]

OR

- Q4) a) Illustrate with the diagram the process of data transfer to the mobile system using IPV4. [10]
  - b) Discuss in detail the problem of Triangular Routing and propose the solution for the same. [7]

#### [Max. Marks : 70

[Total No. of Pages : 2

- Q5) a) Explain TCP mechanisms with its operations, advantages and disadvantages. [10]
  - b) Compare I-TCP, Snooping TCP and M-TCP. [8]

- Q6) a) Discuss the problem of fast retransmit and timeout freezing in mobile transport layer and determine the proposed solution for the same. [10]
  - b) Illustrate how is WAP based web access is different from Traditional Web access. [8]
- Q7) a) Justify the constraints under which the operating system of a mobile device needs to operate. Conclude the special features that are required to be supported by a mobile OS, but are not present in traditional operating systems. [10]
  - b) Show with the diagram and explain Monolithic design versus microkernel design of an operating system. [8]

- Q8) a) Summarise the comparison of any three mobile operating systems that are widely used in mobile phones. [10]
  - b) Explain the architecture of mobile commerce framework and discuss advantages and disadvantages of mobile commerce. [8]



SEAT No. :

# PC2448

#### [6354]-576

[Total No. of Pages : 2

# B.E. (Information Technology) HIGH PERFOMANCE COMPUTING (2019 Pattern) (Semester-VII) (Elective-III) (414444 B)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1)* a) Describe the One-to-all Broadcast and All-to-one Reduction operation for matrix vector multiplication. [9]
  - b) Describe blocking and non-blocking communication with example. [9]

#### OR

- **Q2)** a) Write a short note on Scatter and Gather communication operation. [9]
  - b) Explain Circular shift operation on mesh and hypercube networks. [9]
- **Q3)** a) Explain any 4-performance metrics for parallel systems. [8]
  - b) Examine the impact of granularity on parallel execution performance.[9]

- *Q4)* a) What do you mean by Asymptotic Analysis of Parallel Programs? Explain with an example.[8]
  - b) What is the minimum execution time and minimum cost-optimal execution time for adding n numbers on p processing elements. Explain in detail.[9]
- Q5) a) What is OpenMP and what is it used for? Explain any 4 OpenMP directives.[9]
  - b) Write advantages and limitations of CUDA. Also write four applications of CUDA. [9]

- *Q6*) a) Explain with example, how does OpenMP handle task parallelism. [9]
  - b) Design and explain a simple CUDA kernel function to multiply two integers. [9]
- Q7) a) Discuss the optimization techniques for efficient matrix-matrix multiplication in parallel systems. [8]
  - b) Discuss any variants of Bubble Sort algorithm suitable for parallel execution. [9]

- *Q8)* a) How can Quick sort be parallelized to take advantage of multiple CPU cores or GPUs? [8]
  - b) Explain the Depth-First Search (DFS) algorithm for graph traversal. How can DFS be parallelized using CUDA or OpenMP? [9]



SEAT No. :

# PC2449

### [6354]-577

[Total No. of Pages : 2

# **B.E. (Information Technology) MULTIMEDIA TECHNOLOGY**

(2019 Pattern) (Semester-VII) (Elective-III) (414444 C)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- Q1) a) Define psychoacoustics and its significance in the context of audio compression. Discuss how the human auditory systems perception of sound influences the design of audio compression algorithms.[9]
  - b) Explore the audio compression techniques of DM (Delta Modulation), ADPCM (Adaptive Differential Pulse Code Modulation), and MPEG audio compression. Provide a thorough explanation of one of these techniques and its implementation with a suitable example. Discuss the trade-offs between compression ratios and audio quality. [9]

- Q2) a) Describe the differences between Analog and Digital video signals. Explain the importance of video signal formats such as CCIR, CIF, and HDTV in the context of video quality and transmission.[9]
  - b) Explain the video compression techniques H.261 and H.263 and provide a detailed explanation of one of them along with a relevant example to illustrate its application. [9]
- Q3) a) Provide an overview of the historical development of animation, highlighting key milestones and innovations. How has animation evolved over time, and what were the driving Forces behind these changes? [8]
  - b) Explain the role of animation in web design and development. How does animation enhance user experience on websites, and what considerations should be considered when using animation in web design? [9]

- Q4) a) Explain the diverse applications of animation in different industries. Give examples of how animation is used in fields such as entertainment, education, advertising, and scientific visualization.
  - b) Provide an in-depth explanation of 3D animation techniques, including modeling, rigging, and texturing. Discuss rendering algorithms used in 3D animation and their impact on the visual quality of animated scenes.
- Q5) a) Explain the architectural components of a Virtual Reality system, including hardware and software elements. How do these components work together to create immersive VR experiences? [9]
  - b) Explore the different forms of Virtual Reality, including fully immersive VR, augmented reality (AR), and mixed reality (MR). Compare and contrast these forms and provide examples of their applications. [9]

- *Q6)* a) Highlight various applications of VR in industries like gaming, training, architecture, and more. Discuss how VR is revolutionizing these sectors and enhancing user experiences. [9]
  - b) Present a case study on how Virtual Reality is being utilized in healthcare. Describe a specific example, the challenges it addresses, and the benefits it brings to the respective field. [9]
- Q7) a) Explain the challenges and solutions related to multimedia networking. How does quality of data transmission impact the user experience when it comes to multimedia content? [8]
  - b) Describe the software development life cycle for multimedia applications. Discuss the stages involved and how they differ from traditional software development. [9]

#### OR

- Q8) a) Provide an overview of the Android Multimedia Framework Architecture. How does this architecture support multimedia applications on Android devices, and what are its key components and functions? [8]
  - b) Discuss how multimedia technologies like facial recognition, voice recognition, gesture control, high-definition displays, augmented reality, mobile gaming, and cloud gaming are transforming the gaming industry. Explain their impact and potential future developments. [9]

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[6354]-577

**PC2450** 

[Total No. of Pages : 2

SEAT No. :

#### [6354]-578

# B.E. (Information Technology) SMART COMPUTING

### (2019 Pattern) (Semester-VII) (Elective-III) (414444 D)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

**Q1)** a) Discuss the important features and advantages of ubiquitous computing?

- b) What are basic types of environment for Ubicomp systems? [3]
- c) What is significance of Smart DEI model? Explain with neat diagram.[8]

#### OR

<b>Q2)</b> a)	Discuss internal system properties proposed by Weiser with neat diagram.
	[8]

- b) Explain the term "Intelligence" in ubiquitous computing systems. [4]
- c) Discuss different smart devices form factors? [6]
- Q3) a) What do you understand by smart devices? Discuss important characterises of smart devices in ubiquitous computing? [9]
  - b) Draw a neat diagram of service provision life cycle and explain in detail. [8]

Q4) a) Write short note on: [10] i) Grid Computing

OR

- ii) Virtual Machines
- b) Explain the significance of Mobile Code in ubiquitous application. Explain with an example. [7]

*P.T.O.* 

[Max. Marks:70

[7]

Q5)	a)	Draw block diagram of sensors and explain an application association with wireless sensor networks.	ated [9]
	b)	Discuss the advantages and disadvantages of Embedded system?	[9]
		OR	
Q6)	a)	Write short note on:	[10]
		i) Micro-sensors	
		ii) Nano-computing	
	b)	Discuss Micro- Electro-Mechanical Systems (MEMS) in detail?	[8]
Q7)	a)	What are the different components of IoT? Explain with neat diagram	? <b>[8]</b>
	b)	What are different layers of the IoT protocol stack?	[9]
		OR	
<b>()</b>	a)	What is Internet of Things? Enlist different characteristics of Interne	at of

- (Q8) a) What is Internet of Things? Enlist different characteristics of Internet of Things (IoT)?
  (B) Write short note on Smart Agricultural System.
  (9)
  - \*\*\*\*\*

PC2451

SEAT No. :

[Total No. of Pages : 2

# [6354]-579 B.E. (Information Technology) BIOINFORMATICS (2019 Pattern) (Semester - VII) (Elective - IV) (414445 A)

Time : 2<sup>1</sup>/2 Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat labelled diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- Q1) a) Describe two different methods of sequence visualization and explain how they can be used to identify conserved motifs? [8]
  - b) Explain the different types of microarrays and how they are used to study gene expression? [9]

#### OR

- Q2) a) What is the purpose of a scoring matrix in global alignment? And how global alignment can be used to identify homologous gene? [9]
  - b) Explain the difference between local alignment and global alignment. [8]
- Q3) a) Explain in brief different Clustering, and classification algorithms used in Bioinformatics. [9]
  - b) BLAST and FASTA are two widely used tools for sequence alignment. What are the similarities and differences in their approaches? [9]

OR

- Q4) a) Define the term hidden Markov model (HMM) and explain how HMMs are used to model biological sequences. [5]
  - b) Discuss the advantages and disadvantages of the FASTA algorithm for sequence alignment. How does it compare to other sequence alignment algorithms, such as BLAST and ClustalW? [8]
  - c) Discuss the challenges of clustering and classification in biological data analysis. [5]

[Max. Marks : 70

**Q5**) a) Explain the methods of protein structure prediction and determination.[8]

- i) Experimental
- ii) An-initio
- b) What are the component of modeling and simulation system? Explain in detail with neat diagram. [9]

#### OR

- Q6) a) Explain with example Hierarchical organization of protein structure. [8]
  - b) What is Drug and Drug discovery process? Explain Applications of Bioinformatics in Drug Discovery Process. [9]
- Q7) a) Discuss various applications of Genetic Engineering in real world. [9]
  - b) What is the role of biotechnology in environment? [9]

<b>Q8</b> ) a)	at are the recent trends in bioinformatics world?	
b)	What are the applications of the nanotechnology in our daily life?	[9]



PC2452

SEAT No. :

[Total No. of Pages : 2

# [6354]-580 B.E. (Information Technology) INTRODUCTION TO DevOPs (2019 Pattern) (Semester - VII) (Elective - IV) (414445 B)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) a) What is continuous integration and how does it impact time to marketing and quality of product? [6]
  - b) Outline the importance of code repository in development and delivery?[6]
  - c) Discuss the steps of build in CI/CD system from initiation to release of Project? [6]

- Q2) a) Differentiate between continuous integration and continuous delivery?[6]
  - b) Explain all the stages involved in CI/CD pipeline with diagram? [6]
  - c) Describe different strategies for continuous delivery and its benefits? [6]
- Q3) a) How to implement testing strategy for continuous deployment? [5]
  - b) List and elaborate some of the most common trade-offs decisions during the deployment phase. [4]
  - c) Explain Integration Testing and commit stage of deployment pipeline in details. [8]

- *Q4*) a) Write a short note on managing defect backlog? [5]
  - b) What are the four main stages of a deployment pipeline? [4]

[8]

- c) Write a short note on
  - i) Automated Acceptance Test Gate
  - ii) Subsequent test stages
  - iii) Commit Stage
  - iv) Integration Testing
- Q5) a) What do you understand by monitoring system? Write down the factors involved in monitoring systems. [6]
  - b) Differentiate Between white-box and black-box monitoring with suitable example. [6]
  - c) Identify what is the need of SRE? And explain what are the roles and responsibilities of SRE with relation to DevOps? [6]

#### OR

- *Q6*) a) Elaborate the steps involved in development/creation of the monitoring dashboard. [6]
  - b) Write a short note on monitoring infrastructure and its applications. [6]
  - c) What are common tools used by site reliability engineering (SRE)? [6]
- Q7) a) Write down how Jenkins works in Continuous Integration and Continuous delivery.
  - b) What is Bug tracking tool? Explain various tools for bug tracking. [6]
  - c) Write a short note on serverless orchestration with example. [5]

#### OR

- Q8) a) Illustrate the use of containers while creating container based application design. Explain various containers used in relation with DevOps. [6]
  - b) List various version control tools. And elaborate how version control tools are helpful? [6]
  - c) Explain continuous testing through Selenium. [5]

# \* \* \*

PC2453

SEAT No. :

[Total No. of Pages : 2

# [6354]-581 B.E. (Information Technology) COMPUTER VISION (2019 Pattern) (Semester - VII) (Elective - IV) (414445 C)

Time : 2½ Hours]

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1*) a) How feature Tracking helps the performance-driven animation. [9]
  - b) Explain the concept of vanishing points and their significance in computer vision. [9]

#### OR

- Q2) a) How does edge linking contribute to image processing, and what challenges can arise during this process? [9]
  - b) Discuss the importance of feature tracking in computer vision applications. What are some challenges and solutions associated with feature tracking over time? [9]

Q3) a) Explain the Hough-Based Schemes for Circular Object Detection. How does the Hough Transform help in detecting circular shapes within an image? [9]

b) How the Generalized Hough transform (GHT) can be used for Feature Collation? [8]

- Q4) a) Discuss the concept of ellipse detection using the Hough Transform.What are the key steps involved in detecting ellipses in an image? [9]
  - b) Describe the graph-theoretic approach to object location in the context of the Hough Transform. How does this approach help in solving object detection problems? [8]
- Q5) a) Explain the role of structured lighting in 3D vision. How does structured lighting improve the accuracy and reliability of 3D reconstruction? [9]
  - b) What is optical flow, and how is used for layered motion estimation? [9]

- *Q6*) a) How to achieve 3D Reconstruction in Computer Vision? [9]
  - b) Differentiate between dense motion estimation techniques, including translational alignment, parametric motion models, and spline-based motion estimation. [9]
- Q7) a) Describe the use of particle filters in object tracking in a surveillance context. How do particle filters improve the accuracy of object tracking in dynamic environments? [9]
  - b) Explain the pedestrian detection application in detail. [8]

#### OR

- *Q8*) a) Explain the concept of occlusion classification for object tracking in an in-vehicle vision system. [9]
  - b) Explain how the views of multiple cameras are combined. What are the benefits of combining views from multiple cameras in a surveillance system.

#### \* \* \*

**PC2454** 

SEAT No. :

[Total No. of Pages : 2

# [6354]-582 B.E. (Information Technology) WIRELESS COMMUNICATION (2019 Pattern) (Semester - VII) (Elective - IV) (414445 D )

*Time : 2½ Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1*) a) How Code Division Multiple Access (CDMA) works? Explain in detail with suitable diagram. [9]
  - b) What do you understand by OFDM (Orthogonal frequency Division Multiplexing)? Elaborate in detail with example. [9]

Q2)	a)	How Time Division Multiple Access (TDMA) is useful in wirele communication? Justify	ess [ <b>9</b> ]	
	b) What is MIMO? Explain two formats of MIMO.			
Q3)	a)	Draw and explain WAP Architecture in detail.	<b>[9]</b>	
	b)	Explain the terms: Wi-Fi Direct, Li-Fi, NFC, Sigfox.	[8]	
		OR		
<b>Q4</b> )	a)	Explain the wireless Application Protocol and WAP Programming Mod in detail.	lel [ <b>9</b> ]	
	b)	Explain the terms : Z- Wave, LoRaWAN, RT Wi-Fi, SPEED.	8]	

Q5)	a)	Discuss UMTS Security and Bluetooth Security in detail. [9	[י
	b)	What security issues and challenges are there in 1G, 2G, 3G, and 4C communication model? [9	5 ]
		OR	
<b>Q6</b> )	a)	Discuss Multimedia security in 5G and 6G in detail. [9	[י
	b)	What do you know about kismet, URH (Universal Radio Hacker)? Give detail. [9	e י]
Q7)	a)	Explain 5G NR working and give its benefits. [9	)]
	b)	How Simultaneous Transmission and Reflection (STAR) for 360Coverage is used in communication.[8]	)°  ]
		OR	
<b>Q</b> 8)	a)	What are the Applications of Wireless Technology? Enlist and explain in brief. [9	n ]

b) What do you understand by Holographic MIMO Surfaces for 6G Wireless Networks? [8]

\* \* \*

PC2455

**SEAT No. :** 

[Total No. of Pages : 2

### [6354]-583

# **B.E.** (Information Technology)

## **DISTRIBUTED SYSTEMS**

### (2019 Pattern) (Semester - VIII) (414450)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- Q1) a) Why is clock synchronization using a global time impossible in a distributed system? Illustrate the active time server based centralized clock synchronization algorithm.
  - b) What is the purpose of Message Passing Interface? Illustrate the architectural model for MPI using send and receive primitives. [8]

- Q2) a) Discuss the purpose of overlay network. Describe in brief, any three types of Overlay. [9]
  - b) What are the two important properties of token-based approach? Explain token-ring algorithm to achieve mutual exclusion in a distributed system.[8]
- Q3) a) Describe the following independent axes for defining inconsistencies with examples: [9]
  - i) Deviation in numerical values between replicas.
  - ii) Deviation in staleness between replicas.
  - iii) Deviation with respect to ordering of update operations.
  - b) With a neat diagram, explain the three types of replicas and their logical organization. [9]

- Q4) a) What is checkpointing in a distributed system? Explain the working of Coordinated checkpointing recovery mechanism. [9]
  - b) Discuss and compare "Push versus Pull Protocols" propagation design issue for content distribution. [9]
- Q5) a) What is a Directory Service? What is the difference between DNS and x500? Describe in detail the components of X.500 service architecture.[8]
  - b) What are the key design issues for distributed file systems? Describe the requirements for distributed file systems. [9]

- *Q6*) a) Explain in brief, the two places of client-side web caching? Explain cooperative caching with suitable diagram. [8]
  - b) What are web services? Describe with a suitable diagram the general organization of the Apache web server. [9]
- Q7) a) Explain the following in brief:
  - i) Wearable devices
  - ii) PVM
  - iii) JINI
  - b) Explain in brief, the key features of Zabbix including auto-discovery, triggers, or dashboards. [9]

#### OR

- Q8) a) Explain in brief, the following Distributed System monitoring tools: [9]
  - i) Nagios
  - ii) Zabbix
  - b) Provide an overview of Mach and CHORUS microkernels. How are memory management techniques used to avoid physical copying of data in Mach and CHORUS? [9]

# $\circ$ $\circ$ $\circ$

[9]

PC2456

# [6354]-584

[Total No. of Pages : 2

# **B.E.** (Information Technology) SOFTWARE DEFINED NETWORK

(2019 Pattern) (Semester - VIII) (Elective - V) (414451A)

$Time: 2^{1/2} Hours] \qquad [Ma:$		
Instruction	ns to the candidates:	
1)	Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.	
2)	Figures to the right indicate full marks.	
3)	Neat diagrams must be drawn wherever necessary.	
<b>Q1</b> ) a)	Describe Various Services of Cloud using SDN? [9]	
b)	Enlist Benefits & Challenges for Network Function Virtualization? [9]	
	OR	
<b>Q2)</b> a)	Describe NFV architecture and explain Requirements of NFV Framework? [9]	
b)	Define Design goals of Network Virtualization? [9]	
( <b>03</b> ) a)	Explain SDN Use Cases in the Data Center in Detail? [0]	
$Q_{3}$ (a)	Explain SDN Use Cases in the Data Center in Detail? [7]	
b)	Sketch and describe the wireless architecture in Data Center Network?[9]	
	OR	
<b>Q4)</b> a)	Describe Taxonomy of DCN topology & Explain Fat-Tree topology in detail? [9]	
b)	Enlist various Programmable languages of SDN in detail? [9]	

SEAT No. :

Q5)	a)	What are the Solutions to the security issues in SDN? [9]		
	b)	Explain Security Analysis and Potential attacks in SDN in detail?	[9]	
		OR		
<b>Q6</b> )	a)	Demonstrate the Network Security enhancement using the SI Framework?	)N <b>[9]</b>	
	b)	Enlist Security Characteristics of SDN in detail?	[9]	
Q7)	a)	Enlist and Explain Floodlight Controller classes of APIs?	[8]	
	b)	Write a short note on Traffic Engineering for Service Providers?	[8]	
		OR		
Q8)	a)	Draw & Explain application of Open Daylight Controller?	[8]	
	b)	Differentiate Reactive versus Proactive Applications of SDN applications?	' <b>[8]</b>	

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**PC2457** 

#### [6354]-585

[Total No. of Pages : 2

# **B.E.** (Information Technology) SOCIAL COMPUTING

(2019 Pattern) (Semester - VIII) (Elective - V) (414451B)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*]

Instructions to the candidates:

- Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- Assume suitable data, if necessary. **4**)

#### Explain data mining methods for social media. *Q1*) a) [8]

What is clustering? Explain anyone clustering algorithm with example.[9] b)

#### OR

<b>02</b> ) a)	Explain data	representation	methods for social	l media.	[8]
$\mathcal{L}^{2}$	L'Aprain data	epresentation	memous for soora	i iliculu.	LAI

b) What is classification? Explain anyone classification algorithm with example. [9]

*O3*) a) What is Assortativity? Explain any one technique to measure assortativity.[9]

What is influence? Explain how to measure influence in social computing.[9] b)

#### OR

- What is Homophily? Explain how to measure homophily. [9] **Q4**) a)
  - Explain shuffle test and edge reversal test. [9] b)

[*Max. Marks* : 70

SEAT No. :

- Q5) a) What do you mean by recommendation in social context? Explain any one recommendation algorithm. [8]
  - b) What is individual Behaviour? Explain individual online behavior three categories. [9]

- *Q6*) a) Explain evaluation measures for recommendation algorithms. [8]
  - b) What is collective behavior analysis? Explain user migration in social media. [9]
- (Q7) a) Explain the term TF and IDF with example. [9]
  - b) Explain quality of analysis for processing human language data. [9]

#### OR

- Q8) a) Explain social interactions in terms of people, activities, comments, and moments w.r.t. Google +API [9]
  - b) Explain the process of web crawling and its search technique. [9]

# x x x

### PC-2458

1)

[Total No. of Pages :2

**SEAT No. :** 

### [6354]-586

# B.E. (Information Technology) NATURAL LANGUAGE PROCESSING (Elective - V) (2019 Pattern) (Semester - VIII) (414451 C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.
- *Q1*) a) What is Lexical Semantic? What are the main approaches to meaning representation? Compare and contrast them. [10]
  - b) Write a short note on: Relation of class model and state model. [8]

#### OR

- Q2) a) What is Word Sense Disambiguation (WSD)? Explain the dictionary based approach to Word Sense Disambiguation. [6]
  - b) Explain in detail the types of referring expressions. [6]
  - c) Explain Sematic meaning and its representation with respect to Indian languages. [6]
- (Q3) a) Explain dependency path? How it is used in Experimental Evaluation? What is Kernal? [9]
  - b) What is role of annotate knowledge in text reports. [9]

#### OR

- Q4) a) How sentences are mapped into Word Sequences and then to Dependency Paths.[9]
  - b) Write a note on: [9]
    - i) Frame semantics
    - ii) Semantic role labelling

[Max. Marks : 70

<b>Q</b> 5) a	How pages are classified for trainable document separation. [9	
t	Write a note on : [9]	
	i) Domain Knowledge	
	ii) Domain Concepts iii) Knowledge Roles	
	OR	
<b>Q6</b> ) a	<ul> <li>Write in detail the high level representation approaches in text mining. [9]</li> <li>What is probabilistic model? Give examples of probabilistic models and explain any one in detail. [9]</li> </ul>	
<b>Q7</b> ) a	Write short note on :i)Stemmersii)Part-of-Speech Tagger.[10]	
t	Explain design feature of IR with a neat diagram. [6]	
<b>Q8</b> ) a	With a suitable example explain cluster based IR modeling.[9]Explain in detail "Evaluation of the IR System".[7]	



**PC-2459** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# [6354] - 587

# **B.E.** (**I.T.**)

# SOFT COMPUTING

### (2019 Pattern) (Semester - VIII) (414451D) (Elective - V)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary
- Q1) a) List AND explain the characteristic features of fuzzy logic [9]
  - b) What is Extension Principle for fuzzy arithmetic? Perform following operations [8]
    - i) Multiplication
    - ii) Division

#### OR

<b>Q2</b> ) a)	List and explain following fuzzy set operations with example		[8]
	i) ii)	Normal Fuzzy Set Product of Fuzzy Set	

- **Q3**) a) What is Genetic Algorithm? Explain working principle of GA. [9]
  - b) State and explain advantages and disadvantages of Genetic Algorithm.[8]

*P.T.O.* 

- *Q4*) a) Explore the use of crossover operator in GA? [8]
  - b) Explain how genetic algorithms are different than evolutionary programming. [9]
- **Q5**) a) Describe the Neuro Fuzzy systems and its applications. [9]
  - b) Explain the concept of Fuzzy Genetics Algorithm with suitable case study. [9]

- *Q6*) a) What is hybrid soft computing? Explain Fuzzy Back propagation system.[9]
  - b) Explain application areas of Genetic Algorithm based Back-propagation Network. [9]
- *Q7*) a) Explain use of Soft Computing in Software Engineering using suitable application. [9]
  - b) Explain applications of fuzzy in character recognition system. [9]

#### OR

*Q8*) Write short notes on (Any 3)

[18]

- i) Particle Swarm Optimization (PSO)
- ii) Fuzzy ARTMAP
- iii) MOGA
- iv) Neuro-fuzzy modeling

### **) | | | | |**

## [6354]-587

2
**PC-2460** 

[Total No. of Pages : 2

# [6354] - 588

# B.E. (Information Technology) GAME ENGINEERING

## (Elective - V) (2019 Pattern) (Semester - VIII) (414451E)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume Suitable data if necessary.
- Q1) a) Describe pattern recognition and collecting game mechanics can be useful for gamified system. [6]
  - b) Explain game mechanics for opponent moves in gamification. [6]
  - c) Explain any four mechanics which can be used in any gamified system designed for solving any social problems. [6]

OR

- Q2) a) How can game mechanics be used to enhance engagement in a specific context, such as a cricket league? [6]
  - b) Explain feedback and reinforcement in game design. [6]
  - c) How levels and leaderboards act as game mechanics for designing game? [6]
- Q3) a) What is the concept of "Defining Rules" in the context of game design?[6]
  - b) How does "Utility-based Resource Allocation" impact gameplay in network games? [5]
  - c) What is "Selfish Routing" and how does it relate to network games? [6]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

OR

- *Q4*) a) How does "Network Pricing" affect the performance and outcomes of network games? [6]
  - b) What are the implications of "Competition" in network games and how does it impact network performance? [5]
  - c) What is the "Price of Anarchy" and how does it relate to network games and their outcomes? [6]
  - Q5) a) What are some popular game engines/frameworks and what are their strengths and weaknesses? [6]
    - b) How does Unity differ from other game engines and what types of games is it best suited for? [6]
    - c) What are some key features of Construct 2, and how have they contributed to its popularity among game developers [6]

### OR

- *Q6*) a) Discuss BigDoor platform? Explain any one usage of it? [6]
  - b) What are some of the advantages and disadvantages of using Clickteam Fusion 2.5 for game development, and how does it compare to other game engines? [6]
  - c) Explain useful features of mambo. How mambo platform can be used for e-learning activity? [6]
- Q7) a) How have game developers used game engineering to create a competitive and engaging experience in Counter-Strike? [9]
  - b) What are some applications of game engineering in the field of teaching and learning and how effective are they? [8]

### OR

- *Q8*) a) What are some key features of PUBG New State that distinguish it from other battle royale games? [9]
  - b) Explain implementation of The Psychology Of Gamification: Why It Works (& How To Do It!) for Nike's running app. [8]

#### 

2

[6354]-588

**PC2461** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-589

# B.E. (Information Technology) ETHICAL HACKING AND SECURITY (2019 Pattern) (Semester - VIII) (Elective - VI) (414452A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to right indicate full marks.
- 4) Assume suitable data, if necessary.

<i>Q1</i> ) a	What is Metasploit? Can you explain what an exploit is and how it works in the context of Metasploit? [9]
b	) Explain the term social engineering toolkit uses in details. [9]
	OR
<b>Q2</b> ) a	) What are the 5 types of password cracking methods? [9]
b	) List out the main components of Metasploit and explain in details. [9]
<b>Q3</b> ) a	Explain different technique has the ability to exploit OS vulnerabilities to escalate privileges.
b	) What is the most common Windows privilege escalation? [8]
	OR
<b>Q4</b> ) a	What is the difference between horizontal and vertical privilege escalation [9]
b	) Explain the term most common Linux privilege escalation [8]
<b>Q</b> 5) a	) What is the main risk of a cross-site scripting attack? [9]
b	) What are the most common security issues on web applications? [9]
	OR

[Max. Marks : 70

<b>Q6</b> )	a)	What are the most common results of a Cross-Site Request Forgery	/? <b>[9]</b>
	b)	What are the risk factors involved in XML external entity X vulnerability?	(XE [9]
Q7)	a)	Write a short note on challenges of wireless security.	[9]
	b)	What type of attack is the evil twin attack?	[8]
		OR	

<b>Q8</b> ) a)	Explain in detail problem with the evil twin attack.	[9]
b)	What are the main threats to Wi-Fi security?	[8]

# (i)(i)(i)(i)(i)

**PC2462** 

[6354]-590

# B.E. (Information Technology) AUGMENTED AND VIRTUAL REALITY (2019 Pattern) (Semester - VIII) (Elective - VI) (414452B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to right indicate full marks.
- 4) Assume suitable data, if necessary.

<b>Q1</b> ) a)	Explain the significanc	e of visual perception in	virtual reality systems.[9]
----------------	-------------------------	---------------------------	-----------------------------

b) Describe visual rendering process in detail. [9]

### OR

<b>Q2)</b> a)	Describe different techniques of motion in both the real and virtual world	s. )]
b)	What is tracking? Explain the Tracking in detail.[9]	)]
<b>Q3)</b> a)	How does Augmented Reality Work? Explain with a suitable example.[9	)]
b)	Explain Ingredients of an Augmented Reality Experience. [8	<b>}]</b>
	OR	
<b>Q4)</b> a)	What Does Augmented Reality Mean? Describe the augmented reality history.	's <b>}]</b>
b)	Describe any two applications of Augmented Reality. [9	)]
<b>Q</b> 5) a)	Describe Sensor tracking methods in detail. [9	)]
b)	Identify and discuss the various displays that are used in augmente reality systems.	d )]
	OR	

[Total No. of Pages : 2

[Max. Marks : 70

SEAT No. :

<b>Q6</b> )	a)	List different types of AR devices and explain the feature and uses of	f it. <b>[9]</b>
	b)	Describe sensor fusion with example.	[9]
<b>Q</b> 7)	a)	What is natural-feature tracking? Explain how it differ with marker-bas Tracking.	sed [9]
	b)	What is simultaneous localization and mapping in AR?	[8]
		OR	

- **Q8)** a) List and Explain the major augmented reality software components? [9]
  - b) What is marker tracking in AR? Explain in detail. [8]

# (i)(i)(i)(i)(i)

PC2463

SEAT No. :

[Total No. of Pages : 2

### [6354]-591

# B.E. (Information Technology) BUSINESS ANALYTICS AND INTELLIGENCE (2019 Pattern) (Semester - VIII) (Elective - VI) (414452C)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

*Q1*) a) List and explain the four processes that define a closed-loop BPM cycle. [8]

- b) List and justify any five KPIs for a real time business scenario. [5]
- c) What is data visualization? Explain the need for data visualization in Business intelligence. [5]

### OR

- *Q2*) a) List and explain the four perspectives of Balanced Scorecards. [8]
  - b) List and briefly explain different types of Business Report. [5]
  - c) Discuss Components of Business Reporting Systems. [5]

## *Q3*) a) Write a short note on:

- i) Descriptive analytics
- ii) Predictive analytics
- iii) Prescriptive analytics
- b) Consider a scenario that a bread seller charges Rs. 30 per loaf of bread, and he sells 50 loafs a day. What would happen to his revenue if he charged more for each loaf of bread?

Evaluate the above mentioned scenario using what if analysis with respect to:

Case 1: The volume of bread sold doesn't depend on the price of the bread

Case 2: The amount of bread he sell does depend on the price he charge (Sale increases if price reduced, sale decreases if price increased)

Assume suitable data wherever required.

[8]

[9]

(Q4) a) Discuss structure of mathematical model for decision support. [8]

[9]

- b) Write short note on:
  - i) Certainty
  - ii) Uncertainty
  - iii) Risk
- **Q5**) a) Explain role of Business Intelligence (BI) in finance with the help of an example. [6]
  - b) How does visual analytics helps managers to improve revenue for business? [6]
  - c) Enlist the advantages of using Business Intelligence in Customer Relationship Management. [6]

#### OR

- Explain role of Business Intelligence (BI) in Banking Sector with the help **Q6**) a) of an example. [6] Explain application of Business Intelligence in Fraud Detection with a b) suitable example. [6] Write a short note on: ERP and Business Intelligence. [6] c) **Q7**) a) Write a short note on: Cloud Computing and Business Intelligence. [6] Which are critical factors in developing a successful a BI strategy. b) [5]
  - c) Write a short note on Analytics Applications for Consumers. [6]

### OR

- (*Q8*) a) Write a short note on: Issues of Legality, Privacy, and Ethics. [6]
  - b) Write a short note on Location-Based Analytics for Organizations. [6]
  - c) Explain BI Search and Text Analytics with the help of diagram. [5]

# 0

### [6354]-591

PC2464

SEAT No. :

[Total No. of Pages : 2

## [6354]-592

# B.E. (Information Technology) BLOCKCHAIN TECHNOLOGY (2019 Pattern) (Semester - VIII) (Elective - VI) (414452D)

Time : 2 Instruct 1) 2) 3) 4)	<sup>1/2</sup> Hours] ions to the candidates: Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks. Assume suitable data, if necessary.	[Max. Marks : 70
<i>Q1</i> ) a)	What is Ethereum? Give its Comparison with Bitcoin?	[6]
b)	Explain the various types of Ethereum Networks?	[6]
c)	Explain different features of Ethereum in short?	[6]
	OR	
<b>Q2</b> ) a)	Explain Core Components of Ethereum ecosystem?	[6]
b)	What are Ethereum's four stages of Development?	[6]
c)	Explain the Ethereum state Transaction functio Instructions?	n and the EVM [6]
<b>Q3</b> ) a)	What are the advantages of Hyper ledger?	[6]
b)	What is the main goal of the Hyper ledger Project?	[6]
c)	What is Hyper Ledger Fabric architecture and explain it	s Components?[5]
	OR	
<b>Q4)</b> a)	Explain Contents of the block of Hyper Ledger Fabric	c? [6]

- b) What type of block chain Hyper Ledge is? [5]
- c) Compare Hyper Ledger with Ethereum. [6]

Q5)	a)	Give the features of Centralise and decentralized Finance?	[6]
	b)	What is bitcoin explain the working of Bitcoin?	[6]
	c)	With the diagram explain Bitcoin Architecture?	[6]
		OR	
<b>Q6</b> )	a)	What are the objectives of Block Chain Consensus Mechanism?	[6]
-	b)	What is fungible token?	[6]
	c)	Give the difference between NFT and fungible token?	[6]
<b>07</b> )	a)	Explain the different types of block chain Platforms?	[6]
2')	b)	What are the Limitations of block chain technology?	[5]

c) What are the main risks of blockchain? [6]

## OR

<b>Q8</b> ) a)	How block chain made an impact on the banking sector?	[5]
b)	What is the main goal of block chain?	[6]
c)	What is the Importance of block chain in Insurance?	[6]

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PC2465

[Total No. of Pages : 2

[Max. Marks: 70

SEAT No. :

## [6354]-593 B.E. (Instrumentation & Control) PROCESS CONTROL TECHNIQUES (2019 Pattern) (Semester - VII) (406261)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary
- 5) Use of calculator is allowed
- Q1) a) Discuss feedback control loop elements in detail with neat block diagram.[8]
  - b) Find closed loop stability conditions of P controller for given first order plant Gp(s) for set point change. [9]

$$G_p(s) = \frac{5}{2s+1}$$

- **Q2**) a) Discuss tuning and fine tuning of PID controller in detail. [8]
  - b) Explain Zeigler-Nichols closed loop tuning method. Using this design PI Controller for the following transfer function: [9]

$$G_p(s) = \frac{1}{s^3 + 5s^2 + 7s + 3}$$

- Q3) a) Discuss combined feedback-Feed-Forward control with suitable example.[9]
  - b) With neat sketch explain ratio control and its two arrangements in detail.[9] OR
- Q4) a) With suitable example explain cascade control and its application. [9]
  b) Illustrate split range control with suitable example. [9]
- Q5) a) Explain relative gain array (RGA) and its important properties. Using RGA discuss procedure for determining of recommended controller pairing in detail. [9]
  - b) Discuss decoupling control approaches for multivariable control system.[8]

(Q6) a) Calculate  $\lambda$  for below process model. From obtained  $\lambda$ , discuss on loop interaction and pairing. [9]

$$G_{p}(s) = \begin{bmatrix} \frac{12.8e^{-s}}{16.7s+1} & \frac{-18.9e^{-3s}}{21s+1} \\ \frac{6.6e^{-7s}}{10.9s+1} & \frac{-19.4e^{-3s}}{14.4s+1} \end{bmatrix}$$

- b) Draw block diagram for 2×2 multivariable system. Discuss the direct and indirect effect of interaction with help of 2×2 systems. [8]
- *Q7*) a) With neat block diagram explain design of model based PID controller in detail.
  - b) Determine PID controller design parameters using IMC method for FOPDT process model. [9]

- Q8) a) Give importance of Smith Predictor technique and explain its working in detail with neat block diagram. [9]
  - b) Draw and explain block diagram of model predictive controller in detail.[9]



**PC2466** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-594

# B.E. (Instrumentation & Control) PROJECT ENGINEERING & MANAGEMENT (2019 Pattern) (Semester - VII) (406262)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.
- 5) Assume suitable data, if necessary.
- *Q1*) a) Illustrate the significance of Risk Management Plan with appropriate example. Comment on prioritize of Risks. [9]
  - b) Illustrate the significance of Tendering process with appropriate example and comment on tendering evaluation process. [8]

OR

- *Q2*) a) State the role of Project Procurement Management & Project Procurement Plan and discuss with suitable example. [9]
  - b) Suggest suitable tool for conduct of procurement process, enlist various Procurement activities and the evaluation process. [8]
- Q3) a) Enlist various risk identification methods used for small projects and cite their sources with suitable example. [9]
  - b) Discuss the importance of loop wiring diagram prepare the loop wiring diagram according to ISA S-5.4 for flow loop control. [9]

### OR

- *Q4*) a) What are the FEED documents? Discuss in detail Instrument schedule, I/O schedule. [9]
  - b) State the significance of Instrument layout & Junction box layout with suitable example. [9]

*P.T.O.* 

- Q5) a) Discuss the importance of Cable identification schemes and Cable trays used in detail engineering design. [9]
  - b) Illustrate the importance of Cable identification schemes and Cable trays used in detail engineering design. [8]

### OR

- *Q6*) a) Prepare bill of material (BOM) for any one application. [9]
  - b) Prepare Manufacturing bill of material (MBOM) for any one application. [8]
- *Q7*) a) Illustrate the installation and commissioning activities of the plant and documents require at this stage. [9]
  - b) Explain the significance of Factory Acceptance Test (FAT) with suitable example. [9]

### OR

- Q8) a) Prepare a factory acceptance test (FAT) for a control panel. [9]
  - b) Draw installation sketches of DP type flow transmitter. [9]

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PC5108

SEAT No. :

[Total No. of Pages : 2

## [6354]-595R

# B.E. (Instrumentation & Control) DIGITAL IMAGE PROCESSING (2019 Pattern) (Semester - VII) (Elective - III) (406263A)

<i>Time</i> : 2	Time : 2½ Hours][Max. Marks	
Instruct	ions to the candidates:	
1)	Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.	
2)	Neat diagrams should be drawn wherever necessary.	
3)	Use of non-programmable calculator is allowed.	
4)	Assume suitable data, if necessary.	
<i>Q1</i> ) a)	Explain the image enhancement.	[9]
b)	Explain sharpening in image processing.	[8]
	OR	
<b>Q2</b> ) a)	Explain the non-linear stretching.	[8]
b)	Explain the homomorphic filtering in image enhancement.	[9]
<b>Q3</b> ) a)	Explain image pattern and pattern classes.	[9]
b)	Explain the need of classifiers in image processing. Explain methodology using any application.	the <b>[9]</b>
	OR	
<b>Q4</b> ) a)	Explain in brief the edge linking in case of image segmentation.	[9]
b)	Enlist the different types of classifiers. Explain any one in detail.	[9]
<b>05</b> ) a)	Explain the JPEG compression technique.	[9]
<b>~</b> <i>b</i> )	Explain the use of shift codes in image compression.	[8]
5)		r~1
	OR	

<b>Q6</b> ) a)	Explain the JPEG 2000 compression technique.	[8]
b)	Write a short note on Huffman coding.	[9]
<b>Q7)</b> a)	Explain the role of image processing in biometrics.	[9]
b)	How image processing is used in launching the satellite at space statio	n. <b>[9]</b>
	OR	

- Q8) a) Explain the application in image processing in weather forecasting. [9]
  - b) Write a short note on application of image processing in robot surgery.[9]

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**PC2468** 

## [6354]-596

[Total No. of Pages : 2

# B.E. (Instrumentation & Control) DATA ANALYTICS (2019 Pattern) (Semester-VII) (406263 B) (Elective -III)

Tim Inst	e : 2 <sup>1</sup> ructi	2 Hours] [Max. Marks	s : 70
11130	1) 2) 3) 4)	Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6 Q.7, or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks. Assume suitable data, if necessary.	
<b>Q1</b>	) a)	Explain Apriori algorithm with suitable example.	[10]
	b)	Differentiate between linear and logistic regression.	[8]
		OR	
$Q_2$	) a)	What is logistic regression explain it with example.	[8]
	b)	Explain in detail the transactions that occur in grocery stores.	[10]
<b>Q</b> 3	) a)	What is Decision tree classification? Explain its algorithm.	[9]
	b)	Explain Bayes them with application.	[8]
		OR	
Q4	) a)	Define following terms:	[8]
		i) Concept of classification.	
		ii) Bayesian classifier.	
	b)	What is clustering? Explain K-means with suitable example.	[9]
Q5_	) a)	Explain at least four conventional data visualization tools.	[9]
	b)	Defferentiate between data visualization and Big data visualization.	[9]
		OR	
<b>Q6</b>	) a)	Why is data visualization important? How do you use data visualizato make better decisions?	atior [ <b>9</b> ]
	b)	Explain tools used for data visualization.	[9]

SEAT No. :

- (Q7) a) What is Map-Reduce? Explain working of Map-Reduce with example.[9]
  - b) What are four major categories of NOSQL Tools. [8]

### OR

- (Q8) a) Discuss the NoSQL data stores and their characteristic features. [9]
  - b) What is role of NoSQL in Hadoop ecosystem? [8]

#### 

PC2469

SEAT No. :

[Total No. of Pages : 2

## [6354]-597

# B.E. (Instrumentation and Control) WIRELESS SENSOR NETWORKS (2019 Pattern) (Semester-VII) (Elective-III) (406263 C)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.
- *Q1)* a) Write approximate specific numeric value for each of these MAC protocol parameters: [10]
  - i) Data Rate
  - ii) Probability of advertising packets collision
  - iii) Simulator used (Name only)
  - iv) Transmission power of node
  - v) Number of nodes in cluster
  - b) Write Random Access (Contention based) MAC protocol with respect to: condition among nodes accessing the channel, what if collision occurs, mechanism required (yes/no) to reduce impact of collision, what is MACA?

- Q2) a) Write on Low Energy Adaptive Clustering Hierarchy (LEACH) protocol with respect to: data transmission-from whom to whom, what cluster head does, how are cluster heads chosen in rounds, random number of sensor node and relation to threshold value T(n). [10]
  - b) Define the concept of routing. Explain in detail Geographical routing.[8]

- Q3) a) Explain with neat sketch Event-to-Sink Reliable Transport (ESRT) protocol-. [10]
  - b) Draw a neat sketch and explain Congestion Detection and Avoidance (CODA).

#### OR

- **Q4)** a) Write on UDP or TCP anyone with 5 points in two to four lines each. [10]
  - b) How performance evaluation of any TCP protocol can be done? Mention any four such points. [8]
- Q5) a) Explain with neat diagram MiLAN (Middleware Linking Applications and Networks). [10]
  - b) Define the WSN Middleware Principle. Give the significance of Middleware in Wireless sensor network. [7]

#### OR

- *Q6*) a) What is the role of Middleware in WSN (Write 5 points)? [10]
  - b) Write on IrisNet with anyone example real example problem. [7]
- Q7) a) What are the Sensor Network Platforms and Tools? Explain in detail Sensor Network Platforms. [10]
  - b) Elaborate in detail layer wise attack in wireless sensor networks. [7]

- Q8) a) Write security challenges and requirements associated with Ad-hoc WSN.Any important five points. [10]
  - b) Consider flooding attack: how security can be provided-elaborate with an example? [7]

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**PC2470** 

[6354]-598

# B.E. (Instrumentation & Control) PROCESS MODELLING AND OPTIMISATION (2019 Pattern) (Semester-VII) (406263 D) (Elective-III)

Time : 2½ Hours]

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume suitable data, if necessary.
- **Q1)** a) Explain pulse testing method. [9]
  - b) Explain merits and demerits of step and sine wave testing. [8]

### OR

- **Q2)** a) Explain relationships among time, Laplace and frequency domain. [9]
  - b) Explain sin wave testing method. [8]
- **Q3)** a) Determine the stability of a  $2 \times 2$  process with a diagonal feedback controller given as: [9]

$$G_m = \begin{bmatrix} 3 & 10 \\ 1 & 5 \end{bmatrix} \text{ and } B_s = \begin{bmatrix} 2 & 0 \\ 0.5 & 1 \end{bmatrix}$$

b) Write short note on robust nests Doyle Stein criterion. [9]

- Q4) a) How interaction between loops can be determine? Explain limitation of method.[9]
  - b) For the system given Find NI for this comment on stability also find proper paring of control and manipulated variables. [9]

$$\begin{bmatrix} \mathbf{X} \\ \mathbf{Y} \end{bmatrix} = \begin{bmatrix} 10\frac{e^{-3s}}{(5s+1)} & \frac{e^{-2s}}{(s+1)} \\ 2\frac{e^{-5s}}{s+1} & 7\frac{e^{-2s}}{(5s+1)} \end{bmatrix} \begin{bmatrix} \mathbf{P} \\ \mathbf{Q} \end{bmatrix}$$

- Q5) For the functions given below, analyze the concavity and convexity in each case.[18]
  - a)  $f(x_1, x_2) = x_1^2 + x_2^2 + x_2^2$

b) 
$$f(x) = x_1^2 + 5x_1x_2 + 4x_2^2 + 2x_1 + 6x_2 + 2$$

c)  $f(x) = x + 3x^2 + 6x^3$ 

<b>Q6)</b> a)	How to find extremum of the objective functions and also explain it importance. [9]	s 1
b)	Explain quadratic approximation. [9	]
<b>Q</b> 7) a) b)	Explain polynomial approximation method. [9 Explain scanning and bracketing procedure for optimization o unconstrained problem.	ן f
	OR	1

- **Q8)** a) Explain unidirectional search method for optimization. [9]
  - b) What is optimization? Explain the need of optimization with suitable example. [8]

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**PC2471** 

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-599 B.E. (Instrumentation & Control) CLOUD COMPUTING (2019 Pattern) (Semester - VII) (Elective - IV) (406264 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.
- **Q1**) a) Analyze the architecture of Virtual Machine with its brief operations. [9]
  - b) Comment on "Although virtualization is widely accepted today, it does have its limits". [9]

### OR

(0)	TT 1 '		[10]
QZ) a)	How hypervisor a	re works in cloud computing.	[10]

- b) Justify "Virtualization is the wave of the future". Explain the process of CPU, memory and I/O device virtualization in data center. [8]
- **Q3)** a) Summarize the steps to create EBS volume snapshot? [8]
  - b) Elaborate the security products and features that are available in VPC?[9]

- *Q4*) a) Illustrate the storage of amazon EC2 instance? [10]
  - b) Comment on the performance expections by customer on Elastic Block Storage. [7]

Q5)	a)	Illustrate the significance of RFID in IoT with suitable system architecture features and advantages. [9]
	b)	Justify "zigbee technology in one of the enabling technologies for IoT".[9]
		OR
<b>Q6</b> )	a)	Illustrate the RFID Tags and Device components? [10]
	b)	Justify "Availability is one of the most important security measure in IoT and cloud computing". [8]
Q7)	a)	Comment on : [9]
		i) Location aware applications
		ii) Energy aware cloud computing
		iii) Intelligent fabrics and paints
	b)	justify the impact of cloud on operating system in future. [8]
		OR
<b>Q</b> 8)	a)	Elaborate the docker with respact to process simplification, Broad support and adoption, architecture. [9]

b) Sketch the architecture of mobile cloud computing. [8]

\* \* \*

**PC2472** 

**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-600 B.E. (Instrumentation & Control) SOFT COMPUTING (2019 Pattern) (Semester - VII) (Elective - IV) (406264 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Explain the Basic concepts of fuzzy logic with some example. [8]
  - b) What is meant by Lambda cut of a fuzzy set? Show that Lambda cut relation of fuzzy relation is crisp. [9]

#### OR

Q2) a) What are Fuzzy propositions? List the operations on Fuzzy propositions? [9]

- b) Write a short note on crisp set. Give some example on it. [8]
- Q3) a) Explain fuzzy control for smart cars with particular parameter of car. [8]
  - b) Explain the role of Fuzzy controllers for industrial applications. [9]

- *Q4*) a) Explain the Fuzzy implications, and Fuzzy algorithms. [9]
  - b) Represent the standard fuzzy set operations using venn diagram. [8]

Q5) a) Using Zadeh's notation, determine the  $\lambda$  - cut sets for the given fuzzy sets:  $\underline{S1} = \left\{ \frac{0}{0} + \frac{0.5}{20} + \frac{0.65}{40} + \frac{0.85}{60} + \frac{1.0}{80} + \frac{1.0}{100} \right\}$  $\underline{S2} = \left\{ \frac{0}{0} + \frac{0.45}{20} + \frac{0.6}{40} + \frac{0.8}{60} + \frac{0.95}{80} + \frac{1.0}{100} \right\}$ i)  $S_1 \cup \underline{S}_2$ ii)  $\underline{S}_1 \cup \underline{S}_2$ iii)  $\underline{S}_1 \cap \underline{S}_2$ iv)  $\underline{S}_2$ [9]

b) Explain the construction of Fuzzy controllers in detail. [9]

#### OR

- Q6) a) Using the intuition method develop fuzzy membership functions for the following shapes.
  - i) Trapezoid
  - ii) Gaussian function
  - iii) Isosceles triangle [9]
  - b) Give the Analysis of dynamic properties of fuzzy controller with example. [9]
- Q7) a) Explain the Construction of rule bases by self-learning. [9]
  - b) Distinguish between fuzzy and probability with example. Explain any two methods of composition techniques on fuzzy relations with examples.
     [9]

#### OR

<b>Q8</b> ) a)	Explain the RBF network based self-learning controllers.	[9]
b)	Write a short note on System structure and learning algorithm.	[9]

## \* \* \*

[6354]-600

2

**PC2473** 

SEAT No. :

[Total No. of Pages : 2

## [6354]-601

## B.E. (Instrumentation & Control) AUTOMOTIVE INSTRUMENTATION (2019 Pattern) (Semester - VII) (Elective - IV) (406264 C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- [Max. Marks : 70
- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

Q1) a) List passive safety systems. Explain any two passive safety systems. [9]

b) Explain the dynamic radar cruise control mechanism in automotive with neat diagram. [9]

### OR

- Q2) a) State the difference between active and passive safety system in vehicle.Draw and explain the block diagram of per-collision safety system. [9]
  - b) List different active safety systems. Explain any one active safety system with neat diagram. [9]
- Q3) a) Define protocol. State the role of protocols in vehicles. Explain CAN protocol.[8]
  - b) Explain FlexRay communication protocol application in vehicles. [9]

- *Q4*) a) Explain the architecture of CAN\_FD communication protocol with neat diagram. [9]
  - b) Describe the application of Media Oriented systems Transport (MOST) Protocol in automotive with diagram. [8]

Q5) a) List and explain the basic infrastructure required for maintenance of EV. [10]

b) Write the specification of electric vehicles. [8]

### OR

- Q6) a) Draw and explain the block diagram of wireless charging of electric vehicles.
  - b) What is axial flux motor? Explain various components of axial flux motor with the working of motor. [9]
- Q7) a) What is the role of IoT in vehicles. Explain vehicle to vehicle (V2V) communication technology in detail. [9]
  - b) Explain vehicle to infrastructure (V2I) communication network in vehicles. [8]

### OR

- *Q8*) a) With the help of neat block diagram, Explain the working of Vehicle to pedestrians (V2P) communication network system. [8]
  - b) State the advantages of IoT in automotive. Explain Vehicle to network (V2N) communication network in vehicles. [9]

\* \* \*

**PC2474** 

**SEAT No. :** 

[Total No. of Pages : 3

### [6354]-602

## B.E. (Instrumentation & Control) ADVANCED CONTROL SYSTEM (2019 Pattern) (Semester - VII) (Elective - IV) (406264 D)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables, electronic pocket calculator and steam table is allowed.
- 5) Assume suitable data if necessary.

### **Q1**) a) Find the diagonal canonical form of following system. [9]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -5 & -3 & -4 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} u(k)$$
$$y(k) = \begin{bmatrix} 2 & 0 & 1 \end{bmatrix} x(k)$$

b) Convert the pulse transfer function to controllable canonical form and Jordan Canonical form. [8]

$$\frac{y(z)}{x(z)} = \frac{(z+4)(z+2)}{(z+1)(z+3)(z+5)}$$

OR

**Q2**) a) Find the state transition matrix for following system. [9]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -5 & -2 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$
$$y(k) = \begin{bmatrix} 1 & 2 & 1 \end{bmatrix} x(k)$$

### b) Find the pulse transfer function of following system [8]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -3 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$
$$y(k) = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix} x(k)$$

*P.T.O.* 

[Max. Marks : 70

Q3) a) Investigate controllability and observability of following system. [6]

$$x(k+1) = \begin{bmatrix} 1 & 0 & -2 \\ 3 & -3 & 0 \\ 0 & 0 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} u(k)$$
$$y = \begin{bmatrix} 1 & 3 & 2 \end{bmatrix} x(k) + 4u(k)$$

## b) Find the feedback gain matrix for following system. [12]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -24 & -26 & -9 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$
$$y = \begin{bmatrix} 1 & 5 & 7 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + 6u$$

so that desired poles can be placed at -1,-4, -5

### OR

Q4) a) Investigate controllability and observability of following system. [6]

$$x = (k+1) \begin{bmatrix} 0 & 1 & -1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix} x(k) + \begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix} u(k) and y(k) = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} x(k)$$

[12]

b) Design a full order observer for following system

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -18 & -27 & -10 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$
$$y(k) = \begin{bmatrix} 4 & 2 & 3 \end{bmatrix} x(k)$$

So that poles of close loop system will placed at -2. -5, -7

[6354]-602

**Q5**(a) Determine whether following system is positive definite, positive semidefinite. negative definite, negative semi definite system or undefinite.

$$p = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 4 \\ 1 & 4 & 7 \end{bmatrix}$$

$$p = \begin{bmatrix} 1 & 0 & 2 \\ 4 & 1 & 4 \\ 2 & 3 & 1 \end{bmatrix}$$
[8]

b) Find stability of equilibrium point using Lyapunov stability. [9]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -18 & -27 & -10 \end{bmatrix} x(k)$$

### OR

**Q6**) a) Determine whether following system is stable in sense of Lyapunov or not  $x_1(k+1) = x_1(k)$ 

$$x_2(k+1) = -5x_1(k) - 6x_2(k)$$
[8]

If energy function is given by  $v(x_1, x_2) = x_{1^2} + x_{2^2}$ 

- b) Determine whether following system is stable or not [9]  $x_1(k+1) = 4x_1(k)$   $x_2(k+1) = 2x_1(k) + 4x_2(k) + 6u(k)$ Q7) a) Explain construction of phase plane method. [9]
  - b) Explain stability analysis of nonlinear system. [9]

#### OR

- Q8) a) List various nonlinearities and explain any three. [9]
  - b) Find the describing function of saturation. [9]

## \* \* \*

**PC2475** 

SEAT No. :

[Total No. of Pages : 2

## [6354]-603

# B.E. (Instrumentation & Control) PROCESS INSTRUMENTATION (2019 Pattern) (Semester - VIII) (406268)

## Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.
- *Q1*) a) Develop suitable feedback control strategy for bottoms composition control in a distillation column.[8]
  - b) Identify process variables, classify input and output variables, determine control objectives and appropriate manipulated variables for Distillation column. [9]

#### OR

- *Q2*) a) Develop feedback control strategy for pressure control of a column. [8]
  - b) Develop suitable control strategy for distillation column level control.[9]
- **Q3**) a) Develop cascade control strategy for control of spray dryers. [8]
  - b) Develop cascade control strategy for composition control in single effect Evaporator control. [9]

### OR

- Q4) a) What are objectives of dryers? Comment on characteristics of dryers.[8]
  - b) Develop feedback control strategy for composition control in single effect Evaporator control. [9]

*P.T.O.* 

Q5)	a)	Develop cascade control strategy for endothermic reactors.	[9]	
	b)	Develop end point detection control in batch reactors.	[9]	
		OR		
<b>Q6</b> )	a)	Develop feedback control strategy for exothermic reactors.	[9]	
	b)	Develop time sequence diagram for batch reactor control.	[9]	
Q7)	a)	Develop override control in compressors for the protection of	the	
		equipment.	[9]	
	b)	Comment on start/stop sequence in pumps.	[9]	
	OR			
<b>Q8</b> )	a)	Develop on-off flow control for parallel pumps.	[9]	
	b)	Develop anti-surge control system for compressors.	[9]	

 $\circ$   $\circ$   $\circ$ 

PC-2476

[Total No. of Pages :2

[Max. Marks : 70]

**SEAT No. :** 

## [6354]-604

# B.E. (Instrumentation and Control) Advanced Embedded Systems (2019 Pattern) (Semester - VIII) (406269)

### *Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable/data jf necessary.
- *Q1*) a) Draw a neat block diagram of 32-bit timer and elaborate its operation in brief.[9]
  - b) Describe on chip DAC for ARM-7 processor. [8]

### OR

<b>Q2</b> ) a)	Write a short note on memory mapping of ARM-7 processors.	[9]
----------------	---	-----

- b) Draw and explain architecture of LPC2 148. [8]
- *Q3*) a) Draw a neat block diagram and elaborate Vector Interrupt Controller (VIC). [9]
  - b) Draw the neat interfacing diagram and elaborate the operation of On-Chip (Internal) ADC interfacing with LPC2 148. [9]

- *Q4*) a) Draw a neat block diagram and describe Standard Interrupt Controller (SIC). [9]
  - b) Draw the neat interfacing diagram and elaborate the operation of DC motor interfacing with LPC2 148. [9]

- Q5) a) Draw the neat interfacing diagram and elaborate the operation of GSM module interfacing with LPC2 148. [9]
  - b) Describe the function of END, DCD, CODE16 and DATA assembler directives.
     [8]

### OR

- Q6) a) Draw the neat interfacing diagram and elaborate the operation of EEPROM AT24CXX module interfacing with LPC2 148. [9]
  - b) Elaborate register usage in thumb. Justify how code density will be improved using Thumb. [8]

Q7) Identify different parameters for elevator control system. Develop the system using LPC2 148 ARM-7 microcontroller to display the parameters. For this system,

a)	Identify different parameters for health monitoring system.	[3]
b)	Enlist selected sensors.	[3]
c)	Develop block diagram.	[4]
d)	Elaborate the operation of the system with respect to block diagram.	[4]
e)	Develop the algorithm for the system.	[4]

### OR

Q8) It is decided to design smart home system. Identify different parameters for smart home system. Develop the system using LPC2 148 ARM-7 microcontroller to display the parameters on LCD display. Provide the facility to communicate the information through SMS. For this system,

a)	Identify different parameters for health monitoring system.	[3]
b)	Enlist selected sensors.	[3]
c)	Develop block diagram.	[4]
d)	Elaborate the operation of the system with respect to block diag	gram. <b>[4]</b>
e)	Develop the algorithm for the system.	[4]



### PC-2477

# [6354]-605 B.E. (Instrumentation and Control) ELECTRIC VEHICLES (2019 Pattern) (Semester - VIII) (406270 - A) (Elective - V)

## *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

[Max. Marks : 70

Instructions to the candidates: 1) Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.

- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume Suitable data jf necessary.
- *Q1*) a) Draw the configuration and control of Induction Motor drives and brief.[9]
  - b) Describe the configuration and control of Permanent Magnet Motor drives. [9]

### OR

- **Q2**) a) List electric components used in hybrid and electric vehicles. [9]
  - b) Draw & explain Configuration and control of DC Motor drives. [9]
- (Q3) a) Elaborate Hybridization of different energy storage devices. [9]
  - b) Explain components of EV with respect to Sizing: Propulsion motor. [9]

#### OR

- Q4) a) Explain following components with respect to Sizing: Power electronics.[9]
  - b) Explain following components with respect to Sizing: Selecting the energy storage technology. [9]
- Q5) a) Write a short note on: Case study of 4 wheeler vehicles in EVs. [9]
  - b) Write a short note on: Hybrid (ICE & others). [9]

*P.T.O.* 

SEAT No. :

[Total No. of Pages :2
	OR	
<b>Q6</b> ) a)	Write a short note on: Case study of 3 wheeler in EV.	[9]
b)	Write a short note on: Solar Powered Vehicles.	<b>[9</b> ]
<b>Q7</b> ) a)	Examine the energy management strategies used in hybrid and ele	ectric
	vehicles.	[8]
b)	Classify different energy management strategies.	[8]
	OR	
<b>Q8</b> ) a)	List & explain the various charging techniques.	[8]
b)	Analyze implementation issues of energy management strategies.	[8]



## **PC-2478**

[Total No. of Pages :2

[Max. Marks : 70]

[9]

**SEAT No. :** 

## [6354]-606

# B.E. (Instrumentation and Control) SAFETY INSTRUMENTATION SYSTEMS (2019 Pattern) (Elective - V) (Semester - VIII) (406270 B)

# *Time :2<sup>1</sup>/<sub>2</sub> Hours]*

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume Suitable data if necessary.
- Q1) a) What are some real-world examples of protection layers and their applications in various industries (such as oil and gas, chemical processing, or nuclear power)? [9]
  - b) Describe the Mitigation layer of risk.

#### OR

- **Q2**) a) Describe the Safety requirements specifications (SRS) in detail. [9]
  - b) Describe with neat block diagram of ideal & reality protection layer. [9]
- (Q3) a) Discuss the issues of LOPA in detail. [9]
  - b) What is a Safety Integrity Level (SIL), and how is it used to manage risk in industrial processes? [9]

#### OR

- *Q4*) a) What are the differences between SIL and other measures of safety performance, such as risk reduction factor (RRF) or safety factor (SF)? [9]
  - b) Describe the Risk Graph of SIL determination method with neat diagrams.[9]

*P.T.O.* 

- **Q5**) a) Describe how Reliability Block Diagrams can be used for modeling. **[8]** 
  - b) Elaborate the Fault Tree analysis with the help of block diagram. [9]

<b>Q6</b> ) a)	Describe the sources of Failure rate information.	[8]
b)	Examine the Markov Model with the help of neat block diagram.	[9]
<b>Q7</b> ) a)	Explain the need of Analysis of safety life cycle.	[8]
b)	Describe the conceptual design guidelines of SIS in detail.	[9]
	OR	

- (Q8) a) Develop and describe Safety Requirement Specification (SRS) for a furnace/fired heater. [8]
  - b) Elaborate the Operation and Maintenance Procedures for safe operation.[9]



Total No. of Questions : 8]

**PC-2479** 

[Total No. of Pages : 2

# [6354] - 607

# B.E.(Instrumentation and Control) Renewable Energy Systems

# (2019 Pattern) (Semester - VIII) (406270C) (Elective - V)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed
- 5) Assume Suitable data if necessary
- *Q1*) a) Elaborate on the Charactertics, Specification and selection of Battery. Elaborate on the charging technique for batteries with neat diagram [10]
  - b) Elaborate the working of Super Capacitors with neat diagram [7]

OR

- Q2) a)Compare Battery with other storage media. Elaborate the working of Ni-<br/>MH Rechargeable battery with neat diagram[10]
  - b) Elaborate the working of Fuel Cells with neat diagram [7]
- Q3) a) What is power converter? What is the need of Power Converter? Elaborate on the working principle of Power Converter with neat diagram. [10]
  - b) With a neat diagram, explain the working of Solar Photovoltaic System[8]

OR

- Q4) a) What is MPPT Algorithm? State the need of MPPT Algorithm? Explain the working of MPPT Algorithm with neat diagram. [10]
  - b) With a neat diagram, explain the working of non-isolated Solar Photovoltaic system [8]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

- Q5) a) State the applications of Renewable Energy. Explain the working of Solar water pump system with neat diagram [10]
  - b) Elaborate on the working of solar cooker with neat diagram [7]

- *Q6*) a) Justify how renewable energy is efficient from application point of view. Elaborate on the working of solar power generation plant with neat diagram [10]
  - b) Elaborate on the working of Solar power UPS System with neat diagram[7]
- Q7) a) State the significance of Renewable energy source. Describe the wind energy conversion technology with neat diagram [10]
  - b) Elaborate the concept of Wind farm with neat diagram [8]

#### OR

- Q8) a) State the significance of wind energy. Draw and explain the working of wind + diesel system with neat system. [10]
  - b) State the significance of models in wind pattern prediction Elaborate on various models to predict wind pattern and their analysis [8]

## **be be be**

## [6354]-609

# B.E. (Instrumentation & Control)

## **CYBER SECURITY**

## (2019 Pattern) (Semester - VIII) (Elective - VI) (406271A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.

<i>O1</i> ) a)	Explain Diffie-Hellman key	exchange algorithm with examp	le. <b>[8]</b>
			· · · · · · · · · · · · · · · · · · ·

b) Describe in brief elliptic curve cryptography with example. [9]

#### OR

Q2)	a)	Explain SHA-1, Digital Signatures and Authentication.	[8]
	b)	Explain in detail RSA algorithm along with its advantages disadvantages.	and <b>[9]</b>
Q3)	a)	Explain Mail Security: PGP, S/MIME.	[8]
	b)	Explain Needham Schroeder algorithm and Kerberos.	[9]
		OR	
Q4)	a)	Explain Firewall : Different types and functionalities.	[8]
	b)	Explain IP Security: IPv6 and IPSec.	[9]
Q5)	a)	Explain quantitative vs. qualitative risk control practices.	[9]
	b)	Explain in detail the legal perspectives- Indian perspective, Gloperspective.	obal <b>[9]</b>
		OR	

[Max. Marks : 70

[Total No. of Pages : 2

SEAT No. :

<b>Q6</b> ) a)	Describe risk identification, risk assessment, risk control detail.	strategies in [9]
b)	Explain cloud computing and cybercrime.	[9]
<b>Q7</b> ) a)	Explain windows forensic analysis.	[9]
b)	Explain network forensics.	[9]
	OR	
<b>Q8</b> ) a)	Explain Cyber Crime investigation.	[9]

b) Explain Case scenarios: social media crime, Online defacement crime, Email investigation. [9]

# (i)(i)(i)(i)(i)

#### [6354]-610

[Total No. of Pages : 2

**SEAT No. :** 

# B.E. (Instrumentation & Control) AUTOMATION IN AGRICULTURE (2019 Pattern) (Semester - VIII) (Elective - VI) (406271B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.
- 4) Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam is allowed.
- 5) Assume suitable data, if necessary.
- Q1) a) State the importance of irrigation system used in agricultural field. [9]
  - b) Analyze environmental Monitoring and Control Systems used in Greenhouse. [8]

#### OR

- Q2) a) Enlist types of ventilation in green house. Illustrate the need of ventilation in green house with suitable example. [9]
  - b) State different automation scheme used in green house. [8]
- *Q3*) a) State the importance of Decanter System For Muddy Juice Treatment used in Sugar Industry. [9]
  - b) Enlist the Benefits of Micro-Irrigation system over Conventional System of Irrigation system. [9]

- Q4) a) Analyze moisture control unit used in sugar plant with neat sketch (MCU). [9]
  - b) Elaborate the different components of steam economy devices. [9]

- Q5) a) Enlist eight laws governing the food sector and establishes the Food Safety and Standards Authority (FSSA) to regulate the sector. [9]
  - b) Elaborate International code of hygiene for various products in food processing. [8]

- Q6) a) State the importance of different food preservation techniques. [9]
  - b) Analyze Modern Food Processing techniques used in food processing industry. [8]
- *Q7*) a) Illustrate with suitable example the role of PLC and SCADA in food packing industry. [9]
  - b) Enlist the different trends used in modern food processing industry. [9]

#### OR

- Q8) a) State the importance of agmark for domestic and export purposes. [9]
  - b) State the importance of creating and maintaining controlled atmosphere in food processing industry. [9]

# 1

SEAT No. :

[Total No. of Pages : 2

## [6354]-611

# B.E. (Instrumentation & Control Engg.) ENVIRONMENTAL INSTRUMENTATION (2019 Pattern) (Semester - VIII) (Elective - VI) (406271)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.
- Q1) a) Discuss the equation governing the settling or rising velocity of discrete particles in a fluid. How does hindered settling affect this process? Discuss the real-world applications where understanding particle settling behaviour is critical.
  - b) Discuss the design and operating considerations to maximize the efficiency of a settling basin in wastewater treatment plants. [7]

- Q2) a) Explain the laboratory analysis techniques used for assessing the quality of groundwater samples. Highlight the parameters typically analyzed and their significance in evaluating water quality. [10]
  - b) Discuss the specific instruments for detecting and monitoring contaminants in soil and groundwater. (minimum two instruments each)[7]
- Q3) a) Define COD and BOD. Explain their significance in assessing organic pollution levels in wastewater. Evaluate the importance of COD and BOD testing in monitoring wastewater quality and designing treatment processes.
   [10]
  - b) Discuss the methods used for rainwater harvesting: rooftop harvesting, surface runoff harvesting, and groundwater recharge techniques. [8]

- *Q4*) a) Explain velocity-area flow meters and ultrasonic flow meters for closed-channel flow measurement. Highlight their advantages and limitations. [10]
  - b) Explain the criteria for selecting optimum wastewater sampling locations. How do factors such as flow rate, mixing conditions, and pollutant distribution influence sampling site selection? [8]
- Q5) a) Discuss the significance of addressing air pollution. Analyze the detrimental effects of air pollution on human health, ecosystems, and the economy, citing relevant examples. [10]
  - b) Explain various air sampling methods and equipment used in air pollution monitoring. [7]

- Q6) a) Briefly explain various strategies for controlling air pollution at the source. Discuss the challenges of implementing these strategies for achieving sustainable air quality. [10]
  - b) Assess the impact of air pollution on public health. Discuss the air pollutants which contribute to respiratory diseases, cardiovascular problems, and other health issues. [7]
- Q7) a) Explain the principle of operation of a barometer and its role in measuring atmospheric pressure. Discuss the significance of atmospheric pressure in weather forecasting and climate analysis. [10]
  - b) Discuss the working principle of ceilometers. What are the key components used in it? [8]

#### OR

- Q8) a) Explain the basic working of barometers, rain gauges, and ceilometers used at weather stations. How is the data integrated for predicting the environment? [10]
  - b) List the instruments typically found in a Rover Environmental Monitoring Station (REMS). Briefly describe the function of the instruments used.[8]

SEAT No. :

# PC2483

[Total No. of Pages : 5

[Max. Marks : 70

### [6354]-612

## **B.E.** (Mechanical)

# HEATING VENTILATION AIR-CONDITIONING AND REFRIGERATION

## (2019 Pattern) (Semester - VII) (402041)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicate full marks
- 4) Use of Scientific Calculator is allowed
- 5) Assume Suitable data if necessary
- Q1) a) Explain with neat sketch the flooded type evaporator. [6]
  - b) Explain with neat schematic diagram the frost control circuit used in VCR cycle. [5]
  - c) Explain with neat schematic  $CO_2$  trans critical cycle. [6]

- **Q2**) a) Explain with a neat sketch Thermostatic Expansion Valve. [6]
  - b) Explain with neat schematic Simple Ejector Refrigeration System. [5]
  - c) Discuss the following terms used in thermodynamics analysis of Simple Ejector Refrigeration Cycle. [6]
    - i) Entrainment Ratio
    - ii) Entrainment efficiency
    - iii) Nozzle Efficiency

*Q3*) a) Explain the terms:

iii)

GRSHF i)

ii) BPF **ERSHF** and iv) SHF

- A conference room for sitting 100 persons is to be maintained at 22°C b) DBT and 60% relative humidity. The outdoor conditions are 40°C DBT and 27 °C WBT. The various loads in the auditorium are as follows:[10]
  - Sensible and latent heat loads per person 80 W and 50 W respectively; i)
  - ii) Lights and fans, 15000 W;
  - iii) Sensible heat gain through glass ceiling etc. 15000 W.
  - The air infiltration is  $20 \text{ m}^3/\text{min}$  and fresh air supply is  $100 \text{ m}^3/\text{min}$ . iv)
  - Two-third of recirculated room air and one-third of fresh air are v) mixed before entering the cooling coil.
  - The bypass factor of the coil is 0.1. vi) Determine
    - Apparatus dew point, 1)
    - 2) Grand total heat load and
    - 3) Effective room sensible heat factor

#### OR

- Explain in detail the "decrement factor" and "time lag". **Q4**) a) [8]
  - The air-handling unit of an air-conditioning plant supplies a total of 4500 b) cmm of dry air which comprises by weight 20% fresh air at 40°C DBT, 27°C WBT, and 80 % recirculated air at 25°C DBT and 50% RH. The air leaves the cooling coil at 13°C saturated state. Calculate the following.
    - i) Total cooling load, and
    - ii) Room heat gain
- **Q5**) a) Explain Natural Ventilation and Mechanical Ventilation?
  - Using Equal friction method, determine the duct diameter and velocity b) for section AB, BD and BC. Assume velocity in the main duct AB=600 m/min. Also Calculate maximum pressure drop in the duct system. Distance AB = 30 m, Distance BC = 30 m and Distance BD=10 m. Refer the figure as given below. [10]



2

[6354]-612

[10]

[8]

- *Q6*) a) Define the following as applied to "Air Distribution System" Intake, Outlet, Grille, Register, Diffuser, Filter, Throw and Primary Air. [8]
  - b) Using equal Friction pressure drop method and friction chart estimate the diameter and velocity pressure in AB, BC, CD, BE, CF Duct sections. Take the assumption if any. [10]



( <b>0</b> )	Explain with post skotch variable refrigerent flow (VPE) air ou	ditioning
	OR	
c)	Write a short note on solid packed tower.	[5]
b)	Draw and Explain water to water heat pump circuit.	[6]
<b>Q7</b> ) a)	Explain with neat sketch winter Air conditioning system.	[6]

<b>Q8)</b> a)	Explain with neat sketch variable refrigerant flow (VRF) air conditi system.	oning [6]
b)	Explain with neat sketch all year round air conditioning system.	[6]

c) State the factors to be considered while selecting a system of air conditioning. [5]



[6354]-612

4

#### **Friction Chart for Circular Ducts**



 $\bigcirc$   $\bigcirc$   $\bigcirc$ 

#### [6354]-613

[Total No. of Pages : 4

**SEAT No. :** 

# B.E. (Mehanical Engineering) DYNAMICS OF MACHINERY (2019 Pattern) (Semester-VII) (402042)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6 Q.7, or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of logarithmic tables, slide rule, and electronic pocket calculator is allowed.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.
- Q1) a) Find the natural frequency of the system as shown in figure.1 using Energy Method or Newton's Approach.[8]



- b) Explain with a neat diagram mathematical model of a Bicycle. [5]
- c) Explain the following terms used in vibration.
  - i) Free Vibrations
  - ii) Forced Vibrations

#### OR

- Q2) a) A body of 5kg is supported on a spring of stiffness 1960 N/m & has a dashpot connected to it, which produces a resistance of 1. 96 N at a velocity of 1 m/sec. In what ratio will be amplitude of vibration reduced after 5 cycles?
  - b) Discuss over-damped, under-damped and critically damped system with the help of amplitude versus time plot. [5]
  - c) Define the following terms
    - i) Viscous damping
    - ii) Coulomb damping

[4]

[4]

- Q3) a) A system having rotating unbalance has a total mass of 25 kg. The unbalanced mass of 1 kg rotates with a radius of 0.04m It has been observed that at a speed of 1000 rpm, the system & eccentric mass has a phase difference of 90 degrees and corresponding amplitude is 0.015 m. Find out
  - i) natural frequency of the system
  - ii) damping factor
  - iii) amplitude at 1500 rpm
  - iv) Phase angle at 1500 rpm.
  - b) Explain frequency response curves (Magnification factor Vs. Frequency ratio) forced vibration due to external harmonic excitation. [5]
  - c) Define Quality factor and state its significance in frequency response curves. [5]

- Q4) a) The springs of an automobile trailer are compressed 0.1m under its own weight. Find the critical speed when the trailer is passing over a road with a profile of sine-wave whose amplitude is 80 mm and the wavelength is 14 m. Find the amplitude of vibration at a speed of 60 km/hr. [8]
  - b) What is critical speed of rotor without damping? Explain with the neat sketch. [5]
  - c) Explain Force transmissibility on the basis of [5]
    - i) Definition
    - ii) Equation
    - iii) Terminology used in equation

**Q5)** a) Figure 2, shows a vibrating system having two degrees of freedom. Determine the two natural frequencies of vibrations of motion of  $m_1$  and  $m_2$  for the two modes of vibration. Take  $m_1 = 20$  kg,  $m_2 = 35$  kg, K= 3000 N/m. [10]



Figure. 2

b) Derive the equation for the length of Torsionally Equivalent Shaft. [8]

#### OR

- Q6) a) Determine the natural frequencies and position of node of torsional vibration system having two rotors A and B attached to the ends of a shaft 1500 mm long. The MOI of rotor A is 650 kgm<sup>2</sup> and that of rotor B is 215 kgm<sup>2</sup>. The shaft is 95 mm diameter for the first 600 mm, 60 mm diameter for the next 500 mm lenth and 50 mm diameter for the remaining length. Modulus of rigidity of shaft is 0.8 x 10<sup>5</sup> Mpa. (Assume value of equivalent diameter as 0.1 m).
  - b) Explain free vibrations of a two rotor system using following parameters. [8]
    - i) Zero frequency
    - ii) Node point
    - iii) Position of node
    - iv) Amplitude ratios of two rotors

- Q7) a) Differentiate Time domain and frequency domain Analysis. Explain how frequency spectrum can be used to detect vibration related faults in a system.
  - b) Explain any one frequency measuring instrument with a neat diagram.[5]
  - c) Classify vibration measuring instruments. [4]

- Q8) a) Show that as a distance from a point source doubles, the Sound Intensity Level decreases by 6 dB. Assume that sound propagates in the form of spherical waves.
  - b) Write a short note on Sound fields. [5]
  - c) Define the following term. [4]
    - i) Sound pressure level
    - ii) Sound Power level
    - iii) Sound intensity level
    - iv) Sound absorption coefficent



### [6354]-614

[Total No. of Pages :3

**SEAT No. :** 

# **B.E.** (Mechanical)

# TURBOMACHINERY

## (2019 Pattern) (Semester- VII) (402043)

*Time : 2 Hours]* 

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data wherever necessary.
- 5) Use of steam table/Mollier chart is allowed.
- *Q1*) a) Give classification of turbomachines with suitable example. [6]
  - b) A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 rpm. The net head on pelton wheel is 700m. If the side clearance angle is 15° and discharge through the nozzle is 0.1 m<sup>3</sup>/s. Determine [8]
    - i) Power available at the nozzle.
    - ii) Hydraulic efficiency of the turbine.

- Q2) a) Explain construction and working of Kaplan Turbine with neat sketch.[6]
  - b) The external and internal diameters of inward flow reaction turbines are 1.20 m and 0.6 m respectively. The head on the turbine is 22 m and velocity of flow through the runner is constant and equal to 2.5 m/s. The guide blade is given as 10° and runner vanes are radial at inlet. If the discharge at outlet is radial, determine [8]
    - i) The speed of the turbine
    - ii) The vane angle at the outlet of the runner
    - iii) Hydraulic efficiency of the turbine.

- Q3) a) What is compounding? Explain the need of compounding. Explain any one method of compounding in steam turbines. [6]
  - b) In De Laval turbine, steam is issued from the nozzle with a velocity of 1500 m/s whereas the mean blade velocity is 500 m/s. The nozzle angle is  $20^{\circ}$  and the inlet and outlet angles of blades are equal. The mass of steam flowing through the turbine is at the rate of 1200 kg/hr. Assuming blade velocity coefficient k=0.8, Draw velocity diagram and determine[6]
    - i) The Blade angles
    - ii) The power developed by turbine
    - iii) The Blade Efficiency

- *Q4*) a) Explain governing of steam turbine with any one method. [6]
  - b) In Parson's reaction turbine running at 500rpm with 50% reaction develops 75 kW per kg per second of steam. The exit angle of blades is 20° and steam velocity is 1.5 times the blade velocity. Determine [6]
    - i) Blade Velocity
    - ii) Inlet angle of moving blade.
- Q5) a) State & explain:
  - i) Unit Speed
  - ii) Unit Discharge
  - iii) Unit Power
  - b) The outer diameter of an impeller of a centrifugal pump is 400mm and outlet width is 50mm. The pump is running at 800 rpm and is working against a total head of 15 m. The vane angle at outlet is 40° and manometric efficiency is 75% Determine [6]
    - i) Velocity of flow at outlet
    - iii) Velocity of water leaving the vane
    - iii) Angle made by absolute velocity at outlet

[6354]-614

[6]

- Q6) a) Explain various heads in centrifugal pump with a neat sketch. [6]
  - b) A centrifugal pump delivers 1565 LPS against a manometric head of 6.1m. When the impeller rotates at 200 rpm. The impeller diameter is 1.22 m and area at outer periphery is 6450 cm<sup>2</sup>. If the vanes are set back at angle of 26° at the outlet , Determine [6]
    - i) Manometric Efficiency
    - ii) Power required to drive the pump
    - iii) Minimum starting speed if ratio of external to internal is 2.
- *Q7*) a) Explain Construction and working of axial flow compressor with a neat sketch.
  - b) A rotary air compressor working between 1 bar and 2.5 bar has internal and external diameter of impeller as 300 mm and 600 mm respectively. The vane angle at inlet and outlet are 30° and 45° respectively. If air enters impeller at 15 m/s, Find [8]
    - i) Speed of impeller in rpm
    - ii) Work done by compressor per kg of air.

- Q8) a) Differentiate between centrifugal compressor and axial flow compressor. [4]
  - b) The impeller of the centrifugal compressor has the inlet and outlet diameter of 0.3 and 0.6 m respectively. The intake is from the atmosphere at 100 kPa and 300 K, without any whirl component. The outlet blade angle is 75°. The speed is 10000 rpm and velocity of flow is constant at 120 m/s. If the blade width at inlet is 6 cm, determine the following [8]
    - i) Specific work
    - ii) Exit pressure
    - iii) Mass flow rate
    - iv) Power required to compressor if the overall efficiency is assumed to be 0.7.



3

# 86 [6354]-615 [Total No. of Pages : 3 B.E. (Mechanical Engineering) AUTOMOBILE DESIGN (2019 Pattern) (Semester-VII) (Elective-III) (402044 A)

*Time : 2½ Hours]* 

[Max. Marks:70

**SEAT No. :** 

- Instructions to the candidates: 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
  - Neat diagrams must be drawn wherever necessary.
  - 3) Figures to the right indicate full marks.
  - 4) Use of electronic pocket calculator is allowed.
  - 5) Assume suitable data if necessary.
- Q1) a) A propeller shaft is required to transmit 50 kW power at 600 rpm. It is a hollow shaft, having an inside diameter 0.8 times of the outside diameter. It is made of steel (Syt = 380 N/mm<sup>2</sup>) and the factor of safety is 4. Calculate the inside and outside diameters of the shaft. Assume (Ssy=0.5Syt) [9]
  - b) Describe with neat sketch the working of power steering unit. [9]

## OR

- (Q2) a) Explain with neat sketch full floating axle and state its applications. [8]
  - b) Pair of bevel gears with 20° pressure angle, consists of a 20 teeth pinion meshing with a 30 teeth gear. The module is 4 mm, while the face width is 20 mm. The material for the pinion and gear is steel 50C4 (Sut = 750 N/mm<sup>2</sup>). The gear teeth are lapped and ground (Class-3) and the surface hardness is 400 BHN. The pinion rotates at 500 rpm and receives 2.5 kW power from the electric motor. The starting torque of the motor is 150% of the rated torque. Determine the factor of safety against bending failure and against pitting failure. [10]
- *Q3)* a) Write a short note on:
  - i) Classification of pressed steel disc wheel
  - ii) Factors affecting tyre life
  - b) Explain limitations and benefits of radial ply tyre over the cross ply tyre. [8]

[9]

- Q4) a) Explain with neat sketch construction and working of hydraulic brake system for a vehicle [9]
  - b) A circular road course track has a radius of 500 m and is banked to 10°. If the coefficient of friction between the road and tyre is 0.25. [8] Compute:
    - i) The maximum speed to avoid slipping and
    - ii) The optimum speed to avoid wear and tear on the tyres.
- Q5) a) Explain the working and construction of the shock absorber. State its advantages. [9]
  - b) Design a Helical coil spring with Pmax = 7.5 kN. The mean coil diameter (D) Should be 150 mm from space stiffness of the spring. k = 75 N/mm. Spring made of coil hardened and tempered steel wire (Sut = 1250 N/mm<sup>2</sup>). Permissible shear stress=30% of Ultimate tensile strength (Sut)  $G = 81370 \text{ N/mm}^2$ . Assume a WahI's Stress factor, K = 1.213, [9]

Calculate:

- i) Spring Index,C
- ii) Wire diameter, d
- iii) Number of active coils, N

OR

- *Q6)* a) Explain with neat sketch active suspension system with its limitations and advantages. [9]
  - b) A semi-elliptic leaf spring used for automobile suspension consists of three extra full-length leaves and 15 graduated-length leaves, including the master leaf. The centre-to-centre distance between two eyes of the spring is 1 m. The maximum force that can act on the spring is 75 kN. For each leaf, the ratio of width to thickness is 9:1. The modulus of elasticity of the leaf material is 207 000 N/mm<sup>2</sup>. The leaves are prestressed in such a way that when the force is maximum, the stresses induced in all leaves are same and equal to 450 N/mm<sup>2</sup>. [9]

Determine:

- i) The width and thickness of the leaves;
- ii) The initial nip; and
- iii) The initial pre-load required to close the gap C between extra fulllength leaves and graduated-length leaves.

- Q7) a) Explain the following:
  - i) Mechanical packaging
  - ii) Automotive industry packaging.
  - b) List and explain ergonomic considerations in design of automobile. [7]

- (Q8) a) Explain with suitable examples use of anthropometry in automobile design. [9]
  - b) Write a note on applications of biomechanics in vehicle. [8]



SEAT No. :

[Total No. of Pages : 2

#### [6354]-616

**B.E.** (Mechanical)

# DESIGN OF HEAT TRANSFER EQUIPMENTS (2019 Pattern) (Semester-VII) (Elective -III) (402044 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6 Q.7, or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Explain the Overall Design Process of shell and tube type heat exchanger.[9]
  - b) Define Shell side pressure drop and Tube side pressure drop. Also explain factors affecting on Shell side pressure drop and Tube side pressure drop.
     [9]

#### OR

- (*Q2*) a) Explain in details Baffled heat exchangers. [9]
  - b) What are the sources of Noise in a heat exchanger? How it can be minimized. [9]
- Q3) a) Give the detailed design considerations of heat exchangers for refrigeration and air conditioning applications. [9]
  - b) Explain the design considerations involved in a evaporator and condenser. [8]

#### OR

- Q4) a) Write a classification of condenser used in refrigeration systems. [9]
  - b) Write down the steps in thermal analysis of evaporator. [8]

*P.T.O.* 

Q5) a) Differentiate between plate fin heat exchanger and tube fin heat exchanger. [9]

b) Write down steps in thermal analysis in compact heat exchanger. [8]

#### OR

- Q6) a) Explain with neat sketch types of fins used in plate fin heat exchanger.[9]
  - b) Differentiate mini and micro channel Heat exchanges with neat sketch.[8]
- Q7) a) Define Cooling tower and give the classification of cooling towers. [9]
  - b) Explain the difference between wet bulb & dew point temperatures. [9]

#### OR

- *Q8)* a) Explain the design considerations for a counter flow direct contact heat exchanger. [9]
  - b) Explain the cooling tower internals and roll of fills in cooling towers.[9]

#### 

**PC-2488** 

[Total No. of Pages : 2

# [6354] - 617

# B.E.(Mechanical Engineering) MODERN MACHINING PROCESSES (2019 Pattern) (Semester - VII) (402044C) (Elective - III)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.
- Q1) a) Explain the basic principle of ECM. In an electrochemical machining process with a pure iron work-piece having atomic weight 56g, valence 2 and density 7.8 g/cm<sup>3</sup>, respectively. Determine the current required for a desired material removal rate of 5cm<sup>3</sup>/min.
  - b) Explain in detail with suitable sketch of electro chemical grinding (ECG) process. Also discuss the effect of process parameters, merits, demerits and applications. [9]

### OR

- Q2) a) Explain chemical machining (CHM) process with principle, construction, working process parameters. [8]
  - b) What are the properties of electrolytes used in ECM process? In an ECM process with a pure iron block is being machined. If a current of 5000 amp is used, determine the volume rate of material removal from the copper block if atomic weight of iron is 56g, valence 2 and density 7.8g/cm<sup>3</sup>, respectively. [9]
- Q3) a) What are the functions of dielectric medium in EDM? Explain with neat sketch various dielectric flushing techniques. [9]
  - b) Elucidate with neat sketch Wire Electric Discharge Machining (WEDM) procedure, encompassing its fundamental principles, structural components, operational mechanisms and diverse applications. [9]

[Max. Marks : 70

SEAT No. :

Q4) a) Differentiate between EDM and ECDM based on following points: [9]

- i) Working Principle,
- ii) Power Used,
- iii) Work-piece material,
- iv) Metal removal rate
- v) Accuracy and surface finish.
- b) Draw R-C circuit. Explain with neat graph the effect of following parameters on MRR in EDM? [9]
  - i) Resistance
  - ii) Mean current
  - iii) Capacitance
  - iv) Spark gap.
- Q5) a) Describe the single point diamond turning in terms of its process characteristics, machine tool, materials machined and from quality aspects.[8]

b) With a schematic explain the working principle of  $\mu$ -EDM. Also explain important components of  $\mu$ -EDM. [9]

## OR

- *Q6*) a) Elaborate on the material removal mechanism in diamond turn machining.[8]
  - b) Elucidate the need of precision manufacturing and challenges faced in precision machining. Also state the difference between macro, micro and nanofabrication techniques. [9]
- Q7) a) Explain the photolithography process with principle, construction and process parameters. [9]
  - b) With a schematic state the principle of Abrasive Flow Finishing. How it is differ from Magnetic Abrasive Finishing (MAF). [9]

[18]

### OR

*Q8*) Write short notes on:

- a) Micro-drilling
- b) Micro-engraving
- c) MEMS

# **14 14 14**

2

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SEAT No. :

[Total No. of Pages :2

# [6354]-618R

# **B.E** (Mechanical)

# INDUSTRIAL ENGINEERING

# (2019 Pattern) (Semester - VII) (402044 D) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Figure to the right side indicates full marks.
- 3) Use of electronic is allowed.
- 4) Assume Suitable data if necessary.
- Q1) a) Elaborate any four different types of material handling equipment's with suitable applications? [8]
  - b) Explain the term plant layout. Enlist types of plant layout. Describe the factors to be considered while finalizing the plant layout with suitable illustration. [9]

- Q2) a) Explain types of material flow patterns to achieve optimum flow of material in the plant? [8]
  - b) Compare line layout with function layout also explain objectives of facility layout planning. [9]
- Q3) a) Write a short note on Capacity Planning? Compare job Production and Mass Production. [9]
  - b) M/s XYZ Enterprises uses exponential smoothing with Smoothing Parameter 0.16. for estimating a demand following table shows the demand for 6 months the forecast for May is 545 units. Estimate the forecast for November. [9]

Month	Actual Demand
May	470
June	510
July	516
August	488
September	450
October	550

- Q4) a) Write a short note on
  - i) MPS
  - ii) MRP I

b) Estimate the state forecast for the year 2013 using exponential smoothing forecaster. Take Smoothing Constant = 0.5 and the forecast for the year 2005 as  $175 \times 10^5$  units. [9]

[9]

[9]

[8]

Year	2005	2006	2007	2008	2009	2010	2011	2012
Sale Rs.(x 10 <sup>5</sup> )	195	170	160	175	190	195	200	195

- Q5) a) Write a short note on ERP? Explain its benefits? Also explain different modules present in ERP [9]
  - b) Explain any three selective control techniques of inventory? [9]
    - OR
- *Q6*) a) Write a short note on
  - i) Supply chain strategies
  - ii) Economic order quantity.
  - b) The ABC enterprises use EOQ logic to determine the order quantity for its various components and are planning its orders. The Annual consumption is 95,000 units, Cost to place one order is Rs. 1400, Cost per unit is Rs. 60 and carrying cost is 6% of Unit Cost Find, [9]
    i) EOQ,
    - ii) No. of order per year,
    - iii) Ordering Cost and Carrying Cost
    - iv) Total Cost of Inventory.
- Q7) a) Define Job evaluation? What are its objectives? Explain procedure of job evaluation? [9]
  - b) Explain Rapid Entire body Assessment (REBA) with level of MSD risk.
     [8]

OR

- Q8) a) Elaborate the term "merit rating"? Explain any 4 methods of merit rating?[9]
  - b) Write a short note on:
    - i) KRA
    - ii) Principles of ergonomics

# XXX

## PC-2490

[Total No. of Pages :2

# [6354]-619

# **B.E.** (Mechanical Engineering) Computational Fluid Dynamics

## (2019 Pattern) (Elective - III) (Semester - VII) (402044 F)

## Time :2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume Suitable data if necessary.
- 5) Use of elctronic pocket calculator is allowed.
- *Q1*) a) Describe and illustrate the solution of 1-D transient convection-diffusion system. [10]
  - b) Explain the 2D steady Convection Diffusion system by Central Difference approach. [8]

### OR

- Q2) a) Describe and illustrate the solution of two-dimensional steady heat convection-diffusion equation. [10]
  - b) Why boundary conditions are needed? List common thermal and flow boundary conditions used in CFD. [8]
- (Q3) a) What are the different variations of the SIMPLE algorithm? Explain the need of having different variations. [8]
  - b) Derive solution of Navier-Stoke' equation for incompressible flow. [9]

#### OR

- *Q4*) a) Explain the applications of CFD for external flow over circular cylinder simulation.
  - b) What is simple Lid driven cavity problem? Explain the boundary conditions with a neat sketch. Write an algorithm for the same. [9]

[Max. Marks : 70

SEAT No. :

Q5)	a)	Derive One equation model for Turbulent Flow Modeling. [1	0]
	b)	Explain the Large Eddy Simulation (LES) and its applications. [	8]
		OR	
<b>Q6</b> )	a)	Why turbulence modeling is required? Explain any one "two-equation turbulence model. [1	n" 0]
	b)	Explain k- $\varepsilon$ and k- $\omega$ models in details. [	8]
Q7)	a)	What are the advantages and disadvantages of Eulerian description? [	8]
	b)	Describe rigid body motions for FSI formulation. [	9]
		OR	
<u>(</u> <b>2</b> 8)	a)	Describe the balance laws in Lagrangian and Eulerian forms.	9]
	b)	Explain Arbitrary Lagrangian Eulerian (ALE) formulation.	8]



Total No. of Questions : 8]

PC2491

SEAT No. :

[Total No. of Pages : 2

# [6354]-620 B.E. (Mechanical Engineering) PRODUCT DESIGN AND DEVELOPMENT (2019 Pattern) (Semester - VII) (Elective - IV) (402045 A)

Time : 2 <sup>1</sup> / <sub>2</sub> Hours]		lax. Marks : 70	
Insti	ructio 1) 2) 3) 4) 5)	ons to the candidates: Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks. Use of electronic pocket calculator is allowed. Assume suitable data, if necessary.	
<b>Q1</b> )	a)	Explain Pugh's chart with example.	[7]
	b)	Write note on Economic Analysis.	[6]
	c)	Write a short note on SWOT analysis for a selection of profi	table product. [ <b>4</b> ]
		OR	
Q2)	a)	Explain Product Characteristics.	[7]
	b)	Describe in detail Concept Selection Process.	[6]
	c)	Write note on Alternate thinking in idea generation approace	ch. [4]
Q3)	a)	Describe in detail Design review/part Print Analysis.	[7]
	b)	Explain Qualitative & Quantitative Economic Analysis.	[6]
	c)	Write a short note on Arrangement of Dimensions.	[4]

*P.T.O.* 

<b>Q4</b> )	a)	Explain BOM with example.	[7]
	b)	Explain Value analysis in detail.	[6]
	c)	What is Fit? Describe the types of Fits.	[4]
Q5)	a)	Explain production Part Approval Process tools in detail.	[8]
	b)	Define Purchase Order and Product Costing in vendor development. [6]	

a	Evaloin Drawing office procedure in detail	[ <b>/</b> ]
C)	Explain Drawing office procedure in detail.	[4]

<b>Q6</b> ) a)	Describe in detail Legal Product of design patents.	[8]
b)	Explain Product Testing and its Validation.	[6]
c)	Describe Organization Structure in detail.	[4]

Q7)	a)	Write a short note on Advance Product Quality Planning.	[8]
	b)	What is the importance of PLM and PDM for a Designer?	[6]
	c)	Enlist Industrial Safety to be consider in Product Design.	[4]
		OR	
<b>Q</b> 8)	a)	What is PLM? What are the phases involved in it?	[8]
	b)	Explain Aesthetic and aesthetics consideration in product design.	[6]
	c)	What are guidelines for Design for Robustness? Discuss.	[4]

# \* \* \*

2
Total No. of Questions : 8]

PC2492

[6354]-621

## B.E. (Mechanical) EXPERIMENTAL METHODS IN THERMAL ENGINEERING (2019 Pattern) (Semester - VII) (Elective - IV) (402045 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve all questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. is compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

### *Q1*) a) Define the following properties

- i) Emissivity
- ii) Absorptivity
- iii) Reflectivity and
- iv) Transmissivity
- b) What is an optical pyrometer? Explain its Construction, Working & Its Applications. [7]

### OR

- Q2) a) How do you measure the solar radiation? What is the type of instruments used for solar radiation measurement and explain? [8]
  - b) What is RTD? Explain different methods of construction of RTD. Also compare RTD with thermocouple. [9]
- Q3) a) Classify the working principle of Bourdon tube pressure gauge and diaphragm gauge.[8]
  - b) What type of pressure sensors used in pressure measurement? Explain Pressure measurement in details. [10]
    - i) McIeod gauge
    - ii) Bourdon tube pressure gauge
    - iii) Bellow gauge
    - iv) Pirani gauge
    - v) Ionization gauge

[Total No. of Pages : 2

[10]

[Max. Marks : 70

SEAT No. :

- Q4) a) Describe transient response of pressure transducers in detail. [8]
  - b) Explain the following. [10]
    - i) Inductance-type pressure transducers
    - ii) Capacitance type pressure transducers
- Q5) a) Explain the Principle of Laser Doppler Anemometer (LDA) with neat sketch. Also draw alternative schemes for accomplishing the scattering and measurement process in LDA. [8]
  - b) What is the difference between orifice meter and venturi meter? How does temperature relate to velocity? Explain the thermal effect on Velocity measurement? [10]

- Q6) a) Explain in detail various applications of flow measurements. [8]
  - i) Ultrasonic flow measurement
  - ii) Flow measurements techniques used to validate CFD results
  - iii) Micro channel flow measurement
  - b) State the objectives of flow visualization. Explain Schlieren system with neat sketch. [10]
- Q7) a) What are the principles of Data Acquisition and conversion? What is the importance of signal conditioning? [8]
  - b) How to apply the AI & ML in mechanical measurement process? What is regression used for? [9]

### OR

- Q8) a) Explain procedure of finding statistical parameter such as ANOVA (Analysis of Variance) and its Correlation. [9]
  - b) Describe data transmission with -A/D & D/A conversion Data storage and Display. [8]

### \* \* \*

Total No. of Questions : 8]

PC2493

**SEAT No. :** 

[Total No. of Pages : 2

## [6354]-622 B.E. (Mechanical) ADDITIVE MANUFACTURING (2019 Pattern) (Semester - VII) (Elective - IV) (402045 C)

*Time : 2½ Hours]* 

Instructions to the candidates:

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1*) a) Explain process Fused Deposition Modeling (FDM) with suitable sketch. List its Benefits, Limitations and Applications. [9]
  - b) Explain process Binder Jetting with suitable sketch. [9]

### OR

- Q2) a) Explain process TIG deposition in additive manufacturing. List its Benefits, Limitations and Applications. [9]
  - b) Explain process Plasma Arc Deposition. List its Benefits, Limitations and Applications. [9]
- Q3) a) Explain different quality considerations in Additive Manufacturing. [9]
  - b) Explain Robocasting and Bio Printing with suitable example. [8]

### OR

- Q4) a) Write short notes on Surface enhancement Techniques in Additive manufacturing. [9]
  - b) Explain varieties of chemical treatment applied in pre-and post-processing of additive manufacturing based products. [8]

*P.T.O.* 

- Q5) a) What is calibration of 3D Printer and Explain raw material manipulation in details with suitable examples. [9]
  - b) Explain the design considerations of Positioning Devices and Scanners system used in Laser-Based Metal 3D Printers. [8]

- *Q6*) a) Explain the process and mechanism used in Multi-Jet modeling (MJM).[9]
  - b) What are the bio active materials in additive manufacturing state its application. [8]
- Q7) a) Explain how additive manufacturing is used in Electronics Industries. Also write merits, demerits and practical feasible applications with illustrations.[9]
  - b) Write short notes on Mass Customization and Future trends in additive manufacturing. [9]

### OR

- Q8) a) Explain application of AM in Personalized Surgery, Bio-medical Applications with suitable case study. [9]
  - b) Explain how additive manufacturing is used in Food & Consumer Applications Sector. Also write merits, demerits and practical feasible applications with illustrations. [9]

\* \* \*

Total No. of Questions : 8]

**PC2494** 

SEAT No. :

[Total No. of Pages : 5

## [6354]-623 B.E. (MECHANICAL) OPERATIONS RESEARCH (2019 Pattern) (Semester - VII) (Elective - IV) (402045 D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Answers in one answer books.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

## *Q1*) a) Use Graphical method to solve the following LPP. [10]

Maximize  $Z = 1170X_1 + 1110X_2$ 

Subject to Constraints

 $9X_{1} + 5X_{2} \ge 500$   $7X_{1} + 9X_{2} \ge 300$   $5X_{1} + 3X_{2} \le 1500$   $7X_{1} + 9X_{2} \le 1900$   $2X_{1} + 4X_{2} \le 1000$ 

 $X_1, X_2 \ge 0$ 

- b) Explain in brief
  - i) Objective function
  - ii) Constraint surface
  - iii) Feasible and infeasible points
  - iv) Optimum solution

[Max. Marks : 70

[7]

*P.T.O.* 

Q2) a) Use Simplex method to solve the following LPP Maximize  $Z = 80 X_1 + 55 X_2$ ,

Subject to Constraints

$$4X_1 + 2X_2 \le 40$$
$$2X_1 + 4X_2 \le 32$$

[10]

b) Explain in brief

 $X_{1}, X_{2} \ge 0$ 

- i) Limitations of graphical method [3]
- ii) Conversion of Primal to Dual in LPP problem [4]
- Q3) a) Discuss in brief the methodology used in Hungarian method to solve the any assignment problems for getting optimum solution.[8]
  - b) Find out the initial feasible solution by North West corner method. [10] From To supply

2	11	10	3	7	4
1	4	7	2	1	8
3	1	4	8	12	9
3	3	4	5	6	
	2 1 3 3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

#### OR

Q4) a) An airline company has drawn up a new flight schedule that involves five flights. To assist in allocating five pilot to the five flights, it has asked them to state their preference scores by giving each flight a number out of 10. The higher the number, the greater is the preference. A few of these flights are unsuitable to some pilots, owing to domestic reasons. These have been marked wit "X" [12]

Pilot

I light i tulliool									
	Ι	II	III	IV	V				
А	8	2	Х	5	4				
В	10	9	2	8	4				
С	5	4	9	6	Х				
D	3	6	2	8	7				
E	5	6	10	4	3				

What should be the allocation of the pilots in order to meet maximum preference?

b) Differentiate between assignment and transportation problem. [6]

[6354]-623

- Q5) a) A small project involves 7 activities and their times estimates are listed in the following table. Activities are identified by their beginning [12]
  - i) and ending
  - ii) node numbers.

Activities	Estimated Duration (Weeks)					
(i-j)	Optimistic	Most likely	Pessimistic			
1-2	1	1	7			
1-3	1	4	7			
1-4	2	2	8			
2-5	1	1	1			
3-5	2	5	14			
4-6	2	5	8			
5-6	3	6	15			

i) Draw the network diagram of the activities in the projects.

- ii) Find expected duration and variance for each activity. What is the expected project length?
- iii) Calculate the variance and standard deviation of the project length. What is the probability that the project will be completed:
  - 1) At least 4 weeks earlier than expected time.
  - 2) No more than 4 weeks later than expected time.

Given

Z (0-Z)	1.33
Probability	0.4082

b) Explain looping and Dangling errors in the network. [6]

OR

**Q6)** a) A taxi owner estimates from his past records that the costs per year for operating a taxi whose purchase price when new is Rs. 60,000 are as given below :

Year	1	2	3	4	5
Operating Cost (Rs.)	10,000	12,000	15,000	18,000	20,000

After 5 years, the operating cost is Rs. 6000\*K where K = 6,7,8,9 and 10 (K denotes the age of in years) If the resale value decreases by 10% of purchase price each year, what is the best replacement policy? Cost on money is zero. [12]

[6]

[5]

- b) Differentiate between CPM and PERT.
- Q7) a) A dentist scheduled all his patients for 30 minute appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probability and time actually needed to complete the work:

Category of service	Time required in Minute	Probability
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Check up	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as the idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting at 8:00 a.m. Use the following sequence of random numbers to simulate the above problem. Random Numbers: 40. 82. 11,34,25,66, 17,79. [12]

b) Write short note on Monto Carlo Simulation.

[6354]-623

Q8) a) A salesman located in a city A decided to travel to city B. He knew the distances of alternative routes from city A to city B. He then drew a highway network map as shown in following figure. The city of origin A, is city 1. The destination city B is city 10. Other cities through which the salesman will have to pass through are numbered 2 to 9. The arrow representing routes between cities and distances in kilometres are located on each route. The salesman problem is to find the shortest route that covers all the selected cities from A to B. The time for each activity is given in the table. (Solve by using Dynamic programming). [12]



Activity	Duration	Activity	Duration
1-2	4	4-5	6
1-3	6	4-6	10
1-4	3	4-7	5
2-5	7	5-8	4
2-6	10	5-9	8
2-7	5	6-8	3
3-5	3	6-9	7
3-6	8	7-8	8
3-7	4	7-9	4
		8-10	7
		9-10	9

b) Explain in brief various steps involved in the simulation.

[5]

\* \* \*

Total No. of Questions : 8]

PC2495

**SEAT No. :** 

[Total No. of Pages : 2

### [6354]-624

## B.E. (Mechanical Engineering) AUGMENTED REALITY AND VIRTUAL REALITY (2019 Pattern) (Semester - VII) (Elective - IV) (402045 E)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data if necessary.

*Q1*) a) Explain and illustrate haptic devices used in VR technology. [8]

b) Describe and illustrate VR system with inputs, processes and outputs.[10]

### OR

Q2) a) Explain and illustrate the concept of objects falling in a gravitational field used in physical simulations. [10]

- b) What are the four elements of the computer environment? [8]
- Q3) a) Explain four tracking challenges, which lead to recognition problems in Augmenting Reality (AR).[8]
  - b) What are the skills required to design, build, Manufactrue and support an augmented reality company. [9]

### OR

- Q4) a) Explain the five domains where and how Augmented Reality is used today. [10]
  - b) Explain and illustrate the image generation techniques and environments of AR display systems. [7]

*P.T.O.* 

[Max. Marks : 70

- Q5) a) Describe types of tactile receptors of human body which detects the sensations of touch, pressure and vibration. [9]
  - b) Describe and illustrate force feedback sensors, its characteristics and market available technology used in VR systems. [9]

- *Q6*) a) Explain the five features of modeling toolkits. [10]
  - b) Explain the general-purpose interactive environment for manipulating articulated geometric figures. [8]
- *Q7*) a) Explain any one augmented reality application in entertainment domain.**[8]** 
  - b) How to simulate the combined augmented and virtual reality application in science domain. [9]

### OR

- *Q8*) a) Explain how VR can be subjected to Finite Element Analysis (FEA) techniques to identify areas of stress. [9]
  - b) Explain any one virtual reality application in training domain. [8]

\* \* \*

Total No. of Questions : 8]

PC2496

**SEAT No. :** 

[Total No. of Pages : 2

### [6354]-625

## B.E. (Mechanical Engineering) COMPUTER INTEGRATED MANUFACTURING (2019 Pattern) (Semester - VIII) (402048)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.
- **Q1**) a) Explain and illustrate coordinate System used in CNC Turing Center. [6]
  - b) Write a CNC program for the part shown in Figure lb using an end mill of 6mm diameter. Assume suitable data for machining parameters. Raw material size 75mm × 75mm × 5mm. [12]



(All dimensions are in mm)

Fig. 1b

- Q2) a) Explain and illustrate three Canned Cycles with suitable examples. [6]
  - b) Write a complete part program using G and M codes for the job shown in Figure 2b. The material of the job is MS. Assume suitable speed and feed for machining. Billet size: diameter = 60mm and length = 80 mm, Thread: Major Diameter: 16mm, and Pitch = 1.5 mm, Groove = 5mm and depth = 2.5mm. Use suitable Roughing and Finishing Cycles and appropriate Canned Cycles. [12]





Q3) a) Explain working and advantages of Enterprise Resource Planning (ERP).[9]

b)	Explain approaches of Computer Aided Process Planning	with	their
	Advantages and Disadvantages.		[8]

OR

- Draw and Explain Computer Aided Inspection and Quality Control System.[9] **Q4**) a) What is Manufacturing Resource Planning MRP II? Explain with diagram.[8] b) *Q*5) a) Explain and illustrate four layouts in FMS systems. **[10]** Discuss any four types of material handling systems used in industry.[8] b) OR **Q6**) a) Explain and illustrate the concept of composite part. [9] Write applications of Rank Order Clustering Method (ROCM) in b) Mechanical Industry. [9] Explain the classification of components of Industry 4.0. [8] **Q7**) a) Explain and illustrate Cyber-Physical Manufacturing Systems. [9] b) OR Explain with an example, How Digital Twin is implemented for Smart **Q8**) a) Manufacturing? [9] Compare Industry 4.0 with Industry 5.0. [8] b)
  - $\bigcirc$   $\bigcirc$   $\bigcirc$

[6354]-625

[Total No. of Pages : 3

## [6354]-626

## **B.E.** (Mechanical) **ENERGY ENGINEERING** (2019 Pattern) (Semester - VIII) (402049)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data wherever necessary and mention the same clearly.
- 5) Use of steam tables, Mollier chart and calculator is allowed.
- Discuss the main factors considered for site selection of Diesel Power *Q1*) a) Plants. Also Elaborate the advantages and limitations of Diesel Power Plants. [8]
  - Draw the hydrograph and flow duration curve for the following data: [9] b)

Month	Inflow(m <sup>3</sup> /s)	Month	Inflow(m <sup>3</sup> /s)
Jan.	1600	July	3000
Feb.	1200	Aug.	3000
March	800	Sept.	1600
April	800	Oct.	800
May	800	Nov.	800
June	1200	Dec.	1000

Determine :

- Storage capacity for a constant demand of  $1100 \text{ m}^3/\text{s}$ . i)
- Number of additional months this storage capacity can be utilized if ii) there is no rain fall.

[Max. Marks : 70

**SEAT No. :** 

- Q2) a) What do you mean by nuclear fission? Discuss in brief. Elaborate functions of following elements of nuclear reactor [8]
  - i) Moderators
  - ii) Control Rods
  - b) Describe the Boiling Water Reactor (BWR) with following points. [9]
    - i) Labelled Diagram
    - ii) Construction and working
    - iii) Material for different elements of reactor
    - iv) Limitations
- Q3) a) Discuss concept of thermal efficiency and work ratio of Gas Turbine cycle. How Intercooling technique helps to improve thermal efficiency of Gas Turbine cycle? Elaborate with neat schematic and T-s diagram. [9]
  - b) The air enters the compressor of a gas-turbine power plant at 1 bar, 30 degrees Celsius and 162 tons per hour. The maximum cycle temperature, pressure is 650 degrees Celsius, 5 bar respectively. The two stage expansion with reheating pressure of 2.24 bar is used in the plant. In the reheater gas is heated up to maximum cycle temperature. The isentropic efficiency of compressor, first turbine, and second turbine is 80%, 85%, 90% respectively. Take adiabatic index for air gas as 1.4,1.33 respectively. Take specific heat for air, gas as 1 KJ/Kg-K, 1.15 KJ/Kg-K respectively. Neglect mass flow rate of fuel. Draw cycle arrangement and T-s diagram and determine
    - i) The thermal efficiency of cycle
    - ii) Power output of plant in MW

- Q4) a) What do you mean by cogeneration? Why Cogeneration is needed in gas power cycle? Explain Cogeneration in gas power cycle with simple block diagram and state its advantages. [9]
  - b) Discuss the Integrated Gasification Combined Cycle (IGCC) plant with cycle arrangement, T-s diagram, merits and demerits. [9]
- Q5) a) State the main functions of the circuit breaker. What are different types of the same? Discuss working of any one circuit breaker with a neat sketch.[9]
  - b) What are different methods thermal energy storage? Explain anyone with simple diagram. Discuss the principles of energy management with storage systems.

OR

[6354]-626

- **Q6**) a) The equipment in a power station costs Rs. 15,60,000 and has a salvage value of Rs. 60,000 at the end of 25 years. Determine the depreciated value of the equipment at the end of 20 years on the following methods:[9]
  - i) Straight line method
  - ii) Diminishing value method
  - iii) Sinking fund method at 5% compound interest annually

[8]

- b) Define and write the equation for the following :
  - i) Diversity factor
  - ii) Demand factor
  - iii) Plant capacity factor
  - iv) Plant utilization factor
- Q7) a) Discuss Low temperature flat plate collector solar power plant with a labelled diagram, working fluid and material of component, merits and demerits. [9]
  - b) Elaborate superheated steam geothermal energy based system with following points [9]
    - i) Labelled Diagram
    - ii) Construction and working
    - iii) Advantages
    - iv) Limitations

### OR

- Q8) a) Discuss Anderson Ocean Thermal Energy system with following points [9]
  - i) Labelled Diagram
  - ii) Construction and working
  - iii) Advantages
  - iv) Limitations
  - b) Elaborate working principle of following with simple diagram. [9]
    - i) Biomass gasifier
    - ii) Fuel cell

### $\nabla \nabla \nabla \nabla$

Total No. of Questions : 8]

**PC-2498** 

## [6354]-627

## **B.E.** (Mechanical) **QUALITY AND RELIABILITY ENGINEERING** (2019 Pattern) (Semester - VIII) (Elective - V) (402050A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1)
- Draw suitable neat diagrams, whenever necessary. 2)
- Figure to the right indicate full marks. 3)
- Assume suitable data if required. **4**)
- Define the following (Any 4): *Q1*) a)
  - Failure Rate i)
  - ii) Hazard Rate
  - iii) Mean Time to Failure (MTTF)
  - iv) Failure Density
  - Availability v)
  - b) Explain importance of reliability and what are the quality & reliability assurance rule? [9]

#### Explain uncertainty and its types. **Q2**) a)

Following table shows test results of 1000 components, tested b) simultaneously. Evaluate: Hazard Rate, Failure density function and reliability. [9]

Operating	0	100	200	300	400	500	600	700	800	900	1000
time											
Number of											
surviving											
components	1000	895	810	730	660	600	545	495	450	410	373

[Max. Marks : 70]

[8]

[8]

*P.T.O.* 

**SEAT No. :** 

[Total No. of Pages : 3

Q3) a) A network made of four independent units representing system is shown in figure. The reliability of Ri of unit-I: for i-1, 2, 3, 4 are Given. Calculate the network reliability by using mixed network reduction method. [10]



b) Consider system composed of three sub subsystem with estimated failure rate of  $\lambda_1 = 0.05$ ,  $\lambda_2 = 0.003$  and  $\lambda_3 = 0.001$  failure per hour respectively. The system mission time of 20 hours. A system reliability of 0.95 is required. Find the reliability requirement for the subsystems. [8]

### OR

Q4) a) A system consists of six components connected as shown figure. [10]



If the system reliability is to be improve value of 0.85 for period of 10 hours, Determine the reliability goal of each component by using minimum effort method.

- b) Explain in details any two system reliability models. [8]
- **Q5**) a) Explain tie set and cut set method of reliability evaluation. [8]
  - b) What is purpose of constructing the fault tree diagram? Explain the symbol used while constructing the fault tree diagram. [9]

OR

[6354]-627

- *Q6*) a) What is FMEA? Explain procedural steps involved in FMEA. [9]
  - b) A room with two light bulbs is operated by a single switch. By assuming the no light in the room as the top undesirable event construct the fault tree diagram.



[8]

$$Q7$$
) a) Write short notes on (Any two) :

Maintainability

- ii) Reliability Centered Maintenance (RCM)
- iii) Objectives of maintenance
- b) A Beam is subjected to mean stress 180N/mm<sup>2</sup> and standard deviation 20 N/mm<sup>2</sup>. The mean strength of material is 280 N/mm<sup>2</sup> and standard deviation 40 N/mm<sup>2</sup>. [10]

(Given: for Z = -2.24, Area = 0.4875)

Determine :

i)

- i) Reliability of Beam
- ii) Minimum factor of safety
- iii) Average factor of safety.

### OR

- Q8) a) Difference between Highly Accelerated Life Testing (HALT) and Accelerated Life Testing (ALT).[8]
  - b) In short sample accelerated life testing of system based on weibull distribution the following data are recorded. [10]

Failure no.	1	2	3	4	5	6	7
MTTF (hrs.)	28.0	12.0	21.5	26.0	35.0	38.0	30.0

Plot the variation of reliability against time using:

- i) Mean Ranking
- ii) Median ranking method

[6354]-627

[Total No. of Pages : 2

## [6354] - 628

## **B.E.**(Mechanical)

## **ENERGY AUDIT AND MANAGEMENT**

## (2019 Pattern) (Semester - VIII) (402050B) (Elective - V)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Use of calculator is allowed.
- 4) Assume suitable data if necessary.
- Q1) a) What is sensitivity and risk analysis? Explain the factors affecting. [9]
  - b) Investment for an energy proposal is Rs.10.00 lakhs. Annual savings for the first three years is 150,000, 200,000 & 300,000. Considering cost of capital as 10%, what is the net present value of the proposal? [8]

### OR

- *Q2*) a) Write Notes on A) Return on Investment. B) Internal Rate of Return.[10]
  - b) A sum of Rs.4, 00, 000/- is deposited in a bank at the beginning of a year. The bank pays 5% interest annually. How much money is in the bank account at the end of tenth year, if no money is withdrawn? [7]
- Q3) a) What are different Energy Conservation Opportunities in Boiler System?[8]
  - b) A centrifugal pump is pumping 85 m<sup>3</sup>/hr. of water and pressure rise in the pump is 6 bar (guage). If power drawn by motor is 25KW. Find out the pump efficiency. Assume motor efficiency as 90% & water density as 998 Kg/m<sup>3</sup>.

[Max. Marks : 70

SEAT No. :

- Q4) a) What are the different Energy Conservation Opportunities in cooling tower and pumping system? [8]
  - b) Find out the efficiency of boiler by direct methods with the data given below: [10]

Type of boiler: oil fired Quantity of steam generated (dry): 6000 kg/hr Steam pressure gauges / Temp: 10 bar /180 degree Celsius Quantity of coal consumed: 410 kg/hr Feed water temperature: 70 degrees Celsius and Cpf is 4.2 GCV of fuel: 43500 kJ/kg Enthalpy of saturated steam at 10 bar pressure :2776 kJ/kg Enthalpy of feed water: 70 kJ/kg

- Q5) a) Explain various energy saving opportunities in electrical system? [7]
  - b) The lighting connected load for the small industry consisting of 140 Fluorescent tubes of 55 W each with magnetic ballast. In first option, the magnetic ballast of fluorescent tubes is replaced by electronic ballast & power consumption of same fluorescent tubes reduces to 40W. Calculate the simple payback period of above replacement if cost of electronic ballast is Rs. 110. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20 W & cost of Rs. 450 each. Calculate simple payback period. Which energy saving option is better& why? Consider usage of 16 hrs per day & an electrical tariff of Rs. 4 per KWh.

### OR

- *Q6*) a) Discuss how selection and location of transformer affect the power factor.
   [9]
   b) Explain Energy Efficient Motors. How motor selection is done?
   [8]
- Q7) a) Describe suitable factors influencing selection of cogeneration plan? [9]
  - b) Explain CDM project with flowchart. [9]

### OR

- Q8) a) Explain the term topping cycle and bottoming cycle with examples. [9]
  - b) What is the cogeneration? Describe technical option for cogeneration and write down advantages of cogeneration. [9]

### **)4 )4 )4**

[6354]-628

2

[Total No. of Pages : 2

**SEAT No. :** 

## [6354]-629

## **B.E.** (Mechanical)

## MANUFACTURING SYSTEMS AND SIMULATION (2019 Pattern) (Semester - VIII) (Elective - V) (402050C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Draw suitable neat diagrams, whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

<b>Q1</b> ) a)	Explain in detail Simulation and state its advantages and disadvantages.[9	]
b)	Short note on : [8	
	i) Discrete Event Simulation (DES)	
	ii) Intelligent simulation using Artificial Intelligence (AI)	
	OR	
<b>Q2</b> ) a)	What are the Seven steps in developing a simulation model? [4	]
b)	Discuss simulation as a decision-making tool and its benefits. [8]	
c)	How is a Discrete-Event Simulation Carried Out? [5	]
<b>03</b> ) a)	Explain Agent-based model with neat diagram. [8]	1
<b>2</b> ) )	What are different Tools for Developing the Problem Statement? How to	0
,	write a problem statement in 5 steps? [10	]
	OR	
<b>Q4</b> ) a)	Explain the components of system in modelling and simulation with block	k
	diagram. [8	
b)	Explain following Input data in details. [10	]
	i) Deterministic input data	
	ii) Probabilistic input data	
	iii) Discrete input data	
	iv) Continuous input data	

*P.T.O.* 

- **Q**5) a) How Auto Mod is leading graphical simulation software that provides True-to scale 3-D simulation with suitable example? [9] Explain which software has manufacturing-oriented modeling elements b) and rule-based decision logic and state its benefits. [8] OR How to improve production efficiencies and reduce operating costs **Q6**) a) through simulation by using simulation software? [9] Explain Validation Model Assumptions in details. b) [8] **Q7**) a) Short note on : [8] i) Production planning Inventory control ii) What is the assembly line balancing? How do you balance a line in b) manufacturing? [10] OR What is Resource Allocation? What is an example of resource allocation?[8] **Q8**) a) [10] Short note on : b)
  - i) Material Handling Equipments
  - ii) Scheduling

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SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70]

## [6354]-630R

## B.E. (Mechanical) ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT (Elective - V)

## (2019 Pattern) (Semester - VIII) (402050D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Use of an electronic pocket Calculator is allowed.
- 4) Assume suitable data, if necessary.
- *Q1*) a) What are the main features of the Cash Flow Statement? [6]
  - b) From the following ledger balances of Regal Limited as of 31<sup>st</sup> March 2015. You are required to prepare the Balance Sheet as of 31<sup>st</sup> March 2015 as per Revised Schedule III of the Indian Companies Act. [12]

Particulars	Rs.	Particulars	Rs.
Office Equipment	4,80,600	General Reserve	4,15,000
9% Debentures in	2,45,000	Creditors for Goods	1,68,500
APCO Ltd.			
Loose Tools	1,63,000	Creditors for expenses	36,000
Plant & machinery	18,00,000	Cash Credit	75,000
Computer Software	83,250	Mortgage loan	3,10,000
Debtors for goods	1,90,000	8% Preference share	
		Capital	5,50,000
Advertisement	30,000	Equity share Capital	15,00,00
(unwritten off)			
Stores & Spares	1,00,200	Staff Welfare Fund	85,000
Interest accrued on	51,000	Provisions for Taxation	26,550
investment			
Cash at Bank	23,000		

<b>Q2</b> ) a)	Explain a Balance Sheet in detail with a suitable example. [10]
b)	What are the steps followed in preparation for the Profit and Loss Account and Balance Sheet from incomplete records?[8]
<b>Q3</b> ) a)	Give classification of budgets based on time, condition, function and flexibility. [8]
b)	State the objectives of budgetary control. [9]
	OR
<b>Q4</b> ) a)	State advantages and disadvantages of budgeting. [8]
b)	Explain Incremental, activity and value proposition methods of budgeting.
	[9]
<b>Q5</b> ) a)	What is globalization and what factors influence globalization? [9]
b)	Explain the concept of international business and its motives. [8]
	OR
<b>Q6</b> ) a)	What is the role of international business and finance in the economic development of a country? [9]
b)	What do you understand from barter and stock exchange, Explain in detail. [8]
<b>Q7</b> ) a)	Write a short note on : [10]
	i) Entrepreneurship
	ii) Incubators
	iii) Crowd funding
	iv) Deal Sourcing
	v) Term Sheet
b)	What is business valuation? Explain any three Valuation Methods. [8]
	OR
<b>Q8)</b> a)	Explain the Factors affecting investment decisions for startups. [10]
b)	What is Pre-Money and Post-Money Valuation? Describe in detail. [8]

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[6354]-630R

2

SEAT No. :

[Total No. of Pages :2

## [6354]-631 B.E. (Mechanical) ORGANIZATIONAL INFORMATICS (2019 Pattern) (Elective - V) (Semester - VIII) (402050 E)

#### *Time :2<sup>1</sup>/<sub>2</sub>Hours] Instructions to the candidates:*

[Max. Marks : 70

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume Suitable data if necessary.
- *Q1*) a) What is the relationship between product data and product workflow, and how do they influence each other in a business environment? [10]
  - b) Describe the architecture of a Product Life-cycle Management (PLM) system and its components. [8]

### OR

- Q2) a) What are some common strategies for optimizing product workflows to enhance efficiency and productivity within an organization? [10]
  - b) Explain the concept of information models and product structure within a PLM system. [8]
- Q3) a) Analyze the importance of customization in ERP implementation and the challenges associated with it. [9]
  - b) Compare Business Engineering with Business Process Reengineering (BPR) in the context of ERP implementation. [8]

### OR

- Q4) a) Compare the functionalities and suitability of any 2 ERP software for different business environments. [9]
  - b) Discuss the modules of ERP systems, their features, and applications in organizational settings. [8]

*P.T.O.* 

- Q5) a) Explain the process of MES (Manufacturing Execution System) implementation and its significance in optimizing manufacturing operations. [9]
  - b) Explain the importance of plant dashboards in MOM systems and how they aid in real-time monitoring and control. [8]

- *Q6*) a) Compare the features and functionalities of different MOM software solutions available in the market. [9]
  - b) Explain the functional hierarchy model in MOM systems and how it organizes manufacturing activities. [8]
- Q7) a) How can organizations effectively evaluate the performance and effectiveness of their Information Systems? [10]
  - b) How does cloud computing impact the scalability and accessibility of Information Systems? [8]

### OR

- (*Q8*) a) Differentiate between B2B, EDT, and B2C business models in the context of electronic commerce. [10]
  - b) Discuss the role of Knowledge Management Systems (KMS) in leveraging organizational knowledge for strategic advantage. [8]



[Total No. of Pages :2

**SEAT No. :** 

## [6354]-632

## B.E. (Mechanical Engineering) Computational Multi Body Dynamics (2019 Pattern) (Elective - V) (Semester - VIII) (402050 - F)

*Time :2<sup>1</sup>/<sub>2</sub>Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figure to the right indicates full marks.
- 4) Assume Suitable data jf necessary.
- 5) Use of electronic pocket calculator is allowed.
- Q1) a) Explain the derivation of equations of motion using Newton-Euler formulation.[6]
  - b) What is D'Alembert's Principle? Explain with respect to requirements, advantages, limitations and applicability to the MED system simulations.[12]

### OR

- (Q2) a) Compare Holonomic constraints with non-holonomic constraints. [8]
  - b) Explain the basic terms related various MBD formulation methods: Equilibrium, Virtual work, Virtual displacements, generalized forces, workless constraints. [10]
- *Q3*) a) Compare open-chain with closed-chain kinematic system? [8]
  - b) How to assemble systems of equations for velocity analysis for Planar Kinematic Analysis? [9]

### OR

- Q4) a) What is Inverse Dynamic Analysis of Planar System? Explain with application. [9]
  - b) How to compute Motion/Force Constraints for Planar Kinematic Analysis? [8]

[>]

[Max. Marks : 70

- Q5) a) How the constraints are used in Kinematics Analysis of Spatial Systems? Explain at least 3 constraints. [9]
  - b) What is Articulated Rigid Body? Explain Articulated Rigid Body Kinematic and Dynamics. [10]

- *Q6*) a) How to do computation of Velocity, Acceleration and Angular Velocity for Rigid bodies in Space? [10]
  - b) How Equations of motion are generated for open-chain constrained spatial systems? [8]
- Q7) a) Explain the working of Commercial Kinematic Simulation software. [8]
  - b) How to do Computation of spatial generalized forces for external forces? [9]

### OR

- (Q8) a) How to use Lagrange's multipliers for Dynamic Analysis of Spatial Systems? [9]
  - b) What are the Existing Multibody Dynamics Simulation software? Explain any two.
     [8]



**PC2503** 

#### SEAT No. :

[Total No. of Pages : 2

### [6354]-633

### **B.E.** (Mechanical)

## **PROCESS EQUIPMENT DESIGN**

## (2019 Pattern) (Semester - VIII) (Elective - VI) (402051A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data wherever necessary.

<b>Q1</b> ) a)	What are the types of	vessels and explain classes of vessels.	[9]
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b) Explain vessel opening compensation method. [8]

### OR

Q2)	a) b)	Determine equivalent stress under combined loading by seismic loads and wind loads. Explain with sketch Pre stressing of thick cylinder.	considering [10] [7]
Q3)	a) b)	Explain with neat sketch design of storage vessels. Explain with neat sketch design of reaction vessels. OR	[10] [8]
Q4)	a)	Explain the selection of pumps and compressors.	[10]
	b)	Define and explain types of valves used on pipe line.	[8]
<b>Q</b> 5)	a)	Define processes, process parameters and their correlation.	[10]
	b)	Explain fundamentals of process measurements.	[7]

[*Max. Marks* : 70

<b>Q6</b> ) a)	Explain with sketch control modem control devices.	[9]
b)	Explain controls of major unit operation and processes.	[8]
<b>Q7</b> ) a)	Explain inspection and erection of process equipment like pressu and chimneys.	ire vessels

b) Explain inspection and erection of process equipment like ducting and heat exchangers. [8]

### OR

- *Q8*) a) Explain planning and manufacture of process equipment like pressure vessels and chimneys. [10]
  - b) Explain fuel pumping stations. [8]

## ())()())()

**SEAT No. :** 

[Total No. of Pages : 3

## [6354]-634

## B.E.

## **MECHANICAL ENGINEERING Renewable Energy Technologies** (2019 Pattern) (Semester - VIII) (402051 B) (Elective - VI)

*Time : 2^{1/2} Hours ]* 

Instructions to the candidates :

- Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1)
- 2) Assume suitable data if necessary.
- Neat diagram must he drawn wherever necessary 3)
- 4) Figures to the right indicate full marks.
- Use of electronic pocket calculator is allowed. 5)
- *Q1*) a) What is second generation solar cell? Explain with neat sketch Amorphous Silicon cell. [8]
  - Explain with neat sketch cell, Module and array. List and explain types of b) Modules [10]

### OR

- *Q2*) a) Explain
  - i) Life cycle costing
  - Payback time ii)
  - A residential house has a power requirement of 400 W for 4 hours every b) night. It is proposed to meet the requirement by using a PV array, a battery storage system and an inverter. The whole system is over designed so that it can meet one extra night's requirement even if there has been no sunshine during the day. Calculate number of PV modules and batteries required. Given: i) Solar radiation is available for an average of six hours daily and average hourly global radiation flux incident on the array is 650  $W/m^2$ . ii) Battery rating = 12 V; 120 Ah. Depth of discharge = 0.7 Charging and discharging efficiency 0.9 iii) Inverter efficiency at full load =0.85.[10]

*P.T.O.* 

[Max. Marks : 70

[8]

- Describe any two configurations of rotors of Horizontal axis wind turbine **Q3**) a) with labeled diagram. [8] [9] A propeller type wind turbine has following data : b) Speed of free wind at a height of 10 m = 12 m/sAir density =  $1.226 \text{ kg/m}^3$ Induction or perturbation factor = 0.14Height of tower = 100 mDiameter of rotor = 80 mWind velocity at the turbine reduces by 20% Generator efficiency = 85%Determine : i) Total power available in wind ii) Power extracted by the turbine iii) Electrical power generated iv) Axial thrust on the turbine Maximum axial thrust on the turbine v) OR **04**) a) Describe the different types of variable speed drive systems of wind turbine [9] Elaborate the Materials used for wind turbine components. [8] b) **Q5**) a) Write short notes on [12] Stall control i) ii) Pitch control Yaw control iii) Calculate the annual energy output production from a horizontal axis wind b) turbine with swept area 200 m<sup>2</sup> and operating in a wind regime with an average wind speed of 6 m/s, the density of wind is 1.225kg/m<sup>3</sup> and the wind power coefficient is 0.40. [6] OR **Q6**) a) Write short notes on [10] Maintenance procedure of solar photovoltaic plants i)
  - ii) Effect of dust on PV and remedies
  - b) Write note on installation of electrical and electronic components of PV system. [8]

[6354]-634

- Q7) a) Explain Ethanol production with transesterification process.
  - b) What is Impact resistance index? How it is important for a biomass briquette? [10]

[7]

A Biomass briquette is prepared with the saw dust with cow dung as a binder to use in fixed bed gasifier. The capacity of a briquette to resist extreme elemental forces during handling and transportation is characterized by its impact resistance index. The briquettes were dropped from a height of 2 meters and left to fall easily on a concrete floor until they get fractured. The data recorded are as below. Calculate the Impact resistance Index

Number time	Number pieces
briquette dropped	briquette fractured
5	3
8	2
7	4
6	3
11	2
5	2
9	3
8	3
	OR

- Q8) a) What do you understand by the term gasification? Explain with schematic diagram the downdraft gasifier. [9]
  - b) Write the factors considered for site selection of biogas plants. Why Biogas plants are not much successful in India. [8]



[6354]-634

## [6354]-635 B.E. (Mechanical)

# AUTOMATION AND ROBOTICS

## (2019 Pattern) (Semester - VIII) (Elective - VI) (402051C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- *Q1*) a) Write short note on :
  - i) DC Servomotors
  - ii) AC servo motors
  - iii) Brushless DC motors
  - b) Examine the key characteristics, uses, and constraints of electrical and mechanical drives. [8]

### OR

- Q2) a) What are the things that need to be taken into account while selecting a robot drive system? [9]
  - b) Examine and contrast the key characteristics, uses, and constraints of planetary, harmonic, and cycloidal gearboxes. [8]
- Q3) a) Give the description of commonly used gripper (end-effector) mechanisms. [9]
  - b) Explain briefly the following end-effectors : [8]
    - i) Passive end-effectors;
    - ii) Active end-effectors

### OR

- *Q4*) a) What do you mean by sensor and intelligent sensors? State the desirable features for sensors and transducers. [8]
  - b) Enumerate the components of digital image processing. Enlist the machine vision technologies. [9]

[Max. Marks : 70

[9]

P.T.O.



[Total No. of Pages : 2

- Q5) a) Explain robot kinematic control with forward and reverse kinematics.[9]
  - b) Give the description of homogeneous transformation for solving the kinematic equations of a robot manipulator. [9]

- *Q6*) a) Write comparison of Lagrange-Euler and Newton-Euler formulations.[9]
  - b) Explain and illustrate Newtonian-Euler approach for formulation of equations of motion of planar two link manipulator applicable to robotics.
     [9]
- **Q7**) a) Explain briefly "Motion programming". [9]
  - b) Explain briefly the off-line programming method and state its advantages and disadvantages also. [9]

### OR

- Q8) a) Which are the various operations performed by robots including industrial and non-industrial. Explain robot spray painting operation with its advantages. [9]
  - b) Shortly describe the non-industrial applications of robots in home sector, health sector, UAV. [9]

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**PC-2506** 

[Total No. of Pages : 2

**SEAT No. :** 

## [6354]-636

## B.E. (Mechanical Engineering) INDUSTRIAL PSYCHOLOGY AND ORGANIZATIONAL BEHAVIOR

### (2019 Pattern) (Semester - VIII) (Elective - VI) (402051D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

[Max. Marks : 70

Instructions to the candidates :

- 1) All questions are compulsory i.e. Solve Que 1 or Que 2, Que 3 or Que 4, Que 5 or Que 6, Que 7 or Que 8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- *Q1*) a) What is Performance Development? Explain the methods of Performance Management? [8]
  - b) What is Leadership? Identify different Leadership styles. Explain any one. [9]

OR

- Q2) a) What are different factors affects job satisfaction? Explain any one theory of motivation? [8]
  - b) Write short note on
    - i) Recruitment
    - ii) Time Management
    - iii) Stress Management.
- Q3) a) Explain the Concept of Organization? What is the Human Relations Theory of Organization? [9]
  - b) What is Organizational Behavior and explain any one model of Organizational Behavior? [9]

*P.T.O.* 

[9]

- Q4) a) Describe a Social System. Discuss the elements of a Social System on which the whole Social System works? [9]
  - b) Write short note on
    - i) Classical Theory
    - ii) Human Relation Theory
    - iii) Contingency Theory.
- (Q5) a) What are the different classification of Groups? What are the stages in the Group Development? [8]
  - b) What are the key factors that affect Teamwork? Discuss how the Teamwork affects Organizational Culture. [9]

- *Q6*) a) Explain the concept of Interpersonal Relationships also discuss the different ways in development of Interpersonal Relationships? [8]
  - b) Explain the term Conflict? What are the different types of Causes of Conflict? Explain the different types of ways of Conflict management?

[9]

[9]

[9]

- *Q7*) a) Explain the Concept of Organization Culture? What is the Dominant and Motivating Culture? [9]
  - b) Discuss the causes and forces on Organizational Change and Resistance of Change? [9]

#### OR

- Q8) a) Explain in detail, the concept of Organizational Development with the common processes? Explain the models of Organizational change? [9]
  - b) Write short note on
    - i) Classical Organizational Theory
    - ii) Humanistic Theory
    - iii) Open System Theory.

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PC-2507

[Total No. of Pages : 2

[Max. Marks : 70

## [6354]-637

# B.E. (Mechanical Engineering) ELECTRICAL AND HYBRID VEHICLE (2019 Pattern) (Semester - VIII) (402051 E) (Elective - VI)

*Time : 2½ Hours]* 

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume Suitable data if necessary.
- Q1) a) Explain and estimate the Battery Performance Parameters. [8]
  - b) Explain power efficiency and characteristics curve of Lithium-ion battery.

[10]

### OR

<b>Q2</b> ) a)	A rickshaw has following specifications :	[12]
	Grass curb weight (GCW) = $600 \text{ kg}$	
	Road friction, $R_{r} = 0.015$	
	Coefficient of drag C_{d} 0.45	
	Density of air rho = $1.2$ kg / m <sup>3</sup>	
	Frontal area of Vehicle, $A = 1.6m^2$	
	Wheel radius $= 0.2m$	
	Maximum speed of the vehicle = $30 \text{ kmph} (8.34 \text{ m/s})$	
	Working voltage of motor $= 24$ Volts	
	For attaining the speed range of 90 km per charge, suggest the typ capacity of battery pack required. Assume suitable data wherever rec	be and juired.

b) Explain Units of Battery/Fuel Cell Energy Storage. [6]

*P.T.O.* 

SEAT No. :

<b>Q3</b> ) a)	Describe and illustrate various electric drive-train topologies and their types for Four-Wheeler application. [9]	
b)	Describe the Basic concept of Electric Traction with examples.	[8]
	OR	
<b>Q4</b> ) a)	Describe and Illustrate the Brake System and its types.	[9]
b)	Explain Power flow Control in Electric Drive-Train Topologies.	[8]
<b>Q</b> 5) a)	Describe and Illustrate the types of Electric Vehicle frame Configuration	ions. <b>[9]</b>
b)	Describe Indian AIS Standards for e-Vehicles.	[9]
	OR	
<b>Q6</b> ) a)	What is the homologation of vehicles?	[9]
b)	Describe and illustrate the Driving dynamics and Comfort.	[9]
<b>Q7</b> ) a)	Describe and illustrate Charger Architectures.	[9]
b)	Describe AIS Charging Standards.	[8]
	OR	
<b>Q8</b> ) a)	Explain the Level 1, Level 2 and Level 3 chargers of electric vehicle	s. <b>[9]</b>
b)	Explain BIS Charging Standards.	[8]

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SEAT No. :

### **PC2508**

#### [6354]-638

[Total No. of Pages :2

### **B.E.** (Mechanical Sandwich)

# ENERGY ENGINEERING AND MANAGEMENT(Self Study-III) (2019 Pattern) (Semester- VII) (402064)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.
- Q1) a) What are the components of a complete PV systems to take on the AC loads? Draw the schematic layout of components. [8]
  - b) Write a short note on advantages and disadvantages of wind energy utilization. [9]

#### OR

- (Q2) a) Write short notes on availability of ocean energy in various forms. [8]
  - b) Explain the working of MHD generator with neat sketch. [9]
- Q3) a) Write short note on Indian energy scenario and energy security. [9]
  - b) Write short notes on Commercial energy and Non Commercial energy.[9]

#### OR

- Q4) a) Discuss aspects of energy policy and strategy in energy conservation system.
  - b) Define energy management and state the objective of energy management. [9]

*P.T.O.* 

- (Q5) a) Explain different instruments used for energy audit with their applications. [8]
  - b) What are the different types of energy audit? Discuss the scope of preliminary energy audit. [9]

- *Q6*) a) With the help of different examples elaborate the importance of analysis and recommendation of energy audit. [8]
  - b) Explain need of energy audit and write structure of report of energy audit. [9]
- Q7) a) Briefly describe the various financial analysis techniques for investment in energy efficiency projects and their suitability of application. [9]
  - b) Write a short notes on potential of WHR in industry. [9]

#### OR

- (Q8) a) What are the advantages and limitation of simple payback period? [9]
  - b) What are CDM projects? Explain in detail. [9]

**PC2509** 

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

### [6354]-639

### **B.E.** (Mechanical Sandwich)

# INDUSTRIAL ENGINEERING AND ORGANIZATIONAL MANAGEMENT (SELF-STUDY - IV) (2019 Pattern) (Semester - VII) (402065)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data wherever necessary.

*Q1*) a) What are the factors considered for Production Facility Design? [4]

- b) What are the Principles of Plant layout? Explain with Types and factors affecting the layout? [8]
- c) What are analytical tools of plant layout? Explain with neat sketch layout of manufacturing shop floor. [8]

#### OR

- Q2) a) Define and explain Dynamic plant layout. [4]
  b) Explain Objectives and benefits of Material handling. [8]
  c) What are Quantitative methods of Plant layout and relationship diagrams? [8]
- *Q3*) a) Explain methods of Production with their Characteristics. [8]
  - b) Explain functions and objectives of Production Planning and Control.[8] OR
- Q4) a) What is Inventory control? Explain deterministic and probabilistic Inventory models? [8]
  - b) Differentiate between Material Requirement Planning-I (MRP-I) and Manufacturing Resource Planning-II (MRP-II)? [8]

- Q5) a) What is the Role of Product Engineering department in process planning?Explain Phases of process planning? [8]
  - b) Explain advantages and methods of assembly Line balancing. [8]

- *Q6*) a) What is group technology? Explain with advantages, disadvantages and applications. [8]
  - b) What is Network Analysis? Explain PERT and CPM with its important features? [8]
- *Q7*) a) What is ergonomics? Explain with principles and human factors involved in it? [10]
  - b) Define and explain Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA). [8]

#### OR

- *Q8*) a) Explain Objective, Methods and procedure of Job Evaluation with suitable example? [10]
  - b) What is Performance Appraisal? Explain the role of Key Result Areas in it.
     [8]

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SEAT No. :

### PC2510

[Total No. of Pages : 4

### [6354]-640

# B.E. (Mechanical Sandwich) DESIGN OF TRANSMISSION ELEMENTS (2019 Pattern) (Semester - VIII) (402066)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 & Q7 or Q8.
- 2) Answers in One answer Books.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Discuss McKee's Investigation to find out the effect of Bearing characteristic number on coefficient of friction in slider contact bearing.[6]
  - b) A single row deep grove ball bearing is subjected to the following work cycle [12]

Sr No	Radial	Thrust	Radial	Service	Speed	Fraction of
	load (Fr)	load	factor	factor	(rpm)	cycle
	in N	(Fa) in N	(X)			
1	2000	1200	1.0	3.0	400	1/10
2	1500	1000	0.56	1.5	500	1/10
3	1000	1500	0.56	2.0	600	1/5
4	1200	2000	1.0	1.0	800	3/5

Apply the concept of design and select the suitable bearing : The rated life of the bearing is 15000 hrs. Assume radial and axial load factor to be 1.0 & 1.5 respectively and inner race rotates. Use following data.

Bearing number	6015	6215	6315	6415
Dynamic capacity 'C' KN	31	52	90	120

Q2) a) A 30 HP (22.065 KW) electric motor is directly coupled to a shaft of 25mm diameter, which is supported by two cylindrical roller bearing. The shaft transmits power to another shaft through a flat pulley of 300 mm diameter which is placed mid way between the two bearings. The coefficient of friction between the belt and pulley is 0.3, while angle of lap is 180 degree. The belt is horizontal. The load factor is 1.5 and the expected life of the bearing is 50,000 hrs, Apply the concept of design and select the suitable bearing from manufacturer's catalog. Use following table

Bearing No	NU2205	NU2305
Basic dynamic capacity (C) in KN	15.99	31.39

Explain how the bearing is designated and what NU2205 bearing means.[12]

- b) Differentiate between ball and roller bearing. [6]
- Q3) a) A vehicle weighting 13.5 KN is moving on a level road at a speed of 95 km/hr. When the brakes are applied, it is subjected to a uniform deceleration of 6 m/s<sup>2</sup>. There are brakes on all four wheels. The tyre diameter is 750 mm. The kinetic energy of rotating parts is 10% of the kinetic energy of moving vehicle. The mass of each brake drum assembly is 10 kg and the specific heat capacity is 460 J/kg°C. Calculate [12]
  - i) The braking time
  - ii) The braking distance
  - iii) The total energy absorbed by each brake
  - iv) The capacity of each brake and
  - v) The temperature rise of brake drum assembly.
  - b) Derive the expression for torque transmission capacity of plate clutch using uniform pressure theory and uniform wear theory. [5]

OR

- Q4) a) Derive the expression for self-locking and self emerging brakes. [5]
  - b) A single plate clutch consisting of two pairs of contacting surfaces is used to connect an electric motor running at 1500 r.p.m. with a machine. The machine is equivalent to a rotor of mass 200 kg and radius of gyration 300 mm. The inner and outer diameters of the contacting surfaces are 150mm and 250 mm respectively. The coefficient of friction is 0.2 and the intensity of pressure is limited to 0.3 N/mm<sup>2</sup>. The clutch is engaged suddenly so as to connect the stationary machine with the electric motor. Assuming the clutch as brand new. Determine [12]
    - i) The power transmitting capacity of the clutch.
    - ii) The time required by machine to attain it's full speed and
    - iii) The amount of heat generated during engagement.
- Q5) a) A multi-speed gear box is to be designed for a small size general purpose machine with the following specifications: [12]
  - Minimum spindle speed = 56 r.p.m.
  - Maximum spindle speed = 1000 r.p.m.
  - Recommended geometric progression as per R4
  - Motor speed = 720 r.p.m.

Calculate

- i) Range ratio
- ii) Geometric progression ratio
- iii) Number of speed steps
- iv) Find out various spindles speeds
- v) Number of stages
- vi) Draw the following possible Structure diagram and select the optimum structure diagram using node method of optimization
- Z=2(1) 3(2)
- Z=2(2) 3(1)
- Z=2(3) 3(1)
- Z=3(2) 2(1)
- Z=3(1) 2(3)
- vii) Draw speed diagram, and calculate ratio of belt pulley diameters.
- b) Explain in brief the general guidelines in developing kinematic diagram (Gearing diagram) for multispeed gear box. [6]

OR

- Q6) a) Draw speed ray diagram, layout for six speed gear box and calculate Input shaft speed for a multi speed gear box having any one of the following structural formula: [12]
  - i) 2(3)3(1)
  - ii) 2(1) 3(2)

The output speeds are 160 r.p.m. minimum and 100 r.p.m. maximum speeds. The motor shaft speed is 1440 r.p.m.

- b) Draw the following candidate structural diagram [6]
  - i) 2(1) 3(2) 2(6)
  - ii) 2(6) 3(1) 2(3)
  - iii) 2(2) 3(4) 2(1)
- Q7) a) What is HEV? Classify and explain HEV with the help of block diagram. Also State advantages and Disadvantages of HEV. Also discuss the future requirement of HEV.[10]
  - b) Discuss Basic elements and working of Series hybrid vehicle. [7]

### OR

- *Q8*) a) Explain in brief series HEV with block diagram. Explain components of series HEV. Also explain stepwise operation of series HEV. [10]
  - b) Discuss power management in hybrid electric vehicle. [7]



PC-2511

SEAT No. :

[Total No. of Pages : 3

[Max. Marks : 70

## [6354]-641

# B.E. (Mechanical Sandwich) MACHINE DYNAMICS AND VIBRATION (2019 Pattern) (Semester - VIII) (402067)

*Time : 2½ Hours]* 

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicates full marks.
- 4) Assume suitable data if necessary.
- 5) Use of scientific calculator is allowed.
- *Q1*) a) Define following terms in relation to the damping in vibratory systems-(a) Damping coefficient (b) Critical damping coefficient (c) Damping factor. Also state the unit of these terms. [6]

### OR

- b) A rod of uniform circular cross section having diameter 60 mm and length 100 cm is fixed at one end and oriented with axis in vertical direction. A disc of mass 420 kg and radius of gyration 220 mm is coaxially attached at the other end of the rod. Take modulus of elasticity and rigidity as 220 GPa and 80 GPa respectively. Find the natural frequencies of axial (longitudinal), transverse (lateral) and torsional vibrations in Hz. [11]
- Q2) a) Derive an expression for the natural frequency of a simple spring-mass system in terms of static deflection of spring. [6]
  - b) A single-dof vibrating system is defined by the following parameters : m=10 kg k = 1000 N/m, C = 50 N-s/m. Determine: (a) Damping factor (b) Natural frequency of damped vibration (c) Logarithmic decrement (d) Ratio of two consecutive amplitudes and (e) Number of cycles after which the original amplitude is reduced to 20 percent. [11]

- *Q3*) a) Explain with neat sketch the transient state and steady state of vibration related to forced vibration.
  - b) An electric motor of mass 60 kg produces a static deflection of 30 mm when it is supported on isolation mounts. The motor has rotating unbalance of 54 kg-mm. At a speed of 1300 rpm the motor vibrates in vertical direction with steady state amplitude of 2 mm. Calculate stiffness and damping coefficient of the mount. [11]

- Q4) a) What is critical speed of a shaft? Derive an expression to calculate the critical speed of a simply supported shaft with rotor mounted at the center of span.
  - b) A single DOF mass-spring-damper oscillator is excited by a harmonic force f(t) = 10 sin(20 t) N. The oscillator hása mass of 10 kg, stiffness 1000 N/m and damping coefficient 50 N-s/m. Determine i) Steady state amplitude and ii) Maximurn acceleration of vibration of mass iii) Quality factor of the system iv) Maximurn force transmitted to the support. [11]
- Q5) a) Explain two degree of freedom system with any two practical examples.

[6]

b) Two discs A and B of mass Ml JA = 2 kg-m<sup>2</sup> and  $J_B = 3$  kg-m<sup>2</sup> are mounted on a shaft of torsional stiffness  $K_t = 100$  N-m/rad as shown in the figure. The shaft can freely rotate in the end support bearings. i) Draw FBD of each disc arid Derive the differential equations of motion in terms of angular displacement  $\theta_A$  and  $\theta_B$  of the discs ii) Derive the frequency equation and find natural frequencies of the rotor iii) Find the mode shapes corresponding to each natural frequency and iv) describe mode shapes graphically. [12]



- *Q6*) a) Explain the matrix method (eigen value problem) to determine natural frequencies and mode shapes of a multi-dof (2-dof) system. [6]
  - b) For the system of spring and masses shown in the figure, i) derive the differential equations of motion in terms of displacement  $x_1$  and  $x_2$  of masses ii) derive the frequency equation and find natural frequencies iii) find the mode shapes corresponding to each natural frequency in terms k and m and iv) describe the mode shapes graphically. [12]



- Q7) a) What are vibration exciters? Explain the types of mechanical vibration exciters. [6]
  - b) Explain with neat sketches the working principle of seismic sensor for vibration measurement. [6]
  - c) Explain the method of vibration based condition monitoring of machines.

[6]

#### OR

- Q8) a) Explain with neat labeled sketches a typal arrangement of vibration measurement system. [6]
  - b) What is Dynamic vibration absorber? Explain working principle of undamped dynamic vibration absorber. [6]
  - c) Explain in brief various methods and techniques for vibration control. [6]



3

**PC-2512** 

[Total No. of Pages : 3

[Max. Marks : 70]

[6]

**SEAT No. :** 

## [6354]-642

# B.E. (Mechanical Sandwich) ARTIFICIAL INTELLIGENCE IN MECHANICAL ENGINEERING

# (2019 Pattern) (Semester - VIII) (402068)

### *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of electronic calculator is allowed.
- 4) Assume suitable data, if necessary.

### *Q1*) a) Explain following terms: (any 3)

- i) Accuracy.
- ii) Precision.
- iii) Recall.
- iv) F-1 Score.

	b)	What is the difference between KNN and K means? Also State adva and limitations of KNN and K means?		ages [6]	
	c)	What is Support Vector Machine? How does the SVM work?			
			OR		
Q2)	a)	Hov	v Does Bays algorithm differ from decision tree?	[6]	
	b)	Explain following terms in decision tree:			
		i) Entropy			
		ii)	Information gain		
		iii)	Gini index		
	c)	Diff	erentiate between logistic regression and Linear regression.	[5]	

*P.T.O.* 

- Q3) a) Explain the steps involved in development of classification ML model.[8]
  - b) Quality Engineer wants to solve a two-class classification problem for predicting whether a product is defective. The actual number of products containing no defect are 950.(Truly predicted positives = 900), the actual number defective products are 150 (Truly predicted negatives = 130). So, calculate accuracy, precision, recall and f 1 score. [10]

[10]

**[6]** 

- i) Classification algorithm in ML
- ii) Clustering algorithm in ML

Write a short notes on

- b) State advantages and disadvantages of random forest. [8]
- *Q5*) a) What is the Bellman Equation? How is it helpful in RL? [8]
  - b) What is activation Functions? Explain any one in details. [4]
  - c) Explain Elements of Deep learning.

#### OR

- *Q6*) a) Explain the concept of Reinforcement learning with suitable example.Define following terms in Reinforcement learning: [8]
  - i) Agent

**Q4**) a)

- ii) State
- iii) Environment
- iv) Reward
- b) Compute the output of the following neuron if the activation function is Sigmoid [4]



c) Explain with Neat diagram equivalence of biological neuron and artificial neuron [6]

OR

- Q7) a) Write short note on use of AIML in Material inspection [5]
  - b) Explain in details different applications of AIML. [6]
  - c) Explain fault diagnosis (of any suitable machine element) using ML. [6]

- Q8) a) What are different types of sensors used in human Machine Interactions.[5]
  - b) What are the advantages of using Fault detection in Automobile cars?[6]
  - Make a list of maintenance and explain in brief Discuss the scope of AIML.



PC-2513

[Total No. of Pages : 2

# [6354]-643

# B.E. (Mechanical Sandwich) AUTOMOBILE ENGINEERING (2019 Pattern) (Semester - VIII) (Elective - I)(402069A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of electronic calculator is allowed.
- 4) Assume suitable data, if necessary.

<b>Q1</b> ) a)	Explain with neat sketch principal and working of drum brake system for automobile.	n used [6]
b)	Explain requirements of good automobile wheel.	[6]
c)	Describe tyre specification with suitable example.	[5]
	OR	
<b>Q2</b> ) a)	Explain with neat sketch construction and working of master cylused in hydraulic brake system.	linder [ <b>8</b> ]
b)	Explain various tyre trade patterns. List the advantages of each.	[5]
c)	Why tyre rotation is essential in automobiles. Explain the rotation p used for LMV.	attern [ <b>4</b> ]
<b>Q3</b> ) a)	Explain with neat sketch construction and working of lead acid bat	tery. [8]
b)	Explain charging system used in automobile vehicles.	[10]
	OR	

[Max. Marks : 70

SEAT No. :

(Q4) a) Describe with neat sketch working principle of the following. [8]

- i) Electric Horn
- ii) Odometer.

b)	Write short note on the following.	[10]
<i>c</i> ,	the short hote on the rono ting.	[*°]

- i) Battery maintenance and care
- ii) Head lamp

Q5) a) What is the purpose of servicing of vehicle? What are advantages of it.

[8]

b) Describe with neat sketch exhaust gas recirculation system. [10]

#### OR

- *Q6*) a) Explain various types of vehicle maintenance. Describe the maintenance schedule for each category. [8]
  - b) Explain various sources of emission from engines. Describe emission standards to control it. [10]
- Q7) a) What is hybrid vehicle? Describe layout of electric vehicle and explain various components of it. [9]
  - b) Explain role of artificial intelligence in engine management system. [8]

#### OR

- (Q8) a) What are the type of drive motors used in electric vehicle? Which is the best? Explain. [8]
  - b) Write short note on the following. [9]
    - i) Performance of electric vehicles.
    - ii) Fuel cell.

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**PC-2514** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

## [6354]-644

# B.E. (Mechanical Sandwich) REFRIGERATION & AIR-CONDITIONING (2019 Pattern) (Semester - VIII) (Elective - I) (402069B)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Answer Q.1or Q.2, Q.3 or Q.4, Q.S or Q.6, Q. 7or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of electronic calculator is allowed.
- 4) Assume suitable data, if necessary.
- *Q1*) a) State the function of flash intercooler provided in a compound vapour compression refrigeration system. [9]
  - b) Classify multi evaporator systems. Draw the schematic arrangement of the different components of one such system and explain its operation. Represent the pressure involved on p-h chart. [9]

#### OR

- (Q2) a) Compare cascade and multi-compressor system. [9]
  - b) Explain the Linde system for the liquefaction of air. What methods have been suggested for making this system more efficient? [9]
- Q3) a) Define and explain the following terms
  - i) Bypass factor of coil,
  - ii) ADP and
  - iii) GSHF & ESHF
  - b) Which are the main factors affecting the human comfort and how can these categorized? [8]

*P.T.O.* 

[9]

<b>Q4</b> ) a)	Write down the body heat balance equation and explain the difference terms included in it.	erent [9]
b)	What are the indoor quality of air requirements?	[8]
<b>Q</b> 5) a)	Draw neat sketch of Window air conditioning system and Explai working.	n its [ <b>9</b> ]
b)	Explain with neat sketch	[8]
	i) Dry expansion evaporator	
	ii) Flooded type evaporator.	
	OR	
<b>Q6</b> ) a)	Draw neat sketch of split type air conditioning system and Explai working.	n its [ <b>9</b> ]
b)	Enumerate the functional elements of a Control unit.	[8]
<b>Q7</b> ) a)	Explain Static and Velocity pressure in the duct with neat sketch.	[9]
b)	Explain Velocity reduction method of duct design.	[9]
	OR	
<b>Q8</b> ) a)	Explain various pressure losses in the duct with neat sketch.	[9]
b)	Explain Equal friction method of duct design.	[9]

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**PC-2515** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

## [6354]-645

# B.E. (Mechanical Sandwich) FLUID POWER CONTROL (Elective - I) (2019 Pattern) (Semester - VIII) (402069C)

### *Time : 2½ Hours]*

Instructions to the candidates :

- 1) Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Use of calculator is allowed.
- 4) Figure to the right indicate full marks.
- 5) Assume suitable data, if necessary.
- Q1) a) Draw a simple sketch and ISO symbol of a pressure relief valve, and explain its working. State its importance in hydraulic systems. [8]
  - b) Classify different types of Pressure control valves used in the hydraulic circuits. Draw ISO symbol for each. [9]

OR

- Q2) a) Draw neat sketch and explain the following with their applications in circuit. [8]
  - i) Three Way, Two Position Direction Control Valve.
  - ii) Four Way, Three Position Direction Control Valve (Closed Centre).
  - b) Explain shuttle valve with a neat sketch. State its application with a typical circuit. [9]

Q3) a) Draw a regenerative circuit by using 4/3 DCV and explain its application.

[9]

b) Explain counterbalance valve circuit with neat sketch. [9]

#### OR

- *Q4*) a) Differentiate between meter in circuit and meter out circuit. [9]
  - b) Draw a neat sketch of Pump unloading circuit. State function of unloading valve. [9]

*P.T.O.* 

- Q5) a) Explain with neat sketch working of "AND" valve and with the help of circuit diagram explains any one typical application of it. [9]
  - b) Draw and explain the application of a pilot check valve for locking a double acting cylinder. [9]

- Q6) a) Draw and explain a typical sketch for sequencing of two double acting cylinders in respect of pneumatics. [9]
  - b) Draw circuit for:

i)

Controlling speed of pneumatic double acting cylinder.

[9]

- ii) Speed control of a pneumatic motor.
- Q7) a) Explain an Electro-hydraulic servo system with neat sketch. [8]
  - b) Explain the complete operation of the system shown in fig. [9]



- *Q8*) a) What is a programmable logic controller? State the main function of each of the following elements of a PLC: [8]
  - i) CPU
  - ii) Programmer/monitor
  - iii) I/O module
  - b) Explain the complete operation of the system shown in fig. [9]



**PC-2516** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-646

# B.E. (Mechanical Sandwich) ADDITIVE MANUFACTURING (2019 Pattern) (Semester - VIII) (Elective - I) (402045C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.
- Q1) a) Explain the printing mechanism involved in binder jetting with neat sketch.Give their advantages, disadvantages and applications. [9]
  - b) Explain the working principle of direct metal deposition. List their advantages and limitations. [9]

#### OR

- Q2) a) Explain the construction and working principle of fused deposition modelling with neat sketch. Discuss the possible defects in this method.
  - b) Explain the process polyjet printing. Also write the applications, merits and demerits. [9]
- Q3) a) Explain the post processing steps involved in powder based additive manufacturing. [9]
  - b) Explain with an example how the material and the additive manufacturing method can be selected for various applications. [8]

[9]

[Max. Marks : 70



- Q4) a) Discuss the various techniques used to enhance the surface properties of additively manufactured parts. [8]
  - b) Explain the various design considerations/rules involved in additive manufacturing with the help suitable sketch. [9]
- Q5) a) Explain the functions of sensors, actuators, motors and control electronics used in construction of 3D printers. [9]
  - b) Define slicing and their types. Explain the various infill strategies used for area filling the sliced model. [9]

- *Q6*) a) Explain the construction details of 3D printers. List the advantages, disadvantages and applications of 3D printers. [9]
  - b) Explain the steps followed while slicing a CAD model in slicing software. Explain the construction of extrusion based printers. [9]
- Q7) a) How additive manufacturing can influence the mass customization? Explain in detail mentioning its future trends. [9]
  - b) Discuss a case study on how the performance of automobile parts can be improved by adopting additive manufacturing. [8]

#### OR

- Q8) a) Discuss the benefits of additive manufacturing in the research and development sector. [9]
  - b) Explain the advantages and challenges involved in adopting the additive manufacturing technology in various engineering sectors. [8]

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PC-2517

SEAT No. :

[Total No. of Pages : 2

# [6354]-647

# B.E. (Mechanical Sandwich) AUTOMATION AND ROBOTICS (2019 Pattern) (Semester - VIII) (Elective - I) (402051 C)

Time	: 21/2	Hours] [Max. Marks	: 70
Instru	iction	to the candidates :	
	1)	Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.	
	2)	Neat diagrams must be drawn wherever necessary.	
	3)	Figures to the right side indicate full marks.	
	<i>4</i> )	Use of calculator is allowed.	
	5)	Assume suitable data, if necessary.	
<b>Q1</b> )	a)	Explain BLDC Motors with neat sketch.	[7]
	b)	Write the different between Hydraulic Drives and Pneumatic Drives.	[6]
	c)	Explain Cycloidal Gearbox with sketch.	[5]
		OR	
<b>Q</b> 2)	a)	Explain D.C. Servo Motors for Robot.	[6]
	b)	What is Planetary Gearbox and How Does it Works?	[8]
	c)	State the application of Variable Speed Arrangements.	[4]
<b>Q3</b> )	a)	What are Design Considerations of Transducers?	[6]
	b)	Explain Eddy Current Sensor.	[6]
	c)	Give details Classification of Gripper.	[5]
		OR	
<b>Q4</b> )	a)	Discuss various type of End-Effectors used in robotics.	[6]
	b)	Explain the working of Capacitive Proximity with neat sketch.	[6]
	c)	Write the Difference Between Active and Passive Compliance.	[5]

*P.T.O.* 

- Q5) a) Derive an equation of motion for serial manipulators using Eularian formulation.
  - b) A moving frame  $\{UVW\}$  and fixed frame  $\{XYZ\}$  are initially coincident, then moving frame  $\{UVW\}$  rotate 90 degree about Z axis and then followed by a rotation 90 degree X axis. Then  $\{UVW\}$  locates the points P, at U = 20 V = 30 W = 40. Determine its coordinates with respect to  $\{XYZ\}$ . [7]

c)	Write the short notes on Direct Kinematics.	[4]
ς,	while the short notes on Direct Rinematies.	נדן

<b>Q6</b> ) a)	Derive an equation Newton-Euler Formulation of Equation	ns of Motion.[6]
b)	Explain Inverse Kinematics of link manipulator.	[6]
c)	Explain basic Homogenous Transformations.	[5]
<b>Q7</b> ) a)	Explain Robot-based Manufacturing System.	[8]
b)	Write a short notes on	[10]
	i) Material Handling.	
	ii) Autonomous Underwater Vehicles.	

#### OR

<b>Q8</b> ) a)	Write a Programming for Material Loading and Unloading.	[8]
b)	Write a short notes on	[10]

i) Industry 4.0.

ii) Humanoids.

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**PC-2518** 

[Total No. of Pages : 2

SEAT No. :

# [6354]-648

# B.E. (Mechanical Sandwich) INTERNET OF THINGS (Elective - II) (2019 Pattern) (Semester - VIII) (402044E)

<i>Time : 2<sup>1</sup></i> /	/2 Hours] [Max. ]	Marks : 70
Instructio 1) 2) 3) 4) 5)	ons to the candidates : Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 Neat diagrams must be drawn wherever necessary. Use of calculator is allowed. Figures to the right indicate full marks. Assume suitable data, if necessary.	7 or Q.No.8.
<b><i>Q1</i></b> ) a)	What are the main design principles and needed capabilities in	IoT? [ <b>7</b> ]
b)	How to simulate an IoT environment?	[7]
c)	Explain Basic Embedded C Programming.	[4]
	OR	
<b>Q2</b> ) a)	Describe Programming with focus on interfacing for reading in pins.	input from [10]
b)	List and explain the libraries of Arduino.	[8]
<b>Q3</b> ) a)	Compare Physical vs Cloud Servers used in communication.	[7]
b)	Explain M2M and WSN Protocols.	[10]
	OR	
<b>Q4</b> ) a)	Explain API Virtualization concepts.	[8]
b)	Explain IoT Cloud platforms and Cloud services.	[9]
<b>Q</b> 5) a)	Describe the steps in client communicate with a server using I	HTTP. <b>[9]</b>
b)	Describe in details jQuery for UI Designing.	[8]
	OR	
<b>Q6</b> ) a)	Explain JSON lib for data processing.	[8]
b)	Explain Privacy and Trust in IoT-Data-Platforms.	[9]
		<i>P.T.O.</i>

- Q7) a) Explain First Steps Towards a Secure Platform and Smarties Approach.
  [8]
  b) Explain Data Aggregation for the IoT in Smart Cities. [10]
  OR
  Q8) a) Explain IoT applications for Home automation, Agriculture and Healthcare. [10]
  - b) Describe the new trends of AI and ML in IoT platform based applications with examples. [8]



### **PC-2519**

[Total No. of Pages : 2

### [6354]-649

# **B.E.** (Mechanical Sandwich) **PRODUCT DESIGN AND DEVELOPMENT** (2019 Pattern) (Semester - VIII) (Elective - II) (402045A)

#### *Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*]

Instructions to the candidates:

- Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6 and Q. 1) No. 7 or Q. No. 8.
- 2) Draw neat, labeled diagrams wherever necessary.
- Figures to the right side indicate full marks. 3)
- Use of non-programmable electronic calculator is permitted. **4**)
- 5) Assume Suitable/Standard data if necessary.
- List down different methods used for Product Teardown Process and *Q1*) a) explain any one. [8]
  - Describe benchmarking and state its importance in Product Development. b) [9]

#### OR

- What is concept selection? Explain Pugh's chart with an example. *O2*) a) [8]
  - What is Ergonomics in design? Explain types of Ergonomics with an b) example. [9]
- Explain the process of Concept Embodiment and explain with example. *O3*) a) [9]
  - b) What is product modularity? Explain types of Modularity. [9]

#### OR

- Explain the principles of [9] **Q4**) a)
  - i) Design for Assembly
  - Design for manufacturing ii)
  - What is Design for Safety? Explain the principles of Safety. b) [9]

*P.T.O.* 

#### [Max. Marks : 70]

- Q5) a) Evaluate the role of Finite Element Analysis (FEA) in the design verification and validation process. State its advantages and limitations in simulating complex engineering systems.
  - b) Explain the importance of Fluid-Structure Interaction (FSI) simulations in validating products with dynamic fluid.structure interactions. [9]

- Q6) a) Discuss the key elements and steps involved in conducting a Break-Even Analysis during New Product Development. [8]
  - b) State the design considerations for Facility Tooling and Gauges in product development. Discuss their role in ensuring manufacturing quality and efficiency. [9]
- Q7) a) Explain with example: [9]
  - i) Product Life cycle management (PLM)
  - ii) Product data Management (PDM)
  - b) What are guidelines for design for robustness? Explain. [9]

### OR

- Q8) a) List down types of FMEA and explain any one with example. [9]
  - b) How do Value Analysis and Value Engineering improve product design and development? Explain their main principles and methods. [9]

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**PC-2520** 

[Total No. of Pages : 5

**SEAT No. :** 

## [6354]-650

# B.E. (Mechanical) (Sandwich) OPERATIONS RESEARCH (Elective - II) (2019 Pattern) (Semester - VIII) (402045D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[7]

Instructions to the candidates :

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Answers in One Answer Books.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) Discuss the general mathematical model of linear programming problem.

b) Use the graphical method to solve the following LP problem. [10] Maximize  $Z = 15x_1 + 10x_2$ subject to the constraints

i) 
$$4x_1 + 6x_2 \le 360$$
,

ii) 
$$3x_1 + 0x_2 \le 180$$
,

iii)  $0x_1 + 5x_2 \le 200 \text{ and } x_1, x_2 \ge 0.$ 

#### OR

(Q2) a) In relation to the LP problem, Discuss the following terms. [5]

- i) Decision variables
- ii) Feasible solution
- iii) Infeasible solution
- iv) Optimum solution
- v) Unbounded solution

- b) A manufacturer produces two types of widgets: Widget A, a premium model, and Widget B, a standard model. Widget A generates a profit of Rs 4 per unit, while Widget B yields Rs 3 per unit. It takes twice as much time to produce Widget A compared to Widget B. If all widgets were of type B, the company could manufacture 1,000 units per day. However, due to limited resources, only 800 units (both A and B combined) can be produced daily. Widget A requires a special component, of which only 400 are available per day. For Widget B, there are only 700 components available daily. Determine the optimal daily production quantities for each type of widget by formulating this problem as a linear programming model and solving it using the simplex method. [12]
- Q3) a) Give the mathematical formulation of an assignment problem. How does it differ From a transportation problem? [6]
  - b) A company has three production facilities S1, S2 and S3 with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D1, D2, D3 and D4 with requirement of 5, 6, 7 and 14 units (in 100s) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below. Formulate this transportation problem as an LP model to minimize the total transportation cost. Apply MODI method to obtain optimal solution of transportation problem using the data. [12]

	D1	D2	D3	D4	Supply	
<b>S</b> 1	19	30	50	10	7	
S2	70	30	40	60	9	
<b>S</b> 3	40	8	70	20	18	
Demand	5	8	7	14	34	
OR						

(Q4) a) Explain in brief three methods of initial feasible solution for transportation problem. [6]

b) A salesman must travel from city to city to maintain his accounts. This week he has to leave his home base and visit other cities and the return home. The table shows the distances (in km) between the various cities. His home city is city A. [12]

				To City		
		А	В	С	D	Е
	А	-	375	600	150	190
	В	375	-	300	350	175
From City	С	600	300	-	350	500
	D	160	350	350	-	300
	E	190	175	500	300	-

Use the assignment method to determine the tour that will mimimize the total distance of visiting all cities and then returning home.

- (Q5) a) Explain the CPM and PERT analysis of network model. [6]
  - b) An established company has decided to add a new product to its line, It will buy the product from a manufacturing concern, package it, and sell it to a number of distributors that have been selected on a geographical basis. Market research has already indicated the volume expected and the size of sales force required. The steps shown in the following table are to be planned. [12]
    - i) Draw an arrow diagram for this project.
    - ii) Indicate the critical path.

iii) For each non-critical activity, find the total and free float.

Actinty	Description	Predecessors	Duration (days)
А	Organize sales office	-	6
В	Hire salesmen	А	4
С	Train salesmen	В	7
D	Select advertising agency	А	2
E	Plan advertising campaign	D	4
F	Conduct advertising campaign	n E	10
G	Design package	-	2
Н	Setup packaging facilities	G	10
Ι	Package initial stocks	J. H.	6
J	Order stock from manufacture	er -	13
Κ	Select distributors	А	9
L	Sell to distributors	С. К.	3
М	Ship stocks to distributors	I. L.	5

- Q6) a) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. [6]
  - b) The cost of a machine is Rs 6,100 and its scrap value is Rs 100. The maintenance costs found from experience are as follows: [12]

Year	1	2	3	4	5	6	7	8
Maintenance	100	250	400	600	900	1200	1600	2000
cost (Rs)								

When should the machine be replaced?

- (Q7) a) What is Looping and Dangling errors in network. [5]
  - b) A small project involves 7 activities, and their time estimates are listed in the following table. Activities are identified by their beginning (i) and ending (j) node numbers. [12]

Activities	Estimated Duration (Weeks)						
(i-j)	Optimistic	Most likely	Pessimistic				
1-2	1	1	7				
1-3	1	4	7				
1-4	2	2	8				
2-5	1	1	1				
3-5	2	5	14				
4-6	2	5	8				
5-6	3	6	15				

- i) Draw the network diagram.
- ii) Find the expected duration and variance for each activity. What is the expected project length?
- iii) Calculate the variance and standard deviation of the project length. What is probability that the project will be completed:
  - 1) at least 4 weeks earlier than expected time.
  - 2) no more than 4 weeks later than expected time.

OR

4
### Q8) a) Explain the various steps involved in simulation process.

b) A salesman located in a city A decided to travel to city B. He knew the distances of alternative routes from city A to city B. He then drew a highway network map as shown in the Fig. The city of origin A, is city 1. The destination city B, is city 10. Other cities through which the salesman will have to pass through are numbered 2 to 9. The arrow representing routes between cities and distances in kilometers are indicated on each route. The salesman's problem is to find the shortest route that covers all the selected cities from A to B.

[5]



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PC-2521

[Total No. of Pages : 3

## [6354]-651

# B.E. (Mechanical Sandwich) QUALITY AND RELIABILITY ENGINEERING (2019 Pattern) (Semester - VIII) (Elective - II) (402050A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates :

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of electronic calculator is allowed.
- 5) Assume suitable data, if necessary.

Q1) a) Explain the following terms related to probability

- i) Event
- ii) Experiment
- iii) Mutually Exclusive Events.
- iv) Equally Likely Events
- v) Independent Events
- b) Explain organisational structure for Quality and Reliability assurance in company. And list the differences between Quality and reliability. [9]

### OR

- Q2) a) Explain Aleatory Uncertainty and Epistemic uncertainty. List four difference between them.[8]
  - b) During the transport of a large number of electronic components the probability of failures of any component is 0.2 if we take a random sample of 10 components received Determine the probability of [9]
    - i) Getting just 3 defective components
    - ii) Getting exactly 7 good components
    - iii) 5 or more of them being good

[Max. Marks : 70

[8]



- Q3) a) Express the reliability of series system in terms of its component reliabilities and explain stand by redundancy. [8]
  - b) Determine the system reliability of the system shown in fig 1. [10]



- (Q4) a) Explain Tie Set and Cut Set method of reliability evaluation. [8]
  - b) The following data refer to predicted reliability of six components in series. In case the desired reliability of the system is not fall below 0.85. Find the reliability goal for individual components. [10]

Components	1	2	3	4	5	6
Predicted Reliability	0.994	0.998	0.990	0.996	0.990	0.980

- (Q5) a) Draw and explain symbols used in fault tree construction. [8]
  - b) In the block diagram shown in fig 2. Let I and O be the input and output terminals. There are two sub-systems P and Q that are connected in series, The system fails when either of these two sub-systems fails. Draw the fault Tree diagram. [9]



[6354]-651

2

*Q6*) a) Explain Effects Analysis (FMEA) approach. [8]

[9]

[10]

- b) Write short note (any two) :
  - i) FMECA.
  - ii) Risk Priority Number.(RPN)
  - iii) Ishikawa diagram.
  - iv) Monte Carlo evaluation.
- *Q7*) a) In a short sample "accelerated life testing" of a system based on Weibull distribution the following data are recorded.[8]

Failure No.	1	2	3	4	5	6	7
MTTF (hrs.)	28.0	12.0	21.5	26.0	35.0	38.0	30.0

Plot the variation of reliability against time using :

- i) Mean ranking and
- ii) Median ranking method.
- b) A beam is subjected to mean stress 180 N/mm<sup>2</sup> and standard deviation 20 N/mm<sup>2</sup> The mean strength of beam material is 280 N/mm<sup>2</sup> and standard deviation 40N/mm<sup>2</sup> Determine [10]
  - i) Reliability of the beam.
  - ii) Minimum factor of safety.
  - iii) Average factor of safety.

#### OR

- Q8) a) Explain the preventive maintenance and corrective maintenance. [8]
  - b) Write short Note on (Any Two) :
    - i) MTTR and MTBF
    - ii) Highly Accelerated Life testing
    - iii) Reliability Growth Testing
    - iv) Reliability Centered Maintenance

### $\nabla \nabla \nabla \nabla$

[6354]-651

3

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[Total No. of Pages : 2

[Max. Marks : 70

## [6354]-652

## B.E. (Mechanical Sandwich) ELECTRICAL AND HYBRID VEHICLE (2019 Pattern) (Semester - VIII) (402051E) (Elective - II)

*Time : 2½ Hours]* 

Instructions to the candidates :

- 1) Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of non-programmable electronic calculator is allowed.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.
- *Q1*) a) Write a short note on :
  - i) Battery cooling
  - ii) Thermal control and protection
  - iii) Battery safety and maintenance, control
  - b) Explain the Application of three types of Motors and their Design with Examples. [9]

OR

Q2) a) In e-rickshsaw the battery rating is 20 Ahs, at 24 Volts. It has maximum speed of 25 Kmph speed and motor has power of 250 watts. How much distance it will cover? Assume Suitable data [9]
 Case 1. Using Lead Acid Battery
 Case 2. Using Li ion Pottery. How much renges will increase?

Case 2. Using Li-ion Battery. How much range will increase?

- b) Describe traction battery and what is the difference between normal lead acid battery [8]
- Q3) a) Describe and Illustrate the Effect of Rolling, Pitch & Yaw on velocity and movements.[8]
  - b) Explain the Power train Components and Sizing Calculation. [9] OR

Q4) a) Explain power flow control in electric drive-train topologies. [8]

b) Differentiate between Mechanical Differential and Electric Differential.[9]

*P.T.O.* 

[8]

## SEAT No. :

- Q5) a) Describe and illustrate the Aesthetics and Ergonomics consideration for varieties of electric vehicle configuration. [9]
  - b) What is Retrofitting? Describe and illustrate the retrofitting of Two-wheeler vehicles. [9]

- *Q6*) a) Describe Suspension system and explain any two suspension system[9]
  - b) Explain Need of vehicle Testing. What are the National/International Testing/Regulation/Licensing/Approval Organizations and Agencies?

[9]

[9]

- Q7) a) What is Battery management system? Explain functions of BMS. [9]
  - b) Describe and illustrate Charger Architectures.

OR

- **Q8)** a) Explain the Boost Converter for Power Factor Correction with Examples. [9]
  - b) Write detail note on End of Life (EoL) management of EV's and their batteries. [9]



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[6354]-653

[Total No. of Pages :2

# **B.E.** (Printing Technology Engineering) **GRAVURE PRINTING TECHNIQUES** (2019 Pattern) (Semester- VII) (408283)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

- *1*) Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8.
- 2) Figures to the right indicate full marks.
- Assume suitable data, if necessary. 3)
- Neat diagrams must be drawn wherever necessary. **4**)

<i>Q1</i> ) a)	Explain gravure process in detail with diagram.	[6]
b)	Purpose of slow drying and fast-drying solvents.	[6]
c)	Define Ink Transfer in Sheet fed Gravure.	[6]
	OR	
<b>Q2</b> ) a)	Describe different Types of Inks and Solvents used for Gravure.	[9]
b)	Explain Compatibility of Resin with Solvents.	[9]
<b>03</b> ) a)	What is Viscosity and how its affect print quality	[8]
<b>£</b> 0) (a)	Define dryer and its Types Need of Dryers used on a grayure press	<b>[0]</b>
0)	OR	, [ <sub>2</sub> ]
<b>Q4</b> ) a)	Explain Flammability of solvents.	[8]
b)	Define OSHA (Occupational Safety and Health Association) Standard	ls. <b>[9]</b>
<b>05</b> ) a)	What is Impression Cylinder and affect print quality due to pressur	e[8]
<b>b</b> )	Explain specifications for impression rollers.	[5]
c)	Effect of ESA parameters on ink transfer.	[5]
	OR	

## SEAT No. :

[Max. Marks : 70

<b>Q6</b> )	a)	Explain ESA and Effect of ESA on Print Quality.	[13]
	b)	Describe effect of ESA parameters on ink transfer.	[5]
Q7)	Writ	te a note on:	
	a)	Web Viewing System	[6]
	b)	Web aligner	[5]
	c)	Mounting Techniques of Web Aligner System	[6]
		OR	
Q8)	Writ	te a note on:	
	a)	'3' and '6' air expandable shafts,	[6]
	b)	Electronic Line Shaft	[5]
	c)	Gravure Troubleshooting	[6]



**PC2524** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-654

# B.E. (Printing Technology) DIGITAL PRINTING TECHNIQUES (2019 Pattern) (Semester - VII) (408284)

<i>Time</i> : 2	<sup>1</sup> / <sub>2</sub> Hours] [Max. Marks : 70
Instruct	ions to the candidates:
1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
2)	Figures to the right indicate full marks.
3)	Assume suitable data, if necessary.
4)	Neat diagrams must be drawn wherever necessary.
<b>Q1</b> ) a)	Explain lnkjet digital proofing. [10]
b)	Differentiate between soft proofing and hard proofing. [8]
	OR
<b>Q2</b> ) a)	Explain the concept of OCR. [10]
b)	Explain any 2 process control parameters - Baseline, Characterization, Calibration. [8]
<b>03</b> ) a)	Explain the elements of Digital Camera. [10]
$\mathcal{L}^{(1)}$ (h)	Explain PAW to Tiff and IPEG conversion techniques [7]
0)	Explain KAW to The and FLO conversion techniques. [7]
	OR
<b><i>Q</i>4</b> ) a)	Explain in details all the file formats used in Digital camera. [10]
b)	What are the different types of scanners. Explain any 1 in details. [7]
<b>Q5</b> ) Ex	xplain QR Code and Barcode scanning techniques and its application. [18] OR

Q6) Explain direct imaging techniques. Also explain various types of inks used in digital printing process and its properties. [18]

*P.T.O.* 

(Q7) a) Explain the concept of Print on Demand with workflow diagram. [10]

b) Explain in-line post press operations. [7]

### OR

- *Q8*) a) Explain the detailed workflow of variable data printing technique for scratch card of New Year event. [10]
  - b) Explain PDF types used for Variable data Printing. [7]

# 

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[Total No. of Pages :2

**SEAT No. :** 

### [6354]-655

## B.E. (Printing Engineering) Paper Board & Corrugation Package Technology (2019 Pattern) (Elective - III) (Semester - VII) (408281 A)

*Time :2<sup>1</sup>/<sub>2</sub>Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figure to the right indicates full marks.
- 4) Assume Suitable data jf necessary.
- 5) Use of electronic pocket calculator is allowed.
- Q1) a) Explain in detail the process of manufacturing glue applied labels along with its applications [10]
  - b) Explain "Shrink sleeves" with applications and diagram. [7]

### OR

- Q2) a) Explain in detail the process of manufacturing self adhesive labels along with its application. [10]
  - b) Explain "In mold labels" with applications and diagram. [7]
- Q3) Explain in detail the manufacturing of punching die with complete automated system along with neat diagrams. [18]

### OR

- Q4) a) Explain the importance of V-notches on die along with neat diagram.[9]
  - b) Draw a neat diagram of STE and label all the parts. Also explain the application of each part in brief. [9]
- Q5) Explain in detail the manufacturing of single facer corrugation board along with neat diagram of machine. [17]

[Max. Marks : 70

- *Q6*) a) Explain various types of flutes used in corrugation industry along with their technical specifications and applications. [10]
  - b) Draw a diagram of single facer corrugated board, label the diagram and explain the applications of the same. [7]
- *Q7*) Explain the ECT in detail along with diagram and its applicaton. [18]

#### OR

- Q8) a)Write a short note on RCT.[9]b)Write a short note on FCT.[9]



**PC-2526** 

SEAT No. :

[Total No. of Pages :2

# [6354]-656 **B.E.** (Printing Technology) **Polymer Science**

## (2019 Patern) (Semester - VII) (Elective - III) (408281 B)

Time	Time :2½Hours][Max. Mark]		
Instr	ructio 1) 2) 3)	ons to the candidates: Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks.	
<b>Q1</b> )	a)	What is thermal conductivity of a polymer?	[6]
	b)	Explain the heat of fusion of the polymer in brief?	[6]
	c)	What are the factors which affect the dimensional stability polymer?	of a [6]
		OR	
Q2)	a)	What is wavenumber?	[6]
	b)	How will you identify a plastic using infrared spectrophotometry?	[6]
	c)	What is the difference between blocking and friction in polymers?	[6]
Q3)	a)	What are heat stabilizers? Name any two heat stabilizers for PVC.	[6]
	b)	What is the role of the colorants in the polymer?	[6]
	c)	What is the function of antifogging agents in a polymer?	[5]
		OR	
<b>Q4</b> )	a)	What is the function of reinforcements in a polymer?	[6]
	b)	What is the role of antimicrobials in a polymer?	[6]
	c)	What are fragrance enhancers?	[5]

*P.T.O.* 

- **Q5**) a) With a neat sketch explain orientation in polymers. [6]
  - b) What is sulfonation? What are the advantages of sulfonation? [6]
  - c) What is plasma treatment? Name any two gases which are used in plasma treatment. [6]

- Q6) a) What are the methods to determine whether a polymer is subjected to surface treatment? [6]
  - b) Write short notes on infra-red spectroscopy. [6]
  - c) Differentiate between radiation induced grafting and ionic grafting. [6]
- Q7) a) What is called free volume of a polymer? What is the effect of temperature on the free volume of a polymer? [6]
  - b) What is permeation in a packaging material. How does permeation affect the shelf life of a product. [6]
  - c) What is partial differential pressure? Briefly explain Dalton's law of partial pressure.
    [5]

### OR

- Q8) a) What is chemical potential? write down the equation for chemical potential.[6]
  - b) How will you estimate the shelf life of any food product? [6]
  - c) With a neat sketch explain the quasi-isostatic cell forgases. [5]



**PC-2527** 

## [6354]-657

# **B.E.** (Printing Technology) **MULTIMEDIA ADVERTISING** (2019 Pattern) (Semester - VII) (408282A) (Elective - IV)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*]

Instructions to the candidates :

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right in bracket indicate marks.
- Q1) Compare and contrast between following media with their features, advantages, limitations if any [18]
  - Print media a)
  - Outdoor Media b)

### OR

- What is product research, explain the concept *Q2*) a)
  - Explain PLC with neat diagram b)

- [18]
- Q3) Which are the different types of campaigns, explain each with suitable case study. [17] .

OR

- Q4) What is the concept of Brand Equity, how it is achieved and reviewed. Explain with suitable example. [17]
- (0.5) Explain the difference between construction of advertisement for AV media (television) and Social media (u tube) for the same product. Explain each element in details. [18]

### OR

Q6) What is job of the visualiser in an advertising agency, explain with any case study. [18]

*P.T.O.* 

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

Q7) What is Social media advertising? Explain with suitable case study. [17]

### OR

Q8) What are the different ways to promote content marketing? Explain in details.[17]



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SEAT No. :

[Total No. of Pages : 2

## [6354]-658

## B.E. (Printing Engineering) PROCESS OPTIMIZATION AND TOTAL QUALITY MANAGEMENT IN PRINTING

(2019 Pattern) (Semester - VII) (408282 B) (Elective - IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data if necessary.
- 5) Use of electronic pocket calculator is allowed.
- Q1) Define precision and accuracy with respect to the spectral reflectance measurement instruments used in the Print and Packaging industry. Give an example procedure to calculate the precision and accuracy of a sectrophotometer. [17]

OR

- Q2) What TPM? Explain AM, FI and PM pillars of TPM with suitable examples with reference to printing industry. [17]
- Q3) What are standards? Explain the structure of a standardizing body that is involved in defining standards used in the Printing and Packaging industry.[18]

OR

- Q4) What do ISO 12647 standards recommend? Describe ISO 12647 in detail. [18]
- Q5) What is the purpose of ISO13655 standard? Explain the ISO 13655 standard in detail. [17]

OR

Q6) What is print process control? Explain print process control giving an example? [17]

*P.T.O.* 

Q7) What is Linear Regression? Explain Linear Regression with an example. [18]

Q8) What is Multiple Linear Regression? Calculate CIEXYZ of the given color patches using the below given 3×3 matrix. [18]

	R	G	В
Patch 1	0.408	0.60	0.075
Patch 2	0.114	0.114	0.866

	0.412	0.357	0.181
Matrix :	0.212	0.715	0.072
	0.019	0.119	0.950

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**SEAT No. :** 

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[Total No. of Pages : 3

### [6354]-659

### **B.E.** (Printing Technology)

## **OPERATION MANAGEMENT IN PRINTING AND PACKAGING** (2019 Pattern) (Semester - VIII) (408290)

Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:

- *1*) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures on right in bracket indicate marks.
- 3) Use calculator if necessary.
- *Q1*) Draw product life cycle graph and explain each stage with suitable example from printing packaging field. [17]

#### OR

- Q2) What are PBS and WBS, explain in details and support with suitable case study. [17]
- Q3) Determine the earliest and latest times, the total float for each activity, the critical activities and the project completion time. [18]

Activity	Predecessor	Time in weeks
А	-	12
В	А	7
С	А	11
D	А	8
Е	А	6
F	В	10
G	С	9
Н	D, F	14
Ι	E, G	13
J	H, I	16

[Max. Marks : 70

Q4) A small project composed of 7 activities is listed below.

- a) Draw network
- b) Calculate the expected variance of each activity
- c) Find the expected project completion time
- d) Calculate the probability that the project will be completed 3 weeks earlier than the expected

[18]

e) If the project due date is 18 weeks, what is the probability of not meeting the due date?

Activity (i-J)	Time in weeks				
i-j	to	tl	tp		
1-2	1	1	7		
1-3	1	4	7		
1-4	2	2	8		
2-5	1	1	1		
3-5	2	5	14		
4-6	2	5	8		
5-6	3	6	15		

Q5) Find an optimal sequence for following sequencing problem. Also find total elapsed time [17]

Job:	1	2	3	4
Machine M1	7	6	5	8
Machine M2	5	6	4	3
Machine M3	2	4	5	3
Machine M4	3	5	6	2
Machine M5	9	10	8	6
OR				

*Q6*) Find solution of Processing 5 Jobs Through 4 Machines Problem. Find optimal and idle time of each machine. [17]

Job:	1	2	3	4	5
Machine M1	11	13	9	16	17
MachineM2	4	3	5	2	6
MachineM3	6	7	5	8	4
Machine M4	15	8	13	9	11

Q7) Find Solution using VAM and optimize using MODI method

[18]

D1	D2	D3	D4	Supply	
<b>S</b> 1	19	30	50	10	7
S2	70	30	40	60	9
<b>S</b> 3	40	8	70	20	18
Demand	5	8	7	14	

#### OR

*Q8*) For given problem, find minimum cost by NWCM, LCM and VAM [18]

	D1	D2	D3	D4	SS
<b>S</b> 1	5	10	7	10	50
S2	9	10	3	3	40
<b>S</b> 3	6	4	2	2	60
DD	40	30	10	70	

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[Total No. of Pages : 2

**SEAT No. :** 

### [6354]-660

## B.E. (Printing Technology) ADHESIVES AND COATINGS IN PACKAGING (2019 Pattern) (Semester - VIII) (408291)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Attempt Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) Explain the different types of adhesives used in paper-based packaging applications. Discuss the properties and advantages of each. [9]
  - b) What are the factors to be considered while selecting adhesives for foodgrade packaging materials? [8]

### OR

- Q2) a) Describe the various types of self-adhesive tapes and their applications in packaging. Explain the role of adhesives used in these tapes. [10]
  - b) Explain the process of cold seal adhesive bonding and its advantages over hot seal adhesives in packaging applications. [7]
- Q3) a) Discuss the theory of adhesion in coating applications. How does it affect the performance of different coatings on flexible films? [9]
  - b) What are the key differences between gloss, anti-static and matt coatings used in packaging. and what are their effects on packaging materials? [9]

### OR

- Q4) a) Describe the types of coatings used for metals and flexible films, with emphasis on reverse metallization and release coatings. [10]
  - b) Explain the importance of selecting water-based coatings for food-grade packaging and the criteria involved in the selection process. [8]

*P.T.O.* 

[Max. Marks : 70

- Q5) a) Explain the coating process using wire-wound rod coater and its advantages in coating uniformity. [9]
  - b) What is extrusion coating and how is it different from other coating methods in terms of applications and efficiency? [8]

- Q6) a) Discuss the impact of coating rheology on the coating process and how viscosity affects the final product. [10]
  - b) What is the role of drying in coating applications, and what are the different drying methods used in the coating process? [7]
- Q7) a) What are the key adhesive standards such as BIS. ASTM, and PSTC, and why are they critical in the packaging industry? [9]
  - b) Discuss the different testing methods for adhesives, particularly focusing on the adhesion strength to metal and the rolling ball tack test. [9]

### OR

- Q8) a) Explain the coat weight test and how it is used to evaluate the coating application on paper and board. [9]
  - b) Discuss the migration tests and their importance in evaluating the safety of packaging materials for food products. [9]



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[Total No. of Pages : 2

**SEAT No. :** 

## [6354]-661

# B.E. (Printing Technology) FOOD AND PHARMACEUTICAL PACKAGING (2019 Pattern) (Semester - VIII) (Elective - V) (408288A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of electronic pocket calculator is allowed.

<b>Q1</b> )	a)	Explain Extrusion Technology and its working principle with diagram.	[9]
	b)	Explain Lamination techniques and its types.	[9]
		OR	
<b>Q</b> 2)	a)	Explain Polymer compatibility for co-extrusion process.	[9]
	b)	Explain Die Cutting Process and its type.	[9]
<b>Q3</b> )	a)	Which products are known as FMCG products and what is the importa of right packaging for FMCG Products.	nce [ <b>8</b> ]
	b)	Explain the workflow of Vertical Form Fill Seal Machine (VFFS) we examples.	vith <b>[9]</b>
		OR	
<b>Q4</b> )	a)	Explain conduction sealing process with its benefits.	[8]
	b)	Explain the working of Auger fillers & Rotary Fillers with examples.	[9]

*P.T.O.* 

<b>Q</b> 5) a)	What is Blister Packaging and Write down the advantages a disadvantages of blister packaging.	and <b>[9]</b>
b)	Explain the Processing of Retort Pouch.	[9]
	OR	
<b>Q6</b> ) a)	Explain Pouch Making process its benefits.	[9]
b)	Explain the procedure of making blister packaging.	[9]
<b>Q7</b> ) a)	Explain Quality Assurance Aspects of Packaging.	[8]
b)	Explain the Legislative and Safety Aspects for Migration from Packag to Foods.	ging [ <b>9</b> ]
	OR	
<b>Q8</b> ) a)	Explain the concept of Child Resistant Packaging.	[8]
b)	Explain the rules and regulations defined in FDA Guidelines.	[9]

## $\nabla \nabla \nabla \nabla$

PC-2531

[Total No. of Pages : 2

**SEAT No. :** 

### [6354]-663

# B.E. (Printing Technology Engineering) SUSTAINABLE PACKAGING (Elective - VI) (2019 Pattern) (Semester - VIII) (408289A)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of electronic pocket calculator is allowed.
- Q1) a) What is Edible Food Packaging materials and Bio-Composites materials, recyclable materials? [9]
  - b) Challenges with alternate materials and processing, Compostable packaging. [9]

OR

- Q2) a) What is Effective Packaging and what are the Bio-Based and Biodegradable Food Packaging material? [9]
  - b) Explain the concept of Renewable Packaging materials. [9]
- Q3) a) Explain 3R's of Circular Economy and Negative Impacts of Plastics disposals.[9]
  - b) Explain the concept of Waste Management and Plastics in Circular Economy. [8]

### OR

- *Q4*) a) Explain the Industry 4.0 and Circular Economy. [8]
  - b) Explain key concepts and terminology of circular Economy. [9]

*P.T.O.* 

[Max. Marks : 70

- *Q5*) a) What is Carbon Footprint Assessment and Carbon Credits? [8]
  - b) Explain the Future of LCA.

- *Q6*) a) Explain the Functions of LCA and Types of Packaging for LCA. [8]
  - b) What are the Phases and Processes in LCA and explain Levels of LCA. [9]

[9]

### *Q7*) a) Explain the Brand Positioning and Marketing Strategy. [9]

b) Explain the Consumer Education and understanding of standard signs and symbols. [9]

#### OR

- Q8) a) Explain Ethical sourcing and Impacts of Efficiency of transportation and Impact of Package size on supply chain. [9]
  - b) Explain the Understanding of global regulatory landscapes for sustainable Packaging. [9]

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SEAT No. :

### PC2532

[6354]-665

## B.E. (Production) AUTOMATION AND CONTROL ENGINEERING (2019 Pattern) (Semester - VII) (412481)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

[Total No. of Pages : 2

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of Calculator is allowed.
- 4) Assume Suitable data if necessary.
- Q1) a) Draw the suitable pneumatic circuit using cascade system to actuate cylinder A, cylinder B and cylinder C as per following position step diagram.



b) Draw a suitable pneumatic circuit for a machine driven by a single acting cylinder with actuation of at least two (of three) manually operated valves. [10]

OR

- Q2) a) Draw neat sketches of the following types of valves used in pneumatic circuits: [8]
  - 3/2 direction control valve
  - Flow control valve
  - Pressure reducing valve
  - Sequence valve
  - b) Draw a pneumatic circuit for a machine operated either by manual switch or automatic switch and to ensure that the workpiece is properly clamped and door of the machine is not open. [10]

*P.T.O.* 

- Q3) a) Load the bit pattern 47H in register B and 6BH in register C. Mask all bits except D0 from registers B and C. If D0 is at logic 1 in both the registers turn on the light connected to D0 position of the output port; otherwise turn off the light.
  - b) Draw the flow chart and write the program to multiply two 8 bit numbers.[8] OR

*Q4*) a) Draw block diagram of Microcontroller Architecture. [8]

- b) Explain General Purpose (Working Registers) and special function registers in 8051. [9]
- Q5) a) Draw a ladder diagram that can be used to start a motor and then after a delay of 100 sec. start a pump. When the motor is switched off there should be a delay of 10 sec before the pump is switched off. [9]
  - b) Why integral and derivative controllers are not used alone? How the performance of a control action is measured? [8]

OR

- *Q6*) a) Prepare a programmed ladder diagram to perform following sequence of operation. [9]
  - i) Fill the tank
  - ii) Heat and stir the liquid at 100 for 20 min with timer tick 2 seconds.
  - iii) Empty the tank
  - iv) Repeat from step (i)
  - b) For a certain process, transfer function is  $\frac{5}{s+2}$ . Obtain the response of Integral controllers for step response of 4 if feedback transfer function is the gain of 0.1 and K=2. [8]
- *Q7*) a) Explain the difference between SCADA, PLC and HMI? **[9]** 
  - b) Explain the building blocks of human machine interface. [9]

[18]

### OR

- *Q8*) Write short notes on:
  - a) Applications of SCADA
  - b) Remote Terminal Unit
  - c) Communication methods in SCADA

### $\circ$ $\circ$ $\circ$

PC2533

[6354]-666

[Total No. of Pages : 3

**SEAT No. :** 

# B.E. (Production Engineering) OPERATIONS RESEARCH (2019 Pattern) (Semester - VII) (411082)

[Max. Marks : 70

#### *Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*

- 1) Attempt questions 1 or 2, 3 or 4, 5 or 6 and 7 or 8.
- 2) Draw neat sketches, if needed.
- *Q1*) a) State Bellman's principle of optimality. Explain the forward and backward recursive method used in dynamic programming. [10]
  - b) Explain zero-one implicit enumeration technique of solving 0-1 programming problem. [7]

OR

- Q2) a) Define Goal programming. Distinguish between LP and Goal programming.[7]
  - b) Find the optimal path by using dynamic programming for the following Network path. [10]



Q3) a) The fleet owner finds from his past record, that the maintenance cost per year of an auto whose purchase price is Rs.60,000 is given below: Consider cost of money as 10% per year. [10]

		•	-	•				_
Year	1	2	3	4	5	6	7	8
Maintenance	1000	1200	1400	1800	2300	2800	3400	4000
What is the optimum replacement plan?								

What is the optimum replacement plan?

b) What is discount rate? If C is the capital cost of machine, R is the running cost in the  $i^{th}$  year, v is the discount rate then how will you determine the best period *r* to replace the machine? [8]

- *Q4*) a) Find the cost per period of individual replacement policy of an installation of 300 light bulb, given the following: [10]
  - i) Cost of replacing an individual bulb is Rs.2.
  - ii) Conditional probability of failure is given below:

Week No:	0	1	2	3	4
Conditional probability of	0	0.1	0.3	0.7	1.0
Failure					

- b) Explain with examples the failure mechanisms of items.
- **Q5)** a) The following matrix gives the payoff of different strategies  $S_1$ ,  $S_2$ ,  $S_3$ , against different conditions  $N_1$ ,  $N_2$ ,  $N_3$ , and  $N_4$ . [10]

	$N_1$	$N_2$	$N_3$	$\mathbf{N}_4$
$\mathbf{S}_1$	4000	-100	60000	18000
$\mathbf{S}_2$	20000	5000	400	0
S <sub>3</sub>	20000	15000	-2000	1000

Indicate the decision taken under the following approach:

- i) Pessimistic
- ii) Optimistic
- iii) Regret and
- iv) Equal probability

### b) Define:

- i) Competitive game
- ii) Pure strategies
- iii) Mixed strategies
- iv) Two-person zero sum game
- v) Payoff matrix
- vi) Saddle point

OR

[6354]-666

[7]

[8]

Q6) a) What is decision making? Explain and differentiate this under the conditions of certainty and uncertainty. [7]

**[10]** 

b) Solve the game:

			Player B	
	Strategies	b1	b2	b3
	al	20	25	10
Player A	a2	6	10	15
	a3	40	18	30

Q7) a) A company trading motor car spares wishes to determine the level of stock it should carry for the items in its range. Demand is not certain and there is lead time for stock replenishment. For one item, the following information is obtained: [10]

Demand	3	4	5	6	7
(units/day)					
Probability	0.1	0.2	0.3	0.3	0.1

Carrying cost /unit/ day = 20 paise

Ordering cost per order = Rs.5.

Lead time = 3 days.

Stock in hand at the beginning of the simulation process is 20 units. You are required to carry out a simulation run over a period of 10 days if the ordering policy is to order 15 units when the stock in hand falls to 15 units. Calculate the total cost of operating this inventory for 10 days using the following sequence of random numbers:00, 90, 10, 10, 50, 10, 80, 60, 30, 50, 70, 10, 20 and 90

b) Write short on multi-channel queue with infinite customer population.[8]

### OR

- Q8) a) Arrival rate of the customers at the banking counter follows Poisson distribution with mean 15 per hour. The service rate of the counter also follows Poisson distribution with mean of 25 per hour. Find:
  - i) Probability of having zero customers in the system
  - ii) Probability of having 3 customers in the system
  - iii) Probability that customer have to spend 30 minutes in bank
  - iv) Mean customers in queue
  - v) Average waiting time in queue [10]
  - b) Write note on 'Generation of random numbers'. [8]

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[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354] - 667

# B.E.(Production Engineering) Simulation, Modeling and Digital Twin (2019 Pattern) (Semester - VII) (Elective - III) (411083 A)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data necessary
- 4) Use of Non-programmable scientific calculators is allowed.
- 5) Figures to the right indicate full marks.
- Q1) a) Describe the significance of removing an initial bias while simulating a system.
  - b) Summarize the following briefly: [9]
    - i) Model Confidence Interval Accreditation
    - ii) Testing Hypotheses

### OR

- Q2) a) Give a brief explanation of the statistics from simulation runs. [8]
  - b) Using relevant examples, describe the verification and validation processes used for the simulation models. [9]
- Q3) a) What prerequisites must be met in order to apply digital twins to different industries? [9]
  - b) Using a relevant example, describe the application of digital twins in the services sector. [9]

*P.T.O.* 

- Q4) a) Describe the importance of DTT in industry innovation. Provide an appropriate example to illustrate. [9]
  - b) What sorts of instruments and techniques are used by different sectors to make it possible to use digital twins? [9]
- **Q5**) a) Briefly describe the following topics: [8]
  - i) Automation Simulation
  - ii) Digital enterprise
  - b) Briefly explain the usage of digital thread in a process business. [9]

- Q6) a) Write a brief remark on gathering and analyzing data to enhance the process.[8]
  - b) Which control systems are necessary in the process industry? Describe a few of them in detail. [9]
- Q7) a) Explain how using digital twins might improve the quality of the product. [9]
  - b) Write a brief remark about the ongoing simulation-based manufacturing process forecast and adjustment. [9]

#### OR

- *Q8*) a) If bottlenecks are found, how could efficiency be improved? Provide an appropriate example. [9]
  - b) Kindly provide a brief overview of: [9]
    - i) Using digital twins to improve industrial processes
    - ii) Using digital twins to increase process safety

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**PC-2535** 

[Total No. of Pages : 2

[Max. Marks : 70]

### [6354] - 668

# B.E.(Production Engineering) Elective III: Total Quality Management (2019 Pattern) (Semester - VII) (411083 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data, if necessary
- *Q1*) a) Describe concept Total Productive Maintenance (TPM) in detail. [9]
  - b) What is the meaning of Benchmarking? Explain the Benchmarking process in detail. [9]

### OR

<i>Q2</i> )	a)	Discuss code of conduct for Benchmarking.	[9]
1	b)	Discuss JIT, Kanban concepts used in TQM. detail.	[9]
Q3)	a)	What are the types of failures?	[9]
1	b)	Discuss reliability of system when components are in series with suita sketch.	.ble [8]
		OR	
<i>Q4</i> )	a)	Discuss various Reliability testing methods.	[9]

b) Explain Weibull Distribution with suitable sketch. [8]

*P.T.O.* 

SEAT No. :

Q5) a	a)	How to organize for creating change for quality?	[9]
ł	<b>)</b> )	Discuss Auditor Ethics in conducting Audit.	[9]
		OR	
<b>Q6</b> ) a	a)	How to do value -addition process during Internal Audit?	[9]
ł	<b>)</b> )	Discuss Roles in organizational changes in TQM.	[9]
Q7) a	a)	Explain how to Implement of ISO 9001.	[9]
ł	<b>)</b>	Discuss ISO / TS16949:2002 for Automobile Industry.	[8]
		OR	
<b>Q</b> 8) a	a)	Discuss ISO documentation.	[8]
ł	<b>)</b> )	What are the requirements of ISO 14001	[9]

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PC-2536

[Total No. of Pages : 2

SEAT No. :

# [6354] - 669

# **B.E.(Production)**

## ARTIFICIAL INTELLIGENCE IN MANUFACTURING (2010 Pattern) (Somester VII) (411083 C) (Flagtive III)

	(20	(19  Pattern) (Semester - VII) (411085  C) (Elective - III)	
Time Instr	e : 2½ uctio	Hours] [Max. Marks ns to the candidates:	: 70
	1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.	
	2)	Figures to the right indicate full marks.	
Q1)	a)	Explain the Building-Block Hypothesis of a binary coded GA.	[10]
	b)	Can you declare GA as global optimizer? Explain it.	[8]
		OR	
Q2)	a)	State the advantages and disadvantages of GA.	[10]
	b)	Explain the Application of GA in Optimization Problems.	[8]
Q3)	a)	What is a neural network?How artificial neural networks work?	[10]
	b)	What are the types of back propagation? Explain in brief.	[8]
		OR	
Q4)	a)	What is back propagation neural networks explain its architecture?	[10]
	b)	What is Adaptive Resonance Theory network? Explain.	[8]
Q5)	a)	How is AI used in the manufacturing industry?	[10]
	b)	What are the six steps in the monitoring procedure? Explain in brief.	. <b>[7</b> ]

<b>Q6</b> )	a)	Explain AI in design and manufacturing.	[10]
	b)	What is machine vision in manufacturing? Explain in brief.	[7]
Q7)	a)	Explain the role of Artificial Intelligence in warehouse management.	[10]
	b)	How is AI used in inventory management?	[7]
		OR	
<b>Q</b> 8)	a)	What is AI visual inspection?	[10]

b) How AI is used for appropriate cutting tool selection? [7]



SEAT No. :

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[Total No. of Pages : 2

# [6354]-670

# B.E.(Production Engineering) WORLD CLASS MANUFACTURING (2019 Pattern) (Semester - VII) (411083 D) (Elective - III)

Tim	e : 2½	[Max. Marks : 70				
Instructions to the candidates:						
	1)					
	2)	Neat diagrams must be drawn whenever necessary.				
	3)	Assume suitable data, if necessary.				
	4)	Figures to the right indicate full marks.				
Q1)	a)	List various functions of Store.	[6]			
	b)	Which are the 8 pillars of TPM.	[6]			
	c)	List the 5S used in Visual management.	[5]			
		OR				
Q2)	a)	What is KANBAN? Explain.	[6]			
	b)	Explain Bar Code system in detail.	[6]			
	c)	Explain Bath-Tub Curve in TPM.	[5]			
Q3)	a)	Explain Cause and Effect diagram with example used	in SQC. [6]			
	b)	Discuss 3M in detail.	[6]			
	c)	Discuss Poka-Yoke with example.	[6]			

Q4)	a)	List the 5S used in the 5S visual Management system.	[6]
	b)	What is Just-In-Time? Explain its benefits.	[6]
	c)	List and explain building blocks of FMS.	[6]
Q5)	a)	Describe 8 step problem solving approach used in WCM.	[8]
	b)	Explain characteristics of learning organization.	[9]
		OR	
<b>Q6</b> )	a)	Explain how human resource management of WCM organization different from traditional organization.	n is [ <b>8]</b>
	b)	Discuss various motivation techniques for WCM employees.	[9]
Q7)	a)	What is green manufacturing? Discuss in detail.	[9]
	b)	Discuss a case study related to WCM of any organization.	[9]
		OR	
Q8)	a)	Write short note on Agile Manufacturing.	[9]

b) What is clean manufacturing? Explain its importance in manufacturing.[9]

# **b4 b4 b4**

# [6354]-670

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SEAT No. :

[Total No. of Pages : 2

# [6354]-671

# B.E. (Production Engineeing) PLANT MAINTENANCE AND INDUSTRIAL SAFETY (2019 Pattern) (Semester - VII) (Elective - IV) (411084 A)

Tim	e : 2 <sup>1</sup>	<sup>1</sup> / <sub>2</sub> Hours] [Max. Mar	rks : 70
Inst	ructi 1) 2) 3) 4) 5)	ons to the candidates: Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat diagram must be drawn wherever necessary. Figures to the right indicate full marks. Assume suitable data if necessary. Use of logarithmic tables, slide rules, Mollier charts, electronic pocket cald and steam table is allowed.	culator
Q1)	a)	What are the causes of machine vibration?	[5]
	b)	List the wear debris analysis techniques and explain any one.	[6]
	c)	What is condition monitoring and equipment health monitoring?	[6]
		OR	
Q2)	a)	How system approach to condition monitoring can be useful?	[7]
	b)	Explain vibration monitoring and Lubrication analysis methods.	[10]
Q3)	a)	Explain the implementation of Factories Act-1948.	[8]
	b)	Describe roll of government in Industrial safety.	[10]
		OR	
Q4)	a)	Safety at work increase Productivity of Industry: Justify.	[8]
	b)	Explain safety committees and its structure.	[10]

- Q5) a) Explain accident reporting and investigation procedures. [7]
  - b) Explain the different types of industrial accidents and general steps to be taken for preventing the accidents in any industry. [10]

- *Q6*) a) Explain role of Safety Education and training in Industry. [7]
  b) Explain various factors affecting the selection of plant location. [10]
- *Q7*) a) Define the following terms as per Factories act, 1948. **[8]** 
  - i) A factory
  - ii) Manufacturing Process
  - iii) Child
  - iv) Adolescent
  - v) Adult
  - vi) Worker
  - vii) Hazardous process
  - b) Discuss in detail the control of industrial noise and protection against it. [10]

#### OR

- Q8) a) Explain the ESI Act-1948.
  - b) State the types of hazards and explain any three in detail with possible causes and remedial actions. [10]

[8]

## \* \* \*

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**SEAT No. :** 

[Total No. of Pages : 2

# [6354]-672 B.E. (Production Engineeing) SURFACE ENGINEERING (2019 Pattern) (Semester - VII) (Elective - IV) (411084 B)

*Time : 2½ Hours]* 

Instructions to the candidates:

[Max. Marks : 70

[8]

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1*) a) Which are the different metal cladding processes? Explain any one. [10]
  - b) Describe any one carburizing process.

## OR

- *Q2*) a) Which are thermal spray coating processes? Explain HVOF (High velocity Oxy-Fuel Spraying) [10]
  - b) State the advantages and applications of diffusion coating processes.[8]
- Q3) a) Describe chemical vapor deposition process with its advantages. [10]
  - b) Which are surface engineering problems related to substrate characteristics. [8]

#### OR

- *Q4*) a) Explain any Plasma-based surface engineering processes for wear and corrosion protection. [10]
  - b) Which are the advantages of ion implantation? [8]

- Q5) a)Describe measurement of Thickness of Coatings and Films by indentation<br/>method.[10]
  - b) Explain magnetic particle testing of surface defects. [7]

- Q6) a) What is Adhesion Testing ? Why test Adhesion? [10]
  b) Which are the different destructive testing methods of modified Surfaces? Explain any one. [7]
  Q7) a) Describe X-ray Photoelectron Spectroscopy (XPS) to analyze the surface morphology of nanomaterials? [10]
  b) Write note on simulation of actural application environment in tribometer. [7]
- Q8) a) Describe the use of Laser in Surface Engineering.[10]
  - b) Which paints and coatings that address Environmental Issues? Discuss.[7]

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SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70]

# [6354]-673

# **B.E. (Production Engineering) REVERSE ENGINEERING**

# (2019 Pattern) (Elective - IV) (Semester - VII) (411084 C)

#### *Time :2<sup>1</sup>/<sub>2</sub>Hours] Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Use of Non-programmable scientific calculator is allowed.
- 5) Figures to the right indicate full marks.
- Q1) a) Discuss non contact method used in data collection in reverse engineering along with it's advantages and disadvantages.[8]
  - b) Sort the reverse engineering software into different categories based on the intended use. [9]

## OR

- (Q2) a) Write short note on destructive method in reverse engineering. [8]
  - b) Along with a suitable example briefly explain fundamental reverse engineering operations. [9]
- Q3) a) Discuss the selection procedure for a reverse engineering system briefly using an example. [9]
  - b) Describe the creation of curves and surfaces with appropriate examples. [9]

#### OR

- Q4) a) Explain contact and non contact devices used for data capturing in reverse engineering. [9]
  - b) Describe the idea of post processing of collected data in RE with an appropriate example. [9]

*P.T.O.* 

- **Q5**) a) Describe the reverse engineering model used to create the cloud data.[8]
  - b) How the Integration of RE and RP for Layer-based Model Generation is done? [9]

- Q6) a) Briefly explain how the adaptive layer thickness is determined? [8]
  - b) Explain the idea of first line segment building using an appropriate example. [9]
- Q7) a) How are reverse engineering principles used in the aerospace industry? [9]
  - b) With typical block diagram, explain the workflow for automotive body design. [9]

#### OR

- (Q8) a) Discuss the constraints of using reverse engineering techniques in the actual world. [9]
  - b) Write short notes on applications of [9]
    - i) Automotive industries
    - ii) Medical device industries



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[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# [6354]-674

# B.E. (Production Engineering) ENTREPRENEURSHIP AND INNOVATIONS (2019 Pattern) (Elective - IV) (Semester - VII) (411084 D)

*Time :2<sup>1</sup>/<sub>2</sub>Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Use of electronic pocket calculator is allowed.
- 5) Figures to the right indicate full marks.
- *Q1*) a) Explain role of Industry to National Economy? [9]
  - b) What are the policies that government can use to encourage entrepreneurship? [9]

#### OR

Q2)	2) a) What is the Role of Entrepreneurship in Economic Development?					
	b)	Explain the specific role that entrepreneurship has fulfilled in development of small scale sector, In the Indian context.	the [9]			
Q3)	a)	Explain elements in the project identification?	[8]			
	b)	What are the tools and objectives of project identification?	[9]			
		OR				
<b>Q4</b> )	a)	How to prepare balance sheet, give example.	[9]			
	b)	Explain different sources of project idea can be generated?	[8]			
<b>Q</b> 5)	a)	What is the need of planning and control for a project?	[8]			
	b)	Explain importance of planning and control in project?	[9]			

<b>Q6</b> ) a)	Explain role of project controls in project management?	[8]
b)	Explain with example project control.	[9]
<b>Q7</b> ) a)	What are the legal issues for the entrepreneur?	[9]
b)	What are the five most important business issues that can lead to lead to be problems for global marketers?	egal <b>[9</b> ]
	OR	
<i>Q8</i> ) a)	Explain effect of law on the business?	[9]
b)	What are some basic laws associated with doing business?	[9]



SEAT No. :

PC2542

## [6354]-675

## **B.E.** (Production Engg.)

# COMPUTER INTEGRATED DESIGN AND MANUFACTURING (2019 Pattern) (Semester - VIII) (411088)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary
- *Q1*) a) Explain with neat sketch fused deposition RP. State its advantages, limitations.
  - b) Explain basic data required to prepare a CIM database. [7]

#### OR

- Q2) a) Write note on- capacity planning module and material requirement module. [10]
  - b) Explain
    - i) Operational data and
    - ii) Resource data in CIM database.
- Q3) a) Draw neat sketches for CNC and DNC. State the distinct features of its.[6]
  - b) Write a CNC program in G and M code to turn a part as shown in fig No. 1. Also write a remark for each block. [12]



Fig.No.1 (All dimension are in MM)

OR

*P.T.O.* 

[7]

[Max. Marks : 70

[Total No. of Pages : 3

- Q4) a) Write the meaning of following G and M code-G03, G04, G70, M03, M04, M30 [6]
  - b) Write a CNC program using G and M codes for drilling five holes as shown in the Fig No.2, use canned drilling cycle. [12]



Fig. No. 2 (All dimension are in MM)

Q5) a) Fig. No. 3 shows three springs, having stiffness 20, 15 and 25 N/mm, connected in parallel. One end of the assembly is fixed, and a force of 600 N is applied at the other end. Determine the deflections of individual spring



b) Derive a relation between local coordinate and global coordinate system for truss element. [6]

OR

Q6) a) A two member truss is as shown in the Fig. The cross - sectional area of each member of the truss is 100 mm<sup>2</sup> and the modulus of elasticity is 200 GPa. Determine the deflections, reactions in each of the members. [12]



Fig.No.4(All dimension are in MM)

- b) Explain Penalty Approach in FEA for problem solving [6]
- *Q7*) a) Compare Tool oriented FMs and Tool oriented FMs [8]
  - b) Consider the following part machine matrix. Apply Rank Order Clustering (ROC) Algorithm to identify the part families and machine groups. [9]

Dorto

			1 and				
Machines							
Û	A	В	C	D	E	F	G
1	0	1	0	1	1	1	0
2	1	0	1	0	0	0	0
3	1	0	1	0	0	1	1
4	0	1	0	1	0	1	0
5	1	0	0	0	1	0	1

- *Q8*) a) What is Flexible Manufacturing System (FMS)? Explain the classification on level of flexibility. [9]
  - b) Explain Rank Order Clustering (ROC) algorithm for grouping of parts and machines. [8]

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SEAT No. :

## **PC-2543**

[Total No. of Pages : 3

# [6354]-676 B.E. (Production) INDUSTRIAL ROBOTICS (2019 Pattern) (Semester - VIII) (411089)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.

2) Figures to the right indicate full marks.

<i>Q1</i> ) a)	State the equation of motion for 2DOF robot manipulator.	[8]
b)	Explain Newton-Euler formulation for robot dynamics.	[10]
	OR	

- *Q2*) a) Explain the differential kinematics and significance of Jacobian in robotics.[8]
  - b) Explain Lagrangian formulation for manipulator dynamics. [10]
- Q3) a) Explain construction and working of absolute and incremental optical encoders.[8]
  - b) The image of an object is represented by an array of pixels. The light intensity values at the different pixels are given below. [10]

90	90	88	70
110	105	50	85
95	80	60	75
100	75	90	80

Determine pre-processed data using

- i) Masking operation
- ii) Neighborhood averaging method with a 3 x3 size of neighborhood
- iii) Median filtering with a 3 x 3 neighborhood.

- Q4) a) With neat sketch explain the working principle of inductive, capacitive and hall effect sensor. [8]
  - b) The 8x8 array of pixels indicating each element as the gray level of pixel is given below. i) Construct the histogram and find threshold value. ii) Convert it into black and white image. iii) perform shape analysis (first and second order moments, centroids, run length encoding, principal angle) The 8x8 array of pixels indicating each element as the gray level of pixel is given below. i) Construct the histogram and find threshold value. ii) Convert it into black and white image .iii) perform shape analysis (first and second order moments, centroids, run length encoding, principal angle) [10]

-							
7	12	13	11	13	11	13	9
6	13	10	15	15	17	14	15
9	12	13	16	16	15	15	11
7	12	14	11	15	7	15	11
9	12	15	15	15	15	15	15
7	11	11	16	16	16	11	7
8	7	6	10	12	10	8	8
6	9	8	9	10	16	12	17

- Q5) a) What are the robot programming methods explain with appropriate examples? [6]
  - b) Narrate the steps for programming a robot for any industrial applications. [10]

- *Q6*) a) How to interface robot with computers? [6]
  - b) Write and explain a detail robot program for nut and bolt assembly. [10]

Q7) Write short note on

- a) Biped robots
- b) Heavy robots
- c) AI and Robotics

[6354]-676

2

[18]

Q8) Write short note on :

a) Humanoid robots

- b) Service robots
- c) Field robot

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[18]

**PC-2544** 

[Total No. of Pages : 2

[Max. Marks : 70

SEAT No. :

# [6354]-677

# B.E. (Production Engineering) E-MOBILITY IN AUTOMOBILE (2019 Pattern) (Semester - VIII) (Elective - V) (411090A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates :

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figure to the right indicates full marks.
- 3) Neat Diagram must be drawn wherever necessary.
- 4) Assume Suitable data if necessary.
- 5) Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.

<b>Q1</b> ) a)	Elaborate PMSM motor in detail.					
b)	Explain various challenges in various EV Drives.	[8]				
	OR					
<b>Q2</b> ) a)	(2) a) Discuss applications of EV Drives. Explain any four applications in					
b)	Write short notes on the following. (any two)	[8]				
	i) Limitations of EV Drives					
	ii) BLDC Motor					
	iii) Industrial Motors and EV Motors					
<b>Q3</b> ) a)	Enlist various EVs charging station.	[9]				
b)	Brief on Solar Power Electric Vehicle.					
	OR					

*P.T.O.* 

<b>Q4</b> ) a)	Classify energy sources used in EVs and HEVs.				
b)	) Write a note on Wireless power transfer system.				
<b>Q</b> 5) a)	Explain configuration of any one EV System.	[9]			
b)	Brief on converted and built EVS.	[9]			
	OR				
<b>Q6</b> ) a)	Discuss various methods for EV Communication.	[9]			
b)	Differentiate between V2V and V2G.	[9]			
<b>Q7</b> ) a)	Describe various Government Norms for EVs.	[9]			
b)	b) Elaborate APU control system in series.				
	OR				
<b>Q8</b> ) a)	Explain briefly fuel cell vehicles.	[9]			
b)	Why study of E-Mobility in automobile is essential? Elaborate it.	[9]			

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## **PC-2545**

**SEAT No. :** 

[Total No. of Pages :2

# [6354]-678 **B.E.** (Production) **Smart Manufacturing**

## (2019 Course) (Elective - V) (Semester - VIII) (411090 B)

#### *Time :2<sup>1</sup>/<sub>2</sub>Hours]* Instructions to the candidates:

[Max. Marks : 70]

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- Figures to the right indicate full marks. 3)
- What is software connectivity in smart manufacturing? *Q1*) a) [6]
  - What is data contextualization in smart manufacturing? b) [6]
  - Which four steps are required for building a digital twin and performing c) predictive analytics? [5]

#### OR

Q2)	a)	Which are the challenges that can be addressed by effective dataanalysis?	[6]
	b)	What is hardware requirement in smart manufacturing?	[6]
	c)	Explain modern connectivity for manufacturing equipment in sm manufacturing.	nart [ <b>5</b> ]
Q3)	a)	Which are the benefits of Data analysis in process modeling?	[6]
	b)	Explain data technologies of industry 4.0.	[6]
	c)	Which are the challenges of Industrial AI and predictive analytics smart manufacturing systems?	for [ <b>5</b> ]
		OR	
Q4)	a)	Explain data-based design of experiments.	[6]
	b)	Describe going on-line in process modeling.	[6]
	c)	Explain operations technologies of industry 4.0.	[5]

*P.T.O.* 

Q5)	a)	Explain Multiparametric programming and closed-loop validation.				
	b)	What is Asset autonomy in smart manufacturing?	[6]			
	c)	Write note on Smart manufacturing concepts.	[6]			
		OR				
Q6)	a)	Explain PAROC in smart manufacturing.	[6]			
	b)	Which are the multidisciplinary system design optimization approaches	?[6]			
	c)	Explain High-fidelity dynamic modeling and model approximation.	[6]			
Q7)	a)	Explain Smart Manufacturing as data-enabled sustainable manufacturing.	[6]			
	b)	Describe Support vector machines as data driven sensor.	[6]			
	c)	Which are the Characteristics of process data? Explain in brief.	[6]			
		OR				
Q8)	a)	Explain PLS in process monitoring and part of soft sensor technology	7. <b>[6]</b>			
	b)	Describe use of Artificial neural networks for soft sensor building.	[6]			
	c)	Describe use of PLS in soft sensing.	[6]			

PC-2546

SEAT No. :

[Total No. of Pages :2

# [6354]-679

# B.E. (Production Engineering) MANUFACTURING SYSTEM DESIGN (2019 Pattern) (Elective - V) (Semester - VIII) (411090 C)

Time :2 <sup>1/</sup> 2Hours]		Hours] [Max. Marks	: 70
Inst	ructio	ons to the candidates:	
	1)	Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.	
	2)	Figure to the right indicates full marks.	
Q1)	a)	Write short note on fixturing.	[8]
	b)	What are different steps followed in designing a manufacturing system	? <b>[8]</b>
	c)	Brief shortly about Hybrid Manufacturing System.	[3]
		OR	
Q2)	a)	Write short note on Line Balancing.	[8]
	b)	What are different steps followed in Task Allocation and Sequencing	? <b>[8]</b>
	c)	What is a Need of Manufacturing System?	[3]
Q3)	a)	What is Cellular Manufacturing? Write it's advantages and disadvantages.	. [8]
	b)	Write Production Flow Analysis(PFA) in details.	[8]
	c)	Write advantages and limitation of Group Technology.	[3]
		OR	
Q4)	a)	What is Part Family? What are Benefits of part Families.	[8]
	b)	Write Advantage, Disadvantage And applications of FMS.	[8]
	c)	Mentioned Methods for Part Family Formation.	[3]

Q5)	a)	Write Short note On Zero Inventory.			
	b)	write short note on:			
		i) Value stream Mapping			
		ii) JIT			
		OR			
<b>Q6</b> )	a)	What are principles of Lean Production.	[8]		
	b)	What is Opportunity cost? Explain.	[8]		
Q7)	a)	What are material selection parameter in process planning.			
	b)	Which are the process plan activities?	[8]		
		OR			
<i>Q8</i> )	a)	What are different steps in Process planning?	[8]		
	b)	What do you understand about Aggregate Production Planning?	[8]		



## PC-2547

SEAT No. :

[Total No. of Pages :2

## [6354]-680

# B.E. (Production Engineering) ERGONOMICS AND WORK MANAGEMENT (2019 Pattern) (ELECTIVE - V) (Semester - VIII) (411090 D)

Time :2 <sup>1/</sup> 2Hours]		[Max. Marks : 70	
Instr	uctio	ons to the candidates:	
	1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.	
	2)	Neat diagrams must be drawn wherever necessary.	
	3)	Figure to the right indicates full marks.	
	4)	Assume Suitable data jf necessary.	
<b>Q1</b> )	a)	Describe ergonomic risk factors related to	[9]
		i) Work height positioning	
		ii) Tools and material	
	b)	Describe types of visual displays.	[8]
		OR	
Q2)	a)	Describe the types of controls.	[8]
	b)	Describe the principles of auditory displays.	[9]
<b>Q3</b> )	a)	Define work study. Describe the objectives of work s	study. [8]
	b)	Explain controllable factors (internal) factors influenci	ng Productivity.[9]

The following information regarding the output produced and input consumed for a particular time period for a ABC company is given below:

Compute various productivity indexes

Details	Rs.
Output	50000
Labour	5000
Capital	3000
Material	12500
Energy	4500
other expences	3500

#### OR

- *Q4*) a) Define Basic work content. [8]Describe the factors which affects the basic work content (i.e. excess work content)
  - b) Explain employee based techniques to improve Productivity. [9] The following information regarding the output produced and input

*P.T.O* 

consumed for a particular time period for a ABC company is given below:

Compute various productivity indexes

Details	Rs.
Output	3000000
Labour	250000
Capital	300000
Material	225000
Energy	145000
Other expenses	350000

- Q5) a) Define Micro motion study. Describe various symbols (therbigs) used in micro motion study with their meaning. [9]
  - b) Describe the economic and technical factors to be considered while selecting the job for method study. [9]

OR

- *Q6*) a) Describe principles of motion economy related to work place with neat sketches.
  - b) Describe Flow process chart with suitable illustration & appropriate symbols with their meaning. [9]

# Q7) a) Define Time study.Describe various steps to carry out time study. [9]

- b) The time study is carried for an operation. The elemental data for the time(minutes) for a particular operation and the rating is shown as follows: Calculate: [9]
  - i) Normal (Basic)time
  - ii) Standard time considering allowance of 15%.

Element No.	Cycle1	Cycle2	Cycle3	Cycle4	Rating		
1	5	5.2	5	5.1	100		
2	3.5	3.4	3.5	3.6	110		
3	1	1.1	1	0.9	125		
4	2	1.9	2	2	90		
5	5.5	5.6	5.4	5.6	125		
6	1.4	1.6	1.5	1.4	110		
7	1	1.1	1.2	1	100		
OP							

- *Q8*) a) Describe various types of allowances considered during calculation of standard time. [9]
  - b) Describe the process to carry out work sampling study. State how the standard time is calculated using work sampling study [9]



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[Total No. of Pages : 2

# [6354]-681

# **B.E. (Production Engineering)** FACILITY PLANNING

# (2019 Pattern) (Semester - VIII) (Elective - VI) (411091A)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) a) Explain with sketch different warehouses in the En-route or In-Transit Phase [9]
  - b) With neat sketch explain facility provide in Single-Stage Multimachine Systems for higher productivity. [8]

OR

- Q2) a) State the specific factors that need to be considered when deciding on a warehouse location. [9]
  - b) Explain different facilities provided in JIT manufacturing for zero defect. [8]
- Q3) a) What are the different sanitation issues? Explain how to identify and mitigate them. [9]
  - b) Explain maintenance of Heating, Ventilation and Air conditioning (HVAC) facilities. [9]

#### OR

- Q4) a) What is OSHA? Highlights its characteristics. [10]
  - b) What is the purpose of a ventilation system? State the parts of an industrial ventilation system? [8]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

<b>Q5</b> ) a)	Explain briefly the qualitative layout evaluation technique.			
b)	Explain with suitable example FCFS and LCFO Waiting Line Mod	lels.[9]		
	OR			
<b>Q6</b> ) a)	Explain one method of using travel chart in facilities design.	[9]		
b)	Explain with suitable data a two-stage allocation model.	[9]		
<b>Q7</b> ) a)	What is facilities planning audit? Explain different area considered	d for it. <b>[8]</b>		
b)	Describe Ranking method for evaluating facility plan.	[9]		
	OR			
<b>Q8</b> ) a)	Describe specific situations where block templates or models should instead of contour templates and models and vice versa.	be used [9]		
b)	Explain different phases for facility plan implementation.	[8]		

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**PC-2549** 

[Total No. of Pages : 2

# [6354]-682

# B.E. (Production Engineering) ADDITIVE MANUFACTURING (2019 Pattern) (Semester - VIII) (411091 B) (Elective - VI)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Use of non-programmable scientific calculators is allowed.
- 5) Figures to the right indicate full marks.
- *Q1*) a) Explain in brief Meiko's Rapid Prototyping process, its principle and applications.
  - b) Explain with neat sketch the micro-fabrication process. [6]
  - c) Explain advantages, disadvantages and applications of Rapid Freeze Prototyping. [6]

OR

- Q2) a) Explain the advantages, disadvantages and applications of stereolithography process.[6]
  - b) Explain the advantages, disadvantages and applications of D-MEC's Solid Creation System process. [6]
  - c) Explain advantages, disadvantages and applications of Cubital's Solid Ground Curing process. [6]
- Q3) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Laminated Object Manufacturing (LOM). [9]
  - b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Multi-Jet Modeling System. [8]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

- Q4) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Fused Deposition Modeling. [9]
  - b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Paper Lamination Technology (PLT). [8]
- *Q5*) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Electron Beam Melting.[8]
  - b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Selective Laser Sintering. [9]

- *Q6*) a) Explain with neat sketch the working principle, advantages, disadvantages and applications of Laser Engineered Net Shaping. [8]
  - b) Explain with neat sketch the working principle, advantages, disadvantages and applications of Three-Dimensional Printing. [9]
- Q7) a) Create the flow chart of computer aided tissue engineering and outline its overview. [6]
  - b) Explain in brief (any three): [12]
    - i) Biopsy Needle Housing
    - ii) Knee Implants
    - iii) Scaffolds for Tissue Engineering
    - iv) Operation Planning for Cancerous Brain Tumor Surgery
    - v) Craniofacial Reconstructive Surgery Planning

## OR

Q8) a) Explain in brief the concept of Tissue Engineering and need for Computer Aided Tissue Engineering. [6]

[12]

- b) Explain in brief (any three) :
  - i) Cranium Implant
  - ii) Scaffolds for Tissue Engineering
  - iii) Customized Tracheobronchial Stents
  - iv) Inter-Vertebral Spacers
  - v) Planning Reconstructive Surgery with RP Technology

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[6354]-682

PC-2550

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

# [6354]-684 B.E. (Production Engineering)

# DATA ANALYTICS

# (2019 Pattern) (Semester - VIII) (411091D) (Elective - VI)

## Time : 2½ Hours]

Instructions to the candidates :

- 1) Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.
- 2) Figure to the right indicate full marks.
- Q1) a) What regression technique could be used when the dependent variable is not linearly dependent on the independent variable? Explain using an example. [10]
  - b) Write a short note on Data Analysis and its Importance. [8]

#### OR

- Q2) a) Explain the structure of neural networks and the mathematical functions used in the data analysis process. [10]
  - b) Explain the differences between BI and Data Science. [8]
- Q3) a) What are the three main types of data analysis for businesses? [10]
  - b) Describe the challenges of the current analytical architecture for data scientists. [8]

#### OR

- Q4) a) A data science team is working on a classification problem in which the dataset contains many correlated variables, and most of them are categorical variables. Which classifier should the team consider using? Why? [10]
  - b) Compare Which is better Random Forest vs Neuml Network. [8]
- Q5) a) Briefly explain types of data analytics. [10]
  - b) What are expert systems? [7]

<b>Q6</b> ) a)	What is decision tree analysis?				
b)	State advantages and disadvantages of principal component and	alysis?[ <b>7</b> ]			
<b>Q7</b> ) a)	Which are the benefits of Reinforcement Learning? What's the	Future of			
~ /	Reinforcement Learning?	[10]			
b)	How does Q-learning work?	[7]			
	OR				
<b>Q8</b> ) a)	What is SARSA? How does the SARSA algorithm work?	[10]			

b) What is difference between SARSA and Q-learning? [7]



PC2551

[6354]-685

[Total No. of Pages :3

**SEAT No. :** 

# B.E. (Production Sandwich Engineering) MANUFACTURING AUTOMATION (2019 Pattern) (Semester- VII) (411121)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[6]

Instructions to the candidates:

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary and mention it clearly.
- 5) Use of non-programmable calculator is allowed.
- Q1) a) List seven basic elements used in Electro pneumatic circuits List the advantages of electrical actuation of pneumatic valves over pure pneumatic control.
  - b) Draw only Pneumatic circuit for
    - i) 5/2 Valve actuation control
    - ii) 5/3 Valve actuation control
  - c) What is the function of a pneumatic actuator? How do you classity pneumatic actuators? State Double acting cylinder Cushioning arrangement. [6]

## OR

- Q2) a) Explain construction and working of solenoid valve type valve. What are the factors to be considered for selecting solenoids? [6]
  - b) What is a quick exhaust valve? Explain construction and working of quick exhaust valve with schematic diagram used in pneumatics [6]
  - c) Explain construction and working of time delay valve with schematic diagram used in pneumatics. [6]
- **Q3**) a) Explain the following concept of microcontroller? [6]
  - i) What do you mean by address bus?
  - ii) Why is the data bus bi-directional?
  - iii) What is the function of the accumulator?
  - b) Explain with Neat sketch Architecture of 8051 microcontroller. [6]
  - c) Differentiate between Harvard and Von-Neuman architecture (4 Point).[6]

- *Q4*) a) Explain the following concept of microcontroller?
  - i) How is the instruction set classified?
  - ii) What is an assembly language?
  - iii) Define the term, Data Bus, Address bus, Control Bus.
  - b) Explain Concepts of 8051 microcontroller, Draw the block diagram of internal architecture of 8051, Explain functional blocks in detail. [6]

**[6]** 

- c) Compare data memory and program memory. [6]
- Q5) a) Explain the following type with block diagram Dial Indexing Machine, Carousel Assembly System, Single-Station Assembly Cell Multi-station assembly machine or line.
  - b) What is AGV? What are the types of AGV? What are the components of AGV? What are the Benefits of AGV? [6]
  - c) What are the AS/RS components? Explain with neat sketch Basic Structure of ASRS. Mention important issues related to the layout and [5]

#### OR

- *Q6*) a) Classify three basic types of manufacturing systems. Explain Three basic types of manufacturing systems[6]
  - i) single-station cells,
  - ii) multistation systems with fixed routing, and
  - iii) multistation systems with variable routing
  - b) List principal components of automatic identification technologies, List AIDC technologies six categories. [6]
  - c) A rotary indexing table is driven by a five-slotted Geneva mechanism. The driver rotation is 50 RPM Determine: [5]
    - i) The total cycle time of the indexing table
    - ii) The available processing time for the indexing table

#### [6354]-685

- Q7) a) Comparison of ANN with conventional AI methods, Differences between Fuzzy Logic and Neural Networks. [6]
  - b) Explain Basic architecture of Artificial Neural Networks, Explain learning situations in neural networks, and its Applications. [6]
  - c) Explain HCI to make the man and machine interaction more vibrant and interactive designing model in software engineering. [5]

Q8) a) Define

[6]

- i) Linguistic Variable
- ii) Fuzzy Conditional Statements
- iii) Fuzzy Algorithm
- b) What is Artificial Intelligence? Brief Philosophy, Goals, Contribution, Multiple areas, Applications, Technique. [6]
- c) Explain with block diagram of SCADA Graphics, List SCADA functions and their components. [5]



**PC2552** 

## [6354]-686

# **B.E. (Production Sandwich) OPERATIONS RESEARCH** (2019 Pattern) (Semester - VII) (411122)

Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- 5) Use of calculator is allowed.

*01*) a) Distinguish between pure and mixed integer programming problems.[8]

Explain briefly about Geometric Programming. [9] b)

## OR

- Explain the methodology used in the cutting plane method. [8] *Q2*) a)
  - **b**) What are the essential characteristics of Dynamic Programming. [9]
- Discuss the various types of replacement situations. *O3*) a) [8]
  - A firm is considering replacement of a machine, whose cost is Rs 12,200 b) and the scrap value is Rs. 200. The Maintenance Cost in various years are as given below: [10]

Year	1	2	3	4	5	6	7	8
Maintenance	200	500	800	1200	1800	2500	3200	4000
Cost								
(Rs.)								

When should the machine be replaced?

OR

[Total No. of Pages : 3

[Max. Marks : 70

**SEAT No. :**
- *Q4*) a) i) A machine A costs Rs.9000/-. Annual operating costs are Rs. 200/for the first year and then increases by Rs.2000/- every year. Determine the best age at which the machine A is to be replaced? If the optimum replacement policy is followed, what will be the average yearly cost of owning and operating the machine? Assume machine has no resale value when replaced and that future costs are not discounted.
  - Machine B costs Rs. 10,000/-. Annual operating costs are Rs. 400/for the first year and then increases by Rs. 800/- every year. You have now a machine of type A, which is of one year old. Should you replace it with B, and if so, when? [10]
  - b) A machine costs Rs. 2,500. Maintenance costs are Rs. 1,200/- for the first six years and then increases by Rs. 200/- per year. Assuming a 10 % value of money per year find the optimum length of time to hold the machine before we replace it. Assume that the machine has no salvage value.
- Q5) a) Two firms are competing for business under the conditions so that one firm's gain is another firm's loss. Firm A's payoff matrix is given below: [10]

FIRM B								
		No	Medium	Heavy				
		advertising	advertising	advertising				
FIRM A	No advertising	10	5	-2				
	Medium	13	12	15				
	advertising							
	Heavy	16	14	10				
	advertising							

Suggest optimum strategies for the two firms and the net outcome thereof.

- b) Explain the following terms with reference to game theory [8]
  - i) Payoff matrix
  - ii) Pure and mixed Strategies
  - iii) Saddle point
  - iv) Two Person Zero Sum game

OR

[6354]-686

### *Q6* a) Explain briefly the decisions under uncertainty.

- Player B **B**1 **B**2 **B**3 **B**4 -2 Player A 2 1 0 A1 2 A2 1 0 3
- b) Solve following  $2 \times m$  game theory problem using by graphical method [10]

### Q7) a) Briefly explain the operating characteristics of queueing system. [7]

b) A bakery keeps stock of a popular brand of cakes. Previous experience shows the daily demand pattern for the item with associated probabilities, as given: [10]

Daily demand (no.s)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days.

Also find out the average demand per day Random Numbers: 25,39,65,76,12,05,73,89,19,49.

### OR

- Q8) a) Draw the sketch of queuing system and explain various components of it.
  - b) A branch of Punjab national bank have only one typist .Since the typist work varies in length (Number of pages to be typed), the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letters per hour. The letters arrive at the rate of 5 per hour during the entire 8 hour work day. If the is valued at Rs. 1.5 per hour, Determine. [10]
    - i) Equipment Utilization.
    - ii) The percentage time that an arrival letter has to wait.
    - iii) Average system time.
    - iv) Average cost due to waiting on the part of typewriter.

[6354]-686

**PC-2553** 

[Total No. of Pages : 2

### [6354] - 687

# B.E.(Production Sandwich) Elective III: Additive Manufacturing (2019 Pattern) (Semester - VII) (411123 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, jf necessary.
- *Q1*) a) What is Stereolithography Apparatus (SLA)? Write down its Principle, process, advantages and applications. [9]
  - b) Elaborate on how rapid prototyping is transforming the jewellery industry. [8]

### OR

<b>Q</b> 2) a	a)	What is Solid Ground Curing (SGC) Process? Explain in detail.	[9]
b	<b>)</b> )	What are the steps in Additive Manufacturing? Explain each step.	[8]
<b>Q</b> 3) a	a)	What is the working principle of Laminated Object Manufacturing? Ware the applications of Laminated Object Manufacturing?	Vhat [ <b>9</b> ]
t	<b>)</b> )	Write a short note on Multi-Functional RPM Systems (M-RPM).	[8]
		OR	
<b>Q4</b> ) a	a)	With a neat diagram, explain Melted Extrusion Modelling (MEM).	[9]
1	`		101

b) What is MAGICS software used for? Explain in detail. [8]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

- Q5) a) Explain the critical factors that influence the performance and functions of Selective Laser Sintering and 3-Dimentional printing. [9]
  - b) Write a short note on Multi-Functional RPM Systems (M-RPM). [9]

- Q6) a) With neat sketch, explain Laser Engineered, Net Shaping(LENS), [9]
  - b) What is the principle of Electron Beam Melting? What materials are used in Electron Beam Melting? What are the applications of Electron Beam Melting? [9]
- Q7) a) Write Short notes on Computer Aided Tissue Engineering (CATE) [9]
  - b) What is cranial implant? Explain in detail. [9]

#### OR

- Q8) a) Categorize the applications of Additive Manufacturing in the areas of customized implants and prosthesis. [9]
  - b) Categorize the applications of Additive Manufacturing in the areas of customized implants and prosthesis. [9]

### **be be**

[6354]-687

**PC-2554** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354] - 688

# B.E. (Production Sandwich Engineering) INDUSTRIAL ROBOTICS

### (2019 Pattern) (Semester - VII) (411123 B) (Elective - III)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat Diagram must be drawn wherever necessary.
- 4) Assume Suitable data if necessary.
- 5) Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.
- Q1) a) Explain the principal of working of acoustic sensor to measure the distance of the object from the gripper. [9]
  - b) Explain electro-optical sensors.

### OR

- Q2) a) With neat sketch explain the working of following sensors in robots: [9]
  - i) Electro optical sensors
  - ii) Tactile Sensors
  - iii) Light converting sensors
  - b) Explain any three pressure measurement sensors. [9]
- Q3) a) With neat sketch explain open loop and closed loop control system. [8]
  - b) Explain the working principle of permanent magnetic grippers and list the advantages and disadvantages of using these grippers. [9]

*P.T.O*.

[9]

<b>Q4</b> )	a)	Explain mechanical grippers and its force analysis equation.					
	b)	Explain the working principle of vacuum gripper.	[9]				
Q5)	a)	Explain any three robot programming Languages.	[9]				
	b)	Explain Lee's Algorithm & how it works.	[9]				
		OR					
<b>Q6</b> )	a)	Explain high level programming language and machine language.	[9]				
	b)	Write a note on interfacing of robots with computer.	[9]				
Q7)	a)	Explain Cobot and its types.	[9]				
	b)	What is Artificial Intelligence & explain role of Artificial Intelligence robotics.	e in [ <b>8</b> ]				
		OR					
Q8)	a)	Write a note on: -	[9]				
		a) Walking Robots					
		b) Assembly Robots					
		c) Climbing Robots					
	b)	Explain the role of robots in 3D printing application.	[8]				

# **F4 F4 F4**

# [6354]-688

2

PC-2555

[Total No. of Pages :2

**SEAT No. :** 

### [6354]-689

# B.E. (Production Sandwich Engineering) RELIABILITY ENGINEERING (Elective III) (2019 Pattern) (Semester - VII) (411123-C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Figure to the right indicates full marks.
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Assume Suitable data if necessary.
- 4) Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.
- 5) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- *Q1*) a) Discuss the challenges associated with failure data analysis for repairable systems. [9]
  - b) Suppose we have a system consisting of 10 identical components. The components operate independently and each component has an average time between failures of 200 hours. Calculate the MTTF for the entire system.

### OR

- Q2) a) Describe the use of failure mode and effects analysis (FMEA) in repairable system analysis.[9]
  - b) Explain the concept of failure data analysis in the context of reliability engineering. [8]
- *Q3*) a) Describe the key components of a Fault Tree diagram. [9]
  - b) For a logic diagram shown in figure. Construct fault tree. [9]



*P.T.O.* 

- Q4) a) A fire broke out at unit 1 of XYZ cable manufacturing company despite the safety system in place. The General Manager was very concerned about the accident and requested the Safety Officer in charge to evaluate the system. However, as part of the initial analysis of the existing system, the safety team used FTA to identify the different causes of the accident. Draw the fault tree diagram for the system.
  - b) Explain the difference between qualitative and quantitative Fault Tree Analysis. [9]
- Q5) a) Explain the concept of failure data analysis in reliability estimation. [9]
  - b) Describe the importance of reliability growth modeling in reliability estimation. [8]

- *Q6*) a) Discuss the relationship between reliability estimation and maintenance planning.
  - b) Describe difference between reliability prediction and reliability estimation. [8]
- Q7) a) Explain the concept of reliability optimization and its importance in engineering and system design. [9]
  - b) Discuss the key objectives of reliability optimization [9]

### OR

- Q8) a) Describe common approaches used for reliability optimization. [9]
  - b) Discuss the role of Standby redundant systems. [9]

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**PC-2556** 

[Total No. of Pages : 2

### [6354] - 690

# B.E. (Production Sandwich) MICRO ELECTRO MECHANICAL SYSTEMS (2019 Pattern) (Semester - VII) (411123 D) (Elective - III)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume Suitable data if necessary.
- *Q1*) a) Discuss the concept of static bending of thin plates. [8]
  - b) What do you mean by Thin Film Mechanics in MEMS? Discuss its importance with MEMS. [9]

### OR

- Q2) a) Explain the concept of Thermo Mechanics. How is it related with FEM?[9]
  - b) What do you understand by Finite Element Analysis? Discuss the concept with an example. [8]
- *Q3*) a) Write a short note on Scaling in Heat Transfer. [9]
  - b) Discuss the concept of Scaling laws in Miniaturization in brief. [9]

### OR

- *Q4*) a) Discuss the concept of Scaling laws in Miniaturization in brief. [9]
  - b) What do you understand by Electrostatic Forces in MEMS? Discuss in relation with Scaling. [9]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

Q5)	5) a) Describe in brief advantages and limitations of Micromachining			
	b)	Discuss any 2 types of Micro Machining processes in brief.	[9]	
		OR		
<b>Q6</b> )	a)	What are significant issues related with Surface Micro-Machining.	[9]	
	b)	Write a note on LIGA process of Micromachining.	[8]	
<b>Q</b> 7)	a)	What are Sensors? Explain in brief the Mechanism of Sensing used MEMS.	d in <b>[9]</b>	
	b)	Write a short note on Principle of Sensing with a suitable example.	[9]	
		OR		
<b>Q</b> 8)	a)	What are the different types of Membrane Transducer Materials Use	d? <b>[9]</b>	
	b)	Discuss any 2 of following :	[9]	
		i) CLOC		
		ii) E Nose		
		iii) Chemotransistors		
		iv) Mass sensitive Chemosensors		

### 

[6354]-690

**PC-2557** 

[Total No. of Pages : 2

SEAT No. :

## [6354]-691

# **B.E.** (Production Sandwich Engineering) CREATIVE PRODUCT DESIGN

### (Elective - IV) (2019 Pattern) (Semester - VII) (411124 A)

Time	me :2 <sup>1</sup> / <sub>2</sub> Hours]		ks : 70
Instr	ructio	ns to the candidates:	
	1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.	
	2)	Figures to the right indicate full marks.	
	3)	Use of a programmable calculator is not allowed.	
	4)	Write all necessary steps.	
Q1)	a)	What are the key points of Traditional Brainstorming.	[10]
	b)	Write short note on Pugh's concept.	[7]
		OR	
Q2)	a)	Explain the process of executing Morphological analysis and give exwith the help of Diagram.	xample [10]
	b)	Give summary of 6-3-5 Method.	[7]
<b>Q</b> 3)	a)	Discuss the Steps in Product Teardown.	[10]
	b)	Write short note on Force Flow (Energy Flow Field) Diagrams.	[8]
		OR	
Q4)	Writ	e short notes on following Benchmarking Process tools	[18]
	a)	Thoughts on Benchmarking the Competition	
	b)	Indented Assembly Cost Analysis	
	c)	Function-Form Diagrams	

<b>Q</b> 5) a)	Give any ten guidelines for Design for Assembly. [10]	Give any ten guidelines for Design for Assembly.[10]				
b)	What is your understanding about the term 'Theoretical Minimum numb of parts'.	er 7]				
	OR					
<b>Q6</b> ) a)	Discuss Global, Regional and Local Issues related to Environment.[1	0]				
b)	Mention Material Selection Guidelines and reasons in DFE. [7]					
<b>Q7</b> ) a)	Explain the various stages of Product Life Cycle with the help of Diagram. [8]					
b)	State the Advantages of Product life Cycle. [6]	State the Advantages of Product life Cycle. [6]				
c)	Define Product Lifecycle Management (PLM) & Product Lifecycle Management System (PLM System). [4]					
	OR					
<i>Q8</i> ) a)	Discuss following terms in context of Product data/Information. [12]	2]				
	i) Definition data of the product					
	ii) Life cycle data of the product					
	iii) Metadata that describes the product and lifecycle data					

b) Write short note on Reliability in Product Development. [6]



PC4425

SEAT No. :

[Total No. of Pages : 2

### [6354]-692 B.E. (Production S/W) MECHATRONICS (2019 Pattern) (Semester - VII) (Elective - IV) (411124 B)

Time : 2½ Hours]

Instructions to the candidates:

[Max. Marks : 70

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Use of scientific calculator is allowed.
- 3) Figures to the right indicate full marks.
- Q1) a) Explain the concept of interfacing in embedded systems. What are the key interface requirements that need to be considered when writing an assembly language program for microcontroller applications'? [9]
  - b) Explain how velocity and motion are measured using sensors. What types of sensors are suitable for these measurements, and what are their typical applications? [9]

- Q2) a) Explain the principles of serial interfacing and how it differs from parallel interfacing. Provide an example of an assembly program that sets up serial communication in a microcontroller. [9]
  - b) Define synchronous communication and explain its function in data transmission. How would you write an assembly program to facilitate synchronous communication between two microcontrollers? [9]
- Q3) a) Describe the time domain analysis of a control system and how transient characteristics such as % overshoot, damping factor, damping frequency, and rise time are estimated. Provide the mathematical definitions for each characteristic.
  - b) Discuss the process of frequency domain analysis of a system. Explain how Bode plots and Nyquist plots are used to estimate frequency domain parameters such as natural frequency and damping factor? [8]

- Q4) a) Explain how the natural frequency, damping frequency. and damping factor of a system can be estimated from its frequency response. Provide examples of how these parameters influence the stability and performance of a system?
  - b) Compare the differences between time domain and frequency domain analyses. What are the advantages and limitations of each approach in the context of system performance analysis? [8]
- Q5) a) Explain the terms displacement, position and proximity in the context of sensors. Discuss the types of sensors used for these measurements and their typical applications in industry? [9]
  - b) Define a servosystem and explain its role in mechatronics. How do open-loop and closed-loop control systems differ, and what are the advantages and disadvantages of each type? [8]

- *Q6*) a) Describe the working principles of sensors used for velocity and motion detection. Compare the types of sensors available for these measurements and their suitability for different applications? [9]
  - b) Describe the process of writing a basic PLC program using ladder logic. Include an example that demonstrates the use of basic logic functions such as AND, OR, and NOT? [8]
- Q7) a) Explain the basic structure of a Programmable Logic Controller (PLC) and the role of each component. Discuss how these components work together to control industrial processes? [9]
  - b) Discuss the performance characteristics and applications of vibration and acceleration sensors. Provide examples of where these sensors are used and why they are critical in monitoring systems? [9]

### OR

- Q8) a) Explain the principle and applications of semiconductor sensors and micro-chemical devices. How are these sensors utilized in modern technology for precision measurements? [9]
  - b) Discuss how shift registers are used in PLC programming. Develop a program that uses shift registers to control the sequence of lights in a traffic signal system? [9]

### \* \* \*

**PC-2558** 

[Total No. of Pages : 2

SEAT No. :

### [6354]-693

# B.E. (Production Engineering) (Sandwich) 411124 C: CAD/CAM (Elective - IV) (2019 Pattern) (Semester - VII)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8.
- 2) Figures to the right indicate full marks.
- 3) Use of a programmable calculator is NOT allowed.
- 4) Write all necessary steps.

<i>Q1</i> ) a) I	Discuss important f	features of Rapid	Prototyping &	applications.	[9]
------------------	---------------------	-------------------	---------------	---------------	-----

b)	Discuss	classification	of	Rapid	Prototyping	-	FDM,	LOM,	SLA,
	SLS.								[9]

#### OR

<b>Q2</b> ) a)	Explain CAD and Data exchange format & data format details.	[9]
----------------	---	-----

- b) Discuss Part Slicing and Orientation and its importance. [9]
- Q3) a) Explain Computer integrated production management system & enterprise resource planning. [9]
  - b) Discuss working principles of CNC Turning center and Milling center. [8]

<b>Q4</b> ) a)	Discuss The Siemens Model of CIM & IBM concept of CIM.	[9]
----------------	--	-----

- b) Discuss steps in developing CNC part program in detail. [8]
- **Q5**) a) Discuss Computer Aided Process Planning. [9]
  - b) Computer integrated production management system, inventory material requirement planning. [9]

Explain manufacturing resource planning & enterprise resource **Q6**) a) planning. [9] Discuss Computer application in manufacturing & inspection and quality b) control. [9] **Q7**) a) Discuss the elements of Product Life Cycle. [9] Discuss machine cell design and Cellular manufacturing. [8] b) OR Explain Part Families, Part classification and coding,. **Q8**) a) [9] Explain production flow analysis & Rank Order Clustering b) Algorithm. [8]



**PC-2559** 

SEAT No. :

[Total No. of Pages : 3

[Max. Marks : 70

## [6354]-694

# B.E. (Production Engineering) (Sandwich) DATA ANALYTICS

### (2019 Pattern) (Semester - VII) (411124 D) (Elective - IV)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) a) The average IQ of the adult population is 100. A researcher believes the average IQ of adults is lower. A random Sample of five are tested and scored 69, 79, 89, 99 and 109 with standard deviation 15.81.
  - i) State null hypothesis (Ho) and alternative hypothesis (Ha)
  - ii) At 99% confidence interval level, is there enough evidence to suggest that the average IQ is lower.
  - b) Discuss the following :
    - i) Expert system
    - ii) Principal component analysis
    - iii) Genetic algorithm

### OR

- Q2) What is mean by classification algorithm in machine learning? Discuss any three from the following : [18]
  - a) Logistic regression
  - b) Naive bays
  - c) K-NN
  - d) Decision Tree
  - e) Random Forest

[9]

**Q3**) Discuss the following :

- a) Markov chain analysis
- b) Monte carlo simulation
- c) Q Learning
- d) SARSA

### OR

- Q4) a) Assume that SAT score-are normally distributed and the SAT score of 1150 has a z score of 0.44. Find out how many percentages of students scored above and below the 1150 SAT score? Show the answers using normal distribution plot.
  - b) A factory has machine that dispenses 80 ml of the fluid in a bottle. An employee believes the average amount of fluid is not 80 ml. Using 40 sample, he measures the average amount dispensed by the machine is 78 ml with std. dev. of 2.5. [10]
    - i) State null hypothesis (Ho) and alternative hypothesis (Ha)
    - ii) At 95% confidence interval level, is there enough evidence to support the idea that machine not working properly?
- Q5) a) What is predictive analysis? Discuss with at least five real-time applications. [9]
  - b) What is univariate, bivariate, and multivariate analysis? Write the difference between them? Discuss with examples. [9]

### OR

- Q6) a) The job market is being studied in several neighborhoods. Let x represent total number of jobs in a given neighborhood, and y represents entry level jobs in the same neighborhood. A sample six neighborhood gave the following information. [12]
  - i) Find out the linear regression model using least square method
  - ii) For a neighborhood with 40 jobs, how many jobs are predicted at entry level?

X	16	33	50	28	50	25
У	2	3	6	5	9	3

b) What do you understand by neural network in deep learning? Write are the advantages, disadvantages and application of the neural network. [6]

Q7) a) The following is data collected by the 'A' ice-cream manufacturer's sales department in the 'P' city. Let x represent temperature observed in months (°C), and y represents sell of the ice- cream in the same month (tons). They want to analyze their sells with months and their temperatures. The collected data is transferred to R&D department and you are the head of R&D. The company asking you to find out covariance and correlation between temperature and monthly ice-cream sell? [12]

Months	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
х	15	21	31	34	38	37	31	28	23	25	16	13
У	09	18	21	23	25	19	14	12	10	12	09	08

b) Write the difference between covariance and correlation.

[6]

#### OR

- Q8) a) In a class, average placement salaries of the student are 3.1 LPA and given salaries are normally distributed with standard deviation of 2. Then, find how many percentages of student lies between salaries offered from 7.46 LPA to 10 LPA?
  - b) The following data shows the box office collection of three films 'A', 'B', and 'C', which were released in the years 1975, 2001 and 2020 respectively, and having a box office collection 35, 137 and 332 Cr in the order mention above. [12]

Movie	Year	Movie income	Average movie income in box	Std. deviation
		(Cr)	office in particular year (Cr)	
А	1975	35	12.5	4.65
В	2001	137	35	12.95
С	2020	332	169	51.52

From the above given data, which movie shows the maximum collection in respective year as compare to others?

### \*\*\*

PC2560

[6354]-695

[Total No. of Pages : 2

SEAT No. :

# B.E. (Production Engineering) (Sandwich) SUPPLY CHAIN MANAGEMENT (2019 Pattern) (Semester - VIII) (411134-A) (Elective - V)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicates full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Assume suitable data if necessary.
- 5) Use of logarithmic table, slide rule is electronic pocket calculator is allowed.
- Q1) a) Explain the concept of Economic Order Quantity (EOQ) and discuss its significance in inventory management. Explain with example. [8]
  - b) Explain the ABC analysis method for inventory classification. Discuss the criteria used to categorize inventory items into A, B, and C classes.[9]

OR

- Q2) a) Discuss the role of lead time in inventory management. Explain how lead time variability affects inventory levels. [8]
  - b) Explain the concept of inventory carrying costs. Discuss the different components of carrying costs. [9]
- Q3) a) Discuss the importance of network design in supply chain management.[8]
  - b) Describe the role of inventory positioning in supply chain design. [9]

OR

- Q4) a) Explain the concept of risk management in supply chain design. [8]
  - b) Discuss the role of technology in supply chain design. [9]

*P.T.O.* 

- Q5) a) Explain the concept of supply chain coordination and its significance in improving overall supply chain performance. [9]
  - b) Describe the role of information sharing in supply chain coordination.[9]

- *Q6*) a) Explain how companies collaborate with suppliers, distributors, and other partners to align goals, share risks, and create integrated supply chain networks.
  - b) Discuss the role of incentives and contracts in supply chain coordination.[9]
- Q7) a) Describe the role of cost-to-serve analysis in supply chain optimization.[9]
  - b) Discuss the impact of transportation costs on supply chain design and decisionmaking. [9]

- *Q8*) a) Explain the concept of inventory carrying costs and its significance in supply chain management. [9]
  - b) Discuss the importance of supplier financing programs in supply chain management. [9]



PC-2561

[Total No. of Pages :2

[Max. Marks : 70]

**SEAT No. :** 

### [6354]-696

# B.E. (Production Sandwich Engineering) Plant Engineering and Maintenance (2019 Pattern) (ELECTIVE - V) (Semester - VIII) (411134 B)

### *Time :2<sup>1</sup>/<sub>2</sub>Hours] Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figure to the right indicates full marks.
- *Q1*) a) Explain 4 type of maintenance? The future of preventive maintenance with AI and IoT. [9]
  - b) How do you develop a maintenance strategy? [9]

- Q2) a) Explain The different types of maintenance strategies include: Preventive maintenance Corrective maintenance Predetermined maintenance Condition-based maintenance Reactive maintenance.
   [9]
  - b) Example of Preventative Maintenance Costs of Preventative Maintenance The Difference Between Predictive Maintenance and Preventive Maintenance. [9]
- Q3) a) What is the Difference Between the Failure Rate and Hazard Rate? [9]
  - b) The component failure data for ten components subjected to a life test are given below. Find the failure density rate and hazard rate. [9]

Failure	1	2	3	4	5	6	7	8
Operating time hrs	8	20	34	46	63	86	111	141

OR

- Q4) a) What is hazard rate in reliability? How do you apply the principles of life cycle costing to your projects? [9]
  - b) What are the stages of life cycle costing? What is Life Cycle Cost Analysis? Life cycle cost of Electricity Supply Industry. [9]

Q5)	a)	Explain Ten Steps Methodology for Detailed Energy Audit.	[9]
	b)	Explain Applicable MSIHC rules 2000.	[9]
		OR	
<b>Q6</b> )	a)	Explain Details of major anticipated risks from the Hazards.	[8]
	b)	Explain Salient Feature of Risk Mitigation.	[9]
Q7)	a)	Explain Condition based maintenance of bearings and gears for fadetection.	ault <b>[8]</b>
	b)	Explain Products and Installations Monitored with Ferrography testing	:[9]
		• Engines, Gears, Pumps	

- Compressors, Gas Turbines
- Steam Turbines
- Hydraulic Systems, Refrigeration Systems
- Grease Lubricated Bearings

- (*Q8*) a) Explain Gearbox Condition Monitoring and Diagnosis of Unlabeled Vibration Signals. [8]
  - b) Explain An overview of ferrography and its use in maintenance. [9]



PC-2562

[Total No. of Pages : 2

SEAT No. :

## [6354]-697

# B.E. (Production Sandwich Engineering) 411134-C: Industrial Relations & Human Resource Management

# (Elective V) (2019 Pattern) (Semester - VIII)

Time : 2	[Max. Ma	erks : 70
Instruct	ions to the candidates:	
1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8	
2)	Assume suitable data, jf necessary. Figures to the right side indicate full marks	
3) 4)	Neat diagrams must be drawn wherever necessary.	
<b>Q1</b> ) a)	What are the Promotions policy follow in Industry?	[8]
b)	What Recruitment and selection process follow in IT Industry?	[9]
	OR	
<b>Q2</b> ) a)	Enlist and brief Main resources of recruitment.	[8]
b)	Write note on Job Enrichment and Job Rotation.	[9]
<b>Q3</b> ) a)	What parameters involved in Training Process?	[9]
b)	Explain Methodology follow in Training Process.	[9]
	OR	
<b>Q4</b> ) a)	Explain the Need and objectives of training process.	[9]
b)	Describe Evaluation of Training Programmes.	[9]
<b>Q5</b> ) a)	Why it is necessary to follow Ethics in appraisal system?	[9]
b)	Explain in brief Concepts of Performance Management.	[9]
	OR	
<b>Q6</b> ) a)	What are the Different methods of Performance Appraisal?	[9]
b)	What is Rating Errors? brief with example.	[9]
		<i>P.T.O.</i>

- Q7) a) what are the main reasons of Voluntary Retirement? Does this helpful to Industry? Explain why? [9]
  - b) What are the main aspects responsible for Layoffs? What will be the solution to overcome this issue? [8]

- **Q8)** a) Write note on Industrial Democracy and Industrial Peace.[ 9]
  - b) What is the Role of HRD in developing Industrial Relations? [8]



PC-2563

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354]-698

# B.E. (Production Engineering) (Sandwich) MARKETING MANAGEMENT (2019 Pattern) (Semester - VIII) (Elective-V) (411134D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, jf necessary.
- 3) Figures to the right side indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.

### <u>Unit-Ill</u>

- *Q1*) a) What is Market Segmentation? Discuss in relation with current market scenario with suitable examples.[8]
  - b) How is strategic decision making is done in Marketing Management? Discuss. [9]

### OR

- Q2) a) Discuss in Brief Gathering Marketing Information with Production Engineering Perspective. [9]
  - b) What is the relation between segmenting the market and product positioning in the market? Discuss with suitable Example. [8]

### Unit -IV

- Q3) a) Discuss the concept of Product Development from Marketing Perspective.[9]
  - b) Write a note on Price Theories of Marketing Organization for new product.[9]

OR

- Q4) a) Explain the concept of designing and managing product promotions.Discuss in relation with New Product Development. [9]
  - b) What are intermediaries one needs to face during marketing of products during product development. [9]

*P.T.O.* 

### UNIT-V

<b>Q5</b> ) a)	Explain Sales Force and Sales Terries in regards to Market Management.	ting [ <b>8</b> ]
b)	Discuss the concept of services marketing.	[9]
	OR	
<b>06</b> ) a)	Discuss the relationship between Technological Innovations	and

- (9) a) Discuss the relationship between lechnological innovations and Marketing.
  - b) Write a note about social marketing and its importance. [8]

### UNIT-VI

- Q7) a) What is marketing research? Discuss its importance with reference to Marketing Management. [9]
  - b) How are quantitative tools useful in Marketing Research. Discuss in brief.[9]

- Q8) a) Explain the importance of Marketing Research from an Engineering Perspective. [9]
  - b) Discuss in brief the Structure and Methods of Marketing Research. [9]



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[6354]-699

[Total No. of Pages :2

SEAT No. :

# B.E. (Artificial Intelligence & Machine Learning) INFORMATION RETRIEVAL IN AI (2019 Pattern) (Semester- VII) (418541)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

<b>Q1</b> ) a)	Explain in detail the term NDCG. Explain with suitable example.	[9]
----------------	---	-----

b) What are the various techniques used to specify query in information visualization? [9]

#### OR

Q2)	a)	Explain in detail Visualization in Information System.	[9]
	b)	Elaborate query specification in IR in detail with examples.	[9]
Q3)	a)	Write short note on:	[9]
		i) GEMINI indexing approach	
		ii) MULTOS data model	
	b)	Explain in detail Multimedia office Server (MULTOS).	[8]
		OR	
<b>Q4</b> )	a)	What are Query Languages with respect to multimedia IR? Explain detail.	in it in <b>[9]</b>
	b)	Describe the architecture of Distributed IR. Why is DIR (Distributed IR. Why is DIR (D	ibuted
		Information Retrieval) necessary?	[8]
Q5)	a)	Explain the following in brief.	[9]
		i) Web scraping	
		ii) Meta searches	
		iii) Search engines	
	b)	What is ranking? Explain importance of ranking in detail.	[9]
		OR	

*P.T.O.* 

Q6)	a)	What is web Crawling? Explain techniques used by web crawlers crawl the web.	to [ <b>9</b> ]
	b)	What is role of crawler in web searching? Write short note on Search the web.	ing <b>[9]</b>
Q7)	a)	Explain Difference between simple search and Metasearch.	[9]
	b)	Explain basics working of metasearch.	[8]
		OR	
Q8)	a)	Write Real Life Examples of metasearch engines.	[9]
	b)	Explain Need and Significance of Metasearch.	[8]



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### [6354]-700

# B.E. (Artificial Intelligence & Machine Learning) CLOUD COMPUTING

## (2019 Pattern) (Semester - VII) (418542)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Define Platform as a Service (PaaS) and outline its key components.[10]
  - b) Describe the procedural steps required to initiate the launch of an EC2 instance within the AWS Cloud environment. [8]

### OR

- *Q2*) a) Explain the architecture of Google App Engine (GAE) and its working and Microsoft Azure Services Platform. [10]
  - b) Compare and contrast the advantages and disadvantages of adopting Software as a Service (SaaS) compared to traditional software licensing models. [8]
- Q3) a) Explain Simple Storage Service (S3) in cloud computing, highlighting their respective functionalities and characteristics. [9]
  - b) Describe components of HDFS and Virtual storage containers. [8]

OR

Q4) a) Explain the Big tables and HBase in detail. [9]
b) Explain components of Google File System and cloud storage providers. [8]
Q5) a) Describe different risk and threats involved in cloud security mechanism. [9]
b) Explain the security mechanisms and security policies. [8]

[Total No. of Pages : 2

[Max. Marks : 70

SEAT No. :

- **Q6**) a) Explain Sign-Sign-On (SSO) and Identity Access Management (IAM).[9]
  - b) Explain integrity, Authenticity, availability and Threat in cloud security.[8]
- *Q7*) a) Explain following Standards for Messaging- SMTP, POP. [10]
  - b) How does Docker work, and provide an example to illustrate its functionality? [8]

<b>Q8</b> ) a)	Wr	ite short note on:	[10]
	i)	Standards for Application Developers	
	ii)	Standards for Messaging in cloud computing	
b)	Exp	plain Standards for security SAML OAuth, OpenID.	[8]

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PC2566

[6354]-701

[Total No. of Pages :2

**SEAT No. :** 

# B.E. (Artificial Intelligence and Machine Learning) DEEP LEARNING FOR AI

### (2019 Pattern) (Semester- VII) (418543)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data wherever necessary.
- *Q1*) a) Describe Recursive Neural Network and types of Recursive Neural Network. Explain its advantages. [10]
  - b) Explain Long Short-Term Memory Networks (LSTM) in detail. [8]

### OR

- *Q2*) a) Explain Encoder Decoder architectures. Explain any two Real-world applications of encoder-decoder architecture. [10]
  - b) Explain how sequence to sequence model works. [8]
- Q3) a) Explain the structure of regularized autoencoders. What is the purpose of sparsity constraint in sparse autoencoder? [10]
  - b) Describe Denoising Autoencoders, Contractive Autoencoders. [7]

### OR

- Q4) a) Explain the architecture of sparse autoencoder with suitable diagram.What are advantages of sparse encoder over usual autoencoder? [10]
  - b) Explain how the dimensionality reduction feature of autoencoder is useful in information retrieval task? [7]

*P.T.O.* 

<b>Q5</b> ) a)	Ex	plain Dense Net architecture in detail.	[10]
b	) Wr	ite Short note on	[8]
	i)	Representation Learning	
	ii)	Distributed Representation.	
		OR	
<b>Q6</b> ) a)	Wł	nat is transfer learning? Elaborate transfer learning domain adapta	ation. [ <b>10</b> ]
b	) Ela	aborate Variants of CNN in detail.	[8]
<b>Q7)</b> a)	Wł Ad	nat is Discriminator? Explain the different Applications of Gener versarial Networks?	ative [ <b>10</b> ]
b	) Wr	ite short note on Denoising and Sparcity.	[7]
		OR	
<b>Q8</b> ) a)	Exj wit	plain Generative Adversarial Network Architecture and its Compo h neat diagram.	nents [10]

b) Explain Different Types of GAN Models. [7]



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[Total No. of Pages : 2

### [6354] - 702

# B.E. (Artificial Intelligence & Machine Learning) Elective III: Quantum Computing (2019 Pattern) (Semester - VII) (418544 A)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.
- *Q1*) a) Compare between classical and quantum computing with suitable example. [8]
  - b) Write Short note on
    - i) Quantum Bits
    - ii) Quantum Computation
    - iii) Quantum Algorithms
    - iv) Quantum Information and Quantum information processing

#### OR

[9]	Explain Quantum measurement with suitable examples.	<b>22</b> ) a)
[8]	Explain any 2 postulates of quantum mechanics with examples.	b)
sform. <b>[9]</b>	Explain in detail Discrete Fourier Transform and Fast Fourier Tran	<b>23)</b> a)
ization [9]	What is Quantum Fourier Transform? Explain Shore's Factor Algorithm in detail.	b)

[Max. Marks : 70

[9]

SEAT No. :

Q4)	a)	What are Quantum simulation algorithm. Explain quantum simulations with examples. [9]		
	b)	Write	e Short Note on: [9	]
		i)	Quantum circuits,	
		ii)	Quantum algorithms and qubit operations.	
Q5)	a)	Expl	ain Phase estimation performance and requirements with example.[8	;]
	b)	Write	e short note on Quantum Fourier Transform. [9	]
OR				
<b>Q6</b> )	a)	Explain different types of Quantum Fourier Transform Applications in all domains. [9]		1 ]
b)		Discuss Discrete algorithms in detail. [8]		
Q7)	a)	Write short note on [9]		
		i)	Quantum Machine Learning and Quantum AI	
		ii)	Quantum Neural Networks and Natural Language	
	b)	Expl	ain Quantum Cryptography in detail. [9	]
OR				
<b>Q</b> 8)	a)	What is Machine learning? Explain different Application Domains for Quantum Machine Learning.		r
	[9]			
	b)	Expl exan	ain Quantum Machine Learning and Quantum AI in detail with suitabl nple. [9	e ]

[6354]-702

2

**PC-2568** 

[Total No. of Pages : 2

### [6354] - 703

# **B.E.** (Artificial Intelligence & Machine Learning) **Elective III: Blockchain Technology** (2019 Pattern) (Semester - VII) (418544 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- Figures to the right indicate full marks. 3)
- Assume suitable data, if necessary. **4**)
- What is the fundamental concept behind Ethereum's blockchain platform *Q1*) a) and how does it differ from traditional databases? [7]
  - How are transactions grouped into blocks, and what role do these blocks b) play in the Ethereum blockchain? [6]
  - How does Ethereum's consensus model ensure the security and integrity c) of the blockchain and what is its primary purpose? [5]

OR

- *Q2*) a) Describe the essential components of the Ethereum ecosystem and their respective functions. [7]
  - Explain the concept of runtime byte code in Ethereum and how it is used b) in the execution of smart contracts. [6]
  - Provide an overview of how smart contracts work on the Ethereum platform c) and their significance in the ecosystem. [5]
- *Q3*) a) What is Hyperledger and how does it differ from other blockchain platforms like Ethereum? [6]
  - What are some of the benefits that organizations can achieve by b) implementing Hyperledger Fabric for their blockchain solutions? **[6]**
  - Describe the architecture of the Hyperledger Fabric system, highlighting c) the roles of different elements within the network. [5]

[*Max. Marks* : 70

**SEAT No. :**
<b>Q4</b> )	a)	How does Hyperledger Fabric work and what are its core compon that enable its functionality?	ents [6]
	b)	What are the key considerations when choosing between Hyperled and Ethereum for a particular blockchain project, based on the fundamental differences?	lger heir [6]
	c)	How does Hyperledger ensure privacy and permissions in a blockel network and why is this important for enterprise applications?	nain [5]
Q5)	a)	Short note on:	[7]
		i) Tokenizing Shares and Fund Raising	
		ii) Challenges to Tokenization	
	b)	State and explain different types of Consensus algorithm.	[6]
	c)	How blockchain tokenization can help in enterprise systems? Elabor	ate. [5]
		OR	
<b>Q6</b> )	a)	What is token? Describe technology behind tokenization.	[7]
	b)	Describe the Consensus mechanism in brief.	[6]
	c)	Discuss following consensus algorithms:	[5]
		i) Proof of work	
		ii) Proof of activity	
Q7)	a)	Explain blockchain applications in Supply Chain Financing.	[6]
	b)	Explain different aspects of Risk and Limitations of Blockchain.	[6]
	c)	State and explain different aspects of healthcare where Blockcl technology can be used.	1ain [ <b>5</b> ]
		OR	
Q8)	a)	Explain role of blockchain in Healthcare Insurance application.	[6]
	b)	What are the selection Criteria for Blockchain platform for Application Explain	ons? [ <b>6</b> ]

 c) Explain the "Evil Sides" of Blockchain and Legal Regulations for Blockchain. [5]

### **be be be**

# [6354]-703

2

**PC-2569** 

[Total No. of Pages : 2

### [6354] - 704

# B.E. (Artificial Intelligence & Machine Learning) AI IN DRONES

# (2019 Pattern) (Semester - VII) (418544C) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- *Q1*) a) Explain the different types of Payload and their significance in drones.[9]
  - b) Describe radio communication methods used by drones in detail. [9]

#### OR

<b>Q2</b> ) a	a)	What are the concepts of kinematics and dynamics in drone?	[9]
ł	<b>b</b> )	Demonstrate the different Antenna categories in drone.	[9]
Q3) a	a)	What is Global Positioning System? Describe with appropriate examp	ole. <b>[9]</b>
ł	<b>b</b> )	Describe the working of control station in drone.	[8]
		OR	
<b>Q4</b> ) a	a)	Explain waypoint navigation using a relevant example.	[8]
t	<b>b</b> )	Describe how is path planning carried out in drone.	[9]

*P.T.O.* 

Hand TTT)

[Max. Marks : 70

SEAT No. :

Q5)	a)	What does drone flight control mean? Explain in detail.	[9]
	b)	Explain how a drone's transmitter and receiver work?	[9]
		OR	
<b>Q6</b> )	a)	What are the different types of electronic speed controllers.	[9]
	b)	Describe the different types of flight controllers?	[9]
Q7)	a)	What do you mean by aerial photography? Explain with example.	[9]
	b)	Explain drone mapping and surveying.	[8]
		OR	
Q8)	a)	What are the applications of drones in Surveillance?	[9]
	b)	Explain with an example of how a drone is used to inspect a building	g. <b>[8]</b>

# **F4 F4 F4**

[6354]-704

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-705

# B.E. (Artificial Intelligence and Machine Learning) ETHICAL HACKING AND CYBER FORENSICS (Elective - IV) (2019 Pattern) (Semester - VIII) (418545 A)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) What is Metasploit, and what is its primary function in the context of ethical hacking? [9]
  - b) Can you summarize the stages involved in a typical Metasploit attack?[9]

OR

- Q2) a) Can you summarize the various stages of a typical host exploitation using Metasploit? [9]
  - b) Describe the role of social engineering in password cracking techniques employed by ethical hackers. [9]
- Q3) a) Recall the importance of OWASP's Top 10 vulnerabilities in the context of web application security. [9]
  - b) How would you use a vulnerability scanner to identify and exploit a specific vulnerability in a web application? [8]

#### OR

- Q4) a) Name the different types of wireless attacks that ethical hackers use in security assessments. [9]
  - b) What is steganography, and how does it differ from cryptography in the context of secure communication? [8]

*P.T.O.* 

- Q5) a) Identify the key tools and technologies utilized in digital forensics for evidence examination and extraction. [9]
  - b) Describe the importance of maintaining chain of custody in digital forensics and its impact on evidence admissibility. [9]

- *Q6*) a) Recall the fundamental steps involved in conducting a mobile device forensic analysis. [9]
  - b) Explain the challenges associated with preserving and capturing network data in network forensics. [9]
- Q7) a) What is cloud-based digital forensics, and how does it differ from traditional digital forensics methods? [9]
  - b) What is the Internet of Things (IoT), and how does it impact cybersecurity and digital forensics? [8]

- Q8) a) Name the various ethical guidelines or codes of conduct that guide professionals in ethical hacking and cyber forensics. [9]
  - b) Explain the significance of legal compliance in ethical hacking and cyber forensic practices. [8]



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[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# [6354]-706

# B.E. (Artificial Intelligence and Machine Learning) Augmented Reality and Virtual Reality (2019 Pattern) (Semester - VII) (418545 B) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary
- 3) Figures to the right indicates full marks
- 4) Assume Suitable data if necessary
- *Q1*) a) Explain How concept of perception of Motion and Perception of Color differs and their application areas. [9]
  - b) Explain the process for Combining Sources of Information for visual rendering. [8]

#### OR

<b>Q2</b> ) a)	Explain how representation of Motion in Real and virtual worlds d	iffers.
		[8]
b)	What is tracking? Explain 2D tracking system.	[9]

- **Q3**) a) Explain stepwise how does Augmented Reality works? [8]
  - b) Explain the system structure of Augmented Reality with suitable applicable diagram. [9]

- Q4) a) Explain the software functional components involved directly in Augmented Reality applications. [8]
  - b) What is Mobile Augmented Reality? Write down different advantages and disadvantages of Mobile Augmented Reality. [9]
- Q5) a) Explain sensory displays used in Augmented Reality Hardware. How they are different than Haptic displays? [9]
  - b) Explain the characteristics for stationary tracking systems. [9]

- *Q6*) a) Explain the role of processor and processor system architecture Augmented Reality. [9]
  - b) Explain the process of Tracking and calibration. In what aspects both of them are different? [9]
- *Q7*) a) Explain programming languages used for VR Application development [9]
  - b) Explain applications of VR in Architecture and Construction [9]

#### OR

*Q8*) Write short notes on (Any 3)

[18]

- 1) VR application development using Unity
- 2) Legal and social factors in AR application development
- 3) Sensor Fusion
- 4) Applications of AR and VR in Health and medicines

[6354]-706

2

[Total No. of Pages : 2

**SEAT No. :** 

### [6354]-707

# B.E. (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) DevOps in Machine Learning (Elective - IV) (2019 Pattern) (Semester - VII) (418545C)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answers: Q. 1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.
- Q1) a) Define Continuous Monitoring. What are its benefits? Explain how Continuous Deployment is different from Continuous Monitoring? [9]
  - b) What are factors involved in monitoring systems? Explain with suitable eg. black box and white box monitoring. [8]

Q2)	a)	Explain various deployment pipeline practices and Commit stage with suitable case studies. [8]
	b)	Explain the concept of Site Reliability engineering and its role in DevOps. [9]
Q3)	a)	Explain containerization using Dockers. [9]
	b)	Explain how version control is achieved using Git? [8]
		OR
<b>Q4</b> )	a)	Explain Continuous integration with Jenkins. [8]
	b)	Explain Serverless orchestration in Kubernetes. [9]
Q5)	a)	Explain with suitable diagram machine learning life cycle. How MLOPs is useful in this? [9]
	b)	What is Motivation behind MLOPs? Explain how MLOPs is different than DevOps. [9]

- *Q6*) a) Explain different roles involved in MLOPs. How these roles are different than DevOps? [9]
  - b) Explain how testing, monitoring and maintenance is carried out in MLOPs? [9]
- Q7) a) Define MLOPs. Explain various stages of CI/CD in MLOPs using suitable case study/diagram.
   [9]
  - b) Explain the process of automation of ML through pipelines. [9]

- *Q8*) Write short notes on [Any 3]
  - a) JIRA
  - b) Tools to create ML pipelines
  - c) Docker
  - d) Future trends in M LOPs



[18]

PC2573

SEAT No. :

[Total No. of Pages : 2

### [6354]-708

# B.E. (Artificial Intelligence and Machine Learning) NATURAL LANGUAGE PROCESSING (2019 Pattern) (Semester - VIII) (418550)

<i>Time</i> : 2 <sup>1</sup>	/2 Hours]	[Max. Marks: 70
Instructi	ons to the candidates:	
1)	Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.	
2)	Neat diagrams must be drawn wherever necessary.	
3)	Figures to the right side indicate full marks.	
4)	Assume Suitable data if necessary.	
<b>Q1</b> ) a)	Explain Simple n-gram models.	[6]
b)	Write a short note on:	[6]
	i) Bag of words	
	ii) TFIDF	
c)	Explain Markov model with example.	[6]
	OR	
<i>Q2</i> ) a)	What is Latent Dirichlet Allocation (LDA).	[6]
b)	Explain graph-based model along with its applications.	[6]
c)	Explain Latent semantic analysis.	[6]
<b>Q3</b> ) a)	Explain the concept of a vector space model in the contex	t of information
	retrieval. How does it represent documents and queries?	[6]
b)	Describe the methods, techniques, and difficulties involve	ed in developing
	a Named Entity Recognition (NER) system.	[6]
c)	In natural language processing, distinguish between rel	ation extraction
- /	and entity extraction	[5]
	OR	[-]
<b>04</b> ) a)	What are the key components of a vector space model a	nd how are they
2 - / /	computed?	[6]
h)	Discuss the process of coreference resolution in na	tural language
0)	processing (NLP) including key steps challenges and t	techniques used
	to address them	
、 、	to address them.	[0]
c)	Explain the NER pipeline.	[5]

<b>Q</b> 5)	a)	Compare and contrast prominent natural language processing (NL	LP)
		libraries such as Natural Language Toolkit (NLTK), spaCy, TextBlo	ob,
		and Gensim.	[6]
	b)	Explain Verbnet and Treebank	[6]
	c)	What is Word Sense Disambiguation	[6]
		OR	
<b>Q6</b> )	a)	Discuss features, strengths, weaknesses, and typical use cases in NI	LP
		applications for natural language processing (NLP) libraries such as Natu	ral
		Language Toolkit (NLTK), spaCy, TextBlob, and Gensim.	[6]
	b)	Describe the structure of WordNet and how it can be used in vario	ous
		NLP tasks.	[6]
	c)	What is Treebank?	[6]
Q7)	a)	Compare and contrast rule-based techniques and Statistical Machi	ine
		Translation (SMT) in the context of machine translation.	[6]
	b)	Explain the Question Answer system in NLP	[6]
	c)	Comment on Natural Language Generation.	[5]
		OR	
<b>Q</b> 8)	a)	Explain the concept of Sentiment Analysis in natural language processi	ng
		(NLP), including its methods, applications, challenges, and evaluati	on
		metrics.	[6]
	b)	What is SMT explain with usecase.	[6]
	c)	Comment on Text Entailment	[5]



[Total No. of Pages : 2

**SEAT No. :** 

### [6354]-709

# B.E. (Artifical Intelligence and Machine Learning) DISTRIBUTED SYSTEM (Elective-V) (2019 Pattern) (Semester - VIII) (418551A)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, jf necessary.
- 3) Figures to the right side indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- *Q1*) a) What is Inter-process Communication in Distributed Systems? What are the main functions of IPC? Describe the general characteristics of interprocess communication. [9]
  - b) What are election algorithms in distributed systems? Describe the bully algorithm step-by-step. [9]

#### OR

- Q2) a) What is IPC? Explain with the example of communication between processes using the shared memory. [9]
  - b) What is NTP? Describe the working of NTP and discuss the different applications of NTP. [9]
- Q3) a) What is Replication in Distributed System? Why do we require replication? Discuss the ypes of replications. [9]
  - b) What is a primary-based protocol in a consistency protocol? Explain the working of primary-backup protocol with suitable diagram. [8]

- *Q4*) a) What are the key issues in Replica Management? Explain the following with respect to content replication and placement with suitable diagram.[9]
  - i) Permanent Replicas
  - ii) Server-Initiated Replicas
  - iii) Client-Initiated Replicas

- b) What is the distribution commit problem? Discuss how this problem is solved using the two-phase commit protocol with suitable diagram. [8]
- Q5) a) What is Distributed File System? Explain the different features of Distributed File System. [9]
  - b) What are web services? Describe with a suitable diagram the general organization of the Apache web server. [9]

- *Q6*) a) Describe the architecture of Sun Network File System in details. [9]
  - b) What Does Web Proxy Cache Mean? What is the role of proxy server? Explain the various advantages of a proxy server? [9]

[8]

- *Q7*) a) What is Service Oriented Architecture (SOA)? Explain the various SOA components. How does it differ from traditional software architecture?[9]
  - b) Explain the following in brief:
    - i) Wearable devices
    - ii) PVM
    - iii) JINI

- **Q8**) a) Explain in brief, the key features of Zabbix. [9]
  - b) What are the different Wearable devices available in market? Explain the Key challenges Wearables. [8]



[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-710

# B.E. (Artificial Intelligence and Machine Learning) SOFTWARE PROJECT AND MANAGEMENT (418551B) (Elective-V) (2019 Pattern) (Semester - VIII)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7 or Q8.
- 2) Assume suitable data, jf necessary.
- 3) Figures to the right side indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) What are the primary components of a Use Case diagram in UML and how do they facilitate project design? [8]
  - b) Describe the role of Sequence diagrams in modeling system interactions. How do they differ from Deployment diagrams in their focus? [6]
  - c) What is the GQM Paradigm and how does it aid in process measurement? [4]

OR

- Q2) a) How do Class diagrams in UML contribute to understanding the structure of a system? Explain with a suitable example. [8]
  - b) Explain how Cost Benefit Evaluation techniques can be utilized to justify project investments. [6]
  - c) How can risks to the project schedule be evaluated and mitigated using Risk Strategies? [4]
- Q3) a) Describe the four steps in project cost management. How do they integrate with earned value analysis? [7]
  - b) What are the different types of contracts in software project management and what are the benefits of each? [6]
  - c) What are four features of a good status report and how do they contribute to project management? [4]

[Max. Marks : 70

- Q4) a) Discuss the different factors influencing the Change Control Process and the role of a Change Process Flow Diagram. [7]
  - b) How do tools like Git, Team Foundation Server and Ansible support software configuration management? [6]
  - c) What are the key components of monitoring and control processes in project management. [4]
- Q5) a) What are considered the best methods for staff selection and how do they impact organizational performance? [8]
  - b) What are the key strategies for managing stress in the workplace to maintain high levels of employee health? [6]
  - c) What are the unique challenges and benefits of managing dispersed and virtual teams? [4]

- *Q6*) a) How does the Oldham-Hackman Job Characteristic Model influence job design and employee satisfaction? [8]
  - b) How do different organizational structures affect decision-making processes within a company? [6]
  - c) What are the key principles of effective people management in a modern organizational setting? [4]
- Q7) a) Discuss the tools and features in Azure DevOps that support visibility and collaboration among project teams. [7]
  - b) What features does TFS offer for managing Agile projects and how do they compare to those in Azure DevOps? [6]
  - c) How can Azure DevOps be integrated with other tools and systems to enhance project management? [4]

- Q8) a) What role do metrics play in Agile practices and how are they implemented? [7]
  - b) What are the main differences between Microsoft Team Foundation Server (TFS) and Azure DevOps? [6]
  - c) What are the key features of Application Lifecycle Management (ALM) in Azure DevOps? [4]



PC-2576

[Total No. of Pages : 2

**SEAT No. :** 

### [6354]-711

# B.E. (Artificial Intelligence and Machine Learning) COMPUTER VISION

(418551C) (Elective-V) (2019 Pattern) (Semester - VIII)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Draw neat diagrams and assume suitable data wherever necessary.
- 3) Figures to the right side indicate full marks.
- Q1) a) Discuss the key characteristics of a good feature detector and how it affects image analysis. [9]
  - b) Define vanishing points and discuss their importance in perspective and geometry. [9]

#### OR

- Q2) a) Explain the role of feature descriptors in face recognition systems. [9]
  - b) Discuss how vanishing point detection can be used for camera calibration and scene reconstruction. [9]
- Q3) a) Define the foot-of-normal method and explain how it is used for line detection.
  - b) Explain methods for addressing the problem of unknown circle radius in Hough- based detection. [8]

- Q4) a) Discuss the advantages and limitations of Hough-based schemes for detecting circular objects. [9]
  - b) Describe different types of graph structures used in a graph-theoretic approach to object location. [8]
- Q5) a) Discuss the advantages and limitations of using isometric and axonometric projection in 3D visualization. [9]
  - b) Discuss the challenges and limitations of shape from texture in 3D vision. [9]

- *Q6*) a) Explain the significance of 3D reconstruction in computer vision and how it is achieved. [9]
  - b) Describe the bundle adjustment process and its importance in refining 3D models. [9]
- Q7) a) Explain the process of face detection and its significance in photo albums and personal photo collections. [9]
  - b) Discuss chamfer matching and how it is used for object tracking in surveillance. [8]

- Q8) a) Describe how particle filters handle uncertainty in object tracking and prediction. [9]
  - b) Explain how intelligent photo editing tools utilize computer vision techniques to improve image quality. [8]



**PC-2577** 

[Total No. of Pages : 2

[Max. Marks : 70]

SEAT No. :

## [6354]-712

# B.E. (Artificial Intelligence and Machine Learning) REINFORCEMENT LEARNING (2019 Pattern) (Semester - VIII) (418552A) (Elective - VI)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

<b>Q1</b> )	a)	Explain n-step TD prediction in detail.	[6]
	b)	What is a Q-learning? Explain Games and after states in detail.	[6]
	c)	Explain in short R-learning, off policy learning.	[6]
		OR	
Q2)	a)	What is policy in Reinforcement Learning? Eplain the difference betw on policy and off policy Learning.	een [6]
	b)	Explain in detail roll out in Monte-Carlo method.	[6]
	c)	What is difference between Q-learning and R learning?	[6]
Q3)	a)	Explain forward view in reinforcement learning.	[6]
	b)	Write a note on replacing traces.	[6]
	c)	What is TD( $\lambda$ ) and how is it used?	[5]
		OR	
Q4)	a)	What do you mean by SARSA( $\lambda$ ).	[6]
	b)	Write a note on accumulating traces.	[6]
	c)	Explain the difference between forward and backward view reinforcement learning.	in [5]
		P.7	

Q5)	a)	Explain approximate policy gradient algorithm in detail.	[6]
	b)	Write a note on linear function approximation.	[6]
	c)	What is Actor-critic algorithm? How does it work?	[6]
		OR	
<b>Q6</b> )	a)	Explain use of Policy Gradient methods in non-associative learning detail.	g in <b>[6]</b>
	b)	Explain gradient descent method in Function Approximation.	[6]
	c)	Write a note on :	[6]
		i) Estimating gradients	
		ii) Approximate policy gradient algorithms.	
Q7)	a)	Explain in detail MAXQ framework related Hierarchical RL.	[6]
	b)	Explain Case study on Elevator dispatching in detail.	[6]
	c)	Explain option discovery algorithm in detail.	[5]
		OR	
<b>Q</b> 8)	a)	Explain in detail HAM framework related Hierarchical RL.	[6]
	b)	Explain Case study on Helicopter piloting in detail.	[6]
	c)	Explain Case study on Samuel's checker player.	[5]

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[Total No. of Pages : 2

### [6354]-713R

# **B.E.** (Artificial Intelligence and Machine Learning) **BIG DATA ANALYTICS** (2019 Pattern) (Semester - VIII) (Elective - VI) (18552B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- Figures to the right side indicate full marks. 3)
- Assume Suitable data if necessary. **4**)
- Explain the different MapReduce types and formats. *Q1*) a) [6] What is MapReduce? How does it facilitate distributed data processing?[6] b) Explain in details the characteristics of MongoDB. c) **[6]** OR Explain the main components of the MapReduce framework and how *Q2*) a) do they interact with each other? [6] Explain the role of the JobTracker in MapReduce and how does it b) coordinate job execution? [6] What is MongoDB? Explain the need of MongoDB. [6] c) *Q3*) a) What is Pig Latin? How does Pig Latin handle data transformation, filtering and aggregation operations? [6] Explain the following terms : [6] b) i) Hive Shell ii) Hive Metastore Differentiate between HBase and Relational Database Management c) System. [5] OR What is PIG in Hadoop Eco System? Explain the different execution **Q4**) a) modes of PIG. [6]
  - Explain the main components of Apache Hive and how do they interact b) with each other? **[6]**
  - Explain the key features and characteristics of HBase that differentiate it c) from traditional relational databases. [5]

*P.T.O.* 

[Max. Marks : 70]

**SEAT No. :** 

- Q5) a) Explain the different types of visualization techniques available in R for exploratory data analysis. [6]
  - b) Explain the following terms with example : [6]
    - i) Scatter Plot
    - ii) Histogram
    - iii) Pie Chan
  - c) What is the role of graphical data analysis in the data science workflow and its importance for communicating insights to stakeholders. [6]

<b>Q6</b> )	a)	Explain the concept of statistical modelling in R, including linear regression logistic regression and other commonly used techniques.	n, 5]
	b)	Explain the different types of graphical models in R. [6	5]
	c)	What is conditional independence in Graph? how conditional independence is typically examined in graphical models using R.	1 5]
Q7)	a)	What is the significance of rise of AI-powered big data analytics in data driven decision-making and business intelligence.	մ- 5]
	b)	Explain the advantages of Cassandra over traditional relational databases	s. 5]
	c)	What is Apache Spark? Explain the main components of Spar architecture. [5	k 5]
		OR	
<b>Q</b> 8)	a)	What is Dark Data? Explain the different types of Dark Data.	5]
	b)	Explain the following terms : [6	5]
		i) Streaming Analytics	
		ii) Real-time Analytics	
	c)	What is Apache Cassandra? Explain its key features? [5	5]

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**PC-2579** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-714

# B.E. (Artificial Intelligence and Machine Learning) ARTIFICIAL INTELLIGENCE USING R PROGRAMMING (2019 Pattern) (Semester - VIII) (418552C) (Elective - VI)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- Q1) a) What is a numeric variable, and how is it different from a categorical variable? [6]
  - b) How would you display the frequency distribution of a categorical variable? [6]
  - c) Provide an example where the mode is the most informative measure of central tendency. [6]

- (Q2) a) What types of graphs can be used to represent univariate data? [6]
  - b) Define variance and standard deviation. Why is the standard deviation more commonly used than variance in summarizing data spread? [6]
  - c) Explain the difference between covariance and correlation. [6]
- Q3) a) What are the advantages and disadvantages of using barplots versus pie charts for categorical data visualization? [6]
  b) Define a histogram and explain how it differs from a barplot. [6]
  - c) How do you interpret outliers in box-and-whisker plots? [5]

<b>Q4</b> ) a)	Discuss the significance of bin width in histograms.	[6]
b)	How does classical probability differ from empirical probability?	[5]
c)	Explain the concept of continuous random variables.	[6]

- Q5) a) Differentiate between confidence intervals and prediction intervals in the context of regression analysis. [6]
  - b) Define interpolation and extrapolation in the context of using a regression model. [6]
  - c) Describe how to include categorical predictors with more than two levels in a linear regression model. [6]

- Q6) a) What is a linear regression model and how is it used in statistical analysis? [6]
  - b) Discuss the implications of treating a categorical variable as a numeric variable in regression analysis. [6]
  - c) Explain the concept of a reference level in the context of categorical variables in regression. [6]
- (Q7) a) Explain what the Omnibus F-test evaluates in a multiple linear regression model. [6]
  - b) Explain the process and purpose of K-means clustering in R. [6]
  - c) Explain how stepwise regression is implemented in R and its purpose.[5]

#### OR

- Q8) a) Describe how to build and interpret a decision tree using R. [6]
  - b) Discuss how AdaBoost improves model performance. [5]
  - c) What are the advantages of using random forests over simple decision trees, and how are they implemented in R? [6]

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### [6354]-714

2

PC2580

SEAT No. :

[Total No. of Pages : 2

### [6354]-715

# **B.E.** (Automation and Robotics)

# INDUSTRIAL AUTOMATION AND CONTROL SYSTEMS

#### (2019 Pattern) (Semester - VII) (402541)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer any four questions from the following.
- 2) Draw neat labeled diagrams wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of non programmable electronic calculator is permitted.
- 5) Assume Suitable/Standard data if necessary.
- *Q1*) a) Explain the construction and working of sequencing pneumatic circuit with a neat sketch.
  - b) Explain the construction and working of pneumatic system with the help of neat sketch. [10]

- Q2) a) List and discuss the functions of various components involved in pneumatic system. [10]
  - b) Explain the use of "OR" logic gates in pneumatics with a neat sketch.[8]
- *Q3*) a) Explain the Closed loop control system with a neat sketch and give their advantages and disadvantages. [10]
  - b) Draw the signal flow graph and determine C/R for the block diagram shown in Fig. [7]



- Q4) a) Explain the various components used in control system. Discuss the importance of these components in a robot control systems. [10]
  - b) Simplify the block diagram using block diagram reduction rules and calculate the transfer function. [7]



- Q5) a) Derive the relation of relay function for stability analysis in non-linear systems. [10]
  - b) Define asymptotic stability and instability. Explain the singular points and give their classification. [8]

- *Q6*) a) Derive the relation of deadzone function for stability analysis in non-linear systems. [10]
  - b) Describe the functions of following non-linearities: relay, deadzone and saturation. [8]
- *Q7*) a) Explain the functions of HMI. Explain how the automation is beneficial in large scale control system.
  - b) Explain SCADA with neat block diagram and define each level involved in it. [9]

- *Q8*) a) Define SCADA and HMI. Give the differences between SCADA and HMI. [8]
  - b) Explain how the automation is beneficial in large scale control system with the help of examples. [9]



PC2581

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70]

#### [6354]-716

# B.E. (Automation & Robotics) ROBOTIC PROCESS AUTOMATION & DEVELOPMENT (2019 Pattern) (Semester - VII) (402542)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Draw neat labeled diagrams wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of non-programmable electronic calculator is permitted.
- 5) Assume suitable/standard data, if necessary.
- *Q1*) a) What are some common data manipulation activities that RPA bots can perform in business automation? [8]
  - b) Explain the concept of data scraping in RPA. What types of data sources can be scraped? [9]

#### OR

- Q2) a) What are the key advantages of using RPA for data manipulation tasks compared to manual methods? [8]
  - b) Distinguish between Desktop and Web Recording. [9]
- *Q3*) a) What are Citrix recording methods in RPA, and when would you use each of them? [9]
  - b) Explain the concept of "Anchors" in the context of data extraction. How are they used in RPA processes? [9]

#### OR

- Q4) a) Write a sequence of a project for extracting input data from a excel sheet which needs to be filled on a web portal of a company. [9]
  - b) What are the primary benefits of incorporating AI and ML capabilities into RPA workflows? [9]

*P.T.O.* 

- Q5) a) Explain the different types of bots used in Robotic Process Automation (RPA). Provide a brief description of each type and highlight their specific functions and applications. [8]
  - b) Define the terms "image trigger" and "element trigger" in the context of RPA. Explain how they differ and provide a real-world scenario where each type of trigger might be preferred over the other? [9]

- *Q6*) a) Outline the best practices for effectively utilizing debugging tools to streamline RPA development processes? [8]
  - b) "Exceptions are a critical aspect of Robotic Process Automation (RPA) development. Discuss the role of exceptions in RPA, and provide examples of common exceptions that RPA developers encounter. [9]
- Q7) a) Explain the steps involved in deploying RPA bots within an organization. Discuss how these steps ensure a smooth integration with existing systems and processes. [9]
  - b) Explain the concept of "Bot Orchestration" and how it impacts the deployment of RPA bots in an enterprise. [9]

#### OR

- *Q8*) a) What are the scalability challenges in RPA? How can an organization effectively scale its RPA bot deployment? [9]
  - b) What emerging technologies or trends are likely to impact the deployment and maintenance of RPA bots in the near future? Provide examples and potential implications. [9]

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SEAT No. :

### PC2582

[6354]-717

[Total No. of Pages :2

# B.E. (Automation and Robotics) ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING (2019 Pattern) (Semester- VII) (402543)

Time : 2 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.
- 2) Draw neat labeled diagrams wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of non programmable electronic calculator is permitted.
- 5) Assume suitable/standard data if necessary.
- *Q1*) a) Explain the architecture of neural network and comment on width and depth of neural network.[8]
  - b) Which deep learning model utilizes the back-propagation technique, and what are the learning methods associated with back propagation. [8]

- Q2) a) What is the definition of a neural network? How many layers are required for it to be referred to as a deep neural network. [8]
  - b) Compose a comparison between Binary Neural Networks (BNN) and Artificial Neural Networks (ANN). [8]
- Q3) a) Explain the architecture of a Boltzmann machine and how Boltzmann learning is employed for training.[8]
  - b) What is Adaptive Resonance Theory (ART) network, and how do they differ from traditional Competitive Learning (CL) network in terms of learning and adaptability? [9]

- Q4) a) What is the fundamental concept of associative learning, and how does it differ from other types of learning in neural networks.[8]
  - b) Describe the Self-Organization Maps (SOM) algorithm and the steps involved in training a SOM network. [9]
- Q5) a) What is SoftMax regression, and how is it used in the output layer of a CNN.[8]
  - b) Discuss the application of ANNs in the recognition of consonant-vowel (CV) segments in speech signals. What are the key features used for this task. [9]

- *Q6*) a) What are residual networks, and how do they address the vanishing gradient problem in deep networks. [8]
  - b) What is NET Talk, and how does it convert English text to speech using Artificial Neural Networks (ANN). [9]

**PC-5109** 

**SEAT No. :** 

[Total No. of Pages : 2

[Max. Marks : 70

# [6354]-718

# B.E. (Automation and Robotics) ROBOTICS-COGNITIVE & MEDICAL (2019 Pattern) (Semester - VII) (402544A) (Elective - III)

#### Time : 2½ Hours]

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary
- 4) Use of Non-programmable scientific calculator is allowed.
- 5) Figures to the right indicate full marks.
- Q1) a) Explain the purpose and functionality of physically assistive robots? [9]
  - b) Outline the main challenges in the automation of medical robots. [8]

#### OR

- Q2) a) What is the difference between laparoscopic and endoscopic surgery with regard to robotic systems? [9]
  - b) What are the primary types of robotic systems used in surgery? [8]
- Q3) a) Outline the steps involved in designing a robot for minimally invasive surgery. [9]
  - b) How does robot design for MIS differ from design for other types of surgeries? [9]

#### OR

- *Q4*) a) Identify the key principles involved in cooperative manipulation during surgery.
  - b) What are the key differences between traditional surgical techniques and robotic MIS? [9]
- Q5) a) Identify common sensors used in prosthetic robots for neuro-rehabilitation. [9]
  - b) List examples of software platforms used to integrate robots and virtual environments for neuro-rehabilitation. [8]

*P.T.O.* 

- *Q6*) a) Explain the role of virtual environments in enhancing the effectiveness of neuro-rehabilitation through robotic integration. [9]
  - b) Identify the key types of actuators used in exoskeletons for limb rehabilitation. [8]
- Q7) a) Identify the key clinical applications of biomedical engineering in gynaecology. [9]
  - b) How do biologically inspired robots differ from traditional robots in terms of functionality and design? [9]

- (Q8) a) What are the main uses of biomedical engineering in orthopaedics? [9]
  - b) How do biologically inspired robots enhance biomedical engineering applications? [9]



**PC-2583** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354] - 719

# B.E. (Automation and Robotics) Microprocessors and Microcontrollers (2019 Pattern) (Semester - VII) (402544 B) (Elective III)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer four questions from the following.
- 2) Draw neat labeled diagrams wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of non programmable electronic calculator is permitted.
- 5) Assume Suitable/Standard data if necessary.
- Q1) a) Draw and explain DMA controller 8237A with internal Registers. [8]
  - b) Explain the Multiple Interrupts and Priority Encoder with neat Diagram.

[9]

#### OR

- Q2) a) Draw and explain interfacing of DMA controller 8237A with the 8085.[8]
  - b) Draw and explain main types of 8085 interrupts and respective vector locations. [9]
- Q3) a) Design a multiplexed seven-segment LED display system schematic using the 8085 Microprocessor along with the 8255 programmable peripheral interface (PPI). Provide a detailed explanation of the circuit diagram and components used.
  - b) Explain the basic principles of stepper motor control using a microprocessor 8085. Provide a block diagram that demonstrates the interfacing of a microprocessor 8085 with a stepper motor driver for precise control. Also draw a flowchart for the movement of the stepper motor. [9]

[Max. Marks : 70

- Q4) a) Write a program to display the message μp-rdy (microprocessor-ready) using 8255 PPI and MPU and describe it. [9]
  - b) Describe how a microprocessor 8085 can be utilized to manage traffic lights & efficiently. Draw a diagram that outlines the traffic light sequencing logic and schematic diagram illustrating the connections between the microprocessor 8085 and the traffic lights. [9]
- Q5) a) Write at least 8 differences between a microprocessor and a microcontroller [8]
  - b) Draw and explain 8051 Block diagram. Also write features of 8051 Microcontroller. [9]

- *Q6*) a) Provide a labeled diagram of the pin configuration for an 8051 Microcontroller. Explain the functions of at least five essential pins. [8]
  - b) Provide an overview of the instruction set of the 8051 Microcontroller. How do instructions differ in terms of their functionality? [9]
- Q7) a) Explore the various modes of operation for the parallel port in the 8051 Microcontroller. How do these modes allow the Microcontroller to interact with external devices? [9]
  - b) Explain the role of the "IE' (Interrupt Enable) and "IP" (Interrupt Priority) registers in the 8051. [9]

#### OR

- Q8) a) Write in detail about the interfacing of LCD with 8051 Microcontroller and draw its neat connection diagram. [9]
  - b) Discuss the functions of the SBUF and SCON registers in serial communication. [9]

### **)4 )4 )4**

# [6354]-719

[Total No. of Pages :2

[Max. Marks : 70

SEAT No. :

### [6354]-720

# B.E. (Automation & Robotics) MODERN MACHINING PROCESSES (2019 Pattern) (Semester - VII) (402544 C) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Use of Non programnable scientific calculator is allowed.
- 5) Figures to the right indicate full marks.

<b>Q1</b> )	a)	Explain Electrochemical Machining with neat sketch.	[6]
	b)	Explain Construction of Chemical Machining.	[5]
	c)	Explain difference between Conventional Grinding and Electrochem	
		OR	[v]
( <b>0</b> )	0)	Explain advantages, disadvantages and applications of algebrachem	icol
Q2)	a)	machining.	[6]
	b)	Explain Photochemical Machinig.	[6]
	c)	Explain process parameters and process capabilities of electro stre drilling.	eam [ <b>5</b> ]
Q3)	a)	Explain advantages and disadvantages of Electric Discharge Grind	ing. <b>[6]</b>
	b)	Explain the components of a wire EDM machine.	[6]
	c)	Explain Electric Discharge Diamond Grinding with neat sketch.	[6]
		OR	
<b>Q4</b> )	a)	Explain applications of Electric Discharge Grinding.	[6]
	b)	Write short note on Wire EDM Machines.	[6]
	c)	Explain Electrochemical discharge machining and its working princi	ple.
			[6]

*P.T.O.* 

- Q5) a) Explain the material removel machanism and materials processed in Micro drilling.[6]
  - b) Explain the applications of Micro Electro Discharge Machining. [5]
  - c) Explain the effect of process parameters and materials processed in micro turning. [6]

- Q6) a) Explain the effect of process parameters and materials processed in Micro Electro Discharge Machining. [6]
  - b) Explain the effect of process parameters and Material processed in Diamond turn machining. [5]
  - c) Explain Micro milling, its working principle and material removal mechanism. [6]
- Q7) a) Explain the Rotational Magnetorheological Abrasive Flow Finishing (R-MRAFF) and its working principle. [6]
  - b) Explain application of Microsystems. [6]
  - c) Write short note on photolithography process. [6]

#### OR

<b>Q8)</b> a)	Explain the working principle and material removal	mechanism of
	Magnetic Abrasives Finishing (MAF).	[6]
b)	Explain the Microsystems Products.	[6]
c)	Write short note on Microelectronics.	[6]

### жжж

[Total No. of Pages :2

**SEAT No. :** 

# [6354]-721

# B.E. (Automation & Robotics Engineering) INDUSTRIAL ENGINEERING (2019 Course) (Semester - VII) (Elective - III) (402544 D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary
- 4) Use of Non-programmable scientific calculators is allowed.
- 5) Figures to the right indicate full marks.
- Q1) a) Explain the importance of site selection. What are the factors which should be considered during selection of location of plant? [9]
  - b) Classify and explain different types of material handling equipment. [8]

OR

- Q2) a) Classify and explain different computer aided layout design techniques. [9]b) Explain: [8]
  - i) Plant layout
  - ii) Craft, Blocplan, Corelap
- Q3) a) List any six functions of production planning and control. [9]
  - b) Data on the sales of Diesel engines for the last 12 years is given below. By the method of 3 yearly moving averages establish the trend values and forecast demand for 13<sup>th</sup> year. If the actual demand for the 13<sup>th</sup> year is 540 nos. What shall be the forecast of 14<sup>th</sup> year. [9]

Year	1	2	3	4	5	6	7	8	9	10	11	12
Sale numbers	335	350	330	340	380	410	430	440	430	460	500	560
OB												

#### Q4) a) Explain the following term in brief:

- i) Batch Production
- ii) Make to stock
- b) Discuss the importance of sales forecasting. Explain any one method of Sales forecasting. [9]

*P.T.O.* 

[9]
Q5) a) Define inventory and its importance. Enlist types of inventories. [9]

- b) Explain:
  - i) MRP II
  - ii) Concept of supply chain

#### OR

[8]

- Q6) a) A manufacturing company requires 10,000 units per year. The cost per unit is Rs. 2 and it costs Rs. 36 to place an order and to process the delivery. The inventory carrying cost is estimated at 9% of average inventory investment. Determine [9]
  - i) Economic order quantity.
  - ii) Optimum number of orders to be placed per annum.
  - iii) Minimum total cost of inventory per annum.
  - b) What is cost accounting? What are objectives of cost accounting? Explain elements of cost. [8]
- Q7) a) Explain Rapid Upper Limb Assessment (RULA). [9]
  b) What is Value Engineering? Explain in detail. [9]

#### OR

Q8) a) What are the characteristics of good wage system and what are the factors influencing the wage system? [9]

- b) Explain principles and social significance of ergonomics. [9]
  - $\bigtriangledown \bigtriangledown \bigtriangledown \lor \bigtriangledown \lor$

[Total No. of Pages :2

[*Max. Marks* : 70

**SEAT No. :** 

### [6354]-723

# B.E. (Automation & Robotics Engineering) LEAN MANUFACTURING (2019 Pattern) (Semester - VII) (402545 A) (Elective - IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data necessary.
- 4) Use of Non-programmable scientific calculators is allowed.
- 5) Figures to the right indicate full marks.
- *Q1*) a) What does the term "Total Productive Maintenance" mean?Describe in detail its goals.[8]
  - b) Explain what Kaizen is. Give a brief explanation of Kaizen principles.[9]

OR

- Q2) a) Describe the necessary steps for creating a culture of continuous improvement. [8]
  - b) What do you mean by Error-Proofing? Describe the steps involved in designing error-proof systems and processes. [9]
- Q3) a) What is cellular manufacturing? Briefly discuss benefits and characteristics of cellular manufacturing. [9]
  - b) Write a short note on Integration of lean manufacturing and Six Sigma. [9]

- *Q4*) a) Use of DMAIC methodology in lean Six Sigma projects. Discuss with example. [9]
  - b) Write short note on Lean principles in logistics and distribution. [9]
- Q5) a) Elaborate with suitable example the role of leaders in lean organizations.[8]
  - b) Write short note on Key performance indicators (KPIs) in lean manufacturing. [9]

<b>Q6</b> ) a)	Creating cross-functional teams for lean projects how affects	the
	performance.	[8]
b)	Explain in detail Lean scorecards and visual management.	[9]

- Q7) a) Compose a brief note on creating a lean implementation strategy. Give a suitable example to illustrate. [9]
  - b) Talk briefly about the issues that arise with applying lean. [9]

- Q8) a) Provide a explanation of any one manufacturing lean implementation case study.[9]
  - b) Talk about the takeaways from real-world use of lean case studies. [9]



SEAT No. :

[Total No. of Pages :2

# [6354]-724

# B.E. (Automation & Robotics) PROJECT MANAGEMENT (2019 Pattern) (Semester - VII) (402545B) (Elective - IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Use of Non programmable scientific calculator is allowed.
- 5) Figures to the right indicate full marks.
- Q1) a) Identify the stages involved in change management during a project lifecycle.[8]
  - b) Describe the role of project documentation and record-keeping in ensuring project success. [9]

OR

- Q2) a) State the principles of quality management in project environments. [8]
  - b) Discuss the purpose of network techniques like PERT and CPM in project management. [9]
- Q3) a) State the benefits of activity-based costing in project management. [9]
  - b) Explain the importance of legal and ethical aspects in project management. [9]

OR

- Q4) a) Identify the tools used in project cost estimation techniques. [9]
  - b) Discuss the advantages and disadvantages of linear break-even analysis. [9]
- Q5) a) Describe the process of conducting project audits and reviews. [9]
  - b) Discuss the key components of a project closeout report. [8]

*P.T.O.* 

- Q6) a) Illustrate the steps involved in preparing a final project closeout report. [9]
  - b) Differentiate between project success measurement and project evaluation methods. [8]
- Q7) a) Identify the challenges of project risk management in uncertain environments. [9]
  - b) Explain the role of digital tools in modern project management. [9]

- Q8) a) Discuss the importance of sustainability in project management. [9]
  - b) State the principles of sustainability and green project management.

[9]

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**PC-2587** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# [6354] - 725

# B.E. Automation and Robotics Engineering ADDITIVE MANUFACTURING (2019 Pattern) (Semester - VII) (402545 C) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat Diagrams must be drawn wherever necessary
- 3) Figures to the right indicates full marks
- 4) Assume Suitable data if necessary
- Q1) a) Explain the working principle of electron beam melting. List their advantages and limitations. [10]
  - b) Discuss the post processing steps followed in fused deposition modeling.
     [7]

#### OR

- (Q2) a) Explain the printing mechanism involved in binder jetting with neat sketch. [10]
  - b) Explain the process parameters involved in fused deposition modeling. [7]
- Q3) a) Explain the post processing steps involved in powder based additive manufacturing. [9]
  - b) Discuss the various techniques used to enhance the surface properties of additively manufactured parts. [8]

- Q4) a) List the different types of materials used in 3D printing. Explain with an example how the material can be selected for various applications. [8]
  - b) Explain the various design considerations/rules involved in additive manufacturing with the help of figures. [9]
- Q5) a) Explain the steps followed while slicing a CAD model in slicing software. [8]
  - b) Explain the various infill strategies used for area filling the sliced model. [10]

- *Q6*) a) Explain the functions of sensors, actuators, motors and control electronics used in construction of 3D printers. [9]
  - b) List the advantages, disadvantages and applications of SLM. [9]
- *Q7*) a) Explain the advantages and challenges involved in adopting the additive manufacturing technology in various engineering sectors. [10]
  - b) Discuss a case study on how the performance of automobile parts can be improved by adopting additive manufacturing. [8]

#### OR

- Q8) a) Discuss the reasons on how additive manufacturing influenced the growth in aerospace sector. [8]
  - b) Explain in detail mentioning the future trends of additive manufacturing. [10]



### [6354]-725

**PC-2588** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# [6354]-727

# B.E. (Automation and Robotics Engineering) Augmented Reality and Virtual Reality (2019 Pattern) (Semester - VII) (402545 E) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat Diagram must be drawn wherever necessary
- 3) Figure to the right indicates full marks
- 4) Assume Suitable data if necessary
- *Q1*) a) Why do DC magnetic trackers suffer less from metal interference than ACones? [6]
  - b) What is a Boom 3D display and how does it work? What advantages does it have compared to an HMD? [6]
  - c) What is the mathematical description for object position/orientation in virtual environments? How can invariants be used? [5]

#### OR

Q2)	a)	How does a wireless tracking suit work? Give examples.	[6]
	b)	Draw and explain the architecture of the CAVE.	[6]
	c)	How does the CyberGlove work?	[5]
Q3)	a)	What are the functionalities of AR?	[6]
	b)	How AR is used to enhance human computer interaction?	[6]
	c)	Which are the evaluation methods of AR?	[5]

*P.T.O.* 

Q4)	a)	What is interactivity in AR?	[6]
	b)	What's the difference between AR and VR?	[6]
	c)	How do augmented reality applications enhance the real world?	[5]
Q5)	a)	What is the function of the special senses eyes and ears in VR?	[6]
	b)	Which tools and software are used in virtual reality?	[6]
	c)	Explain VRTK toolkit in VR.	[6]
		OR	
Q6)	a)	Explain the'Unity' popular tool for VR development?	[6]
	b)	What is a head coupled display in virtual reality?	[6]
	c)	What is virtual acoustics in VR?	[6]
Q7)	a)	What advantages does VR offer for rehabilitation, particularly for postroke patients? Give examples.	ost- [ <b>6</b> ]
	b)	Why is ADHD assessment in a, virtual classroom more realistic to current questionnaire-basedmethods?	han [ <b>6</b> ]
	c)	What is the Visible Human database and how was it created? Descrisome of its applications.	ribe [ <b>6</b> ]
		OR	

- Q8) a) How is VR used for patients with fear of flying? What is the system architecture and study outcomes? [6]
  - b) What is the Digital Anatomist project, and why is it increasing access for students? [6]

[6]

c) Give types of PC video games.

### **)4 )4 )4**

[6354]-727

2

SEAT No. :

PC2589

#### [6354]-728

# B.E. (Automation and Robotics) EMBEDDED SYSTEMS IN ROBOTS (2019 Pattern) (Semester - VIII) (402549)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[Total No. of Pages : 2

Instructions to the candidates:

- 1) Answer four questions from the following
- 2) Draw neat labeled diagrams wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of non programmable electronic calculator is permitted.
- 5) Assume Suitable/Standard data if necessary.

<i>Q1</i> ) a)	a) i) Write down the difference between Network protocols & standa		
		with proper example.	[5]
	ii)	What do you mean by RS232 Serial Communication	n Protocol?
		Explain with proper diagram.	[5]
b)	Exp	plain TCP/IP model keeping OSI model as reference.	[8]
		OR	

- Q2) a) Explain the different modes of data communication. (Simplex, Duplex, Half Duplex, Serial, Parallel, Synchronous and Asynchronous). [8]
  - b) Write a short note on any 2 of the below mentioned Serial Communication protocols with neat diagram: [10]
    - i) I2C
    - ii) SPI
    - iii) CAN
    - iv) USB
- Q3) a) i) Write any 5 differences between RISC & CISC processors. [5]
  - ii) Write any 5 differences between Microprocessor & Microcontroller.[5]
  - b) What is PIC Microcontroller? Mention any 5 features & application of PIC microcontroller. [7]

- Q4) a) Explain ATmega 8 AVR microcontroller architecture with proper diagram. [10]
  - b) What is ARM Microcontroller? Mention any 5 features & application of ARM microcontroller. [7]
- Q5) a) Discuss the difference between Arduino Uno, Arduino Mega and Arduino Nano boards in terms of specifications and capabilities with proper application example. [10]
  - b) Which microcontroller is used in Arduino? What is the role of the microcontroller in an Arduino board? [8]

- *Q6*) a) Explain the concept of serial communication and how it is used in Arduino projects via which pins. Explain with neat diagram. [9]
  - b) Explain the following functions:
    i) pinMode () ii) digitalRead() iii) digitalWrite() iv) analogRead ()
    v) analogReference() vi) analogWrite() vii) serial.begin()
    viii) serial.print() ix) serial.println() [9]
- *Q7*) a) What is LCD? Draw Interfacing diagram of Arduino board with LCD & write the program to display a message on LCD.[8]
  - b) Write the arduino program code for interfacing accelerometer with Arduino. [9]

#### OR

- Q8) a) Write the arduino program code for interfacing of IR sensor with arduino & draw the interfacing circuit. [9]
  - b) What do you mean by serial communication? Explain serial communication using Arduino IDE programming code and show the output. [8]

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**SEAT No. :** 

[Total No. of Pages :2

### [6354]-729

# **B.E.** (Automation & Robotics) FUNDAMENTALS OF AUTONOMOUS SYSTEM (2019 Course) (Semester - VIII) (402550)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer four questions from the following. 1)
- 2) Draw neat labeled diagrams wherever necessary.
- Figures to the right side indicate full marks. 3)
- **4**) Use of non programmable electronic calculator is permitted.
- Assume Suitable/Standard data if necessary. 5)
- *Q1*) a) Explain the concept of hierarchical decision-making architectures in autonomous systems. How do these architectures organize decision processes at different levels of abstraction? **[10]** 
  - Explain the concept of path planning in autonomous systems. How do b) algorithms generate optimal paths considering environmental constraints and system objectives? [8]

#### OR

- *Q2*) a) How do decision-making algorithms adapt to changing conditions and goals in autonomous systems? Provide examples of adaptive decisionmaking strategies used in practice. [8]
  - b) Describe how decision-making algorithms are integrated with perception systems in autonomous vehicles. How does perception data influence decision-making processes? [10]
- *O*3) a) Explain how machine learning techniques can be integrated into control systems of autonomous vehicles to improve navigation and trajectory planning. **[10]** 
  - What are the primary motion control techniques used for achieving precise b) movement and navigation in autonomous systems? Provide examples of their applications. [7]

#### OR

Describe the process of training and validation of machine learning models **Q4**) a) for autonomous systems. What are the key considerations in ensuring model accuracy and reliability? **[10]** 

[Max. Marks : 70

- b) How do feedback control systems and machine learning complement each other in enhancing the overall capabilities of autonomous systems?
  - [7]
- Q5) a) Outline the principles of human-robot interaction in autonomous systems. How do these principles guide the design of interfaces and interaction mechanisms? [10]
  - b) Describe wireless communication technologies utilized in autonomous systems. What are their applications and how do they address specific challenges in communication? [8]

- *Q6*) a) Explain safety considerations and regulations for human-robot interaction in autonomous systems. How do these regulations ensure the safety of users and bystanders? [9]
  - b) Provide examples of successful human-robot interaction implementations in real world autonomous systems. What lessons can be learned from these examples? [9]
- Q7) a) Describe the role of autonomous industrial robots and manufacturing systems in modem manufacturing processes. How do these systems enhance efficiency and productivity in industrial settings? [8]
  - b) Analyze the role of public perception and acceptance in the widespread adoption of autonomous technologies. What factors influence public trust in autonomous systems, and how can trust be fostered? [9]

- Q8) a) Explain the concept of ethical decision-making in autonomous systems.How can ethical principles be embedded into the design and operation of autonomous agents to ensure morally sound behavior? [9]
  - b) Discuss the potential economic impacts of autonomous systems on various industries and sectors. How can organizations leverage autonomy to drive innovation and competitiveness? [8]



[Total No. of Pages :2

SEAT No. :

# [6354]-732

# B.E. (Automation & Robotics Engineering) PRODUCT DESIGN AND DEVELOPMENT (402045 A) (2019 Pattern) (Semester - VIII) (Elective - V)

<i>Time : 2<sup>1</sup>/</i>	2 Hours] [Max. Mar	ks : 70
Instructio	ons to the candidates:	
1)	Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8.	
2)	Neat diagrams must be drawn wherever necessary.	
3)	Figures to the right indicate full marks.	
<i>4)</i> 5)	Use of electronic pocket calculator is allowed.	
3)	Assume Suitable auta jj necessary.	
<b>Q1</b> ) a)	Explain Idea Generation and Idea Generation Approaches.	[7]
b)	Write a short note on SWOT analysis for a selection of profitable produ	ict. [6]
c)	Explain in detail 'Product Architecture'.	[4]
	OR	
<b>Q2</b> ) a)	Explain Pugh's chart with example.	[7]
b)	Describe in detail Concept Selection Process.	[6]
c)	Write a short note on 'Economic Analysis'.	[4]
" <i>Q3</i> ) a)	Explain BOM with example.	[7]
b)	Describe in detail Design review/part Print Analysis.	[6]
c)	What are the various elements of Production Drawing?	[4]
	OR	
<b>Q4</b> ) a)	What is the need for Engineering Drawing? Classify Engineering Draw	ving.[ <b>7</b> ]
b)	Explain Design for Assembly and Design for Manufacturing.	[6]
c)	Write a short note on Tolerance.	[4]
<b>Q</b> 5) a)	List down types of FMEA and explain steps of FMEA.	[8]
b)	What is the importance of PLM and PDM for a Designer?	[6]
c)	Enlist Industrial Safety to be consider in product design.	[4]

<b>Q6</b> )	a) b) c)	Write a short note on Advance Product Quality Planning. Explain Aesthetic and Aesthetics Consideration in product design. What are guidelines for Design for Robustness? Discuss.	[8] [6] [4]
Q7)	a)	Explain Production Part Approval Process Tools in detail.	[8]
	D)	Explain Product Testing and its validation Describe Organization Structure in detail	[0] [4]
	•)	OR	
<b>Q</b> 8)	a)	Describe in detail Legal Product of Design Patents.	[8]
	b)	Define Purchase Order and Product Costing in vendor development.	[6]
	c)	Explain Drawing Office procedure in detail.	[4]



PC-2592

SEAT No. :

[Total No. of Pages : 2

# [6354]-735

### **B.E.** (Automation and Robotics)

### DATA SCIENCE

# (2019 Pattern) (Semester - VIII) (402552A) (Elective - VI)

*Time : 2½ Hours]* 

Instructions to the candidates :

- 1) Answer four questions from the following.
- 2) Draw neat labeled diagrams wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of 'non programmable electronic calculator is permitted.
- 5) Assume Suitable/Standard data necessary.
- Q1) a) Why is effective communication of results important in data analytics?[8]
  - b) Why data preparation is considered a critical step in the data analytic lifecycle? [9]

#### OR

- (Q2) a) What is the primary goal of the discovery phase in data analytics? [8]
  - b) What does it mean to operationalize findings in the context of the data analytic lifecycle? [9]
- Q3) a) What are Scikit-learn, how do you handle datasets in Scikit-learn and why is this important for machine learning? [9]
  - b) When should logistic regression be used instead of linear regression?[9]

#### OR

- Q4) a) How do you swap variables in a dataset and why is this step important during data preprocessing? [9]
  - b) Discuss the Naïve Bayes categorization technique, considering the assumptions it relies on. [9]
- Q5) a) Exactly what is the significance of an elbow plot in clustering and how is it created? [8]
  - b) Explain the role of sklearn metrics in evaluating machine learning models and how is a confusion matrix used to assess classifier performance?[9]

[Max. Marks : 70

- Q6) a) What data does an AUC-ROC curve comprise and how do you understand it? [8]
  - b) Illustrate the K-Means clustering approach and its processes, as well as the benefits and drawbacks of using it. [9]
- (Q7) a) Provide an overview of the Hadoop ecosystem and its components. [9]
  - b) Discuss the objective of a line chart in data visualization and give an example of how it can effectively represent patterns or trends in data.[9]

- Q8) a) Analyze the advantages of combining line charts, plots of scatter, histograms, density charts and box plots in a holistic data visualization technique. [9]
  - b) Explain the term histogram and clarify why it is useful for showing the typical distribution of numerical information. [9]



PC2593

SEAT No. :

[Total No. of Pages : 2

#### [6354]-740

### B.E. (Robotics and Automation) MACHINE VISION SYSTEM (2019 Pattern) (Semester - VII) (411501)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of Calculator is allowed.
- 4) Assume suitable data if necessary

# *Q1*) a) What is the significance of filters in machine vision systems? State any six applications of filters in machine vision system.

- b) For the below given 5×5 image find out following. [10] Image:
  - 13336
  - 65722
  - 00151
  - 20106
  - 12672
  - i) Probability Density Function (PDF) of each pixel value.
  - ii) Huffman' s Code for each pixel value.
  - iii) What is the Huffman's code length for highest & lowest probability for pixel and why? Justify your answer.

#### OR

- Q2) a) What are image compression techniques? Explain any one image compression technique in detail. [5]
  - b) Draw & explain degradation model in image compression. [5]
  - c) Below is the  $5 \times 3$  binary image.

Image:

- $0\ 0\ 1\ 1\ 1$
- 11100

00111

For the given image calculate following

- i) Total number of Run length vectors.
- ii) Compression ratio.
- iii) Predict if data is compressed? Justify your answer.

[8]

Q3)	a)	Write a short note on image segmentation. [9	9]
	b)	Explain texture-based representation in detail. How it is different fro shape-based image representation?	m 9]
		OR	
Q4)	a)	How the image is segmented with technique-based approach? And expla stochastic technique in detail.	in 9]
	b)	Write a short note on image representation.	9]
Q5)	a)	What is rotation & scale motion estimation technique explain with releva example.	.nt 9]
	b)	Write a note on windowed correlation in motion estimation techniqu (expression is mandatory).	ue 8]
		OR	
<b>Q6</b> )	a)	Explain in detail parametric motion estimation.	9]
	b)	Write a short note on incremental refinement and parametric motion.	8]
Q7)	a)	What are convolutional neural networks explain how it is feasible to u in robotics applications.	se 9]
	b)	Explain supervised learning algorithm and explain in detail.	8]
		OR	
<b>Q8</b> )	a)	Explain in detail unsupervised learning and explain in detail.	9]
	b)	What do you understand by Principle Component Analysis (PCA Explain in detail.	)? <b>8]</b>

# $\odot$ $\odot$ $\odot$

**PC2594** 

SEAT No. :

[Total No. of Pages : 3

#### [6354]-741

# B.E. (Robotics & Automation) ROBOT SYSTEM RELIABILITY & SAFETY (2019 Pattern) (Semester - VII) (411502)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

- Instructions to the candidates:
  - 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
  - 2) Neat diagrams must be drawn wherever necessary.
  - 3) Assume suitable data, if necessary.
  - 4) Use of logarithmic table, slide rule and electronic pocket calculator is allowed.
  - 5) Figures to the right indicate full marks.
- *Q1*) a) Apply the AGREE allocation method to a robotic system containing the following components: [8]

Component = C. Parts count = PC Importance index = IND Operating time hr/yr = OT

C: Control System.	PC:153	IND: 0.95	OT: 2000
C: Motor drive.	PC: 28	IND: 0.90	OT: 1000
C: Actuation System	PC: 34	IND: 1.00	OT: 2000

The warranty program requires a reliability of 0.99 over the first year of use.

b) A computer used for controlling robot consists of three sub- system having consecutive failure rates  $\lambda 1=0.015$ ,  $\lambda 2=0.018$ ,  $\lambda 3=0.023$  failures per month. Select the requirements of reliability through 36 months in service to achieve total reliability it as 0.98 using ARINC Method of Reliability Allocation. Also, check if the total reliability goal of computer is achieved. [9] Q2) a) A two-element system model is subjected Markov Analysis having the block diagram given below: [8]



Derive an expression of reliability for this sytem assuming the elements are independent and are parallel. Also, find the reliability if  $\lambda_1 = 50E-06$  failures per hour,  $\lambda_2 = 20E-06$  failures per hour,  $\mu_1 = 1/100$  repairs per hour, and  $\mu_2 = 2/1000$  repairs per hour. Consider the steady state transition throughout the sytem.

b) Optimize and allocate the reliability of a robot motors for 4 axis articulated robot using Minimum Effort Method, if cost of all motors should not exceed €8000: [9]

Joint	Component	Initial	Minimum	Maximum	Per Unit
	Feasibility	Reliability	Reliability	Reliability	Cost
$J_{i}$	$f_i$	R <sub>i</sub>	R <sub>i,min</sub>	R <sub>i,max</sub>	C <sub>i</sub>
1	0.68	0.985	0.9	0.999	30
2	0.66	0.985	0.9	0.999	30
3	0.66	0.985	0.9	0.999	40
4	0.64	0.98	0.9	0.999	40

Q3) a) Find expression of system probability at each stage using Markov Analysis Method for the 3-unit system having following transition state diagram: [12]



b) Explain Markov Analysis Model for Reliability.

[6]

[6354]-741

*Q4*) a) Consider below System. Use event space method and find an equation for the reliability of the system if all chunks are identical and independent.



Find the reliability of the following system if the probability of success of each component is 0.8.

[9]

- b) Explain the Minimum Effort Method of Reliability Allocation. [9]
- Q5) a) Define Risk. Explain various perceptions, criteria, management method and estimation of risk. [9]
  - b) Explain in details the lead and lag indicators of the hazard control. [9]

#### OR

*Q6*) a) If sampling was conducted for a worker working with for air contaminant containing heptane for two cases as below: [9]

<u>**Case-1**</u> The worker worked for seven hours and the concentration for that seven hour was 500 parts per million (ppm) for a shift of 8 hours.

<u>Case- 2</u> The worker worked for one workspace for 2 hours with 100 ppm exposure and in another workspace for 3 hours with 200 ppm for a shift of 8 hours.

Find time weighted average for both the cases according to OSHA specification. Also check is this exposure is within the safe range if safe range of time weighted average for heptane is 400 ppm as per OSHA.

- b) Explain in detail about ISO45001: 2018. [9]
- Q7) a) Differentiate between Unsafe Condition and Unsafe Act with relevant examples and case study. [8]
  - b) Explain RULA and REBA to evaluate musculoskeletal disorder. [9] OR
- Q8) a) Explain various kinds of hazards and what are the various methods to avoid, control and measure such hazards. Explain with relevant case study.
  - b) Explain various methods of Preliminary Hazard Analysis or Risk Assessment. Use relevant case studies to explain various methods. [9]

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[6354]-741

[Total No. of Pages : 3

[Max. Marks : 70

**SEAT No. :** 

### [6354]-742

# B.E. (Robotics & Automation Engineering) ADVANCED COMPUTATIONAL TECHNIQUES (2019 Pattern) (Semester - VII) (411503A) (Elective III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Use of Non-programmable scientific calculators is allowed.
- 5) Figures to the right indicate full marks.

Q1) a) Use the shooting method to solve  $\frac{d^2T}{dx^2} + h'(T_a - T) = 0$  for a 10-m rod with h' = 0.01 m<sup>-2</sup>,  $T_a = 20$  and the boundary conditions T(0)=40 T(10)=200 [8]

b) An axially loaded wooden column has the following characteristics :  $E = 10 \times 10^9$  pa,  $I = 1.25 \times 10^{-5}$  m<sup>4</sup>, and L = 3 m.

Employ the polynomial method to determine the eigenvalues for the axially loaded column using (a) one, (b) two, (c) three, and (d) four interior nodes. [9]

#### OR

Q2) a) An axially loaded wooden column has the following characteristics :  $E = 10 \times 10^9$  pa,  $I = 1.25 \times 10^{-5}$  m<sup>4</sup>, and L = 3 m. Determine the first eight eigen values and the corresponding buckli

Determine the first eight eigen values and the corresponding buckling loads. [8]

b) Explore how MATLAB can be used to solve the following set of nonlinear ODEs from t 50 to 20 : [9]

$$\frac{dx}{dt} = 1.2x - 0.6xy \quad \frac{dy}{dt} = -0.8y + 0.3xy$$

Where x = 2 and y = 1 at t = 0.

*P.T.O.* 

Q3) a) Find by Liebmann's Method the values at the interior lattice points of a square plate of the harmonic function u whose boundary values are given in the figure. [9]



b) Explain Riemann Solver method to solve the problems. Explain with example. [9]

OR

*Q4*) a) Solve 
$$\frac{\partial u}{\partial u} = \frac{\partial^2 u}{\partial^2 x^2}$$
 in  $0 < x < 5$ ,  $t \ge 0$  given that  $u(x, 0) = 20$ ,  $u(0, t) = 0$ ,  $u(5, t) = 100$ . Compute u for the time-step with  $h = 1$  by the Crank-Nicholson

- b) Use the simple implicit finite-difference approximation to solve for the temperature distribution of a long, thin rod with a length of 10 cm and the following values: k' = 0.49 cal/(s . cm, °C),  $\Delta x = 2$  cm, and  $\Delta t = 0.1$  s. At t = 0, the temperature of the rod is zero and the boundary conditions are fixed for all times at T(0) = 100°C and T(10) = 50°C. Note that the rod is aluminum with C = 0.2174 cal/(g. °C) and  $\rho = 2.7$  g/cm<sup>3</sup>. There fore, k = 0.49/(2.7.0.2174) = 0.835 cm<sup>2</sup>/s and  $\lambda = 0.835(0.1)/(2)^2 = 0020875$ .[9]
- Q5) a) Describe the various terminologies used in the semi-implicit Moving Particle technique. Give a relevant example to illustrate.[8]
  - b) Discuss about the hp-FEM approach. Provide an example to illustrate.[9]

OR

- *Q6*) a) Describe the various terminologies used in hydrodynamics of smoothed particles. Give a relevant example to illustrate.[8]
  - b) What is Discontinuous Galerkin (DG) Meshifree Methods? How the methods are applied to solve the problems? [9]

[6354]-742

method.[9]

- *Q7*) a) Explain sequential quadratic programming in detail. Provide an example to illustrate.
  - b) Explain application to solve inverse kinematics problems. [9]

- Q8) a) Explain Genetic algorithms. Explain any one genetic algorithm in details.[9]
  - b) Briefly describe the process of simulated annealing. How can it be applied to solve problems? [9]



[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354]-743

# B.E. (Robotics & Automation Engineering) WIRELESS SENSOR NETWORK (2019 Pattern) (Semester - VII) (411503B) (Elective III)

#### *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

Instructions to the candidates :

- 1) All questions are compulsory ie. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right side indicates full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) Explain any 4 layers of wireless sensor network protocol stack in detail along with layered structure. [9]
  - b) Explain the terms wibree, ANT, BLE, Zwave in detail with respect to wireless sensors network. [9]

#### OR

- Q2) a) What is wireless HART? Explain it with its working principal and architecture in detail. [9]
  - b) Write a short note on 6LoWpan along with its features and applications in detail. [9]
- Q3) a) What is mean by routing? Explain various routing metrics in detail [9]
  - b) Explain following terms in detail:
    - i) Distance Vector Routing Protocols
    - ii) Link-State Routing Protocols

#### OR

# Q4) a) Write a short note on : [9]

- i) Multi hop communication
- ii) Proximity schemes in detail
- b) Explain the concept of full network broadcast and directed diffusion in detail. [9]

*P.T.O.* 

[9]

- **Q5**) a) Which kind of security requirements do we need in WSN? [8]
  - b) What is mean by in network processing? Explain data aggregation in detail.
     [9]

- *Q6*) a) Explain compressive sampling in detail along with its advantages and disadvantages in detail.[8]
  - b) What is threat model? Why we need threat model in WSN? Explain any 5 components of threat model in detail. [9]
- (Q7) a) Explain how we design and deploy WSN applications in detail. [8]
  - b) Explain top down Design Process in detail along with diagram. [9]

#### OR

- *Q8*) a) Explain Bottom-Up Implementation Process in detail along with diagram.[8]
  - b) Explain general testing and validation process for WSN applications in detail. [9]



[6354]-743

[Total No. of Pages :2

**SEAT No. :** 

### [6354]-744

# B.E. (Robotics & Automation) MICROPROCESSOR AND MICROCONTROLLER (2019 Pattern) (Semester - VII) (411503 (C)) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Figures to the right indicate full marks.
- *Q1*) a) Discuss the significance of following signals of 8085 in detail: HOLD, READY, ALE, HLDA. [8]
  - b) Analyze the architecture of 8051 microcontroller along-with a suitable block diagram. [9]

OR

- Q2) a) Explain the Features of 8051 microcontroller. Write down all instruction set of 8051 and explain with example. [8]
  - b) Illustrate the addressing modes of 8051 microcontroller. Support your answer with suitable examples. [9]
- Q3) a) Illustrate the Instruction set of PIC18FXX microcontroller. Support your answer with suitable examples. [9]
  - b) Explain: [8] i) Watch Dog Timers
    - ii) Power down modes

- Q4) a) Comparison of the PIC family. [8]
  b) Explain: [9]
  i) Configuration registers and oscillator options (CONFIG)
  - $\frac{1}{2} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{1}{2} + \frac{1}$
  - ii) Bank selection using BankSelect Register

Q5)	a)	Draw the interfacing diagram of Seven segment LED with Cortex M4 based microcontroller. Also write basic algorithm used for this interfacing.
		[9]
	b)	Write down concept of UART Programming. [9]
		OR
<b>Q6</b> )	a)	Draw the interfacing diagram of LDR and MQ3 with STM32F4xx based
		microcontroller and explain it. [9]
	b)	Explain STM32F4xx : Timers and counters [9]
<b>0</b> 7)	a)	Write down short note on Unmanned Vehicle Design Using Microcontroller.
~ /	/	[9]
	b)	Explain in details Mobile Robot Analysis and control for Pipe Line
	,	Inspection. [9]
		OR
<b>Q8</b> )	a)	Write down short note on Home automation Design Using Microcontroller.
~		[9]
	b)	Give the Bus Cycle timing diagrams for IN and OUT instructions. How
		are they different from comparable MOV instructions? Can MOV
		Instruction be ever used for I/O operation? If yes, what the I/O type is
		• • • •

then called? If no, why not? [9]

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SEAT No. :

[Total No. of Pages :2

# [6354]-745

# B.E. (Robotics and Automation) ERGONOMICS AND WORK MANAGEMENT (2019 Course) (Semester - VII) (411503-D) (Elective - III)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary
- Q1) a) What is basic application of anthropomorphic data? What are two types that determines the design dimensions? [9]
  - b) Based on anthropomorphic measurements taken on randomly selected sample, mean eye height is 160 cm with a standard deviation of 12 cm. Calculate eye height of (i) 90<sup>th</sup> percentile (ii) 50<sup>th</sup> percentile. [9]

#### OR

- Q2) a) Describe the procedure for the use of anthropometric data that should be used to achieve an appropriate fit between the operator and the design (of equipment, workplace, etc.) [9]
  - b) Assuming a shoe-sole thickness of 2.5 cm, what range of seat height adjustability can accommodate 90% of the US 50-50 mixed male- female civilian population? [9]
- Q3) a) What are the principles of ergonomics? What are the three ergonomic risk factors? [9]
  - b) Explain with suitable example, the Model-Based Framework for Influencing Consumer Products. [8]

- *Q4*) a) What is product life cycle? What are its stages? Explain with suitable example. [9]
  - b) Describe the Framework for Integrating Environmental Issues in Ergonomics to Product Development. [8]

- **Q5**) a) Explain seven types of Muda (wastes) according to Lean Manufacturing.
  - b) Define and explain following terms : (i) Poka-Yoke (ii) Kaizan (iii) Kanban (iv) 5S. [8]

- *Q6*) a) What is method study? What are its objective? [9]
  - b) What is MOST? What are its features? Explain with suitable examples.[8]
- Q7) a) Describe classes of fire and also explain their extinguishing mediums?[9]
  - b) Describe various safety measures and their contribution in augmenting plant productivity. [9]

#### OR

*Q8*) Write short notes on :

[18]

[9]

- a) Occupational Safety and Health Administration (OSHA)
- b) Personal Protective Equipment (PPE)
- c) Principles of Industrial hygiene
- d) Workman's compensation Act

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**PC-2598** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354] - 746

# B.E. ROBOTICS AND AUTOMATION Computational Fluid Dynamic (2019 Pattern) (Semester - VII) (411505 A) (Elective IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat Diagram must be drawn wherever necessary
- 3) Figures to the right indicates full marks
- 4) Assume Suitable data if necessary
- 5) Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.
- *Q1*) a) What are the advantages and limitations of Finite Volume method? [8]
  - b) What considerations should be taken into account when selecting an advection scheme for a particular problem in Finite Volume method?[9]

#### OR

- Q2) a) How does the Finite Volume Method differ from Finite Difference and Finite Element methods? [8]
  - b) Discuss general steps involved in implementing the Finite Volume Method for a 2-D steady-state diffusion problem. [9]
- Q3) a) What is the SIMPLE algorithm, and why is it used in CFD? [9]
  - b) How are boundary conditions incorporated in the discretization of the momentum equation? [9]

[Max. Marks : 70

<b>Q4</b> )	a)	Explain the arrangement of variables on a staggered grid.	[9]
	b)	What is the primitive variable approach in fluid dynamics, and how do it differ from other formulations?	oes [ <b>9</b> ]
Q5)	a)	Why is a grid necessary in computational simulations?	[9]
	b)	Explain geometric modeling in the context of grid generation.	[9]
		OR	

- *Q6*) a) Explain the concept of a surface grid. [9]
  - b) Name and describe common types of grid elements used in simulations.[9]
- (Q7) a) What are recent advancements in CFD techniques and methodologies? [8]
  - b) Explain how CFD assist in simulating heat transfer and thermal management in engineering applications. [9]

- Q8) a) How have machine learning and artificial intelligence impacted CFD simulations in recent years? [8]
  - b) Explain how CFD contribute to simulating and optimizing the cooling of electronic components. [9]

### **) | | | | |**

**PC-2599** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

# [6354] - 747

# B.E. (Robotics & Automation Engineering) Elective IV: Internet of Things and Machine Learning (2019 Pattern) (Semester - VII) (411504 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right side indicates full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) Explain the stages involved while performing IOT Data Storage & Retrieval.
  - b) Which kind of Wireless medium access issues we face during IOT Data Storage & Retrieval. [9]

- **Q2**) a) Explain how data can be Analyse by using Ipython Module [9]
  - b) Explain steps involved while Data Cleaning in IoT [9]
- Q3) a) Enlist in detail different clustering techniques used in ML. [9]
  - b) Explain Difference between Artificial intelligence and Machine learning in detail. [9]

- *Q4*) a) Enlist any 9 different applications of ML in Robotics and Automation industries.[9]
  - b) Explain confusion matrix present in Machine Learning in detail. [9]
- *Q5*) a) What is ESP8266? Explain working flow of ESP8266 Wi-Fi Module in detail.[8]
  - b) Explain various Wi-Fi library components that we used in ESP8266 WiFi module. [9]

- *Q6*) a) Explain processing of Arduino IDE while Networking with ESP8266 WiFi module in detail.[8]
  - b) Explain Interfacing of ESP8266 with Web services in detail. [9]
- Q7) a) Explain concept of Smart Metering with respect to IOT in detail. [8]
  - b) Explain the role of IOT in Home Automation/smart homes in detail. [9]

#### OR

- *Q8*) a) Explain any 8 Automotive Applications of IOT in detail. [8]
  - b) Explain the working of c-Health Body Area Networks with respect to patient movement trackers in detail. [9]

#### **64 64 64**

### [6354]-747

**PC-2600** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-748

# **B.E.** (Robotics & Automation) **Artificial Neural Networks and Fuzzy System** (2019 Pattern) (Semester - VII) (411504 C) (Elective IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicates full marks.
- **4**) Assume suitable data, if necessary.
- Brief on Recurrent networks in ANN. [9] *Q1*) a)
  - Differentiate single layer and multi-layer feed forward network. b) [8]

#### OR

- Discuss various factors affecting on back propagation training. [9] *Q2*) a)
  - Why study of perception and convergence rule is important. Explain it. b) [8]

<b>Q</b> 3)	a)	Write development stages of fuzzy logic.	
	b)	Brief on fuzzy set theory and its operations in detail.	[8]
		OR	
Q4)	a)	Classify various properties of fuzzy sets.	[9]
	b)	Explain fuzzy to crisp relations.	[8]

[Max. Marks : 70]
Q5)	a)	What are fuzzy I then rules. Explain it.	[9]
	b)	Why membership functions are important. Explain types of members function.	hip <b>[9]</b>
		OR	
<b>Q6</b> )	a)	Discuss defuzzification. Elaborate it in detail.	[9]
	b)	Brief on stages of generating fuzzy algorithm.	[9]
Q7)	a)	What is fuzzy rule base and approximate reasoning? How to implem it.	ient [9]
	b)	Explain Mumdani and Sugeno Architecture.	[9]
		OR	
Q8)	a)	What is fuzzy interference system. Explain in detail.	[9]
	b)	Why concept of Operations of Fuzzy Relation is essential. Elaborate	it. <b>[9]</b>



PC-2601

[Total No. of Pages : 2

[*Max. Marks* : 70

**SEAT No. :** 

# [6354]-749

# B.E. (Robotics & Automation Engineering) POWER ELECTRONICS AND DRIVES (2019 Pattern) (Semester - VII) (411504 D) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right side indicates full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) With the help of a neat circuit diagram and associated waveforms, discuss the operation of Buck converter. List the application of Buck Converter[9]
  - b) Explain in detail control strategies of DC-DC Chopper [9]

### OR

- Q2) a) In a dc chopper, the average load current is 30 Amps, chopping frequency is 250 Hz. Supply voltage is 110 volts. Calculate the ON and OFF periods of the chopper if the load resistance is 2 ohms. [9]
  - b) With the help of a neat circuit diagram and associated Output waveforms, discuss the operation of Boost converter [9]
- Q3) a) Explain in detail working operation of Single Phase Voltage Source Inverter with its Circuit diagram & Output voltage waveform [9]
  - b) With an appropriate power diagram, discuss the principle of working of a three-phase bridge inverter. Draw phase and Line voltage waveforms on the assumption that each thyristor conducts for 120° and the resistive load is star connected. Also, Prepare a table which shows the sequence of firing of various SCRs. [9]

*P.T.O.* 

- Q4) a) With an appropriate power diagram, discuss the principle of working of a three-phase bridge inverter. Draw phase and Line voltage waveforms on the assumption that each thyristor conducts for 180° and the resistive load is star connected. Also, Prepare a table which shows the sequence of firing of various SCRs. [9]
  - b) A single phase bridge inverter delivers power to a series connected RLC load with R=2 and wL=10. The periodic time T=0.lmsec. What value of C should the load have in order to obtain load commutation for the SCRs. The thyristors turn off time is 10 sec. Take circuit turn off time as 1.5tq. Assume that load current contains only fundamental component.[9]
- Q5) a) Describe the operation of single-phase Full-wave A.C voltage regulator with R Load, the help of voltage and current waveforms. [8]
  - b) Describe the operation of single phase to single phase step Down cycloconverter for Dis-continuous Load Current & with neat power-diagram and voltage and current waveforms. [9]

- *Q6*) a) Describe the operation of single-phase Half -wave A.C voltage regulator with R Load, the help of voltage and current waveforms. [9]
  - b) Describe the operation of single phase to single phase step up cycloconverter with neat power-diagram and voltage and current waveforms. [8]
- Q7) a) Explain in detail concept of Electrical drives by using it's block diagram[8]
  - b) Draw & Explain the operation of single-phase, half- wave converter drive. Also, draw the voltage and current waveforms. [9]

#### OR

- Q8) a) Draw & Explain the operation of single-phase, semi- converter drive. Also, draw the voltage and current waveforms with average output voltage equation. [9]
  - b) Explain in detail classification of Electrical Drives [8]

#### 

[6354]-749

SEAT No. :

### PC2602

### [6354]-750

# B.E. (Robotics and Automation) FIELD AND SERVICE ROBOTS (2019 Pattern) (Semester - VIII) (411508)

*Time : 2½ Hours]* 

[Max. Marks : 70

[Total No. of Pages : 2

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data if necessary
- *Q1*) a) Explain in detail about the concept of light weight autonomous climbing robot for elderly and disabled persons services.[9]
  - b) Describe the concept of an enhanced robotic library system for an off-Site shelving facility in detail. [9]

#### OR

- Q2) a) Explain in brief how planning under uncertainty contributes to the reliability of health care robotics. [9]
  - b) How does the development of a Personal Service Robot with User-Friendly Interfaces enhance user experience? Explain in brief. [9]
- Q3) a) Describe the concept of development of mobile robots for search and rescue operation systems in detail. [9]
  - b) How does the implementation of spraying robots in grape production contribute to sustainable agriculture practices? Discuss the environmental and economic benefits compared to traditional spraying methods. [9]

- *Q4*) a) How does distributed search and rescue with robot and sensor teams improve response efficiency in emergency situations? Explain in brief.[9]
  - b) Explain in detail about the concept of development of pneumatically controlled expandable arm for search in the environment with tight access. Also provide certain characteristics of Distal Expandable Tube. [9]

- Q5) a) Explain briefly the process of learning helicopter control from a pilot for autonomous flight. Highlight the key experimental approaches used in this area and their outcomes. [9]
  - b) Discuss the significance of compact millimetre-wave radar sensors for unmanned UAVs Provide a brief explanation of their features and applications, emphasizing their impact on UAV operations. [8]

- Q6) a) Describe the challenges associated with landing on a moving target using an autonomous helicopter. Provide a brief overview of the methods employed to address these challenges and assess their effectiveness. [9]
  - b) Explain briefly the importance of real-time navigation, guidance, and control for UAVs. Outline the methods utilized to achieve real-time capabilities using low-cost sensors and discuss their implications for UAV performance.
- Q7) a) Explain briefly the concept of online interactive building of presence and its relevance to human-robot interaction. Outline the methods used for online presence-building and discuss their impact on designing immersive virtual environments.
   [9]
  - b) Explain briefly how the integration of road scene monitoring with vehicle control contributes to safer roads. Highlight the key technologies and methods involved in this integration. [8]

#### OR

- Q8) a) Describe the importance of effective human-robot interaction in performing skilled work with an interactively operated service robot. Discuss the challenges and potential solutions for enhancing collaboration between humans and robots in skilled task environments.
  - b) Discuss the significance of developing a multi-purpose eight-legged robot for evaluating a neural interface. Provide a brief overview of the robot's design and functionalities, and evaluate its potential applications in assessing neural interface technologies. [8]

### $\circ$ $\circ$ $\circ$

[Total No. of Pages : 2

### [6354]-751

# B.E. (Robotics & Automation Engineering) PLC and SCADA Programming (2019 Course) (Semester - VIII) (411509) (Theory)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right side indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) Draw representations of NO NC switch Coil, Timer, Counter, Latching and Interlocking and explain each with an example. [9]
  - b) What are programming languages of PLC? Explain any three in short.[8]

#### OR

- Q2) a) Write Short Notes on: [9]
  i) Functional Block Diagram
  ii) Sequential Flow Chart
  iii) Ladder Logic
  - b) What is memory mapping and Input/output addressing in PLC? Explain with an example. [8]
- Q3) a) Write in short about evolution of DCS. Also explain with structure of DCS.[8]
  - b) Describe the Architecture of DCS? Write down the Features, Applications and Benefits of DCS. [9]

#### OR

- *Q4*) a) How is SCADA and DCS is used in Industry 4.0? Write its advancements compared to conventional systems. [8]
  - b) Explain the networking Protocols Field bus, Process bus, Modbus and Ethernet, CAN open, HART. [9]

[Max. Marks : 70

SEAT No. :

- Q5) a) What are components of SCADA? Explain any three in short. [9]
  - b) How SCADA can be implemented to monitor the Railways, Traffic signals, Thermal Power Station? [9]
     OR
- **Q6**) a) What is SCADA? Explain issues faced by SCADA in the industry. [9] b) Explain the Following; [9] MTU i) ii) RTU iii) HMI Using Ladder Logic design a pneumatically operated system for opening **Q7**) a) and closing of the door with explanation of each rung. [9] Explain the Following; b) [9] Electromagnetic Control Relay i)
  - ii) Manually Operated Switch
  - iii) Proximity Sensor

- Q8) a) Design the Ladder logic, for the example of boxes counting control System. And explain each Rung. [9]
  - b) How is PLC interfaced with Inputs and Outputs? [9]



**PC-2604** 

# [6354]-752 **B.E.** (Robotics & Automation Engineering) **Reverse Engineering** (Elective - V) (2019 Pattern) (Semester - VIII) (411510 A)

*Time* :  $2^{1/2}$  *Hours*] Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8. 1)
- Assume suitable data, if necessary. 2)
- Figures to the right indicate full marks. 3)
- Neat diagrams must be drawn wherever necessary. **4**)
- Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed. 5)
- Explain contact type methods in reverse engineering with its advantages *Q1*) a) and disadvantages. [9]
  - Define non-contact type reverse engineering methods and classify it with b) neat sketch. [9]

#### OR

- Explain destructive method of reverse engineering and procedure of data *Q2*) a) acquisition in reverse engineering. [9]
  - [9] b) Classify reverse engineering software based on application.
- Explain the concept of detailed vendor assessment and benchmarking in **Q3**) a) selection process of reverse engineering. [8]
  - b) Explain touch trigger probe and continuous analogue scanning probe.[9]

#### OR

- Explain the concept of triangulation approach in reverse engineering.[8] **Q4**) a)
  - With neat sketch explain the concept of X-ray tomography. b) [9]

**SEAT No. :** 

[Total No. of Pages :2

[Max. Marks : 70]

Q5)	a)	Explain Adaptive Slicing Approach for Cloud Data Modeling. [9	<b>)</b> ]
	b)	Write a short note on data processing in rapid prototyping.	<b>)</b> ]
		OR	
<b>Q6</b> )	a)	Explain the Integration of Reverse Engineering and Rapid Prototypin for Layer-based Model Generation.	ıg ₽]
	b)	Explain Modeling of Cloud Data in Reverse Engineering. [9	<b>)</b> ]
<b>07</b> )	a)	Explain with neat sketch application of Reverse engineering in automotiv	/e
21)	u)	industry.	<b>)</b> ]
	b)	Explain the legal aspects of reverse engineering. [8	3]
		OR	

<b>Q8</b> ) a)	Explain the application of Reverse engineering in aerosp	bace industry.[9]
b)	Explain the barriers in adopting reverse engineering.	[8]



**PC-2605** 

[Total No. of Pages : 4

[Max. Marks : 70

**SEAT No. :** 

### [6354]-753

# B.E. (Robotics and Automation) DATA ANALYTICS (Elective - V) (2019 Pattern) (Semester - VIII) (411510B)

*Time : 2½ Hours]* 

Instructions to the candidates :

- 1) All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data if necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Neat diagrams must be drawn wherever necessary.
- *Q1*) a) A study was conducted to understand consumer preferences for robotic drones based on specific attributes and levels: [9]

Attributes	Level 1	Level 2	Level 3		
Flight Time (minutes)	15 minutes	30 minutes	60 minutes		
Camera Quality	720p HD	1080p Full HD	4K Ultra HD		
Range (meters)	100 meters	500 meters	1000 meters		
Foldability	Non-foldable	Foldable	Compact Foldable		
Price (in USD)	\$200	\$400	\$800		

After data analysis and regression modelling, the following utility equation was developed to predict consumer preference (U) based on these attributes:

U=20 +  $(5 \times 30 \text{ minutes Flight Time})$  +  $(8 \times 60 \text{ minutes Flight Time})$  +  $(3 \times 1080 \text{p Full HD Camera Quality})$  +  $(6 \times 4 \text{K Ultra HD Camera Quality})$  +  $(4 \times 500 \text{ meters Range})$  +  $(7 \times 1000 \text{ meters Range})$  +  $(2 \times \text{Foldable})$  +

 $(5 \times \text{Compact Foldable}) - (0.4 \times \$400 \text{ Price}) - (0.8 \times \$800 \text{ Price})$ 

- i) Calculate the part-worth utility score for each level of every attribute.
- ii) Determine the importance of each attribute.
- iii) Calculate the predicted utility (U) for a robotic drone with the following attributes: Flight Time: 60 minutes, Camera Quality: 4K Ultra HD, Range: 1000 meters, Foldability: Compact Foldable, Price: \$400
- iv) How much more valuable (in dollars) is a robotic drone having flight time 60 minutes compared to a robotic drone having flight time 15 Minutes.

b) You are investigating the relationship between the speed of a robotic arm (in meters per second) and the load it carries (in kilograms) to predict the power consumption (in watts) of the robotic system. You collected data from several experimental trials and obtained the following dataset: [9]

Trial	Speed (m/s)	Load (kg)	Power Consumption (watts)
1	0.5	2	100
2	0.8	3	120
3	0.3	1	80
4	2.2	4.2	150
5	0.6	2.5	110

i) Write down the General equation for the multi linear regression model to predict power consumption (Y) based on speed (Xl) and load (X2).

- ii) Compute the coefficients (intercept and slopes) of the regression model using the provided dataset.
- iii) If the robotic arm operates at a speed of 0.7 m/s with a load of 3.5 kg, use your regression model to predict its power consumption.

OR

Q2) a) Given the following network, compute the outputs from ol and o2 (assume that the activation function is the sigmoid function). Also calculate mean squared error (MSE). [9]



b) You want to optimize sensor placement for a robotic system in a given environment. The dataset consists of potential sensor locations represented by 6 points in a 2D space:

 $\{(1,1), (3,2), (5,4), (7,6), (9,8), (12,11)\}$ 

Use k = 3. Choose initial cluster centroids: C1=(2,2), C2=(6,5), C3=(10,9) Apply k-means algorithm to group sensor locations into clusters and update the centroids. [9]

[6354]-753

**Q3**) a) Explain Linear Discriminant Analysis (LDA) with example.

b) A robot with a visual recognition system is trained to classify objects as either 'fruit' or 'non-fruit" based on images it captures. Here are the results for 10 objects: [9]

Observation	Expected	Predicted
1	Fruit	Non-fruit
2	Non-fruit	Non-fruit
3	Fruit	Fruit
4	Fruit	Fruit
5	Non-fruit	Fruit
6	Non-fruit	Non-fruit
7	Fruit	Fruit
8	Fruit	Fruit
9	Non-fruit	Non-fruit
10	Fruit	Fruit

i) Compute the confusion matrix for the data.

ii) Compute the accuracy, precision, recall, sensitivity and specificity of the data.

#### OR

- Q4) a) Explain random forest in detail with example.
  - b) Use a support vector machine to classify the following training set: [9]

X1	X2	Class
1	1	+
1	-1	+
2	1	+
2	-1	+
4	0	_
5	1	_
5	-1	_
6	0	_

- i) Determine the vector w and intercept b.
- ii) Plot Decision boundary with training points on an x1-x2 axis.
- iii) Find the class of point (0, 1).

[6354]-753

[8]

- Q5) a) Explain genetic algorithm in detail.
  - b) Use PCA to reduce the dimension from 2 to 1 from given data: [9]

X	-3	1	-2	
у	2	-1	3	
				OR

### *Q6*) a) Explain Expert system with example.

[8]

[8]

[9]

b) Consider the following set of training examples:

Instance	Classification	al	a2
1	-	F	Т
2	+	Т	Т
3	-	Т	F
4	+	F	F
5	-	F	Т
6	+	Т	Т

- i) What is the entropy of this collection of training examples with respect to the target function "classification"?
- ii) What is the information gain of al and a2 relative to these training examples?

<b>Q7</b> ) a)	What are the advantages and disadvantages of Reinfo	rcement Learning?[10]
b)	Explain Q learning and application.	[8]
	OR	
<b>Q8</b> ) a)	Write a short note on	[10]

- i) Markov Chain analysis
- ii) Regression based ML model
- b) Explain different types of Reinforcement Learning. [8]



### [6354]-753

[Total No. of Pages : 3

[Max. Marks : 70

**SEAT No. :** 

# [6354]-754

# B.E. (Robotics & Automation) ENTREPRENEURSHIP AND INNOVATIONS (2019 Pattern) (Semester - VIII) (411510 C) (Elective - V)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat Diagram must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.
- 5) Assume suitable data wherever if necessary.
- Q1) a) In what ways does entrepreneurship contribute to the expansion of job markets and the overall development of economies in developing countries? [8]
  - b) Explain the different sub-control types in entrepreneurship and how they influence business operations. [9]

- Q2) a) What role does innovation play in driving the competitive edge of entrepreneurs, and could you share instances of startups that have leveraged innovation effectively to establish themselves in the market? [8]
  - b) In what ways do government interventions to promote entrepreneurship shape the landscape of the startup ecosystem and what criteria should be used to gauge their effectiveness and efficiency? [9]
- Q3) a) How does market research contribute to project formulation for entrepreneurs? Can you share an example from India? [9]
  - b) How do different types of project evaluation methodologies contribute to strategic planning and risk mitigation? [9]

- Q4) a) In what manner do organizations integrate field-study practices and information gathering methods to pinpoint projects, taking into account principles of accountancy? [9]
  - b) How does balance sheet preparation serve as a vital tool in project identification, emphasizing the need for accurate financial documentation?

[9]

[4]

- (Q5) a) Describe the process of determining the cost of capital and its relevance in evaluating the financial health of a business. [4]
  - b) Total debt = 90,00,000
    Interest expenses = ₹ 2,80,000
    Equity = ₹ 1,40,00,000
    Beta coefficient = 1.5
    Risk -free rate = 6.5%
    Market return = 15.5%
    Expected dividend per share next year = ₹ 8
    Current market price per share = ₹ 130
    Growth rate of dividends = 7.5%
    Calculate :
    - i) The cost of debt (rD)
    - ii) The cost of equity (rE) using both the Capital Asset Pricing
    - iii) Model (CAPM) and the Dividend Discount Model (DDM)

The Weighted Average Cost of Capital (WACC) assuming the weights of debt and equity are 30% and 70% respectively.

c) What is profit planning and why is it important in entrepreneurship? [9]

OR

Q6) a) Total debt = ₹65,00,000

Interest expenses = ₹3,25,000 Equity = ₹1,60,00,000 Beta coefficient = 1.2 Risk-free rate = 5.5%Market return = 14% Expected dividend per share next year = ₹ 5.50 Current market price per share = ₹ 105 Growth rate of dividends = 8.5%

[6354]-754

2

Calculate:

- i) The cost of debt (rD)
- ii) The cost of equity (rE) using both the Capital Asset Pricing Model (CAPM) and the Dividend Discount Model (DDM)
- iii) The Weighted Average Cost of Capital (WACC) assuming the weights of debt and equity are 42.5% and 57.5% respectively. [4]
- b) Discuss the importance of financial management in product planning and control, highlighting at least two specific functions. [4]
- c) What challenges do public enterprises face in maintaining competitiveness and efficiency, especially regarding technological obsolescence and bureaucratic procedures? [9]
- Q7) a) Analyze the impact of international taxation on Indian business with global operations. How do cross-border tax norms influence the strategies of Indian multinational corporations (MNCs)? [9]
  - b) What challenges do entrepreneurs face regarding Indian laws? Give examples. [9]

#### OR

- (Q8) a) Explain the importance of fair competition regulations for startsups in India. [9]
  - b) Discuss the role of employers in ensuring compliance with the Workmen's Compensation Act and the potential consequences of non-compliance for both workers and businesses in India. [9]



[6354]-754

**PC-2607** 

# [6354]-756 B.E. (Robotics & Automation Engineering) (Additive Manufacturing) (2019 Pattern) (Semester - VIII) (411511A) (Elective - VI)

#### *Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, jf necessary.
- 3) Figures to the right side indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- Q1) a) Explain Fused Deposition Modeling (FDM) process with suitable sketch.List its Benefits, Limitations & Applications. [8]
  - b) Explain Robocasting process in detail. [5]
  - c) Explain Bio-printing process in detail. [5]

#### OR

- Q2) a) Explain Plasma deposition process with suitable sketch. List its Benefits, Limitations & Applications. [9]
  - b) Explain Multi-Jet Modeling (MJM). What are the advantages and limitations of MJM. [9]
- Q3) a) Explain use of Polymers in Additive Manufacturing with important process parameters, benefits, Limitations and appropriate applications. [9]
  - b) Explain Surface enhancement Techniques used in additive manufacturing based products. [9]

#### OR

<b>Q4</b> ) a)	Write short note on Bio-active materials.	[8]
b)	Explain error sources in Additive Manufacturing.	[5]
c)	Write short note on Acetone treatment.	[5]

SEAT No. :

[Total No. of Pages :2

[Max. Marks : 70

- *Q5*) a) Explain the Construction, Layout and sub-system of Material Jetting process based 3D Printers with illustrations.[8]
  - b) Explain the classification of Equipment Topology/Layout Frame Designs used in 3D Printers with illustrations. [9]

- **Q6**) a) Explain function of Laser controller and Gas Filtration System in AM.[8]
  - b) What are the different types of slicing? Describe in details. [9]

[8]

- (Q7) a) Write short note on:
  - i. 5D Printing
  - ii. Bio-printing
  - b) Explain the applications of AM in Health care industry, Food-Processing and consumer application industry with suitable case study. [9]

#### OR

*Q8*) a) Write a short note on Bio-materials and its applications. [8]
b) Explain Mass Customization and Future trends in AM. [9]



### [6354]-757

# **B.E.** (Robotics & Automation)

### **Industry 4.0**

### (411511B) (2019 Pattern) (Semester - VIII) (Elective - VI)

[Max. Marks : 70 *Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates: Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1) Assume suitable data, if necessary. 2) Figures to the right indicate full marks. 3) Neat diagrams must be drawn wherever necessary. **4**) Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed. 5) What do you mean Digital twin? [8] *O1*) a) b) Explain term: [9] i. Cyber physical system ii. Impact of Digital Twin OR What is mean by Predictive maintenance and Anomaly Detection in *O2*) a) Industry? [8] What do you mean by Process Automation and Optimization? b) [9] Explain Different Cloud deployment Techniques? [9] **Q3**) a) Explain the following: [9] b) i. Role of cloud Computing in IOT and Industry 4.0 ii. Virtualization OR Draw and Explain Architecture of cloud applications? [9] **Q4**) a) b) Explain Fog Computing? [9]

*P.T.O.* 

**SEAT No. :** 

[Total No. of Pages :2

Q5)	a)	Explain Cyber Laws and cyber policies in Industry 4.0?	[9]
	b)	Explain terms Data Communication and Networking with characteristics.	its [ <b>9</b> ]
		OR	
<b>Q6</b> )	a)	What is Security system and its function.	[9]
	b)	Write short note on Digital Forensics.	[9]
Q7)	a)	What is AI, explain in details.	[8]
	b)	Explain the term Industry 4.0 laboratories.	[9]
		OR	
<b>Q</b> 8)	a)	Explain IIoT with its benefits and Disadvantages?	[9]
	b)	Write note on IoT And IIoT Case Studies.	[8]



[Total No. of Pages :2

**SEAT No. :** 

### [6354]-758

# B.E. (Robotics & Automation Engineering) 411511C: VLSI Design for Robotics (2019 Pattern) (Semester - VIII) (Elective - VI)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, jf necessary.
- 3) Figures to the right side indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- *Q1*) a) Write about the CPLD Architecture along with its Features, Specifications, and Applications. [8]
  - b) Write Short note on: [9]
    - i. Clock management techniques
    - ii. Simulation Tools
    - iii. Synthesis Tools

#### OR

- (Q2) a) Describe the Design Flow for PLD Architectures and give its applications. [9]
  - b) Write about the FGPA Architecture along with its Features, Specifications, and Applications. [8]
- Q3) a) Describe the terms N-MOS, P-MOS and CMOS with suitable circuit diagrams.[9]
  - b) Describe the Hot electron effect and Velocity saturation. Give proper example with diagram. [8]

#### OR

- *Q4*) a) Differentiate between P-MOS and N-MOS systems. [8]
  - b) What is Technology scaling? Also explain Channel length modulation with neat circuit diagram. [9]

*P.T.O.* 

[Max. Marks : 70

- *Q5*) a) Explain Design Flow and Cell design specifications for IC's with circuit diagram.
  - b) What is AC and DC analysis? Write about Transfer Characteristics and its Transient responses. [9]

[9]

#### OR

- *Q6*) a) Give detail explanation of Library cell designing for NAND & NOR with proper circuit diagram. [9]
  - b) Explain the Following;
    - i. Noise analysis
    - ii. Lambda rules
    - iii. Design Rule Check
- Q7) a) Write in short about the VLSI Testing and Analysis along with its applications. [9]
  - b) Explain the Following for VLSI Testing; [9]
    - i. Types of fault
    - ii. Need of Design for Testability (DFT)
    - iii. DFT Guideline

- Q8) a) Describe the Test pattern generation, Sequential circuit test and Built In Self Test for VLSI circuit. [9]
  - b) What is a Built In Self Test, JTAG & Boundary scan? Explain with neat diagram. [9]



**SEAT No. :** 

[Total No. of Pages :2

### [6354]-759 **B.E.** (Robotics & Automation) **Intelligent Robotics System** (2019 Pattern) (Semester - VIII) (Elective - VI) (411511D)

#### *Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8 1)
- 2) Assume suitable data, *if necessary*.
- Figures to the right side indicate full marks. 3)
- Neat diagrams must be drawn wherever necessary. **4**)
- Elaborate role of micro grippers in microrobotics. [9] *Q1*) a)
  - Define micro robotics and explain its significance in modern technology. [8] b)

#### OR

Q2)	a)	Discuss different actuation methods for micro robots, such as magnetic piezoelectric, and electrostatic actuation. Compare their efficiency and applicability in different scenarios. [9	;, d ]		
	b)	Brief on Micro robot powering system in detail. [8	]		
Q3)	a)	Define neurorobotics and explain how it integrates principles from neuroscience and robotics. [9	n ]		
	b)	Write in brief celebral models in robotics. [8	]		
	OR				
<b>Q4</b> )	a)	Elaborate optic flow in robots. [9	]		
	b)	Why speech recognition is important in nuero robots? Explain it. [8	]		
Q5)	a)	Define cloud robotics and explain how it differs from traditional robotic systems. [9	c ]		

Discuss how cloud computing can enhance perception and sensing b) capabilities in robots. Provide examples of cloud-based solutions for image processing, object recognition, or environmental sensing. [9]

[Max. Marks : 70]

- **Q6**) a) Brief on Autonomous mobile robot on the web. [9]
  - b) Explain Web software architecture in detail. [9]
- Q7) a) Discuss the key differences between traditional industrial robots and collaborative robots. What are the main advantages of collaborative robots in terms of safety and flexibility? [9]
  - b) Explain the concept of human-robot collaboration safety zones (HRCSZ) and their role in ensuring safe interactions between humans and robots.[9]

- Q8) a) Explore various industrial applications of collaborative robots, such as assembly tasks, material handling, quality inspection, and human-robot teamwork in manufacturing processes. [9]
  - b) Discuss design and deployement of cobots. [9]



**PC2611** 

[6354]-760

[Total No. of Pages :2

**SEAT No. :** 

# B.E. (Electronics & Computer Engineering) DATA SCIENCE & VISUALIZATION (2019 Pattern) (Semester- VII) (410341)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- Q1) a) Enlist the different types methods of data analysis. Explain any two methods in detail. [6]
  - b) What is clustering in data science? Explain any two clustering methods/ techniques in detail. [6]
  - c) What is K-Means clustering? Explain how to choose the right number of clusters in K-Means clustering. Explain the applications of K-Means clustering.

#### OR

- Q2) a) What is meant by Association Rules in data analysis? How does Association Rule learning work? [6]
  - b) Explain working of Apriori algorithm in detail. Write advantages and disadvantages of Apriori Algorithms. [6]
  - c) What is the Naive Bayes Algorithm? Explain the Naive Bayes Algorithm with Bayes theorem and suitable example. Write the various applications of Naive Bayes Algorithms. [8]
- Q3) a) Explain Entropy in Decision Tree with formula. Explain the process of root node selection by giving suitable example. [8]
  - b) What is Random Forest algorithm? Write the important features of Random Forest algorithm. Differentiate between Decision Tree and Random Forest. [8]

#### OR

- Q4) a) With the help of diagram explain working of Decision Tree. Explain different terminologies used in Decision Tree. Explain the classification and regression Decision Trees. [8]
  - b) What is feed-forward neural networks? Draw and explain architecture of feedforward neural networks. What are the disadvantages of a feedforward neural network? [8]

*P.T.O.* 

- Q5) a) What is data visualization? Explain importance of data visualization in data science. What are challenges of data visualization? Elaborate each challenge.[8]
  - b) Construct box plot for following data: [8]

100, 120, 110, 150, 110, 140, 130, 170, 120, 220, 140, 110.

#### OR

- Q6) a) What is a Data Dashboard? Explain different steps to create a data dashboard. What is the difference between a data visualization and a dashboard? [8]
  - b) What is heat map plot? What is the purpose of heat map plot? When to use Heat Maps? Write advantages of a heat maps plot. [8]
- Q7) a) What is the scatter plot matrix? Explain it with suitable example. Why scatter plot matrix required for data visualization? When to use scatter plot matrix.[9]
  - b) What is Sammon Mapping algorithm? What is drawback of PCA in multidimensional scaling? How does Sammon Mapping overcome the drawback of PCA? [9]

- Q8) a) What is a parallel coordinates plot? Explain the components of a Parallel Coordinate plot. Explain the advantages of Parallel Coordinate plots. Explain the challenges in Parallel Coordinate plot. [9]
  - b) What is data modelling? What are the types of data modelling? Explain each type of data modelling in detail. [9]



**PC2612** 

[6354]-761

# B.E. (Electronics and Computer Engineering) WEB TECHNOLOGY (2019 Pattern) (Semester - VII) (410342)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.
- *Q1*) a) What are the various JavaScript objects? Explain anyone with an example. [8]
  - b) Explain the features javascript and explain how to call JavaScript function from HTML page. [9]

#### OR

Q2)	a)	Explain features of Java script. How to create array and read element Java script.	s in <b>[9]</b>
	b)	What are different data types available in javascript?	[8]
Q3)	a)	Explain various JSP scripting elements, actions and Templates in JSP	. <b>[9]</b>
	b)	Define JSP. List advantages of java servlet over JSP.	[8]
		OR	
Q4)	a)	Explain the Strut architecture with neat diagram and also explain benefits of Strut.	the [9]

- b) Compare doGet and doPost methods in servlet. [8]
- Q5) a) What is Associate arrays in PHP? Explain it with simple PHP code. [9]
  - b) What is Angular JS? List and explain various directives in Angular JS?[9]

*P.T.O.* 

[Total No. of Pages : 2

**SEAT No. :** 

[Max. Marks : 70

<b>Q6</b> ) a)	What is purpose of AJAX? Explain with relevant example?	[9]
b)	Explain in detail WAP Architecture & WML.	[9]

- *Q7*) a) What are the different types of EJB? Identify and explain situations about when to use session beans. [9]
  - b) What is use of JSF? Write differences between SOAP and REST indetail? [9]

- *Q8*) a) List the difference between entity bean and session bean? Explain the callback method? [9]
  - b) Write brief note on following: [9]
    - i) Word press
    - ii) Spring

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**PC2613** 

[6354]-762

[Total No. of Pages :2

**SEAT No. :** 

# B.E. (Electronics & Computer Engineering) INTERNET OF THINGS

### (2019 Pattern) (Semester- VII) (410343)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.28.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

<i>01</i> ) a)	Introduce WSN technology along with its features.	[6]
		L 1 J

- b) Explain in brief challenges of cloud computing? [6]
- c) Along with diagram explain how WSN is playing a vital role in intelligent transportation. [8]

#### OR

<b>Q2</b> ) a)	What is cloud. Explain in detail business concerns in cloud.	[6]
$\sim$ / /		

- b) Draw and explain the basic architecture of cloud computing. [6]
- c) With the help of neat diagram explain how WSN can be used in Healthcare system. [8]
- Q3) a) What is Ultrasonic sensor. Write a program for interfacing of ultrasonic sensor to Raspberry Pi along with its interfacing diagram. [8]
  - b) In detail write down the steps for analysis of data using any loT platform. [8]

#### OR

- Q4) a) What is PIR Sensor. Draw interfacing diagram and write a program for PIR sensor interfacing to Arduino board. [8]
  - b) Introduce python programming environment with any one simple assignment/program. [8]

*P.T.O.* 

- Q5) a) Explain the term Big Data. Also explain in detail modern corporate need of Big Data strategy.[8]
  - b) Explain in detail data analytics using Thingspeak platform. [8]

- *Q6*) a) Explain along with steps how to visualize live data streams using cloud services.
  - b) Along with diagram explain Hadoop technology in detail. Also list out its features.
     [8]
- Q7) a) With the help of diagram explain loT based Greenhouse Monitoring System.[9]
  - b) Explain how wearable technologies are partnering with smart cities to address social issues. [9]

- *Q8*) a) Write short note on Industrial standards in IoT. [9]
  - b) With the help of diagram explain loT based Smart home automation. [9]



PC-2614

[Total No. of Pages :2

### [6354]-763

# B.E (Electronics & Computer Engineering ) BIG DATA & ANALYTICS (2019 Pattern) (Semester - VII) (410344 A) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Figure to the right indicates full marks.
- 3) Assume Suitable data if necessary.
- *Q1*) a) Explain Map Reduce with proper diagram for word count example.[8]
  - b) Draw and explain Architecture of HIVE [9]

#### OR

- Q2) a) Explain the Big data Ecosystem with a suitable diagram. [8]
  - b) Explain Google File system and its advantages. [9]
- Q3) a) List and explain the steps in discovery phase of data analytics life cycle.[8]
  - b) Explain the terms data cleaning and data transformation with the help of example. [9]

#### OR

- Q4) a) What is the need of big data analysis? Explain the different types of analysis techniques. [8]
  - b) Why R is used? Write a user defined function to calculate a cube of a given number in R. [9]
- Q5) a) What are the advantages of data visualization? Write a short note on any three tools used for data visualization. [9]
  - b) Explain different tools for data visualization. Write two data visualization functions from seaborn. [9]

[Max. Marks : 70

SEAT No. :

Q6)	a)	What are the major challenges in visualizing the big data and how overcome these challenges.	to 9]
	b)	List the conventional Data Visualization Tools. Explain any two. [9	9]
Q7)	a)	What are the key elements of soical media? [9	9]
	b)	What is text mining? Draw and explain text mining architecture are explain its need.	nd 9]
		OR	
Q8)	a)	Explain Data Scientist role and responsibilities with suitable diagram	n. 9]
	b)	Write a short note on: [9	9]
		i) Social media analytics	
		ii) Roles and responsibilities of big data person	
		iii) Mobile analytics.	

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[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354]-764

# B.E. (Electronics and Computer Engg.) MOBILE APPLICATION DEVELOPMENT (Elective - III) (2019 Pattern) (Semester - VII) (410344 B)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Figures to the right indicate full marks.
- *Q1*) a) Define what User Interface (UI) Screen elements are in the context of Andriod development. Provide examples of commonly used UI screen elements.
  - b) Explain the importance of designing user interfaces with layout in Android development. Describe at least three different types of layouts and when they are typically used.
     [8]

OR

- Q2) a) What are the key considerations when designing user interfaces for mobile devices compared to desktop or web platforms? [9]
  - b) Describe the process of drawing in Android applications. How can custom drawing be implemented and what are its advantages? [8]
- Q3) a) What are the key steps involved in testing an Android application before its release? Describe at least three different types of testing methodologies commonly used in Android development. [9]
  - b) Explain the significance of publishing Android applications on the Google play store. What are the prerequisites and steps involved in publishing an app on the play store? [9]

OR

Q4) a) Describe the purpose and usage of Android preferences in application development. How can developers implement user preferences using shared preferences and Preference Activity? [9]

*P.T.O.* 

- b) Discuss the concept of managing application resources in a hierarchy in Android development. Explain the role of resource qualifiers and how they enable developers to provide different resources for different device configurations. [9]
- Q5) a) Describe the role of Android Data and Storage APIs in application development. Explain the differences between internal storage, external storage and shared preferences. [9]
  - b) What is SQLite and how is it used for managing data in Android applications? Discuss the key features of SQLite and the steps involved in integrating a SQLite database into an Android application. [8]

- *Q6*) a) Explain the concept of content providers in Android and how they facilitate data sharing between applications. Provide an example scenario where a content provider would be used to share data between two apps. [9]
  - b) Discuss the various Android networking APIs available for handling network Communication in Android applications. Compare and contrast the usage of Http URL Connection, Volley and Retrofit for making network requests. [8]
- Q7) a) Discuss the role of SMS telephony in Android applications. How can developers utilize SMS features to enhance user experience or enable communication within their apps? [9]
  - b) Explain the concept of Location Based Services (LBS) in Android development. Provide examples of how LBS can be used to deliver location-specific content or functionality to users. [9]

#### OR

- Q8) a) Describe the steps involved in creating a new Android project. What are the key components of an Android project structure and how do they contribute to the development process? [9]
  - b) Explain the process of obtaining a Maps API key for integrating Google Maps into an Andriod application. What are the prerequisites for obtaining the API key and how is it used in the project? [9]

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[Total No. of Pages :2

[Max. Marks : 70]

**SEAT No. :** 

### [6354]-765

# BE (Electronics and Computer Engineering) INFORMATION AND CYBER SECURITY (2019 Pattern) (Semester - VII) (410344C) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Neat Diagram must be drawn wherever necessary.
- 3) Figure to the right indicates full marks.
- 4) Assume Suitable data if necessary.

<i>Q1</i> ) a)	Explain elliptic curve cryptography.	[8]

b) Determine value of *X* using Chinese remainder theorem.

 $X = 1 \pmod{5} \quad X = 6 \pmod{7} \quad X = 8 \pmod{11}$  [6]

c) Solve if p = 7, q = 17 using Diffie Hellman algorithm, select a = 6, b = 4. [4]

Q2)	a)	What is digital signature? Which security goals are met by s document using digital signature?	igning a <b>[8]</b>
	b)	Explain Diffie Hellman key Exchange Algorithm with example.	[6]
	c)	What characteristics are needed in a secure hash function?	[4]
Q3)	a)	Classify and explain cybercrimes against property.	[7]
	b)	Write note on Cyberstalking.	[6]
	c)	Differentiate Qualitative and Quantitative Risk Analysis.	[4]
		OR	
<b>Q4</b> )	a)	Address security issue in Cloud computing.	[7]
	b)	Write a short note on Indian legal perspective.	[6]
	c)	Explain challenges in social engineering.	[4]
			<i>P.T.O.</i>

Q5)	a)	What is the purpose of the SSL record layer protocol and handshat protocol.	ke <b>8]</b>
	b)	How AH and ESP protocols works under transport and tunnel mode?[	6]
	c)	What four requirements were defined for Kerberos? [	<b>4</b> ]
		OR	
<b>Q6</b> )	a)	What services are provided by IPSec? What is the deference betwee tunnel mode and transport mode in IPSec.	en 8]
	b)	Explain Needham Schroeder algorithm with neat diagram.	6]
	c)	Write Short note on Mail security. [	4]
Q7)	a)	Explain phishing and password cracking.	7]
	b)	Explain Adware and Ransomware. [	6]
	c)	Explain trap - door - one - way function with example. [	<b>4</b> ]
		OR	
<b>Q8</b> )	a)	What is SQL injection? Explain in detail.	7]
	b)	Write short note on Virus and Worms.	6]
	c)	What are the different types of phishing? [	4]

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PC-2617

SEAT No. : [Total No. of Pages :2

## [6354]-766

# B.E. (Electronics and Computer Engineering) DIGITAL IMAGE PROCESSING (2019 Pattern) (Semester - VII) (410344 D) (Elective - III)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume Suitable data, if necessary.
- 4) Figures to the right indicate full marks.
- Q1) a) Define redundacy in the context of digital data and explain the defferent types of redundancy encounterd in images. [9]
  - b) Provide an overview of image and video compression standards. What is JPEG and how does it differ from MPEG? [8]

#### OR

- Q2) a) Explain the concept of lossless compression and describe the following techniques: Runlength coding, Huffman coding. [9]
  - b) What is the Discrete Cosine Transfrom (DCT) and how is it used in image compression? Provide an overview of its application in JPEG compression.
     [8]
- Q3) a) Define image segmentation and explain its significance in digital image processing.[9]
  - b) Describe the process of line detection in image segmentation. What are the key algorithms used for line detection? [9]

- Q4) a) Describe the Canny edge detection algorithm. How does it overcome limitations of other edge detection methods? [9]
  - b) Discuss the Hough Transform and its application in image segmentation. How is it used for detecting lines and other shapes? [9]

- Q5) a) Define image restoration and explain the degradation model. How does the degradation model represent the process of image degradation?[9]
  - b) Describe different noise models encountered in digital images and their characteristics. [8]

- Q6) a) Explain the concept of mean filters in image restoration. How do they reduce noise while preserving image details? [9]
  - b) Explain the principles behind band reject filters and their applications in image restoration. [8]
- Q7) a) Define features extraction in the context of image processing. What are the key characteristics of effective features? [9]
  - b) Discuss the types of classification algorithms commonly used in image processing. How does supervised and unsupervised classification differ?
     [9]

### OR

- **Q8)** a) Discuss the Bayes classifier and its principles of probabilistic classification. What assumptions are made in Bayes classification? [9]
  - b) Discuss the concept of content based image retrieval (CBIR). How do image features and similarity metrics play a role in CBR systems?
     [9]

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[Total No. of Pages : 3

## [6354] - 767

# B.E. (Electronics & Computer Engineering) ROBOTICS & AUTOMATION (2019 Pattern) (Semester - VII) (410345 A) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data if necessary.
- Q1) a) Provide an example to illustrate the application of D-H parameters in a simple robotic manipulator with two joints. [6]
  - b) Explain the process of obtaining the forward kinematics solution for a PUMA robot. [6]
  - c) Provide a numerical example to demonstrate the application of the forward kinematics equations for a specific configuration of a SCARA robot with given joint angles and link lengths. [8]

### OR

- Q2) a) Define the key terms involved, including joint variables, end-effector position, and orientation. [6]
  - b) Provide a numerical example to illustrate the application of forward kinematics in determining the end-effector position and orientation for specific joint angles. [6]
  - Provide a numerical example to demonstrate the application of the forward kinematics equations for a specific configuration of a PUMA robot with given joint angles and link lengths. [8]

*P.T.O.* 

[Max. Marks : 70

SEAT No. :

- Q3) a) Discuss the significance of Inverse Kinematics and describe the challenges associated with solving inverse kinematics problems. [8]
  - b) Explain the tondepts of kinetic and potential energy in the context of robot dynamics. Define the equations for kinetic energy (T) and potential energy (U) for a robotic system. [8]

- Q4) a) Describe the inverse kinematics solution for a simple SCARA (Selective Compliance Assembly Robot Arm) robot. Define the robot's kinematic structure, joint variables, and end-effector pose.
  - b) Explain Lagrange's Equation and its significance in the context of robot dynamics. Define the key terms : kinetic energy, potential energy, and generalized coordinates. [8]
- Q5) a) Define the Jacobian matrix J in the context of a manipulator with revolute joints. [4]
  - b) How can the angular velocity be expressed or derived from the transformation matrix, and what role does it play in describing the rotational motion of a rigid body? [6]
  - c) Identify and define the key parameters in the trapezoidal velocity profile, such as acceleration time, constant velocity time, and deceleration time.[6]

### OR

- *Q6*) a) Explain the implications of a singularity on the manipulator's ability to perform certain tasks. [4]
  - b) Derive the mathematical model that relates the motor torque t to the arm joint angle  $\theta$  and the motor current I. [6]
  - c) Explore how RMPC and RMRC can be integrated to enhance the overall performance of a robotic manipulator. [6]

[6354]-767

- Q7) a) Explain selection criteria for Hydraulic, Pneumatic drive technology. [9]
  - b) What are the roles and advantages of Resolver, Rotary shaft encoders, Potentiometers in servo control system? [9]

- Q8) a) Explain selection criteria for stepper motor and D.C. servo motor in electric drive technology. [9]
  - b) Explain selection criterion of sensors, selection of drives and actuators, methods of control for Handling of rotary tools robot. [9]



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[Total No. of Pages : 2

## [6354]-768

# B.E. (Electronics and Computer Engineering) HUMAN COMPUTER INTERFACE (2019 Pattern) (Semester - VII) (410345 B) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary
- 3) Figure to the right indicates full marks
- 4) Assume Suitable data if necessary
- Q1) a) Describe briefly four different interaction styles used to accommodate the dialog between user and computer .Specify advantages and disadvantages of each interaction style. [6]
  - b) What is Ergonomics? List and explain different disciplines of Ergonomics.

[6]

c) Explain theory of User experience by Honeycomb Model. [6]

### OR

Q2)	a)	Explain interaction framework in detail.	[6]
	b)	Explain paradigms of Interaction design.	[6]
	c)	Explain the context of interaction with an example?	[6]
<b>Q</b> 3)	a)	What are different goals prototyping? Explain different types of prototyping technique in detail.	of rapid <b>[9]</b>
	b)	What is the need of MVC pattern?Draw figure and explain.	[8]

[Max. Marks : 70

SEAT No. :

- *Q4*) a) Explain UI layer and its execution framework. [9]
  - b) What are different types of scenarios? Write scenarios for Music player design. [8]
- Q5) a) Discuss Shneiderman's 8 golden rules of interface design, with an example. [9]
  - b) What are the goals of evaluation? Explain Evaluation through Expert Analysis. [8]

- *Q6*) a) What is Usability? Explain the principles 'hat support Usability. **[9]** 
  - b) Explain Nielsen's ten heuristics. [8]
- Q7) a) What is mental opeartor in Ketstroke Level Model(KLM)?How it is different from physical operators. [9]
  - b) Discuss applications meant for computer-mediated communication. [9]

#### OR

- Q8) a) A Hierarchical Task Analysis (HTA) provides an understanding of the tasks users need to perform to achieve a certain goal. Perform HTA of the task to cook food(rice) Illustrate using diagram. [9]
  - b) List out different Diagrammatic Dialog Design notations.Explain Flow Charts and JSD diagrams with an. example. [9]

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**PC-2620** 

[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-769

# B.E. (Electronics and Computer Engineering) DIGITAL SYSTEM DESIGN (2019 Pattern) (Semester - VII) (410345 C) (Elective IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagram must be drawn wherever necessary.
- Q1) a) Sketch Y-Chart representation of Verilog construct supporting synthesis activity. Explain the logical synthesis in detail. [9]
  - b) Explain with suitable example about Synthesis of sequential logic with latches. [8]

#### OR

- Q2) a) Explain in details basic rules used to anticipating the results of synthesis.[9]
  - b) Explain with suitable example about Registered logic. [8]
- Q3) a) Sketch the state machine controllers for a datapath. Explain in detail about partitioning sequential machines into a datapath. [9]
  - b) Explain in detail about RISC SPM Instruction Set. [8]

*P.T.O.* 

[Max. Marks : 70

- *Q4*) a) Explain in detail about UART Transmitter and Receiver. [9]
  - b) Sketch architecture and state transition graph of a synchronous 4-bit binary counter with proper explanation. [8]
- *Q5*) a) Explain in detail about various storage devices used in Programmable logic devices.[9]
  - b) Sketch and explain Carry look-ahead adder circuit. [9]

- *Q6*) a) Sketch the circuit diagram and explain the operation of Programmable Logic Array (PLA). [9]
  - b) Explain in detail about Programmable ROM. Compare the various types of ROMs. [9]
- Q7) a) Explain in detail about Postsynthesis Design Validation with example.[10]
  - b) Explain the boundary scan and JTAG ports. Also explain the operation of JTAG modes of operation [8]

#### OR

- *Q8*) a) Describe fault simulation. Explain different approaches of Fault simulations. [10]
  - b) Explain the different option available for elimination of ASIC timing violation.
     [8]

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**PC-2621** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

## [6354]-770

# B.E. (Electronics and Computer Engineering) Augmented and Virtual Reality (2019 Pattern) (Semester - VII) (410345 D) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagram must be drawn wherever necessary.

Q1) a) What is representation of virtual world explain in detail?	[5]
---	-----

- b) What are the two types of rendering? Explain any one in details. [6]
- c) Explain the commonly used haptic devices in details. [6]

#### OR

Q2)	a)	What are the problems with haptic technology?	[5]
	b)	Explain the main objectives of virtual worlds?	[6]
	c)	List and explain the feature of the virtual world?	[6]
Q3)	a)	How will virtual reality change the way we interact with the world?	[5]
	b)	List and explain the device is used to experience virtual reality?	[6]
	c)	Explain how to Interacting with the VR System	[6]

*P.T.O.* 

Q4)	a)	What is the importance of virtual reality in our daily life? [	5]
	b)	What are the different Substance of the Virtual World?	6]
	c)	Explain the following terms [	6]
		1) Interacting with Others-Shared Experience,	
		2) Collaborative Interaction	
Q5)	a)	Compare between virtual reality and AR? [	5]
	b)	Explain, what are the different constraints affect a mobile AR experience	e? 6]
	c)	Explain why augmented reality is the best? [	7]
		OR	
<b>Q6</b> )	a)	Explain the concepts of marker-based and marker less tracking in AR[	5]
	b)	List and explain the main benefits of AR?	6]
	c)	How does AR works? Explain.	7]
Q7)	a)	Explain the different software component of Augmented system require for Reality Systems.	ed 5]
	b)	Explain Software Tools for Content Creation [	6]
	c)	Explain in brief description of how virtual reality works?	7]
		OR	
Q8)	a)	Explain Mobile Augmented Reality. [4]	5]
	b)	Explain how does augmented reality work on mobile? [4]	6]
	c)	Explain how does virtual reality help to make work experiences more?	7]

[6354]-770

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**PC2622** 

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

### [6354]-771

# B.E. (Electronics & Computer Engineering) ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (2019 Pattern) (Semester - VIII) (410350)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.

<b>Q1</b> )	a)	What are the different levels of knowledge representation.	[6]
	b)	Explain Probability and Bay's Theorem.	[6]
	c)	Explain WUMPUS World Environment giving it space description exp how percept sequences generated.	lain [ <b>8</b> ]
		OR	
Q2)	a)	What do you mean by resolution and unification explain with example	.[6]
	b)	Explain Kalman Filter in detail.	[6]
	c)	Write a note on Knowledge representation.	[8]
Q3)	a)	Compare Machine Learning with traditional programming. Discuss ty of Machine Learning with suitable examples.	/pes [8]
	b)	What are various Statistical Learning Approaches.	[8]
		OR	
Q4)	a)	Explain different data formats used in Machine Learning.	[8]
	b)	What is Machine Learning? Explain applications of Machine Learnin data science.	g in [ <b>8</b> ]

*P.T.O.* 

<b>Q</b> 5) a)	What is support vector machine .Discuss in detail?			
b)	Explain the following.	[8]		
	i) Linear regression			
	ii) Logistic Regression			
	OR			
<b>Q6</b> ) a)	Differentiate between Lasso Regression and Ridge Regression.	[8]		
b)	Explain the following Evaluation Metrics:			
	i) MAE			

- ii) RMSE
- iii)  $R^2$
- Q7) a) Explain artificial neural network based on perception concept with diagram.[9]
  - b) Describe multi-layer neural network. Explain why back propagation algorithm is required. [9]

- *Q8*) a) What is Functional Link Artificial Neural Network (FLANN)? Explain its merits over other ANNs. [9]
  - b) Explain Single Layer Neural Network and What is Activation Function? Explain with a suitable example. [9]

### $\circ$ $\circ$ $\circ$

**PC-2623** 

[Total No. of Pages : 2

## [6354]-772

# B.E. (Electronics and Computer Engineering) VLSI Design and Technology (2019 Pattern) (Semester - VIII) (410351)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] [Max. Marks : 70 Instructions to the candidates: Answers the Q.1, or Q.2, Q.3, or Q.4, Q5, or Q6, Q7, or Q.8. 1) 2) Neat diagrams must be drawn wherever necessary. Figures to the right side indicate full marks. 3) Use of logarithmic tables slide rule, Electronic pocket Calculator is allowed. **4**) 5) Assume Suitable data if necessary. *Q1*) a) Differentiate between static RAM and dynamic RAM. Enlist the different DRAM cells. [8] Explain the 6T SRAM cell with the help of diagram. [9] b) OR Explain the refresh circuit. Also explain the timings. *Q2*) a) [8] Explain in brief the sense amplifier. [9] b) Explain in brief the different floor planning methods. *Q3*) a) [8] "Explain the global routing and switchbox routing. b) [9] OR Explain the different factors considered in floor planning. **Q4**) a) [8] Explain the power distribution and clock distribution. [9] **b**) Explain in brief the cascade chains in FPGA. **Q5**) a) [9] b) Explain the JTAG. Also explain the boundary scan. [9]

## SEAT No. :

- Q6) a) Explain the example of logic blocks in commercial FPGAs. [9]
  - b) Explain in brief the TAP controller. [9]
- Q7) a) Draw the structure of n-channel enhancement MOSFET. Also explain its operation. [9]
  - b) Explain the working of CMOS inverter with the help of Voltage Transfer curve. [9]

- Q8) a) Draw CMOS logic for 2 input NAND gate. Explain its working and draw its stick diagram. [9]
  - b) Discuss need for transmission gate. Draw 4:1 Mux using TG. [9]



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[Total No. of Pages : 2

[Max. Marks : 70

[8]

[8]

**SEAT No. :** 

## [6354]-773

# B.E. (Electronics & Computer Engineering) CLOUD COMPUTING

## (2019 Pattern) (Semester - VIII) (Elective - V) (410352A)

#### Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates :

- 1) Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8,
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.
- Q1) a) What are the common standards in Cloud Computing [8]
  - b) Write down the difference between
    - i) LAMP and LAPP
    - ii) XML and JSON

#### OR

### Q2) a) Write short note on -

- i) Google AppEngine
- ii) Microsoft Assure
- b) Explain Solution Stacks and standards for security in cloud computing.[8]

Q3) a) Write general Security Advantages of Cloud-Based Solutions and Disaster recovery [9]
b) Explain Cloud file systems and Cloud data stores. [9]

#### OR

- (Q4) a) Explain the Business Continuity and threats in Disaster Recovery. [9]
  - b) Enlist the cloud Storage Providers and explain its need and services [9]

*P.T.O.* 

- Q5) a) What is ubiquitous computing ? Which are the Cloud Trends that Support Ubiquitous Computing. [9]
  - b) Elaborate the Innovative Applications of the Internet of Things and Networking in CC. [9]

- Q6) a) Explain the following applications [9]
  - i) Smart Buildings
  - ii) Smart Power Grid
  - b) Elaborate the Performance of Distributed Systems in the Cloud Computing and What are the Enabling Technologies for the Internet of Things. [9]
- *Q7*) a) List down the features of Cloud Computing ,Advantages of CC in daily life and its limitations. [9]
  - b) Explain in brief applications of IoT based on Cloud Supports [9]

#### OR

- Q8) a) Explain the Docker —. Features, Workflow and Architecture. [9]
  - b) Describe the Future of Cloud TV & Cloud-Based Smart Devices,.[9]

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**PC-2625** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-774

# B.E. (Electronics & Computer Engg.) EMBEDDED SYSTEM & REAL TIME OPERATING SYSTEMS

(2019 Pattern) (Semester - VIII) (410352B) (Elective - V) Time : 2<sup>1</sup>/<sub>2</sub> Hours] [Max. Marks : 70 Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

Q1) a) Explain semaphore & mutex in  $\mu$ cos II Real Time Operating System.[6]

b) Describe advantages of Embedded Linux. [6]

c) Describe memory selection criteria of embedded system. [6]

#### OR

Q2) a) Explain Task management service of  $\mu$ cos II operating system. [6]

- b) Describe Task & resource synchronisation mechanism in  $\mu$ cos II. [6]
- c) How Mailbox, Message queue works, explain with example. [6]
- **Q3**) a) Describe the need of embedded Linux OS. [6]
  - b) What is embedded development environment. Explain in detail. [6]
  - c) Define cross development environment? Explain with example. [6]

- Q4) a) Enlist the development tools for embedded system. Explain any two.[6]
  - b) What are the advantages of embedded Linux. [6]
  - c) Explain in short : Embedded Linux setup & embedded system storage considerations. [6]

Q5)	a)	Explain BIOs & Bootloader.	[5]
	b)	Describe device driver concept & methods of driver.	[6]
	c)	Describe background of Linux Kernel.	[6]
		OR	
<b>Q6</b> )	a)	What are the challenges of bootloader. Explain steps followed in boloader.	oot [ <b>6]</b>
	b)	Explain : Das U-Bot & Porting U-Boot.	[6]
	c)	Describe the construction & configuration of linux kernel.	[5]
Q7)	a)	Explain the process of Embedded system development.	[6]
	b)	Draw & explain the block schematic of ATMega328P based uno board.	[6]
	c)	Explain structure of Arduino programs.	[5]
		OR	
<b>Q</b> 8)	a)	Explain the specifications of host & target machine & liking, loading software in any embedded system.	ng [ <b>6]</b>
	b)	Explain the process of getting software in Target system.	[5]
	c)	Write detail case study of embedded system of automatic car parking with ultrasonic sensor.	ng [ <b>6]</b>

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[6354]-774

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SEAT No. :

[Total No. of Pages : 2

# [6354]-775

# B.E. (Electronics & Computer Enggineering) SOFTWARE TESTING AND QUALITY ASSURANCE (2019 Pattern) (Semester - VIII) (410352C) (Elective - V)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

*Q1*) a) What is data driven testing? Explain Data driven testing framework. **[8]** 

b) What are some of the challenges in automating the testing of GUI portions of an application? Compare backend testing and frontend testing. [6]

c) What are the selection criteria of automated testing tool? [4]

#### OR

<b>()</b> () a)	What is Test Automation and Terms used in Automation?	[6]
$Q^2$ (a)	what is fest Automation and ferms used in Automation?	լօյ

- b) Explain the Design and Architecture of Automation? [6]
- c) What is the Generic requirement for the Test Tool? [6]
- Q3) a) What is Selenium? What are the different Selenium components? [9]
  - b) Why should one select selenium as a test tool? What are selenium test design considerations? [8]

- Q4) a) Describe Selenium Web driver architecture with the help of a neat diagram.List the advantages of web driver over selenium server. [9]
  - b) Explain Selenium Grid architecture with the help of a neat diagram. [8]

- Q5) a) What is ISO standard? What are advantages and limitations of ISO standard.[9]
  - b) What is software quality and why is it important in software development? [8]

- *Q6*) a) What are the main elements of Software Quality Assurance (SQA) and also write SQA Tasks and Goals? [9]
  - b) What is six sigma? Explain the terms DMAIC and DMADV. [8]
- Q7) a) Explain with example software maintenance metric : i) Fix backlog and backlog maintenance index ii) Percent Delinquent fixes [9]
  - b) Explain the following terms-Pareto Chart, Scatter diagram, cause and effect diagram. [9]

- (*Q8*) a) Explain Total Quality Management approach of software testing. [6]
  - b) Compare Product Quality Metrics and process Quality Metrics? [6]
  - c) Describe the role of software maintenance in ensuring product quality.[6]



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[Total No. of Pages : 2

**SEAT No. :** 

# [6354]-776

# B.E. (Electronics & Computer Engineering) ARTIFICIAL NEURAL NETWORK (2019 Pattern) (Semester - VIII) (Elective - V) (410352D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8,
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.
- *Q1*) a) Explain Artificial neurons and Biological neurons. Explain the relationship between Biological neural network and artificial neural network with the help of suitable diagram.
  - b) Explain parameters and hyperparameters in deep learning. Provide an example of each. Differentiate between parameters and hyperparameters in deep learning. [9]

- Q2) a) What is a multilayer perceptron neural network? Explain benefits and limitations of multilayer perceptron neural network [8]
  - b) Discuss various methods to avoid overfitting during the training of neural networks. Compare and contrast techniques such as dropout, L1 and L2 regularization, and early stopping. [9]
- Q3) a) Explain the training process of Convolutional Neural Networks. How are CNNs trained using backpropagation and gradient descent? [8]
  - b) Draw and explain the architecture of Convolutional Neural Networks. Discuss the significance of convolutional layers in CNNs. [9]

- Q4) a) Explain ReLU activation function. Discuss the advantages and disadvantages of using the ReLU activation function. Compare the ReLU and Tanh functions.
   [8]
  - b) What is activation function in neural network? Explain the role of the activation function in Neural Networks. What are its advantages and disadvantages of Neural Networks? [9]
- Q5) a) Explain the training process of Bidirectional Recurrent Neural Networks. How are BRNNs trained using forward propagation and backpropagation through time? Discuss the challenges faced during training.
   [9]
  - b) Explain the concept of Recurrent Neural Networks. What makes RNNs different from feedforward neural networks? Discuss the internal architecture of RNNs and how they can handle sequential data. [9]

- *Q6*) a) Discuss the two main issues of Standard Recurrent Neural Networks. How do they affect the training and performance of RNNs? [9]
  - b) Describe the Long Short-Term Memory architecture in Recurrent Neural Networks. How does the LSTM architecture solve the vanishing gradient problem in RNNs to remember information over long sequences? Discuss the main components of the LSTM architecture and their functions. [9]
- Q7) a) What is deep learning? What are the various applications of deep learning? Explain any one application in detail with architecture diagram. [9]
  - b) Discuss the challenges of Large-Scale Deep Learning. What are the main challenges faced when training deep learning models on large-scale datasets? [9]

#### OR

- Q8) a) What is natural language processing? How is deep learning used in natural language processing? Explain it with example [9]
  - b) Explain the application of Convolutional Neural Networks in handwritten digit recognition. How are CNNs utilized in digit recognition tasks? Discuss the architecture of CNNs adapted for digit recognition, including the training process, activation functions and output layers. [9]

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## [6354]-776

**PC-2628** 

[Total No. of Pages : 3

[Max. Marks : 70]

**SEAT No. :** 

## [6354] - 777

# B.E. (Electronics and Computer Engineering) DATA MINING AND WAREHOUSING (Elective-VI) (2019 Pattern) (Semester - VIII) (410353A)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Figures to the right side indicate full marks.
- 3) Assume Suitable data, if necessary.
- Q1) a) Explain with example how to measure dissimilarities in the following attributes: [9]
  - i) Categorical attributes
  - ii) Binary attributes
  - iii) Ordinal attributes

b) Explain Cosine Sinnarity with example.	[ð]
---	-----

OR

### **Q2**) a) Explain following.

- i) Minskowski Distance
- ii) Euclidean distance
- iii) Manhattan distance
- b) Calculate Cosine Similarity between two text Documents [8]
   Docl= "Data is The Oil of Digital Economy"
   Doc2= "Data is new Oil"

## Q3) a) Briefly with an example explain the following: [8]

- i) Frequent itemset
- ii) Closed frequent itemset
- b) Explain FP-Growth algorithm. Compare and contrast FP-Growth algorithm with Apriori algorithm. [9]

*P.T.O.* 

[9]

- Q4) a) Consider the Market basket transactions shown below. Assuming the minimum support = 50% and Minimum confidence = 80% [8]
  - i) Find all frequent item sets using Apriori algorithm
  - ii) Find all association rules using Apriori algorithm

Transaction_id	Items_bought
T1	{Mango, Apple, Banana, Dates}
T2	{Apple, Dates, Coconut, Banana, Fig}
T3	{Apple, Coconut, Banana, Fig}
T4	{Apple, Banana, Dates}

b) Explain Apriori algorithm. How can we improve the efficiency of the Apriori algorithm? [9]

[9]

- Q5) a) Write short note on :
  - i) Rule Induction Using a sequential Covering Algorithm
  - ii) Case based reasoning Classifier
  - b) Define classification and prediction.Explain decision tree based classification method with suitable example. [9]

#### OR

- *Q6*) a) Write and explain K-Nearest-Neighbour Classification algorithm with suitable example. [9]
  - b) Define Lazy learners with an example. Explain the IF-THEN rules for classification? [9]
- Q7) a) Explain following measures for evaluating classifier accuracy [9]
  - i) Specificity
  - ii) Sensitivity
  - iii) Recall
  - iv) Precision
  - b) Explain in detail following techniques to evaluate the accuracy of a Classifier. [9]
    - i) Holdout method
    - ii) Cross validation

2

[6354]-777

Q8) a) How the performance of Classifiers algorithms is evaluated.Explain following with example [9]

[9]

- i) Accuracy
- ii) Error Rate
- b) Explain the following :
  - i) Systematic learning
  - ii) Wholistic learning

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[6354]-777

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[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

## [6354] - 778

# B.E. (Electronics and Computer Engineering) ELECTRIC VEHICLE TECHNOLOGY (2019 Pattern) (Semester - VIII) (Elective-VI) (410353B)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Figures to the right indicate full marks.
- Q1) a) Define the concept of drive trains in the context of energy consumption. How does the architecture of electric drive trains differ from traditional internal combustion engine drive trains? [9]
  - b) Compare and contrast the working principles of DC motors, induction motors, and BLDC motors used in EVs. [8]

- Q2) a) Explain the function of controllers in electric vehicle drives. How do controllers contribute to optimizing performance, efficiency, and safety in EVs? [9]
  - b) Describe the types of sensors commonly used in electric vehicles and their respective functions. Discuss how sensors contribute to real-time monitoring, control, and safety in EVs. [8]
- Q3) a) What are the key components of a traditional EV battery system, and how does it differ from conventional internal combustion engine vehicles?[9]
  - b) Why is energy storage critical for EVs, and what are the key performance criteria that influence the selection of energy storage solutions? [9]

- Q4) a) Compare and contrast different types of batteries commonly used in EVs. Discuss their advantages, limitations, and suitability for EV applications.
  - b) Explain the hybridization of different energy storage devices in electric vehicles. Discuss the advantages and challenges of combining multiple energy storage technologies. [9]
- Q5) a) Explain the importance of electrical protection and system requirements in electric vehicles (EVs). Discuss key considerations for ensuring safety, reliability, and efficiency in EV electrical systems. [9]
  - b) Describe the design of photovoltaic solar-based electric vehicles. How do solar panels integrate into the vehicles structure, and what role do they play in extending range and reducing reliance on grid charging? [8]

- *Q6*) a) Compare and contrast battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), plug-in hybrid vehicles (PHEVs), and fuel cell electric vehicles (FCEVs).
  - b) Define the levels of electrification and discuss how they impact vehicle performance, fuel efficiency, and emissions. [8]
- Q7) a) Discuss the different types of charging stations for electric vehicles (EVs), including Level 1, Level 2, and Level 3 (DC fast charging). Compare and contrast their charging speeds, power outputs, and suitability for various EV applications.
  - b) Identify and describe the components of a typical charging station.
     Discuss the roles of components such as power converters, connectors, communication modules, safety features, and billing systems. [9]

### OR

- Q8) a) Explain the process of selecting and sizing a charging station for a specific application. Consider factors such as available power supply, charging requirements, anticipated usage patterns, and compatibility with EV models.
  - b) Discuss the selection of power semiconductors for EV charging and infrastructure applications. Explain the importance of reliability, efficiency, and thermal management in choosing suitable semiconductor devices for high-power applications. [9]



# [6354]-778

**PC-2630** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354] - 779

## B.E. (Electronics and Computer Engineering) SOFTWARE DEFINED RADIO (2019 Pattern) (Semester - VIII) (Elective VI) (410353C)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- Q1) a) Explain frequency offset & its correction techniques in SDR. [6]
  - b) Write advantages of multirate DSP. [6]
  - c) Draw & explain block diagram of digital upconversion used in SDR.[6]

Q2)	a)	What is channel estimation? Explain one technique.	[6]
	b)	What are the challenges of multirate DSP in SDR.	[6]
	c)	Explain applications of multirate DSP.	[6]
<b>Q3</b> )	(b) a) What is spectrum efficiency? How it decides various function CR.		s of [ <b>6</b> ]
	b)	Describe applications of cognitive Radio	[6]
	c)	Explain cognitive Radio related standardizations by IEEE standard.	[5]
		OR	

Q4)	a)	What is spectrum sharing? How it may benefit for communication indus	stry. [6]
	b)	Explain cognitive Radio network	[5]
	c)	Define spectrum efficiency. How it helps in advancement of communica era.	tion [6]
Q5)	a)	Draw & explain public - subscribe CRN architecture	[6]
	b)	Explain spectrum sensing techniques used in cognitive Radio	[5]
	c)	Describe the impact of policy support in cognitive Radio	[6]
		OR	
<b>Q6</b> )	a)	Write & explain characteristics of cognitive radio network.	[6]
	b)	Draw & explain architecture of public-subscribe cognitive Radio Netwo	ork. [5]
	c)	Explain the effect of cognitive Radio in current communication system	. <b>[6]</b>
Q7)	a)	Present case study of beagle board based SDR.	[6]
	b)	Explain Advance communication system with SDR	[6]
	c)	Brief about interoperability of SDR.	[6]
		OR	
Q8)	a)	Explain the challenges & issues of SDR implementation.	[6]
	b)	Explain the modes of public safety cognitive Radio	[6]
	c)	Explain SDR $\rightarrow$ The advance communication system	[6]

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PC-2631

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

## [6354] - 780

# B.E. (Electronics and Computer Engineering) WIRELESS SENSOR NETWORKS (2019 Pattern) (Semester - VIII) (Elective-VI) (410353D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- *Q1*) a) Explain role of Medium Access Protocols (MAC).Explain metrics throughput and delay which decides the performance of Medium Access Protocols (MAC).[6]
  - b) Explain in detail protocol stack of WSNs along with its diagram. [6]
  - c) List the features of Wibree Protocol/standard. State advantages, disadvantages and applications of Wibree protocol/standard. [8]

#### OR

- Q2) a) Explain in detail BLE protocol standard along with its architecture. [6]
  - b) Draw and explain the architecture of Wireless HART Protocol. [6]
  - c) Write a short note on IEEE802.15.4 low rate WPAN. Also state the features of same. [8]
- Q3) a) What is localization in Wireless Sensor Networks? Explain the need and challenges of localization in Wireless Sensor Networks.[8]
  - b) Draw and explain multi-hop Wireless Sensor Network architecture. State the advantages and disadvantages of multi-hop Wireless Sensor Networks.

[8]

*P.T.O.* 

- Q4) a) What is routing in Wireless Sensor Networks? Explain full-network broadcast routing protocol with flow diagram. [8]
  - b) Explain range-based localization and range free localization in Wireless Sensor Networks. [8]
- **Q5**) a) Explain security requirements and threat model in WSN. [8]
  - b) Explain clustering techniques in Wireless Sensor Networks. Explain need of clustering in Wireless Sensor Networks. State the advantages of clustering in Wireless Sensor Networks. [8]

[8]

#### OR

- *Q6*) a) Explain the following:
  - i) Low Energy Adaptive Clustering
  - ii) Hybrid Energy Efficient Distributed clustering
  - b) Explain different security issues and challenges in Wireless Sensor Networks. [8]
- Q7) a) Along with block diagram explain patient health monitoring application of WSN. [9]
  - b) What is need for energy management in WSN. Compare Adhoc and Sensor Networks. [9]

#### OR

- Q8) a) Explain general problems in deployments of Wireless Sensor Networks.Also explain in detail general testing and validation process. [9]
  - b) Explain in detail issues and challenges in providing QoS. Also explain in detail QoS frameworks. [9]

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[6354]-780

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SEAT No. :

## PC2632

[Total No. of Pages : 2

### [6354]-781 B.E. (AIDS) MACHINE LEARNING (2019 Pattern) (Semester - VII) (417521)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams mus be drawn wherever necessary
- 3) Figures to the right indicates full Marks
- 4) Use of electronic pocket calculator is allowed
- *Q1*) a) What are kernel functions in SVM? Describe the Radial Basis Kernel, and Sigmoid kernel. [6]
  - b) Write formula for accuracy, precision, recall and fl-score. Calculate accuracy, precision, recall and fl-score for given example. [12]

		Actual Values	
		Cancer	No Cancer
<b>Predicted Values</b>	Cancer	45	18
	No Cancer	12	25

#### OR

- Q2) a) Explain any 4 evaluation measures of Multiclass classification. [4]
  - b) Differentiate Balanced and Imbalanced Classification. [6]
  - c) Write a detailed note on K Nearest Neighbour algorithm with suitable example. [8]
- Q3) a) Differentiate Agglomerative Hierarchical Clustering and Divisive Hierarchical Clustering.[8]
  - b) What is clustering? Elaborate Types of Clustering. [9]

- Q4) a) Explain DBSCAN algorithm with advantages and disadvantages. [8]
  - b) Describe centroid based clustering algorithm and explain any one type with example. [9]

<b>Q</b> 5) a)	Explain Following with respect to Ensemble learning.		
	i) Need of Ensemble Learning		
	ii) Advantages of Ensemble methods		
	iii) Ensemble learning limitations		
b)	Elaborate stacking approach of ensemble with example.		
	OR		
<b>Q6</b> ) a)	Describe ensemble learning. Explain Gradient Boosting ensemble learn techniques.	ing <b>[9]</b>	
b)	Explain any three voting mechanism in ensemble learning.	[9]	
<b>Q7</b> ) a)	Differentiate supervised and unsupervised learning with example.	[8]	
b)	Explain Reinforcement Learning need and its types in detail?	[9]	
	OR		
<b>Q8</b> ) a)	Explain following terms:		
	i) Belman Equation		
	ii) Markov Chain		
	iii) Q table		
	iv) Q function		
b)	How does the Markov property relate to Reinforcement Learning? W is it important?	′hy <b>[9]</b>	



PC2633

SEAT No. :

[Total No. of Pages : 2

## [6354]-782 B.E. (Artificial Intelligence and Data Science) DATA MODELING AND VISUALIZATION (2019 Pattern) (Semester-VII) (417522)

Time	<sup>2</sup> Hours] [Max. Marks	[Max. Marks: 70	
Instr	ructi 1) 2) 3) 4)	ons to the candidates: Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6 Q.7, or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right side indicate full marks. Assume suitable data, if necessary.	
Q1)	a)	Explain in detail design choices in data visualization.	[8]
	b)	Explain data handling for data visualization.	[9]
		OR	
Q2)	a)	Write a short note on Role of Computational Statistics in data visualizat	ion. [8]
	b)	Explain the different types of Data visualization.	[9]
Q3)	a)	Explain the Force-directed Techniques and Multidimensional Scalin detail.	g in [ <b>9</b> ]
	b)	Explain importance of reshaping and pivoting in data visualization.	[8]
		OR	
Q4)	a)	Write a short note on Pulling Under Constraints Model.	[8]
	b)	Explain the process of data wrangling in detail.	[9]

*P.T.O.*
Q5)	a)	Expl	ain Data aggregation with suitable example.	[9]
	b)	Expl	ain in detail cross tabulation 67 Time Series.	[9]
			OR	
Q6)	a)	Exp visua	lain Group by Mechanics techniques in data modeling a alization.	nd [ <b>9]</b>
	b)	Writ	e a short note on.	[9]
		i)	Pivot Tables	
		ii)	Periods and Periods Arithmetic	
Q7)	a)	Expl	ain PET Images and its applications in data modeling and visualization	on. [ <b>9]</b>
	b)	Expl mod	ain the various data reconstruction techniques used to assist de eling and visualization.	ata [ <b>9]</b>
			OR	
<b>Q</b> 8)	a)	Writ	e a short note on :-	[9]
		i)	Ultrasound Images	
		ii)	Magnetic Resonance Images	
	b)	Expl	ain ER/Studio with its applications.	[9]



**PC-2634** 

SEAT No. :

[Total No. of Pages :2

## [6354]-783

# B.E. (Artificial Intelligence and Data Science) QUANTUM ARTIFICIAL INTELLIGENCE (2019 Pattern) (Semester - VII) (Elective - III) (417523 (A))

<i>Time</i> : 2 <sup>1</sup> /	Time : 2 <sup>1</sup> / <sub>2</sub> Hours]	
Instructi	ons to the candidates:	
1)	Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7	or Q.8.
2)	Neat diagrams must be drawn wherever necessary.	
3)	Assume suitable data if necessary	
4)	Figures to the right indicate full marks.	
<i>Q1</i> ) a)	Explain Quantum Part of the Shor's Algorithm.	[9]
b)	Describe Grover's Algorithm.	[9]
	OR	
<b>Q2</b> ) a)	Explain Factoring Integers, with example.	[9]
b)	Discuss analysis of Deutsch algorithm in details.	[9]
<b>Q3</b> ) a)	Explain Nearest Neighbour Search in detail.	[9]
b)	Explain Quantum Algorithms for Linear Algebra.	[9]
	OR	
<b>Q4</b> ) a)	Identify the key differences between classical SVM in terms of their advantages?	and Quantum SVM [9]
b)	Explain quantum boosting with example.	[9]
<b>Q5</b> ) a)	Explain Quantum Teleportation in detail.	[9]
b)	Describe Quantum cryptography and secure commu	nication in detail. [8]
	OR	

<b>Q6</b> )	a)	Explain in short Quantum Dense Coding.	[9]
	b)	Explain Noise and error models in quantum systems.	[8]
Q7)	a)	State the challenges and limitations are associated with q computing in data sciences.	uantum [9]
	b)	Describe Heuristic Search with example.	[8]
		OR	
Q8)	a)	Describe the Quantum Walk-Random Insect.	[9]
	b)	Write a short note on Quantum Tree Search.	[8]

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**PC-2635** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

## [6354]-784

# B.E. (Artificial Intelligence and Data Science) INDUSTRIAL INTERNET OF THINGS (2019 Pattern) (Semester - VII) (417523B) (Elective - III)

*Time : 2½ Hours]* 

Instructions to the candidates :

- 1) Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicate full marks
- 4) Assume suitable data if necessary.

Q1) a) What are the primary components of an industrial IoT system? Explain each in details.[6]

- b) Explain the Industrial Internet Architecture Framework (IIAF). [6]
- c) What are different types Industrial IoT- Layers? Explain in details each layer. [6]

- Q2) a) What are the key components and Design consideration of a typical WSN used in industrial IoT? [6]
  - b) Explain the Business Model Architecture of industrial IoT. [6]
  - c) ExplaIn the difference between edge computing and cloud computing in industrial IoT. [6]
- Q3) a) Explain the concept of Cloud of Things (CoT) and its significance in the context of Industrial IoT. [6]
  - b) What is the role of data analytics in Industrial IoT? Explain Any one Example. [6]
  - c) What is need of Digital Twin for industrial IoT? Explain Elements of Digital Twin in Industrial IoT. [6]

<b>Q4</b> )	a)	Explain the SaaS PaaS and IaaS with examples.	6]
	b)	Explain the importance of data visualization techniques in presentir complex Industrial IoT data.	1g 6]
	b)	Provide examples of how digital twin technology is transforming industrie and driving digital transformation.	es 6]
Q5)	a)	What are the key challenges and security considerations when implementir the industrial IoT in industrial environments?	ıg 6]
	b)	What is the concept of threat analysis in the context of Industrial IoT Explain the industrial IoT threat analysis in smart manufacturing plant.[6]	[? 6]
	c)	Explain the Network security techniques in industrial IoT.	5]
		OR	
<b>Q6</b> )	a)	Explain the Conventional web technology and relationship with industri IoT.	al 6]
	b)	What is importance of access control in industrial IoT? Explain the methodologies for access control.	1e 6]
	c)	Explain Management aspects of cyber security in industrial IoT.	5]
Q7)	a)	Explain the concept of smart factories and how they differ from tradition manufacturing facilities.	al 6]
	b)	How does industry 4.0 benefits the industrial IoT in manufacturing process?	1g 6]
	c)	What is industry 5.0 with example?	5]
		OR	
<b>Q</b> 8)	a)	Explain the health care application in industrial IoT.	6]
	b)	Describe the advantages and challenges of implementing smart logistic in supply chain management.	cs 6]
	c)	What are Key characteristics of industry 4.0?[4]	5]



[6354]-784

2

**PC-5104** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354]-785R

# B.E. (Artificial Intelligence and Data Science) ENTERPRISE ARCHITECTURE & COMPONENTS (2019 Pattern) (Semester - VII) (417523C) (Elective III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates :

- 1) Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicate full marks
- 4) Assume suitable data if necessary.
- *Q1*) a) Explain the key components of architecture, governance? Define the term architecture governance? [8]
  - b) Evaluate and explain the fundamental principles that govern architectural design? [9]

#### OR

- Q2) a) Analyze the concept of baseline architecture? Evaluate the implementation of architectural best practices within this context. [8]
  - b) List out the main phases of the architecture development process? How can organizations ensure the success of their architecture development process? [9]
- Q3) a) Compare and contrast the advantages of enterprise information architecture with traditional IT architecture. [8]
  - b) Describe an operational model relationship diagram framework with suitable example? [9]

#### OR

- (Q4) a) What are the contexts of operational model design techniques? [8]
  - b) Explain the roles of Component interaction diagram. Component description and Component relationship diagram? [9]

- Q5) a) What are the popular interoperability standards and protocols for metadata and master data exchange? [9]
  - b) Elaborate the steps and considerations for implementing a master data management system. [9]

- Q6) a) Describe the challenges that organizations face when implementing interoperability standards for data exchange? [9]
  - b) Define the term Metadata. Describe the various metadata management tools used in enterprise architecture? [9]

[9]

- Q7) a) Write a note on
  - i) Enterprise Architecture Tools and Technologies
  - ii) Importance of enterprise architecture governance
  - b) Explain Business Process Model for IT Management based on Enterprise Architecture. [9]

#### OR

- Q8) a) How does enterprise architecture support IT strategy? Explain the role of enterprise architecture in digital transformation? [9]
  - b) Explain the steps for establishing an Enterprise Architecture Governance Framework. [9]



[6354]-785R

PC-2637

[6354]-786

# **B.E.** (Artificial Intelligence and Data Science) **BIOINFORMATICS**

## (2019 Pattern) (Semester - VII) (417523 D) (Elective - III)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.
- Q1) a) Differentiate between the terms 'primary', "secondary", and "tertiary" in the context of protein structure. [9]
  - b) Discuss the role and significance of machine learning algorithms in CADD. [9]

#### OR

- Q2) a) Describe the key steps involved in the process of homology modelling in bioinformatics. [9]
  - b) What is threading in the context of protein structure prediction? How it is different from homology modelling? [9]
- Q3) a) Define systems biology and explain its fundamental principles. [9]
  - b) Discuss the importance of network analysis and visualization tools in systems biology. [8]

#### OR

- Q4) a) Explain how mathematical modelling of regulatory networks contributes to our understanding of gene expression and cellular regulation. [8]
  - b) Provide an example of a specific regulatory network and its role in a biological system. [9]

*P.T.O.* 

[Total No. of Pages : 2

SEAT No. :

- Q5) a) Describe the Principal Component Analysis (PCA) method. How is it utilized in dimensionality reduction and what are its limitations? [9]
  - b) Discuss the adaptation and importance of deep learning techniques in bioinformatics for analysing large-scale biological data. [9]

- Q6) a) Provide an example of a specific gene network analysis task where machine learning, deep learning, or CNNs have provided valuable insights.
  - b) Explain the importance of clustering in pattern recognition and data analysis. [9]

Q7) a) What types .of biological data are most critical in developing bioinformatics tools for disease treatment and how are they utilized?[9]

b) Discuss how bioinformatics contributes to environmental biotechnology, particularly in microbial genomics and bioremediation. [8]

- Q8) a) What are some ethical considerations that need to be addressed in the evolving field of bioinformatics? [9]
  - b) Explain how genomic information influences drug response and highlight its role in personalized medicine. [8]



**PC-2638** 

[Total No. of Pages : 2

[*Max. Marks* : 70

**SEAT No. :** 

## [6354]-787

### **B.E.** (AI & DS)

## GPU Programming and Architecture (2019 Pattern) (Semester - VII) (417524 A) (Elective IV)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right side indicate ate full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- Q1) a) What are the common problems faced by CUDA programmers? explain these issues in detail. [6]
  - b) Explain Synchronization issues in detail. [6]
  - c) Explain parallel programming issue: Race Hazard? [6]

#### OR

- Q2) a) What are the commonly used CUDA error handling APIs? provide a detailed explanation of each. [6]
  - b) Describe Image feature extraction algorithm based on CUDA Architecture? [6]
  - c) What are tools and techniques that you should employ for finding and Avoiding CUDA errors [6]
- *Q3*) a) What is OpenCL? Explain Key features and components of the OpenCL standard? [9]
  - b) Describe the alternatives to OpenCL for GPU Programming? [8]

Q4)	a)	Draw & Explain OpenCL Execution Model?	[9]
	b)	Explain Kernels and Host Device Interaction?	[8]
Q5)	a)	Explain convolution parallel algorithm?	[6]
	b)	Explain Parallel Predix Sum algorithms?	[6]
	c)	Explain Heterogeneous Cluster?	[6]
		OR	
<b>Q6</b> )	a)	What is Parallelism? Explain Task based parallelism and data-ba parallelism?	sed [6]
	b)	Explain Common parallel Patterns: Loop-based and fork/join Pattern	? <b>[6]</b>
	c)	Explain Sparse Matrix Multiplication on a GPU?	[6]
Q7)	a)	Explain Heterogeneous computing with OpenCL?	[9]
	b)	What are the Application Specific Processors (ASP)? Explain it?	[8]
		OR	
Q8)	a)	Draw & Explain OpenCL Memory Model?	[9]
	b)	Draw & Explain Transport Triggered Architecture (TTA)?	[8]

## **F4 F4 F4**

# [6354]-787

2

SEAT No. :

PC-2639

[Total No. of Pages : 2

# [6354]-788

## **B.E.** (AI&DS)

# **INFORMATION RETRIEVAL**

## (2019 Pattern) (Semester - VII) (417524 B) (Elective IV)

Time : 2½ Hours][Max.Instructions to the candidates:		e Hours] [Max. Marks	: 70
111511	1) 2)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat diagram must be drawn wherever necessary.	
	3)	Assume suitable data, if necessary.	
<b>Q1</b> )	a)	Define and explain Probabilistic Retrieval.	[6]
	b)	What is the binary independent retrieval model?	[6]
	c)	Explain types of language models?	[6]
		OR	
Q2)	a)	List and explain the challenges in Natural language processing	[6]
	b)	State and explain different types of Bayesian networks?	[6]
	c)	Explain with suitable example different levels of NLP	[6]
Q3)	a)	What is the difference between clustering and classification? Can cluster be used for classification purposes?	ring [ <b>6</b> ]
	b)	What are different types of clustering algorithm? Explain any one of th	em. [ <b>5</b> ]
	c)	Explain in detail about naïve Bayes algorithm and its application in classification	text [6]
		OR	

<b>Q4</b> )	a)	What is K nearest neighbor classifier with an illustration in informat retrieval?	tion [6]
	b)	Explain Mixture of GaussiansModel.	[5]
	c)	Solve Agglomerative hierarchical clustering for single link with examp	ple. [6]
Q5)	a)	Factors that influence a webpage's PageRank score	[6]
	b)	Discuss the factors that influence a webpage's PageRank score. Disc the challenges involve in web search engine	cuss [ <b>5</b> ]
	c)	Define Python library is used for web crawling?	[6]
		OR	
Q6)	a)	Define Python library is used for web crawling?	[6]
	b)	What are the Main challenges posed by Web?	[5]
	c)	Explain the components of focused web crawlers?	[6]
Q7)	a)	Explain multimedia IR models?	[9]
	b)	What are the four phases of recommender system?	[9]
		OR	
Q8)	a)	What are the different evaluation metric for Recommender system.	[9]
	b)	What is the difference between information retrieval and recommensystem?	ider [ <b>9</b> ]

## **b4 b4 b4**

# [6354]-788

**PC-2640** 

# [6354] - 789 B.E. (AI&DS) UI/UX Design

## (2019 Pattern) (Semester - VII) (417524 C) (Elective IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Assume Suitable data if necessary.
- 4) Neat diagram must be drawn wherever necessary.

Q1)	a)	What is the significance of information architecture in user interface desi	gn? [6]
	b)	What is your design process for mobile applications?	[6]
	c)	How to evaluate Interface design?	[6]
		OR	
Q2)	a)	With suitable example explain the concept of Usability testing.	[6]
	b)	Explain golden rules of design principle.	[6]
	c)	Describe the various human factors that go into design.	[6]
<b>Q</b> 3)	a)	Explain advantages and disadvantages of Direct Manipulation.	[6]
	b)	Write a short note on-Navigating Menu.	[6]
	c)	Explain WIMP in detail.	[5]

*P.T.O.* 

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

Q4)	a)	Write a short note on-Interaction with natural language.	[6]
	b)	How different interaction styles are useful in different scenarios.	[6]
	c)	Differentiate between menu bar and toolbar.	[5]
Q5)	a)	What are the different elements of windowing systems.	[6]
	b)	Explain drop down and pop-up list boxes.	[6]
	c)	Explain different presentation controls.	[6]
		OR	
Q6)	a)	What is Screen based controls?	[6]
	b)	Explain individual windows design and multiple windows design.	[6]
	c)	What is the significance of training and learning.	[6]
Q7)	a)	Write a short note on-Societal and individual impact of user interface	.[6]
	b)	Explain Think Aloud protocol in detail.	[6]
	c)	Explain different challenges for information visualization.	[5]
		OR	
<b>Q</b> 8)	a)	Differentiate between usability testing and user testing.	[6]
	b)	With an example explain A/B testing.	[6]
	c)	Explain importance of Surveys and Questionaries in detail.	[5]

## **b4 b4 b4**

# [6354]-789

2

PC-2641

[6354]-790

# **B.E.** (Artificial Intelligence and Data Science) **OPTIMIZATION ALGORITHMS**

(2019 Course) (Semester - VII) (Elective - IV) (417524 D)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicate full marks
- 4) Use of scientific non programmable calculator is allowed
- 5) Assume suitable data if necessary
- Q1) a) Write a note on :
  - Quadratic Programming
  - Geometric Programming
  - b) There is knapsack with capacity m = 15 and items to be chosen along with profit are  $W = \{10, 15, 12, 9, 21\}$  and  $P = \{100, 40, 25, 55, 45\}$ , using Dynamic solve the problem to fill the sack optimally. [10]

OR

- Q2) a) What is principle of optimality? Differentiate Continuous vs Discrete Dynamic programming. [10]
  - b) Use the Revised Simplex Method of Linear Programming and solve the following problem. [8]

Max  $z = x_1 + x_2$ subject to,  $2x_1 + 5x_2 \le 6$  $x_1 + x_2 \ge 2$  $x_1, x_2 \ge 0$ 

- **Q3**) a) Solve the equation 4a + 4b + 5c + 10d + 8e + 12f = 920 with Genetic Algorithms approach, stop your calculation after THREE iterations and compare how closely you produced an answer. [9]
  - b) With suitable example explain in detail the Boltzmann Distribution. [8]

*P.T.O.* 

SEAT No. :

[Total No. of Pages :2

[Max. Marks : 70

[8]



- Q4) a) What is simulated annealing? Explain basic convergence properties in detail.[9]
  - b) Solve the following linear equation with genetic algorithms with given optimization function. [8]

$$a + 5b + 8c = 120$$
  
 $f(x) = (a + 5b + 8c) - 120$ 

To speed up the calculations values of *a*, *b*, *c* restrict between 0 to 10

- **Q5)** a) The knapsack with capacity m = 25 and Items with which sack to be filled optimally to get maximum profit, there weights and profits are mentioned  $W = \{10, 20, 7, 9, 8\}$  and  $P = \{45, 84, 73, 35, 10\}$  respectively. Apply PSO and solve the problem. [10]
  - b) Prove that escape velocity Particle Swarm Optimization algorithm escape from local optimum. Use following equation for the same. [8]

$$V_{i}^{t+1} = W.V_{i}^{t} + c_{1}U_{1}^{t}(P_{b1} - P_{i}^{t}) + c_{2} + U_{2}^{t}(g_{b}^{t} - P_{i}^{t})$$
  
OR

Q6) a) Apply any colony optimization problem on traveling salesman problem

mentioned in this matrix 
$$\begin{bmatrix} \infty & 2 & 4 & 6 \\ 2 & \infty & 3 & 8 \\ 4 & 3 & \infty & 7 \\ 6 & 8 & 7 & \infty \end{bmatrix}$$
 [10]

- b) In differential evaluation how the parameters of convergence chooses and analysis is carried out, explain it briefly. [8]
- Q7) a) Write and explain the behavior of Firefly Algorithm with variation of light intensities.[9]
  - b) Write and explain framework for self tuning of an algorithms and list parameters with short description. [8]

- Q8) a) Let us assume a seen where Dataset  $D^{n \times n}$  contains n features, we dont have PCA Algorithm here so want rely on Batman algorithm and complete task with of feature selection for machine learning activity. [9]
  - b) Write down the application areas where firefly algorithm can be used. Explain one application in detail. [8]

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SEAT No. :

### **PC2642**

#### [Total No. of Pages : 2 [6354]-791

# B.E. (A.I. & D.S.) COMPUTATIONAL INTELLIGENCE (2019 Pattern) (Semester - VIII) (417530)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- [Max. Marks : 70
- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicate full marks
- 4) Use of electronic pocket calculator is allowed.
- *Q1*) a) Explain the role of genetic operators in Evolutionary Computing. [6]
  - b) Compare and contrast Evolutionary Computation with classical optimization techniques. [6]
  - c) Explain the importance of constraint handling in Evolutionary Computing.[6]

- Q2) a) Discuss common performance measures used to evaluate Evolutionary Algorithms. [6]
  - b) Explain the Ant Colony Optimization (ACO) algorithm and its inspiration from ant foraging behaviour. [6]
  - c) What is the difference between single and multi-objective optimization?[6]
- Q3) a) Define the following terms in the context of Genetic Algorithms: Individuals, Population, Search Space, Genes, Fitness Function, Chromosome, Trait, Allele, Genotype, and Phenotype. [9]
  - b) Define the Fitness Score in the context of Genetic Algorithms. Why is it important to have a well-defined Fitness Function in a Genetic Algorithm?[8]

- Q4) a) Describe the Initialization process in a Genetic Algorithm and its significance.[9]
  - b) Explain the Canonical Genetic Algorithm, also known as the Holland Classifier System in detail. [8]
- Q5) a) What is Natural Language Processing (NLP), and why is it important in modern computing? [6]
  - b) Compare and contrast traditional metrics (e.g., BLEU) with neural metrics (e.g., BERT score) for evaluating machine translation. [6]
  - c) How is NLP being used to address challenges in healthcare, finance, or other industries? [6]

- *Q6*) a) What is the BLEU score, and how is it used to evaluate the quality of machine translations? [6]
  - b) Define Neural Style Transfer and its applications in image processing.[6]
  - c) Explain the Seq2Seq architecture and its role in Neural Machine Translation (NMT).
     [6]
- Q7) a) Define the danger theory model proposed by Polly Matzinger and how It challenges traditional views of the immune system? [9]
  - b) Explain the role of dendritic cells in the immune system. [8]

#### OR

- Q8) a) Describe the clonal selection theory of immune response and how does it explain the specificity and diversity of the immune response. [9]
  - b) Define the natural immune system and its primary functions. [8]

#### $\circ \circ \circ$

PC-2643

SEAT No. :

[Total No. of Pages : 3

[Max. Marks : 70

# [6354]-792 B.E. (AI & DS) Distributed Computing (2019 Pattern) (Semester - VIII) (417531)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- *Q1*) a) Explain the concept of Remote Procedure Call (RPC) and how it facilitates communication between distributed systems with schematic diagram?

[9]

b) How ZooKeeper's Atomic Broadcast consensus algorithm ensures consistency and fault tolerance in distributed systems ? Provide an overview of the key components and mechanisms involved in this process.
 [8]

- Q2) a) "Compare and contrast Proof of Stake (PoS) and Proof of Work (PoW) as consensus mechanisms in blockchain networks. Discuss the advantages and disadvantages of each approach and argue why some argue that Proof of Stake is more beneficial than Proof of Work in terms of scalability, energy efficiency, and security." [9]
  - b) Explain the concept of Remote Method Invocation (RMI) in the context of distributed computing. Discuss its advantages and potential challenges in designing and implementing distributed systems. [8]
- Q3) a) Explain the Distributed Gradient Descent (DGD) algorithm used in distributed machine learning. Analyze the advantages and challenges of implementing DGD in large-scale distributed systems, considering factors such as communication overhead, scalability, and convergence speed.[9]
  - b) "How do Spark, GraphLib, and TensorFlow contribute to the efficiency and scalability of distributed machine learning algorithms. [8]

- Q4) a) Describe how Federated Learning enables model training across multiple decentralized devices while preserving data privacy. Discuss the advantages and challenges of Federated Learning compared to traditional centralized machihe learning approaches.
  - b) Provide examples of how intelligent resource management strategies improve resource utilization, reduce latency, and facilitate seamless scalability in distributed computing environments for machine learning tasks."
- Q5) a) "Compare and contrast (any two) Apache Storm, Apache Samza, and Apache Flink as big data processing frameworks in distributed computing. Discuss their key features, architectural differences, fault tolerance mechanisms, and use cases. Finally, argue why one framework might be more suitable than the others for specific real-time or batch processing scenarios." [6]
  - b) Discuss various scalable data ingestion methods used in distributed computing environments. [6]
  - c) Describe the various types of real-time analytics used in distributed computing systems. Discuss their respective advantages, limitations, and typical applications. [6]

#### OR

- *Q6*) a) Discuss various tools and frameworks used for scalable data ingestion in distributed computing environments. [6]
  - b) Compare and contrast Single Instruction Single Data (SISD) and Multiple Instruction Single Data (MISD) architectures in the context of distributed computing. [6]
  - c) Discuss the various types of streaming analytic used in distributed computing systems. [6]

[6354]-792

- Q7) a) Explain any two AI-based Intrusion Detection and Threat Mitigation Techniques? [9]
  - b) Enlist security challenges in distributed system? Explain any 3 challenges in detail? [9]

- Q8) a) Discuss the importance of privacy preservation techniques in distributed computing and provide examples of such techniques. How do these techniques help protect sensitive data while enabling collaborative data processing across distributed environments? [9]
  - b) Explain the significance of Threat Hunting and Visualization in distributed computing environments. Provide examples of tools or techniques used for Threat Hunting and Visualization in such environments. [9]



**PC-2644** 

SEAT No. :

[Total No. of Pages : 2

## [6354]-793

## B.E. (Artificial Intelligence and Data Science) VIRTUAL REALITY AND GAME DEVELOPMENT (2019 Pattern) (Semester - VIII) (417532 - A) (Elective - V)

Time Instr	e : 2½ uction	[Max. Marks : ns to the candidates :	70
	1) 2) 3) 4)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Figures to the right indicate full marks. Neat diagrams must be drawn whenever necessary. Make suitable assumptions whenever necessary.	
<b>Q1</b> )	a)	Explain the various human factors involved in Virtual Reality.	[9]
	b)	List and describe the direct effects of VR simulations on users. OR	[9]
<b>Q</b> 2)	a)	Illustrate any three VR tools in detail.	[9]
~	b)	What are the social implications of VR?	[9]
<b>Q3</b> )	a)	Explain the significant milestones in the history of electronic ga development? What traditions in early game development are still existence?	.me l in <b>[9]</b>
	b)	What is level design and how does it relate to gameplay, story and character development?	ter [8]
		OR	
<b>Q</b> 4)	a)	Write short notes on	
		i) Games Genres	
		ii) Gaming Platforms and Players Modes	[8]
	b)	What is Ludology? Explain the common frameworks for Ludology.	[9]
<b>0</b> 5)	a)	Write a short note on	<b>[9</b> ]
$\boldsymbol{z}$ - $\boldsymbol{z}$		i) Transforming objects in 2D with blender	
		i) Object modifiers in blender	
	$\mathbf{h}$	Explain the process of creating a 3D animation in Rlender	۲ <b>0</b> ٦
	0)	Explain the process of creating a 5D animation in Dichdel.	[7]

- Q6) a) How would you apply knowledge of Blender software to real-time applications, demonstrating comprehension of its functionalities and their practical utilization? [9]
  - b) Explain the significance of the Timeline and Keyframes in the animation process. [9]
- Q7) a) Describe the key features that distinguish virtual reality (VR) games from traditional gaming. [9]
  - b) Differentiate between heuristic and non-heuristic search algorithms employed in game AI. [8]

- Q8) a) Explain the advantages and disadvantages of VR gaming experiences compared to conventional gaming platforms. [9]
  - b) Describe how search algorithms are applied in game AI to solve complex problems with example. [8]

## $\nabla \nabla \nabla \nabla$

**PC-2645** 

[Total No. of Pages : 2

## [6354]-794

## **B.E.** (Artificial Intelligence and Data Science) **BIG DATA ANALYTICS (ELECTIVE -V)** (2019 Pattern) (Semester - VIII) (417532B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates :

- Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or *1*) *Q.No.8.*
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.

<b>Q1</b> )	a)	Explain the steps involved in performing the linear regression analy using R programming.	vsis [ <b>6]</b>
	b)	Explain dirty data in R Programming with suitable example.	[6]
	c)	Explain the steps involved in data preparation for data analysis.	[6]
		OR	
<b>Q</b> 2)	a)	Write a short note on model planning and model building in data analyt lifecycle.	tics [ <b>6</b> ]
	b)	Explain the data cleaning and processing techniques in R programmit to address dirty data.	ing [ <b>6</b> ]
	c)	Explain the role of MapReduce in data cleaning and validation process.	[6]
Q3)	a)	Explain Exploratory Data Analytics in the data analysis process	[6]
	b)	Write a short note on Boosting and AdaBoost ensemble techniques.	[6]
	c)	Explain Holdout Method of dataset Partitioning.	[6]
		OR	
<b>Q4</b> )	a)	Explain the working of random forest algorithm.	[6]
	b)	Explain the steps in data exploration.	[6]
	c)	Explain random subsampling method of dataset Partitioning.	[6]

[Max. Marks : 70

*P.T.O.* 

**SEAT No. :** 

Q5)	a)	Discuss various techniques for visual data representation.	[6]
	b)	Explain the key challenges of big data visulization.	[6]
	c)	Explain the importance of Tableau in data visualization.	[5]
		OR	
<b>Q6</b> )	a)	Explain the analytical techniques used in Big data visualization.	[6]
	b)	Write a short note on.	[5]
		i) Candela	
		ii) D3. js	
	c)	Explain various types of data Visualization.	[6]
Q7)	a)	Discuss the applications of Big Data Analytics in the retail industry.	[6]
	b)	Write a short note on data collection tools.	[6]
		i) Semantria tool	
		ii) Sentiment Analysis tool	
	c)	Explain Scraper data extraction tool in big data analytics.	[5]
		OR	
<b>Q</b> 8)	a)	Discuss the applications of Big Data Analytics in the healthcare analytics	s. <b>[6]</b>
	b)	Write a short note on data storage tools.	[6]
		i) Apache HBase	
		ii) CouchDB	
	c)	Explain Mozenda data extraction tool in big data analytics.	[5]



# [6354]-794

**PC-2646** 

[Total No. of Pages : 2

SEAT No. :

## [6354]-795

# B.E. (Artificial Intelligence and Data Science) SOFTWARE DEVELOPMENT FOR PORTABLE DEVICES (2019 Pattern) (Semester - VIII) (417532C) (Elective - V)

Time Instr	[Max. Marks : 70 Ins to the candidates :	
	1) 2) 3)	Aswer four questions Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8. Neat diagrams must be drawn wherever necessary. Assume suitable data, if necessary.
<b>Q1</b> ) a)		Explain the concept of Monitoring Location Provider Status and Availability with Example. [9]
	b)	Write a short note on:
		a) Refreshing the Current Location
		b) Tracking Your Location in Where Am I [9]
		OR
Q2)	a)	How to create a Notification and Configuring the Status Bar Display. [9]
	b)	Explain Reverse Geocoding and Forward Geocoding. [5]
	c)	How to configure the apearance of the Notification within the extended notification tray in a number of ways? [4]
<b>Q</b> 3)	a)	List the Android Wear Platform? Explain them in detail with suitable examples. [9]
	b)	Explain Android Wear Devices: Getting Started [8] OR
Q4)	a)	Explain Android Notifications and Android Wear. [8]
	b)	Describe Notification Setting and Control. [9]

Q5)	a)	Write a note on: Creating the Android App.	[9]
	b)	Elaborate Hello Fit: hands-on example.	[9]
		OR	
<b>Q6</b> )	a)	What is SQLite, Working with SQLite Databases	[8]
	b)	Explain BleApi interface, SensorsApi, RecordingApi	[7]
	c)	What is Google fit main package.	[3]
Q7)	a)	Explain the Home Entertainment with Example and Fitne Health and Medical.	ss, [ <b>8</b> ]
	b)	Explain Wearable for Medical Professional, Wearables and Remote Medi Diagnostics.	cal [ <b>9</b> ]
		OR	
<b>Q</b> 8)	a)	Explain the terms Industrial Manufacturing, Civic, Government, a Democracy.	ind [ <b>9</b> ]
	b)	Explain in detail Future of Portable Devices.	[8]



[6354]-795

**PC-2647** 

SEAT No.:

[Total No. of Pages : 2

[Max. Marks : 70]

## [6354]-796

# **B.E.** (Artificial Intelligence and Data Science) **DEEP LEARNING**

## (2019 Pattern) (Semester - VIII) (417532 D) (Elective - V)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- *Q1*) a) Draw and explain CNN (Convolution Neural Network) architecture in detail.[9]
  - b) Explain ReLU Layer in detail. What are the advantages of ReLU over Sigmoid? [9]

#### OR

<b>Q2</b> ) a)	<b>Explain Pooling L</b>	ayer with its need and differer	nt types. [9	)]
$\sim$ / /	1 0			

- b) What is the difference between a *fully connected layer* and a convolutional layer? [5]
- c) Explain the term parameter sharing in CNN. [4]
- Q3) a) Explain the working of RNN with suitable diagram. Illustrate the Vanishing Gradient problem occurs in simple RNN. [9]
  - b) How Name Entity Recognition Problem is fixed using Bidirectional RNN? Explain with the help of suitable diagram. [8]

OR

- *Q4*) a) Explain Encoder-Decoder Sequence to Sequence architecture with its application.
  - b) How short term memory problem avoided in LSTM? Explain with the help of suitable diagram. [9]

- Q5) a) Explain GAN (Generative Adversarial Network) architecture with an example.[9]
  - b) What are applications of GAN (Generative Adverssarial Network)? Explain any three in detail. [9]

- *Q6*) a) Differentiate generative and discriminative models in GAN (Generative Adversarial Network).
  - b) Do GANs (Generative Adversarial Network) find real or fake images? If yes explain it in detail. [7]
  - c) What are the types of Generative Adversarial Network (GANs) [3]
- *Q7*) a) What are the challenges of reinforcement learning? Explain any three in detail.[8]
  - b) Explain in detail Dynamic programming algorithms for reinforcement learning. [9]

#### OR

Q8) a) Explain Markov Decision Process with Markov property. [6]
b) Write Short Note on Q Learning and Deep Q-Networks. [6]
c) What is deep reinforcement learning? [5]

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**PC-2648** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

## [6354] - 797

# **B.E.** (Artificial Intelligence and Data Science) AUGMENTED REALITY

### (2019 Pattern) (Semester - VIII) (Elective VI) (417533A)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary
- 3) Make suitable assumptions if necessary
- 4) Figures to the right indicate full marks.
- Q1) a) How is computer vision used in augmented reality? Explain in detail Marker Tracking and Multiple-Camera Infrared Tracking. [9]
  - b) List and Explain the different Major Software Components for Augmented Reality Systems. [9]

#### OR

- *Q2*) a) Explain Natural Feature Tracking and its types. [9]
  - b) Explain In detail which kind of Software used to Create Content for the Augmented Reality Application. [9]
- **Q3**) a) Explain Different Augmented Reality Techniques in detail. [9]
  - b) Explain different Marker types with detail description of 2D barcode markers. [8]

- Q4) a) Explain Augmented Reality System And Threats of Augmented Reality.[9]
  - b) Explain different Tracking methods with detailed explanation of hybrid tracking. [8]
- **Q5**) a) Explain Augmented Reality Components in details. [9]
  - b) Explain in detail Scene Generator.Difference between Tracking system and monitoring system. [9]

- *Q6*) a) Explain Augmented Reality Devices in details. [9]
  - b) What is the difference between video see through and optical see through? Explain in detail key characteristics of projection displays. [9]
- Q7) a) Explain in detail Cloud services in AR Applications [9]
  - i) Business applications,
  - ii) Weather prediction,
  - iii) Market prediction
  - b) Explain the AR applications for Civil Engineering, Architecture, Archaeology, Crime and Security [8]

#### OR

- *Q8*) a) Explain in detail different Tools available for Augmented Reality and Recognition. [9]
  - b) Explain the following Points related to the AR application. [8]
    - i) Healthcare Sector
    - ii) Education,
    - iii) Agriculture
    - iv) IoT.

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[6354]-797

**PC-2649** 

[Total No. of Pages : 2

[*Max. Marks* : 70

**SEAT No. :** 

## [6354] - 798

# **B.E.** (Artificial Intelligence and Data Science) Business Intelligence

### (2019 Pattern) (Semester - VIII) (Elective VI) (417533B)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary
- 3) Make suitable assumptions if necessary
- 4) Figures to the right indicate full marks.
- Q1) a) Explain the concepts of ETL Architecture, Extraction, Transformation, and Loading (ETL) in the context of Business Intelligence. [6]
  - b) Develop a plan for Data Quality assessment and profiling in the context of a specific business dataset. [6]
  - c) Create a visual representation (e.g., diagram or flowchart) of the Data Provision in process, highlighting key stages and components. [6]

OR

- *Q2*) a) Differentiate between Initial and Incremental Loading in ETL processes. [6]
  - b) Create a simplified data mart and explain its purpose in a BI system. [6]
  - c) Compare and contrast the data provisioning methods of different BI tools such as Tableau, Power BI, and Dundas BI. [6]
- Q3) a) Describe the significance of Data Reduction in the context of large datasets, and explain the methods of Sampling. [6]
  - b) Define Data Transformation and describe the process of Standardization in data preprocessing. [5]
  - c) Propose a feature extraction method suitable for a specific domain and explain its potential benefits. [6]

- Q4) a) Differentiate between Feature Selection and Principal Component Analysis (PCA) in terms of data reduction techniques. [6]
  - b) Evaluate the effectiveness of different methods of Data Discretization in improving the interpretability of data. [5]
  - c) Evaluate the strengths and weaknesses of measures of correlation for numerical attributes in multivariate analysis. [6]
- Q5) a) Analyze the strengths and limitations of Linear Regression in different scenarios. [6]
  - b) Discuss the principles underlying the Apriori Algorithm for association rule mining. [6]
  - c) Design a regression model for a complex problem, considering relevant variables and data. [6]

- Q6) a) Critically analyze the outcomes of clustering models based on partition and hierarchical methods. [6]
  - b) Evaluate the trade-offs between Bayesian methods and Logistic Regression in classification problems. [6]
  - c) Propose a clustering strategy for a large dataset and justify your approach. [6]
- Q7) a) Explain how Logistics and Supply Chain Management benefit from Business Intelligence applications. [5]
  - b) Develop a Customer Relationship Management strategy that incorporates Business Intelligence tools and analytics. [6]
  - c) Compare the advantages and disadvantages of Mobile Business Intelligence with traditional BI approaches. [6]

#### OR

- Q8) a) Identify and analyze key issues related to analytics, such as data privacy and security concerns. [5]
  - b) Evaluate the ethical considerations and risks associated with the use of Web 2.0 and Online Social Networking in Business Intelligence. [6]
  - c) Evaluate the potential future impacts of Location-based Analytics on organizational decision-making. [6]

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## [6354]-798

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**PC-2650** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

### [6354] - 799

# B.E - (Al & DS Engineering) Information Systems Management (2019 Pattern) (Semester - VIII) (Elective VI) (417533C)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answers: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Draw neat figures wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of Calculator is allowed.
- 6) Assume Suitable data if necessary.
- Q1) a) What are the major types of knowledge management systems explain in brief? [9]
  - b) What is business intelligence and how it works? [9]

#### OR

- (Q2) a) List and explain the analytic functionalities provided by BI systems. [9]
  - b) How Does Knowledge Management Enhance the Process of Decision-Making? [9]
- Q3) a) Provide a comprehensive evaluation of the key tools and methodologies available within Business Process Management (BPM). [9]
  - b) Write short Note on: Modelling and Design System [8]

Q4)	a)	Compare and contrast Structured and Object-Oriented Methodolog for modelling and designing systems	gies [9]		
	b)	Evaluate the multifaceted purposes of the System Development Proc cycle.	cess [8]		
Q5)	a)	List and describe the challenges posed by enterprise applications.	[6]		
	b)	Distinguish between a push-based and a pull-based model of supply ch Management.	nain [ <b>6</b> ]		
	c)	Illustrate how enterprise systems provide value for a business.	[6]		
	OR				
<b>Q6</b> )	a)	Distinguish between operational and analytical CRM.	[9]		
	b)	Define customer relationship management and deduce why customer relationships are so important today.	mer <b>[9]</b>		
Q7)	a)	List and describe four business objectives, four system functionalitie a typical e-commerce Web site.	s of <b>[9]</b>		
	b)	List and describe the Unique features of e-commerce.	[8]		
		OR			

- Q8) a) Identify' and explore important types of m-commerce services and applications. [9]
  - b) List and explain any three options for building and hosting e-commerce Web sites. [8]

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**PC-2651** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354] - 800

# B.E. (Artificial Intelligence & Data Science) Reinforcement Learning

### (2019 Pattern) (Semester - VIII) (Elective VI) (417533D)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data jf necessary.
- Q1) a) Discuss the formulation of planning in MDPs and highlight its importance in decision-making. [6]
  - b) Compare policy iteration and value iteration algorithms in MDPs. [6]
  - c) How does the Banach fixed-point theorem contribute to the convergence analysis of dynamic programming algorithms in MDPs? [6]

#### OR

- Q2) a) Explain the principle of optimality in the context of MDPs. Flow does it influence planning? [6]
  - b) Describe the iterative policy evaluation technique and its role in estimating value functions. [6]
  - c) Discuss the significance of the contraction mapping property in proving the convergence of iterative algorithms. [6]
- Q3) a) What are Monte Carlo rnethods in the context of reinforcement learning and how do they differ from other approaches? [9]
  - b) Explain the difference between first-visit and every-visit Monte Carlo methods in reinforcement learning. [8]

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- Q4) a) Describe the process of Monte Carlo control and how it is used to approximate optimal policies. [9]
  - b) Compare on-policy and off-policy learning in reinforcement learning, providing examples of each. [8]
- Q5) a) Describe the Q-learning algorithm and its key components in the context of reinforcement learning. [8]
  - b) Explain the concept of on-policy and off-policy learning in temporal difference learning, providing examples of each. [5]
  - c) What are the limitations of traditional Q-learning algorithms and how do advancements such as Double DQN address these limitations? [5]

#### OR

- *Q6*) a) Explain how the advancements in deep Q-learning algorithms contribute to handling complex environments and improving learning performance.[9]
  - b) How does a deep Q-network (DQN) differ from traditional Q-learning, and what are the advantages of using deep neural networks in reinforcement learning? [9]
- Q7) a) Explain the Dyna architecture and how it integrates planning, acting, and learning in reinforcement learning. [6]
  - b) Describe the role of rollout algorithms in reinforcement learning planning algorithms, and how they contribute to estimating the value of actions or states. [6]
  - c) Explain the concept of trajectory sampling and its significance in reinforcement learning planning algorithms. [5]

#### OR

- Q8) a) What is prioritized sweeping and how does it prioritize state updates in planning algorithms? [6]
  - b) How do heuristic search algorithms work and what role do they play in planning and decision-making processes? [6]
  - c) Discuss the concept of planning at decision time and its implications for real-time decision-making in reinforcement learning. [5]

### **64 64 64**

[6354]-800

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[6354]-801

[Total No. of Pages :2

**SEAT No. :** 

# B.E. (Mechatronics Engineering) ROBOT OPERATING SYSTEM

### (2019 Pattern) (Semester- VII) (417541)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

[3]

[5]

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

# *Q1*) a) Classify the Robot Programming language based on generation. Explain each generation in detail. [10]

- b) Explain the following statements:
  - i) PROMPT "text", INDEX
  - ii) TYPE "text"
  - iii) GOTO 10

c) Explain the following commands:

- i) CLOSE 10 MM
- ii) GRASP 40, 100
- iii) SIGNAL 4 ON
- iv) SIGNAL 10 OFF
- v) WAIT 10 ON

#### OR

- Q2) a) Explain the various components of the Robot language structure that are coordinated with the help of diagrams. [6]
  - b) Write and explain all the commands for logarithmic, exponential, and similar functions. [6]
  - c) Write any six commonly used monitor mode commands and explain each of them. [6]
- *Q3*) a) Write a program control statement, constants, and Variables for AML.[5]
  - b) Write a subroutine in Rapid language for Industrial Robot. [5]
  - c) Write the motion instructions for Pick and Place using Industrial Robot.[7]

<b>Q4</b> )	a)	What is AML and its elements?	[5]
	b)	Explain the sensor commands and motion control for the AML language	e. <b>[5]</b>
	c)	What is MOVE Master command language? Write the syntax and exp each line syntax in detail.	lain [ <b>7</b> ]
Q5)	a)	Explain any five key aspects of Robotics Process Automation.	[5]
	b)	Explain Jogging and robot components in Robot Studio.	[5]
	c)	Explain input and output signals in Robot Studio.	[8]
		OR	
<b>Q6</b> )	a)	What is soft Robotics? Explain it with the application.	[5]
	b)	Explain work planning and Program module for Robot Studio.	[5]
	c)	Write the process chart to demonstrate the issue and potential solution of multiple robot and machine interference in a virtual robot environment.	ions tics [8]
Q7)	a)	How to use the simulation for decision-making?	[5]
	b)	Explain different types of Simulation.	[5]
	c)	What is the Monte Carlo method? Explain.	[7]
		OR	
<b>Q</b> 8)	a)	Write the advantages and disadvantages of simulation.	[10]

b) What do you understand by Analog and Hybrid Simulation? [7]



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[6354]-802

# B.E. (Mechatronics Engineering) DATA COMMUNICATION (2019 Pattern) (Semester - VII) (417542)

*Time* : 2<sup>1</sup>/<sub>2</sub> *Hours*] *Instructions to the candidates:* 

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Neat diagrams must be drawn wherever necessary.
- *Q1*) a) Define Modulation index. Explain the frequency spectrum for FM wave.[8]
  b) Explain in detail Narrow Band FM and Wide Band FM. [9]

#### OR

Explain Frequency Transmission Direct and Indirect Method. [8] *Q2*) a) With the help of neat sketch explain phase lock loop. State the advantages, b) disadvantages and application of the same. [9] Explain the following modulation Techniques [8] **Q3**) a) **OPSK** i) BFSK ii) Explain in details M-ary PSK Transmitter and Receiver. [9] b) OR Write a short note on MSK **Q4**) a) [8] Explain in details Differentially Encoded BPSK and DQPSK [9] b) Define Antenna Explain **05**) a) [9] **Radiation Intensity** i) ii) Directivity Power Gain iii) Bandwidth iv) Write short note on Half wave dipole and Folded wave dipole Antenna b) state their applications. [9]

[Total No. of Pages : 2

[Max. Marks: 70

SEAT No. :

<b>Q6</b> )	a)	What is wave Propagation explain its various types.	[9]
	b)	Explain the relation fom small loops and its radiation resistance.	[9]
Q7)	a)	Explain in detail Adjacent channel Interference.	[9]
	b)	With the help of neat sketch explain Cellular System.	[9]
		OR	
<b>Q</b> 8)	a)	What is Multipath Effect in mobile communication? Explain parameters of Multipath Reception.	the <b>[9]</b>
	b)	Explain in details following network system.	[9]

- i) 2G
- ii) 2.5G

# (i) (i) (i) (i)

**PC2654** 

[6354]-803

[Total No. of Pages :2

**SEAT No. :** 

# B.E. (Mechatronics Engineering) MICRO ELECTRO MECHANICAL SYSTEMS (2019 Pattern) (Semester- VII) (417543)

Time : 2<sup>1</sup>/<sub>2</sub> Hours] [Max. Marks : 70 Instructions to the candidates: 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 2) Neat diagrams must be drawn wherever necessary. Use of Non-programmable Calculator is allowed. 3) **4**) Assume suitable data if necessary. *Q1*) a) Explain in brief the process of etching. [9] b) Write a short note on micro-machining with neat diagram. [8] OR Explain in brief the bulk micro-machining. [9] *Q2*) a) Write a short note on different materials used in MEMS. [8] b) *Q3*) a) Write a short note on Scaling in electro - static forces. [9] Explain the concept Scaling in geometry. [9] b) OR With neat diagram the Scaling in electro-magnetic forces. [9] **Q4**) a) [9] Write a short note on rigid body dynamics. b) **Q5**) a) Explain in brief the ESPI. [9] Write a short note on SEM. [8] b)

a)	Explain in brief the STM.	[9]
b)	Explain in detail the different Topography methods with suitable diagram	m. [ <b>8]</b>
a)	Enlist the different applications of Nano-Technology.	<b>[9]</b>
b)	Write a short note on Carbon Nano-Tubes.	[9]
	OR	
a)	Enlist the different industrial applications of Carbon Nano-Tubes. Expla any one in detail.	ain [ <b>9]</b>
b)	Write a short note Nano - Indention technique.	[9]
	<ul> <li>a)</li> <li>b)</li> <li>a)</li> <li>b)</li> <li>b)</li> </ul>	<ul> <li>a) Explain in brief the STM. [</li> <li>b) Explain in detail the different Topography methods with suitable diagraphical applications of Nano-Technology. [</li> <li>b) Write a short note on Carbon Nano-Tubes. [</li> <li>OR</li> <li>a) Enlist the different industrial applications of Carbon Nano-Tubes. Explain any one in detail. [</li> <li>b) Write a short note Nano - Indention technique. [</li> </ul>



### PC-2655

[6354]-804

# B.E (Mechatronics Engineering ) IMAGE PROCESSING & COMPUTER VISION (2019 Pattern) (Semester - VII) (417544 A) (Elective - III)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Figure to the right indicates full marks.
- 3) Assume Suitable data if necessary.
- 4) Use of Calculator is allowed.
- 5) Neat Diagrams must be drawn wherever necessary.
- Q1) a) What is Interest point of the corner Detector process of an Image?Expalin with proper steps using Harris Corner detector Algorithm.[8]
  - b) Explain Histogram of oriented Gradients with the help of proper example. [10]

#### OR

**Q2)** a) Give matrix Ix and Iy for an image.

	4	7	6		4	8	8
Ix =	8	8	7	Iy =	8	6	7
	8	6	5		6	6	4

Find out, given area of the image is corner or not using Harris Corner Detection Algorithm.

- b) Explain Scale Invariant Feature Transform in detail. [9]
- **Q3)** a) Explain Clustering for knowledge representation. [5]
  - b) Explain Object Detection in Computer Vision. [5]
  - c) What are different parameter Estimation Techniques? Expalin Maximum Likelihood Estimation in detail. [7]

*P.T.O.* 

SEAT No. : [Total No. of Pages :2

[9]

[Max. Marks : 70

Q4)	a)	What is Learning and adaptation in Machine Learning?	[4]
	b)	Waht is Dimension Reduction?	[5]
	c)	Explain Linear discriminant Analysis in detail.	[8]
Q5)	a)	Give Opencv code for following operation :	[6]
		i) Accessing and modifying pixel values of an image.	
		ii) Accessing Image properties.	
	b)	Give opency code for following shape drawing functions :	[6]
		i) Circle	
		ii) Text	
	c)	Explain Image Blurring Technique. Give advantages of Ima Blurring.	ges [ <b>5</b> ]
		OR	
Q6)	a)	What are Image Contours? Write steps for finding and draw contours using opency.	ing [6]
	b)	What are different Arithmetic Operations on Image ? Explain Addit of Image.	tion [6]
	c)	Explain Image Thresholding Technique with syntax and syn explanation.	tax [ <b>5</b> ]
Q7)	a)	What is Artificial neural network for pattern Classification?	[6]
	b)	What is Convolution Neural Network (CNNs)?	[6]
	c)	What are Autoencoders?	[6]
		OR	
Q8)	a)	Give a brief on application of Computer Vision - Gesture Recognition	ion. [ <b>9</b> ]
	b)	Explain Object Tracking in computer vision in detail.	[9]

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PC-2656

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70]

### [6354]-805

# B.E. (Mechatronics Engineering) MEDICAL MECHATRONICS (2019 Pattern) (Semester - VII) (417544 - B) (Elective - III)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary.
- Q1) a) State the significance of Pulmonary function testing. Describe the Working principle of any type of Pulmonary function testing machine with the neat diagram. [10]
  - b) With the help of neat diagram, Explain the working of Infrared Gas Analyzer with the help of neat diagram. [7]

OR

- Q2) a) Define Hearing Loss. Draw and Discuss the working principle of Audiometer with the help of block diagram. [10]
  - b) Define Blood Pressure? Explain the working of Direct Method of Blood Pressure Measurements. [7]
- Q3) a) State the role of external devices in the body. Compare Pacemaker and Defibrillator. [10]
  - b) With the help of neat diagram, explain the working of electrosurgical unit with the help of neat diagram. [8]

OR

- Q4) a) State the role of Defibrillator in the body. With the help of neat diagram, Explain the working of Defibrillator with the help of neat diagram. [10]
  - b) With the help of neat diagram, Explain the working of Ventilator system with the help of neat diagram. [8]

*P.T.O.* 

- Q5) a) State the advantages of Magnetic Resonance effect in the body. With the help of neat diagram, Explain the working of Magnetic Resonance Imaging with the help of neat diagram. [10]
  - b) With the help of neat diagram, Explain the working of Microwave Hermagraphy with the help of neat diagram. [7]

#### OR

- *Q6*) a) State the advantages of X Rays in the body. With the help of neat diagram, Explain the working of Computer Tomography. [10]
  - b) With the help of neat diagram, Explain the working of Cystoscope with the help of neat diagram. [7]
- Q7) a) State the concept of micro shock and macro shock hazard. With the help of neat diagram, Explain the concept of EMI / RFI Interference.

[10]

b) With the help of neat diagram, Explain the working of Biomedical Telemetry with the help of neat diagram. [8]

#### OR

- *Q8*) a) State the role of database in HIS. With the help of neat diagram, Explain the working of HIS System with the help of neat diagram. [10]
  - b) Elaborate the concept of Structuring medical record with help of neat diagram . [8]



**PC-2657** 

[Total No. of Pages : 2

### [6354] - 807

# **B.E.** (Mechatronics) **PRODUCT DESIGN & DEVELOPMENT** (2019 Pattern) (Semester - VII) (417545 A) (Elective - IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- *Q1*) a) Discuss the concept of Brainstorming and Lateral thinking.
  - Explain different sources of information gathering in a concept generation b) process. [9]

#### OR

<b>Q2)</b> a)	Explain Pugh's Concept Selection Chart with suitable concept.	[9]
b)	Explain the Concept Selection process in Product Design.	[8]

- Discuss the process of Product tear down in detail. *O3*) a) [9]
  - What is Product Portfolio? Explain the types of Product Portfolio b) Architecture. [9]

[Max. Marks : 70

**SEAT No. :** 

[8]

<b>Q4</b> )	a)	Discuss the role of Measurement and Experimentation in reverse engineering.	se 9]
	b)	Explain following tools used in Benchmarking process:	9]
		i) Intended assembly cost analysis	
		ii) Function Form Diagrams	
		iii) Trend Analysis.	
Q5)	a)	Discuss the Design Failure Mode effect analysis in detail.	9]
	b)	Explain the guidelines of design for assembly.	8]
		OR	
<b>Q6</b> )	a)	Discuss guidelines of design for safety in detail. [8	8]
	b)	Elaborate the local, regional and global issues for Environment.	9]
Q7)	a)	Discuss the essential elements and applications of PLM in various field	ls. 9]
	b)	Explain the phases of product lifecycle.	9]
		OR	
Q8)	a)	Explain the role of customer involvement in PLM. [9	9]
	b)	Describe the concept of product data management with its benefits.	9]

### **F4 F4 F4**

[6354]-807

2

**PC-2658** 

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354] - 810

### **B.E.** (Mechatronics Engineering)

# Industry 4.0

### (2019 Pattern) (Semester - VII) (417545 C) (Elective - IV)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non-programmable calculator is allowed.
- *Q1*) a) Explain the Availability and Usability of EVs. [6]
  - b) Explain in brief Pumped Hydro Storage. [6]
  - c) Write a note on Zinc-Bromine Batteries. [6]

#### OR

Q2)	a)	Discuss the potential of Sodium-Sulphur Battery Energy Storage to Ena Integration of Wind.	able [6]
	b)	Explain in brief Compressed Air Energy Storage.	[6]
	c)	Explain Variable Renewable Electricity Sources.	[6]
<b>Q</b> 3)	a)	Differentiate between Conventional Grid and Smart Grid.	[6]
	b)	Explain concept of Self-Healing Grid.	[6]
	c)	What are different Stages of Evolution of Smart Grid.	[6]
		OR	

*P.T.O.* 

[6] 7 4.0 [6] [6] [6] [5]
<ul> <li>4.0</li> <li>[6]</li> <li>[6]</li> <li>[6]</li> <li>[5]</li> </ul>
[6] [6] [5]
[6] [5]
[5]
[6]
[6]
[5]
[6]
[6]
[5]
0. <b>[6]</b>
;s. <b>[6]</b>

# **F4 F4 F4**

# [6354]-810

2

**PC2659** 

SEAT No. :

[Total No. of Pages : 2

#### [6354]-811

# B.E. (Mechatronics Engineering) INTERNET OF THINGS

(2019 Pattern) (Semester - VIII) (417548) Time : 2<sup>1</sup>/<sub>2</sub> Hours] [Max. Marks : 70 Instructions to the candidates: Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8. 1) Neat diagrams must be drawn wherever necessary 2) Figures to the right indicate full marks 3) Assume Suitable data if necessary *4*) How to Choose an IoT Platform [9] *Q1*) a) b) Explain MQTT protocol. [8] OR Define IoT Platform. How does an IoT platform Work? [9] *Q2*) a) State and explain different Types of platform b) [8] Explain Big data in context of cloud computing. [6] *Q3*) a) b) Explain IoT service Models:Platforms a Service. [6] Explain IoT Data Synchronization in context with IoT [6] c) OR Explain Cloud Computing Architecture and its characteristics. [6] **Q4**) a) Explain different deployment cloud models. [6] b) c) Explain IoT Service Models: Infrastructure as a service. [6]

Q5)	a)	Explain IoT reference Model	[6]
	b)	Explain different IoT Routing Attacks	[5]
	c)	Explain Security Frameworks for IoT	[6]
		OR	
<b>Q6</b> )	a)	Explain Secure Data Aggregation in IoT	[6]
	b)	Explain the use of use of IoT gateways in Security	[6]
	c)	Explain Authorization Mechanisms IoT	[5]
Q7)	a)	Explain in detail -Smart Grid	[6]
	b)	Explain in detail-Smart Health Care System	[6]
	c)	Explain-Cloud and Big Data Analytics in the Health Care Sector	[6]
		OR	
Q8)	a)	Explain in detail-Smart home	[6]
	b)	Explain in detail-Smart Cities	[6]
	c)	Explain Ingestible Sensor, Digital Medicine, Mobile Apps in Health C Sector	Care [6]

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[6354]-811

**PC-2660** 

[Total No. of Pages : 3

**SEAT No. :** 

### [6354]-812

# B.E. (Mechatronics Engineering) VIBRATION ANALYSIS AND CONTROL (2019 Pattern) (Semester - VIII) (417549)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Use of drawing instruments, electronic pocket calculators are allowed.
- 4) Figure to the right indicates full marks.
- 5) Assume suitable data if necessary.
- Q1) a) Define the term critical damping coefficient related to vibrations. [7]
  - b) Explain transverse vibrations with neat diagram. [4]
  - c) A mass of 2kg is supported on a spring of 3 KN/M and has a dashpot having damping coefficient of 5ns/m. If the initial displacement of 8mm is given, find : [7]
    - i) The damped natural frequency:
    - ii) The logarithmic decrement
    - iii) The amplitude after 3 cycles

OR

Q2) a) A vibrating system is defined by the following parameters: m = 3 kg, k = 100N/m and c = 3Ns/m [6]

Determine :

- i) the damping factor:
- ii) the natural frequency of damped vibration:
- iii) Logarithmic decrement:
- iv) the ratio of two consecutive amplitudes and :
- v) the number of cycles after which the original amplitude is reduced to 20%.

*P.T.O.* 

b) In a single degree freedom viscously damped vibrating system the suspended mass of 20kg makes 50 oscillations in 20 seconds. The amplitude of natural vibrations decreases to one fourth of the initial value after 4 oscillations. [6]

Determine :

- i) The logarithmic decrement
- ii) damping factor
- iii) Damping coefficient
- c) A 500 kg vehicle is mounted on springs such that its static deflection is 1.5 mm. What is the damping coefficient of viscous damper to be added to the system in parallel with the springs such that the system is critically damped? [6]
- (Q3) a) What do you mean by whirling of shaft. [8]
  - b) Write a short note on: forced vibrations due to reciprocating unbalance. [10]

#### OR

- Q4) a) An electric motor weighs 25 kg and is mounted on a rubber pad which deflects by 1 mm to motor weight. the rotor weighs 5 kg has an eccentricity of 0.1 mm and rotates at 1500 rpm. Find the amplitude of vibration of the motor and force transmitted to the foundation under the following conditions.
  - i) There is no damping
  - ii) Damping factor: 0.1
  - b) A radio set of 20kg mass must be isolated from a machine vibrating with an amplitude of 0.05mm at 500 cpm. The set is mounted on four isolators, each having a spring scale of 31400 N/m and damping factor of 392 Ns/m.
     [10]
    - i) What is the amplitude of vibration of the radio?
    - ii) What is the dynamic load on each isolator due to vibration.

[6354]-812

Q5) a) Explain the concept of torsionally equivalent shaft and derive the equation of its equivalent length. [6]

[6]

[5]

[8]

[8]

- b) Explain degenerate system with any two examples.
- c) Define the following terms.
  - i) Zero frequency
  - ii) Node point

#### OR

- Q6) a) Determine the natural frequencies and the positions of the node of torsional vibration system having 2 motors A and attached to the ends of a shaft 1500mm long. The mass moment of inertias of rotor A is 650 kgm<sup>2</sup> and that of rotor B is 215 kgm<sup>2</sup>. the shaft 95 mm diameter for the first 600 mm, 60 mm diameter for next 500mm length and 50 mm diameter for the remaining length. Modulus of rigidity of shaft material is  $0.8 \times 10^{5}$  MPa. [8]
  - b) The flywheel of an engine driving a dynamo has mass of 200 kg and has a radius of gyration of 300mm. The shaft at the flywheel end has an effective length of 250mm and is 50mm diameter. The armature mass is 225 kg and has a radius of gyration of 255mm. The dynamo shaft has a diameter of 43.75mm and a length of 200 mm. Neglecting the inertia of the shaft and coupling, calculate the frequency of the torsional vibrations and position of node. take the modulus of rigidity for shaft material as 80GPa.
- (Q7) a) Write a short note on : Condenser microphone.
  - b) A device used to measure tensional acceleration consist of a ring having a moment of inertia of 0.049 kgm<sup>2</sup> connected to a shaft spring having a scale of 0.98Nm/rad and a viscous damper having a constant of 0.11Nms/rad. When the shaft vibrates with a frequency of 15cpm, the relative amplitude between the ring and shaft is found to be 2°. What is the maximum acceleration of the shaft. [9]

#### OR

- Q8) a) Explain torsional vibration absorber with neat diagram.
  - b) A vibration measuring device is used to find the displacement, velocity and acceleration of a machine running at 120 rpm. If the natural frequency of the instrument is 5 Hz and it shows 0.04 mm. What are the 3 readings? Assume no damping. [9]

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[6354]-812

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[Total No. of Pages : 2

SEAT No. :

# [6354]-813

# **B.E.** (Mechatronics Engineering) APP DEVELOPMENT

# (2019 Pattern) (Semester - VIII) (Elective - V) (417550A)

<i>Time : 2½</i>	[Max. Marks :	70
Instruction	ns to the candidates :	
1)	Solve Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7or Q.8.	
2)	Neat diagrams must be drawn wherever necessary.	
3)	Figures to the right indicate full marks.	
4)	Assume suitable data, if necessary.	
<b>Q1</b> ) a)	Explain with syntax-Auto Complete Text View	[6]
b)	Explain the activity life cycle.	[6]
c)	List all attributes to develop a simple button and Write the syntax Intent—Filter tag	for [6]
	OR	
<b>Q2</b> ) a)	Write the Syntax and output for:	10]
	i) Progress Bar	
	ii) Toast	
	iii) Switch button	
	iv) Image Button	
	v) Check Box	
b)	Explain different layout managers with its uses in Android	[8]
<b>Q3</b> ) a)	Describe the significance of SQLite database in Android.	[6]
b)	Write a program to capture an image using a camera and display it.	[6]
c)	List sensors in Android and explain any one in detail.	[5]
	OR	

*P.T.O.* 

<b>Q4</b> ) a)	Define content provider and explain fragments.	[6]
b)	How can you create and use databases	[6]
c)	What are the methods for converting text to speech in android	[5]
<b>Q5</b> ) a)	Describe types of permissions used while developing android applicatio	ns. [ <b>9</b> ]
b)	Develop a program to send an email.	[9]
	OR	
<b>Q6</b> ) a)	Write a program to locate user's current location. (Write ONLY .java a manifest file) [1	und [ <b>0]</b>
b)	Develop a simple calculator using table layout.	[8]
<b>Q7</b> ) a)	Describe the procedure to connect our device to internet resources.	[6]
b)	Explain Web servers and web browsers with examples.	[6]
c)	Explain HTML & its roots.	[5]
	OR	
<b>Q8</b> ) a)	Explain different approaches to web application development	[9]
b)	Explain dynamic web application and its applications	[8]

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PC-2662

[6354]-815

# **B.E.** (Mechatronics Engineering) **ADVANCED CONTROL SYSTEMS**

### (2019 Pattern) (Semester - VIII) (417550-C) (Elective - V)

Time : 2½ Hours]

Instructions to the candidates:

- 1) Solve Q.1 or Q.2., Q.3. or Q.4., Q.5. or Q.6, Q.7 or Q.8.
- 2) Neat diagrams should be drawn wherever necessary.
- 3) Use of Non- programmable Calculator is allowed.
- 4) Assume suitable data, if necessary.

Q1) a) Derive the state equation for the state transition matrix. [6]

b) Diagonalise the plant matrix for the system having the state equation as,

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -3 & -5 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} u(k)$$

Find the diagonal matrix also.

OR

**Q2)** a) For a system with the state equation, x(k + 1) = Gx(k) + Hu(k) and y(k) = cx(k), where

$$G = \begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 7 & 3 \end{bmatrix}, H = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \text{ and } C = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}$$

Find the pulse transfer function.

[12] [6]

b) Define the following terms.

i) State.

- ii) State Variable.
- iii) State Space.
- iv) State Vector.

*P.T.O.* 

[Total No. of Pages : 3

**SEAT No. :** 

[12]

lective - V) [Max. Marks : 70

- **Q3**) a) Explain the following terms :
  - i) Full Order State Observer.
  - ii) Minimum Order State Observer
  - iii) Reduced Order State Observer
  - b) Find the state controllability, state observability and output controllability for the given system. [9]

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ 48 & 14 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k)$$
$$u(k) = \begin{bmatrix} 1 & 1 \end{bmatrix} x(k)$$

#### OR

- Q4) a) Explain the duality property of the controllability and observability. [6]
  - b) Find the state feedback gain matrix for the system, x(k + 1) = Gx(k) + Hu(k) and y(k) = cx(k), with [12]

$$G = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix}, H = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \text{ and } C = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

the system is placed at the desired pole locations at,  $2\pm j4$ , 5, -3

- **Q5**) a) Explain the following terms :
  - i) Positive definiteness.
  - ii) Positive semi-definiteness.
  - iii) Negative definiteness.
  - b) Determine the stability of the equilibrium state of the following system using Lyapunov method, [8]

$$\dot{x} = \begin{bmatrix} -3 & 7\\ -6 & -5 \end{bmatrix} x(t)$$

2

[6354]-815

[9]

- *Q6*) a) Write a short note on, Lyapunov's direct and second method for stability analysis of Continuous and Discrete Time LTI systems. [9]
  - b) Determine the stability of the equilibrium state of the following system using Lyapunov method, [8]

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+2) \end{bmatrix} = \begin{bmatrix} 0 & 3 \\ -0.5 & -5 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

- **Q7**) a) Explain the characteristics of non-linear systems. [9]
  - b) Explain the concept of describing function and use of the describing function of ideal relay.
     [8]

#### OR

- **Q8**) a) List out the common non-linearities. Explain any three. [9]
  - b) Write a short note on stability analysis using describing function. [8]

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[Total No. of Pages : 2

[*Max. Marks* : 70

SEAT No. :

### [6354]-817

# B.E. (Mechatronics Engineering) HUMAN MACHINE INTERFACE (2019 Pattern) (Semester - VIII) (Elective - VI) (417551 B)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

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Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of Non- programmable Calculator is allowed.
- 4) Assume suitable data if necessary.
- *Q1*) a) Explain brief the graphical design concepts. [8]
  - b) Enlist the different components of visible language. Explain any two. [9]

#### OR

- *Q2*) a) Write a short note on graphical design by grids. [9]
  - b) Explain the characteristics of good representations. [8]
- Q3) a) Explain in brief interaction styles and communication. [9]
  - b) Write a short note on menus and device-based controls. [9]

#### OR

<b>Q4</b> ) a)	Write a short note on windows based control with neat diagram.	[9]
b)	Explain in brief the screen based controls.	[9]

- Q5) a) Explain the design principles used in HMI. Explain nay one on detail. [9]
  - b) Write a short note on Human Computer Interaction (HCI) patterns. [9]

<b>Q6</b> )	a)	Explain the golden rules and heuristics in designing of HMI.	
	b)	Write a short note on standars used in the design of HMI.	[9]
Q7)	a)	Explain the design of HMI for Process application.	[9]
	b)	Explain the design of HMI for Bio- Medical application.	[8]
		OR	
Q8)	a)	Explain the design of HMI for Robotic Welding.	[8]
	b)	Explain the design of HMI for flight operation.	[9]

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[Total No. of Pages :2

**SEAT No. :** 

### [6354]-818

# **B.E.** (Mechatronics Engineering) Electric Vehicles

### (2019 Pattern) (Semester - VIII) (Elective - IV) (417551C)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6,Q7or Q8
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Non- programmable Calculator is allowed.
- **Q1**) a) Explain the Application and selection criteria for Electric Motors. [6]
  - b) Describe and Illustrate the different Energy Storage System Types. [6]

c) Find out battery rating considering the given data: [6]

Speed = 25 Km/hrs. max,

Motor rating = 250 Watts, 24 Volts,

Motor efficiency = 85 %, to cover distance of 100 km.

Assume suitable data, if necessary.

#### OR

- Q2) a) Describe the components of Flywheel system with neat diagram. [6]
  - b) Calculate the range of two-wheeler and for how many hours power will be supplied by battery with following specifications: [6]
    Battery Rating: 30 Ah, 48 V
    Motor Power: 1.5 kW, 48 V,

Max Speed: 50 kmph at full load. Assume Suitable data necessary

- c) Describe and Illustrate the BCU their types. [6]
- Q3) a) Differentiate between mechanical differential and electric differential. [6]
  - b) Describe and illustrate the brake system and its types. [6]
  - c) Explain Fuel Efficiency Analysis.

[5]

[Max. Marks : 70

<b>Q4</b> )	a)	Explain with suitable equations rolling resistance, aerodynamic drag total driving resistance.	;/lift <b>[6]</b>
	b)	Descibe and Illustrate the General description of vehicle movement.	[6]
	c)	Describe and illustrate Four-Wheeler Electric Vehicle Configurations	s. <b>[5]</b>
Q5)	a)	Describe and illustrate the body loads based on varieties of Elec	tric
		venicle Configuration.	[0]
	b)	State and explain the different types of frames used in electric vehicle	:.[6]
	c)	Explain Need of vehicle Testing.	[6]
		OR	
<b>Q6</b> )	a)	What is the Homologation of Vehicles?	[6]
	b)	Explain about the different National/International Testing / Regulati	on /
		Licensing/Approval Organizations and Agencies?	[6]
	c)	Describe and illustrate the retrofitting of Two-wheeler vehicles.	[6]
Q7)	a)	What are the Requirements for Charging System?	[6]
	b)	Describe and illustrate Charger Architectures	[6]
	c)	Write a note on AIS Charging Standards,	[5]

Q8)	a) b)	Explain the Boost Converter for Power Factor Correction with Examples. Describe with neat diagram Typical Structure of Battery Managem	<b>[6]</b> ent
		Systems (BMS).	[6]
	c)	Write a note on Charging Infrastructure for Electric Vehicles - EV	/CI
		Guidelines.	[5]

2

PC-4426

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

### [6354]-819

# B.E. (Computer Science & Design) COMPUTER VISION (2019 Pattern) (Semester - VII) (418241)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Make suitable assumptions wherever necessary.
- Q1) a) Explain different thresholding techniques in image processing. [9]
  - b) What is region identification and how does region identification handle noisy or incomplete data? [9]

#### OR

<b>Q2</b> ) a)	What is Clustering-based se	gmentation? Explain K-means clustering-ba	ased
	algorithm with example.		[9]

- b) Write short note on [9]
  - i) Contour-based shape representation
  - ii) Region-based shape representation
- Q3) a) What is statistical object recognition with suitable example? [8]
  - b) What is syntactic clustering, how does syntactic clustering handled ambiguity and uncertainty? [9]

#### OR

- Q4) a) Write short note on
  - i) Bays classifier
  - ii) KNN classifier
  - b) What is difference between hierarchical and non-hierarchial approach in object recognition? [9]

[8]

- How does Parallel and serial processing control strategies applied in **Q5**) a) image understanding? [8]
  - List different Methods for 3D vision and explain any two methods in b) detail. [9]

#### OR

- Write short note on following: **Q6**) a)
  - Bottom-up control i)
  - ii) Model-based control
  - How do you represent 3D object with respect to meshes, point clouds b) and voxels? [9]
- Explain optical flow analysis based on correspondence of intrest points. [9] **Q7**) a)
  - What is motion analysis, list and explain different motion analysis b) methods? [9]

#### OR

- Explain how trajectory detection performs in motion analysis. [9] **Q8**) a) [9]
  - Write short note on the following: b)
    - Logarithmic search algorithm i)
    - Kalman filters ii)



[8]

**PC4869** 

**SEAT No. :** 

[Total No. of Pages : 2

### [6354]-820 B.E. (Computer Science and Design Engineeing) DEEP LEARNING (2019 Pattern) (Semester - VII) (418242)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn whenever necessary.
- 4) Make suitable assumptions whenever necessary.
- *Q1*) a) What are Convolutional Neural Network? List and describe three real world applications of CNN in computer version. [6]
  - b) What is the role of the ReLU activation in CNNs? [6]
  - c) What are padding and strides in the context of convolutional layers?[6]

#### OR

- Q2) a) What is the purpose of convolutional layers, and how do they extract features from data? [6]
  - b) What is local response normalization, and how does it aid feature learning in CNNs? [6]
  - c) Explain pooling layer with its different types. [6]
- Q3) a) Explain how unfolding a computational graph helps in training Recurrent Neural Networks (RNNs).[6]
  - b) Explain in brief Encoder-Decoder architecture. [6]
  - c) Analyze the impact of vanishing gradients on the performance of deep recurrent networks. [5]

[Max. Marks : 70

Q4)	a)	Define Recurrent Neural Networks (RNNs) and explain how they different from feedforward neural networks. [6	er []
	b)	Write short notes in Performance Matrices.[6]	[]
	c)	Commpare and contrast Recursive Neural Networks and Recurrent Neural Networks in terms of structure and applications. [5	1 []
Q5)	a)	Define a deep generative model and its primary objective. [6	5]
	b)	Compare and contrast Boltzmann Machines and Deep Belief Network is terms of architecture and learning algorithms. [6	n 5]
	c)	Identify the challenges faced during GAN training, such as mode collaps and instability, and purpose solutions. [6	e 5]
		OR	
<b>Q6</b> )	a)	Differentiate generative and discriminative models in GAN. [6	<b>[</b> ]
	b)	Explain and list the different types of GAN (Generative Adversaria Network). [6	1 []
	c)	Explain the structure and working of a Deep Belief Network (DBN). [6	<b>[</b> ]
Q7)	a)	Describe the basic framework of reinforcement learning, including the roles of the agent, environment and reward signal. [6]	e []
	b)	Explain in detail Dynamic programming algorithms for reinforcement learning. [6	nt 5]
	c)	Compare Active and Passive Reinforcement Learning. [5	;]
		OR	
Q8)	a)	Write short note on Q Learning and Deep Q-Networks. [6	5]
	b)	Explain simple reinforcement learning for Tic-Tac-Toe. [6	5]
	c)	Explain Markow Decision Process with Markov property. [5	5]

# \* \* \*

2

# PC5011

SEAT No. :

[Total No. of Pages : 2

### [6354]-821

### **B.E.** (C.S.D.)

GAME DESIGN AND DEVELOPMENT

### (2019 Pattern) (Semester-VII) (418243)

Time : 2½ Hours]       [Max. M		. Marks : 70
Instructi	ons to the candidates:	
<i>I)</i> 2)	Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6 Q./, or Q.8. Draw Neat and Clean Diagram	
2) 3)	Assume suitable data, if necessary.	
<b>Q1</b> ) a)	Explain 2D Rendering Foundations.	[6]
b)	What is Scrolling & explain its types.	[6]
c)	What is Shading and explain its types.	[6]
	OR	
<b>Q2</b> ) a)	Explain Lights and its types.	[6]
b)	Write a short note on Game objects.	[6]
c)	Explain Traditional game loop in detail.	[6]
<b>Q3</b> ) a)	Explain Accelerometer and Gyroscope input device.	[6]
b)	What is Sound Occlusion and Sound Obstruction?	[6]
c)	Explain the types of Camera in details.	[5]
	OR	
<b>Q4</b> ) a)	Write short note on Rays and Line Segments.	[6]
b)	Explain Digital Signal Processing (DSP).	[6]
c)	Write Short note on 3D sound.	[5]
<b>Q5)</b> a)	Explain informal individual testing of playtesting.	[6]
b)	List & Where you look for more people to playtest your gar	ne. <b>[6]</b>
c)	Explain Quality Assurance (QA) Testing and Automated Tes	ting. <b>[6]</b>

<b>Q6</b> )	a)	Explain online playtesting in detail.	[6]
	b)	Explain first and second circle of playtesters in details.	[6]
	c)	What are the different ways to become a great playtester yourself?	[6]
Q7)	a)	Explain Beta phase and list elements that must be required to complete phase.	lete [6]
	b)	Write short note on Game Design document.	[6]
	c)	Explain Game Documentation phases in details.	[5]
		OR	
Q8)	a)	Explain Management phases of Game Development in details.	[6]
	b)	Explain project plan and test plan.	[6]
	c)	Write short note on game proposal.	[5]

###
**PC-5117** 

[Total No. of Pages : 2

SEAT No. :

### [6354]-823

### B.E. (Computer Science & Design Engineering) SOFTWARE TESTING & QUALITY ASSURANCE (2019 Pattern) (Semester - VII) (418244B) (Elective - III)

Time	: 2 <sup>1</sup> /2	[Max. Marks	: 70
Instru	uction 1) 2) 3) 4)	is to the candidates : Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Figures to the right indicate full marks. Neat diagrams must be drawn wherever necessary. Make suitable assumption whenever necessary.	
<b>Q1</b> )	a)	Differentiate between Functional & Non-Functional Testing.	[6]
	b)	What is Equivalence Partitioning Testing?	[6]
	c)	Explain Cookies Testing & Session Testing.	[6]
		OR	
<b>Q</b> 2)	a)	Explain Difference between White Box Testing, Black Box Testing.	[6]
	b)	What do you mean by Use Case Testing?	[6]
	c)	What is I18N Testing and LION Testing?	[6]
<b>Q3</b> )	a)	What are the Characteristics of Software?	[6]
	b)	Why software has Defects? Explain in detail.	[6]
	c)	Explain in detail about CMM standards.	[5]
		OR	
<b>Q4</b> )	a)	Explain why ISO-9001 standard and its importance in software testing	? <b>[6]</b>
	b)	Differentiate between Quality Assurance and Quality Control.	[6]
	c)	What are the Pillars of Quality Management System?	[5]

*P.T.O.* 

<b>Q5</b> ) a)	What are the challenges and limitations of Selenium WebDriver?	[6]
b)	Explain Robotic Process Automation (RPA) in detail.	[6]
c)	Write a short note on selenium IDE.	[6]
	OR	
<b>Q6</b> ) a)	Illustrate selenium tool suite in detail.	[6]
b)	Why do you prefer Selenium Automation Tool?	[6]
c)	What are the Benefits of automation testing?	[6]
<b>Q7</b> ) a)	Compare Ishikawa's flow chart and Histogram tools.	[6]
b)	Explain in detail Total Quality Management?	[6]
c)	What is Defect Removal Effectiveness?	[5]
	OR	
<b>Q8</b> ) a)	What is Product Quality metrics?	[6]
b)	Explain six sigma characteristics in details.	[6]
c)	Compare Run charts and Control charts in details.	[5]

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[6354]-823

PC4851

SEAT No. :

[Total No. of Pages : 2

### [6354]-824

### B.E. (Computer Science and Design Engineering) BLOCKCHAIN TECHNOLOGY (2019 Pattern) (Semester - VII) (418244C) (Elective - III)

Time	<i>Time : 2<sup>1</sup>/<sub>2</sub> Hours</i> ] [ <i>M</i>			[Max. Marks : 70
Instr	ructi 1) 2)	ons to Attem Figur	the candidates: pt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. res to the right indicate full marks.	
	3) 4)	Neat o Assur	diagrams must be drawn wherever necessary. ne suitable data if necessary.	
<b>Q1</b> )	a)	Exp	lain in details.	[8]
		i)	Bitcoin	
		ii)	Hyperledger	
	b)	Dis	cuss following consensus algorithms used in block	chain technology. [6]
		i)	Proof of work	
		ii)	Proof of activity	
	c)	Exp	plain proof of stake (POS).	[4]
			OR	
Q2)	a)	Exp	lain consensus in blockchain in details.	[4]
	b)	Exp	lain in detail following blockchain platforms.	[8]
		i)	Public	
		ii)	Private	
		iii)	Consortium	
		iv)	IoTA	
	c)	Wri	te a note on Corda and R3.	[6]

Q3)	a)	Describe Token in details with example.	[6]
	b)	What is Metamask? Illustrate in detail.	[6]
	c)	Differentiate between coinbase & Binance.	[5]
		OR	
Q4)	a)	Differentiate between metamask and coinbase wallet	[6]
	b)	Explain in detail cryto wallets.	[5]
	c)	List & explain types of crypto currency.	[6]
<b>Q</b> 5)	a)	What is Ethereum? Explain.	[8]
_	b)	Explain in details Whisper.	[6]
	c)	Define the purpose and types of Smart Contracts.	[4]
		OR	
<b>Q6</b> )	a)	Explain solidity in detail.	[4]
	b)	Discuss whisper Decentralized Messaging platform.	[6]
	c)	Write a note on Swarm.	[8]
Q7)	a)	Explain use of Blockchain in detail.	[6]
	b)	List and explain benefits of using Blockchain in Government sector.	[6]
	c)	List and explain any two Blockchain applications.	[5]
		OR	
Q8)	a)	Discuss integration of blockchain with other domains.	[6]
	b)	Explain blockchain applications in financial services.	[6]
	c)	Explain application of blockchain in government sector.	[5]

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PC-5118

SEAT No. :

[Total No. of Pages : 2

### [6354]-826

### B.E. (Computer Science & Design) NATURAL LANGUAGE PROCESSING (2019 Pattern) (Semester - VII) (418245A) (Elective - IV)

<i>Time : 2<sup>1</sup>/</i> .	e Hours]	[Max. Marks : 70
Instruction 1) 2) 3) 4)	ns to the candidates : Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Neat diagrams must be drawn wherever necessary. Figures to the right indicate full marks. Assume suitable data if necessary.	
<b><i>Q1</i></b> ) a)	Explain Markov model in detail.	[8]
b)	Explain Latent Dirichlet allocation (LDA) in detail. OR	[9]
<b>Q2</b> ) a)	<ul> <li>Write a short note on :</li> <li>i) word2vec</li> <li>ii) doc2vec</li> <li>iii) Contextualized representation (REPT)</li> </ul>	[0]
b)	Write a short note on TFIFD.	[8]
<b>Q3</b> ) a)	Write a short note on Cross Lingual Information Retrie	eval. [8]
b)	What is Vector Space Model? Explain in detail. OR	[10]
<b>Q4</b> ) a)	Define Information Retrieval. Explain in detail.	[9]
b)	Explain NER System Building Process.	[9]
<b>Q</b> 5) a) b)	<ul> <li>Explain Lexical Knowledge Network in detail.</li> <li>Write a short note on : <ul> <li>i) Spacy</li> <li>ii) TextBlob</li> <li>iii) Gensim</li> </ul> </li> </ul>	[8] [10]

<b>Q6</b> ) a)	What are various Prominent NLP Libraries? Explain.	[10]
b)	Write a short note on :	[8]
	i) Indo Wordnet	
	ii) VerbNets	
	iii) PropBank	
	iv) Treebanks	
<b>Q7</b> ) a)	Write short note on :	[10]
	i) Dialog and Conversational Agents	
	ii) Natural Language Generation	
b)	Explain working of IBM Watson Natural Language Processing.	[7]
	OR	
<b>Q8</b> ) a)	Describe in detail the Lesk algorithm and Walker's algorithm for Sense disambiguation	r word
	Sense disambiguation.	
b)	Enlist various applications of NLP? Explain.	[7]

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[6354]-826

**PC2665** 

#### [6354]-830

#### **B.E.** (Civil)

### HONORS IN METRO CONSTRUCTION PAPER **Work Method Statement Making** (2019 Pattern) (Semester - VII) (401301)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- Attempt Q.1 or Q. 2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8 and. Q.9 or Q.10. 1)
- Neat diagram must be drawn wherever necessary. 2)
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary and clearly state.
- 5) Use of cell phone is prohibited in the examination hall.
- Use of electronic pocket calculator is allowed. **6**)
- Q1) Explain in Method Statement for Pier Protection and Kerb Median Fixing for metro projects. [14]

#### OR

- **02**) Explain General Safety measures while excavation. [14]
- Q3) Explain Method Statement for Vertical Bearing Installation in metro projects.[14]

#### OR

Q4) Write Method statement for Open Foundation in case of metro projects. [14]

Q5) Role of Quality Assurance Manager in case of metro projects. [14]

#### OR

Q6) Explain in brief Method Statement for Span load test. [14]

*P.T.O.* 

#### [Total No. of Pages : 2

**SEAT No. :** 

[Max. Marks : 70

*Q7*) Explain Sequence of Work for construction of Concourse Pier arm Platform Pier arm with integrated pier cap & portal beams. [14]

#### OR

- *Q8*) Explain in brief Method Statement for Overhead Launching Girder. [14]
- Q9) Explain in brief for Underslung Segment Launcher erection of Ground Supported Staging System. [14]

#### OR

*Q10*)Write a Method Statement for Load Testing of Launching Girder. [14]

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**PC2666** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-831

### **B.E.** (Civil Engineering)

# HONORS IN ARCHITECTURE AND TOWN PLANNING Traffic and Transportation Planning (2019 Pattern) (Semester - VII) (401401)

*Time : 2½ Hours]* 

Instructions to the candidates:

- 1) Answer Q.1 or Q. 2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat figures must be drawn wherever necessary.
- 4) Assume suitable data if required.
- 5) Use of non programmable scientific calculator is allowed.
- *Q1*) a) Describe in detail the Overtaking Sight Distance. [6]
  - b) Explain norms and standards for on street and off Street parking. [6]
  - c) Write a note on public transport and its importance in today's context.[5]

### OR

- Q2) a) Write a note on hierarchy of roads. Explain in detail what are the design criteria for the same. [6]
  - b) What are the pedestrian design considerations at-grade and grade separated facilities. [6]
  - c) Explain in detail concept of Para-transit and how it plays important role in today's context. [5]
- *Q3*) a) What are the different types of road intersection? Elaborate any one with proper sketch. [6]
  - b) What facilities are provided at Passenger terminals? [6]
  - c) Which issues consider under road safety management and Also explain the various activities conducted by Government of India for road safety.[5]

[Max. Marks : 70

- *Q4*) a) Enlist the components of at grade intersection and explain importance of at grade intersection.
  - b) What is logistics management and how it is affect on urban transportation. [6]
  - c) Draw the neat sketch of rotary intersection and show all the design elements in it. Also explain any two design elements of it. [5]
- **Q5)** a) Write a note on : Salient features of Nagpur 20 year road plan. [6]
  - b) What is the purpose of Land Use Model? Explain Lowry Model. [6]
  - c) Enlist urban system components and mention issues normally observed in India. [6]

#### OR

- Q6) a) Write a note on: Salient features of Bombay 20 year road plan. [6]
  b) Write a note on urban spatial structure and its influence on transport linkages. [6]
  c) Explain Lowry Garin Model. [6]
- *Q7*) a) Elaborate urban transport problems in India. [6]
  - b) Write a note on BRTS. [6]
    - c) Elaborate : Transportation System Management (TSM) process. [6]

#### OR

- Q8) a) Explain the need and components of sustainable urban transportation.[6]
  - b) Write a note on Metro rail by mentioning names of case studies. [6]
  - c) Elaborate different special aspects in case of sea shore cities in transportation planning. [6]

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**PC2667** 

SEAT No. :

[Total No. of Pages : 2

#### [6354]-832

### **B.E.** (Mechanical)

### **HONORS IN 3D PRINTING**

# Additive Manufacturing System Design

### (2019 Pattern) (Semester - VII) (402014MJ)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

[Max. Marks : 70

Instructions to the candidates:

- 1) Draw suitable neat diagrams, wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data jf required.

<b>Q1</b> ) a)	What are the Types of Atomization? Explain Plasma Atomiza	tion and its
	Benefits.	[10]

b) Explain Melt spinning process with its neat sketch. [8]

#### OR

Q2)	a)	Explain screw powder feeder with its schematic figure and working & advantages. [10]
	b)	Explain in detail chemical powder treatments. [8]
Q3)	a)	Explain the structure of nozzle and Nozzle heating. [10]
	b)	Write a short note on. [7]
		i) Inert gas cooling system
		ii) Gas recirculating system
		OR
<b>Q4</b> )	a)	What is the powder feed system and its types with systematic diagrams? [10]
	b)	Explain the auxiliary system on 3D printing. [7]
Q5)	a)	Explain in detail Preparation and setup of 3D printer before calibration. [10]

b) Why is it so important to calibrate your 3D printer? [8]

- **Q6**) a) Explain: [10] X-axis calibration i) Y-axis calibration ii) iii) Z-axis calibration What is the importance of the first layer explain in detail. [8] b) **Q7**) a) What are the common faults and trouble shooting in 3D Printing system? [10] What is the project planning in additive manufacturing system? [7] b) OR Explain different operations and maintenance for additive manufacturing **Q8**) a) system. [10]
  - b) Explain in thermal management and Part shielding. [7]

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### **PC2668**

### [6354]-833

### **B.E.** (Mechanical)

### HONORS IN ELECTRICAL ENERGY SYSTEMS (2019 Pattern) (Semester - VII) (402024 MJ)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- Figures to the right of each question indicate full marks. 3)
- **4**) Assume suitable data wherever necessary and mention the same clearly.
- *Q1*) a) Discuss compressed air system with its different components and their functions. [10]
  - Discuss parameters for efficient operation of compressed air system.[8] b)

#### OR

- Explain the procedure for quantification of compressed air leakages.[10] *Q2*) a)
  - If the compressor of 300 m<sup>3</sup>/min loads in 10 seconds and unloads in 20 b) seconds, calculate the amount of air leakages in the system. [8]

#### *O3*) a) Discuss following psychometric terms. **[10]**

- Specific humidity i)
- **Relative humidity** ii)
- WBT iii)
- Degree of saturation iv)
- Enthalpy of air v)
- Discuss the performance parameters of cooling tower. [7] b)

### OR

- **Q4**) a) Explain Aqua Ammonia Vapour absorption Refrigeration system with schematic diagram. **[10]** 
  - What is function of cooling tower? What are the components of the **b**) cooling tower? [7]

[Max. Marks : 70

[Total No. of Pages : 2

**SEAT No. :** 

*P.T.O.* 

- What are types of fans? Explain working of axial fan with schematic *Q*5) a) diagram. [10] Discuss the merits of VSD application in case of pumps. [8] b) OR Discuss energy conservation opportunities in a pumping system. **Q6**) a) [10] Discuss the difference between fan, blower and compressor. b) [8] **Q7**) a) What is a lamp? Explain the principle of operation and features of Fluorescent Tube Lamp (FTL). [10] Discuss the factors that need to be considered for DG set selection. [7] b) OR
- Q8) a) Discuss energy conservation measures possible in lighting system. [10]
  - b) What are Advantage and limitations of adopting diesel power plant? [7]

# 1

PC2669

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

#### [6354]-834

## B.E. (Mechanical/Automobile) HONORS IN MODELLING & SIMULATION OF EHV (2019 Pattern) (Semester - VII) (302034 MJ)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Draw the neat sketch wherever necessary.
- *Q1*) a) Explain A Motor Control Unit in electric vehicle with its functional features? [4]
  - b) Explain Electronic Control Unit of electric vehicle with its types and working principal? [8]
  - c) What is Battery/Cell Control System in EV? Explain with its functions and working principal? [8]

#### OR

### *Q2*) a) Explain Torque and speed coupling in electric vehicle? [4]

- b) Explain EV and EHV configuration based on power electronics? [8]
- c) Explain the importance of Sensor Management and Integration for electric vehicle with functional and application point of view? [8]

### Q3) a) Explain EV configuration and list out the components involved in it?[8]

- b) Explain the important feature of following (any four). [8]
  - i) Unicycle
  - ii) Bicycle
  - iii) Dicycle
  - iv) Tricycle
  - v) Qudracycle

- *Q4*) a) Explain front and rear wheel drive for electric vehicle with its advantages and disadvantages? [8]
  - b) Explain Propulsion and Power distribution system in electric vehicle with its main components? [8]
- Q5) a) Explain Frame building Problems? Also list out Types of Frame Damage & How to Spot it? [8]
  - b) What do you mean by the term "DFMEA"? Explain the objective feature that can achieve the in the process of system or equipment design? [8]

#### OR

- *Q6*) a) Explain Chassis frame layout with suitable sketch? Also list out various types of Loads on the Chassis frame? [8]
  - b) Explain the following parameters related to vehicle dynamics in detail.[8]
    - i) Aerodynamic drag
    - ii) Aerodynamic lift
    - iii) Side force
    - iv) Rolling movement
- *Q7*) a) Explain Durability along with Factors Affecting Electric Car Durability? [10]
  - b) Explain Fatigue analysis. List out The factors which affect the fatigue behavior? [8]

#### OR

- Q8) a) Explain the phases involved in Crashworthiness Design along with its important features? [10]
  - b) What do you mean by Topology and Topography Optimization, explain with suitable example? [8]

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[6354]-834

**PC2670** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-835

# B.E. (Honors in System Engineering)/(Mechanical) SYSTEM MODELLING & SIMULATION (2019 Pattern) (Semester - VII) (302044 MJ)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:*  [Max. Marks : 70

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Neat diagrams must be drawn wherever necessary
- 4) Figures to the right indicates full marks.
- Q1) a) Explain the significance of basic bond graph elements in system modeling. [9]
  - b) Describe the characteristics and functions of basic 1-port elements in bond graph theory. Provide examples. [9]

#### OR

- *Q2*) a) Conduct a comparative analysis of bond graph modeling versus other system modeling approaches. Highlight the strengths and weaknesses.[9]
  - b) Illustrate how bond graph elements and causality considerations are applied in a real-world engineering problem. [9]
- *Q3*) a) Analyze the role of equivalent circuits in simplifying complex electrical networks. [9]
  - b) Describe the modeling of mechanical systems using Newton's second law and provide an example involving a mass-spring-damper system.[8]

#### OR

- *Q4*) a) Discuss the challenges of integrating different physical domains (electrical, mechanical, hydraulic) into a unified system model. [8]
  - b) Illustrate the application of system models in real-world engineering problems, such as automotive suspension or industrial automation. [9]

- Q5) a) Describe algebraic loops in system models. How do they arise, and what are the challenges associated with them? [9]
  - b) Explain methods for identifying and resolving algebraic loops in dynamic system simulations. [9]

#### OR

- Q6) a) Explain the benefits and limitations of using automated simulation tools for nonlinear system analysis. [9]
  - b) Evaluate the impact of advanced simulation tools on the field of engineering design and optimization. Provide examples of their application. [9]
- *Q7*) a) Why are nonlinearities significant in real-world systems, and what impact do they have on system performance and stability? [8]
  - b) Explain the method of solving ordinary differential equations (ODEs) using the characteristic equation. Provide an example with a second-order linear ODE. [9]

#### OR

- Q8) a) Discuss the role of automated simulation in dynamic system modeling. How does it enhance the modeling process? [8]
  - b) What is meant by the free response of a linear system? Explain the relationship between eigenvalues and the stability of a system, and provide an example to illustrate this relationship. [9]

### 1

**PC2671** 

[6354]-836

[Total No. of Pages : 2

[Max. Marks : 70

**SEAT No. :** 

# B.E. (Electronics & Telecommunication) INDUSTRIAL IN ROBOTICS & AUTOMATION (2019 Pattern) (Semester - VII) (404181HR)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Draw neat diagrams wherever necessary.
- 3) Figures to the right indicates full marks.
- 4) All questions carry equal marks.
- 5) Assume suitable data, if necessary.
- Q1) a) Explain basic components of pneumatic system with neat diagram. [8]
  - b) How pneumatic compressors are classified. Explain positive displacement compressors. [9]

#### OR

- Q2) a) Explain air treatment stages and pressure Regulation method with neat diagram.
  - b) Define pneumatic Actuators how they are classified. Explain Rotory actuators with neat diagram. [9]
- Q3) a) State design features of CNC system. Explain drive system for CNC manchine tools. [9]
  - b) Explain in detail how high speed automation insertion is possible in robotic assembly. State general rules for product design and automation. [9]

#### OR

- Q4) a) Write steps to design of parts for high speed feeding and orienting. State different feeding difficulties. [9]
  - b) How to perform the analysis of an assembly. Explain with a suitable example. [9]

*P.T.O.* 

- Q5) a) Define Mechatronics. Explain basic elements of Mechatronics system with sketches.
  - b) Prepare a detailed case studies on A Pick and place robot. Write pick and place robot algorithm. [9]

#### OR

- *Q6*) a) What are the stages in mechatronics design. Explain different phases of mechatronics design process. [8]
  - b) Write a case study on The Engine Management system. Compare Traditional and mechatronics design. [9]
- **Q7**) a) Compare Electrical, Mechanical and Hydraulic transmission systems.[6]
  - b) Draw neat diagram to achieve Forward and Reverse stroke using cylinder and piston mechanism. [6]
  - c) What is back pressure? When it arise and how to avoid it? [6]

#### OR

- *Q8*) a) Draw and explain basic components of hydraulic system? [6]
  - b) Give comparison between hydraulic and pneumatic system. What are the applications of hydraulic system. [6]
  - c) Give classification of hydraulic Pumps. Explain positive displacement pumps and its characteristics. [6]

### 1

PC5012

[6354]-837

[Total No. of Pages : 2

[*Max. Marks* : 70

SEAT No. :

### B.E. (E & TC) HONORS IN BLOCK CHAIN TECHNOLOGY

### Smart Contracts & Cryptocurrency

### (2019 Pattern) (Semester-VII) (404181 HBCT)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer any one Question out of Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

<b>Q1</b> )	a)	What is Ethereum? How does It work? And what is difference betw	veen
		Ethereum and Bitcoin.	[8]
	b)	Explain the detailed Working of smart contract.	[9]
		OR	
Q2)	a)	Explain following Terms	[8]
		i) Sidechain	
		ii) Namecoin	
	b)	What is a DAO? How do DAOs work?	[9]
Q3)	a)	Explain Black market and Global economy in detail.	[9]
	b)	Explain what is bitcoin its working and limitations in detail.	[9]
		OR	
<b>Q4</b> )	a)	Compare digital currency and cryptocurrency.	[9]
	b)	List and explain different domain name services available for blockcl	nain
		cryptocurrencies.	[9]
Q5)	a)	Explain following terms with example.	[8]
		i) Digital Signature	
		ii) Digital Keys	
		iii) Bitcoins Wallets	
		iv) Bitcoins Addresses.	
	b)	List and explain types of bitcoin wallets.	[9]
		OR	

*P.T.O.* 

<b>Q6</b> )	a)	Write Note following.	[8]
		i) Bitcoins Network	
		ii) Bitcoin Payments	
	b)	How bitcoin transaction works? Explain in detail.	[9]
Q7)	a)	Discuss Block chain use cases in Healthcare.	[9]
	b)	Discuss different investment management platforms of block detail.	chain in [ <b>9</b> ]
		OR	
Q8)	a)	Explain future of AI and blockchain.	[9]
	b)	Discuss IBM Block chain.	[9]

### 

**PC-2672** 

[Total No. of Pages : 2

SEAT No. :

### [6354]-838

# B.E. Honors. in Advanced Packaging Technology (Printing Technology) SUSTAINABLE PACKAGING (2019 Pattern) (Semester - VII) (408214)

Time	Time : 2½ Hours] [Max. Mai		ks : 70	
Instr	ructio	ons to the candidates:		
	1)	Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No. 6, Q.No. Q.No. 8.	7 or	
	2)	Figures to the right indicate full marks.		
	3)	Assume suitable data, if necessary.		
	4)	Neat diagrams must be drawn wherever necessary.		
<b>Q1</b> )	a)	Explain in details compostable packaging.	[10]	
	b)	What are essential elements of effective packaging design.	[7]	
		OR		
Q2)	a)	State the importance of corporate images and brand management.	[10]	
	b)	What is edible packaging.	[7]	
Q3)	a)	Explain the Stages in the life-cycle of product/service or activity.	[9]	
	b)	What are the Key Concepts and Terminology of circular economy.	[9]	
		OR		
Q4)	a)	What are the Key Concepts of LCA.	[9]	
	b)	Explain 3R 's of Circular Economy.	[9]	
Q5)	Wha	at is the Green Packaging and Explain Functions of LCA.	[17]	
		OR		
<b>Q6</b> )	a)	What are the Phases and Processes of LCA.	[10]	
	b)	What is the Future of LCA.	[7]	
		Р.:	<i>T.O</i> .	

- Q7) a) Explain the Environmental Claim for sustainable packaging. [9]
   b) Which ISO standards are used in sustainable packaging industry. [9]
   OR
   Q8) a) Explain the Marketing Strategy for Sustainability. [9]
  - b) Explain the Warketing Strategy for Sustainability. [7]
    b) Explain why Understanding and Engagement with Consumers is required for marketing. [9]



**PC-2673** 

[Total No. of Pages : 2

[Max. Marks : 70]

**SEAT No. :** 

### [6354] - 839

# B.E. (Computer Engineering) (Honours\* in Artificial Intelligence and Machine Learning) MACHINE LEARNING (2019 Pattern) (Semester - VII) (410301)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours] Instructions to the candidates:* 

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Make suitable assumption whenever necessary.
- *Q1*) a) Explain support vector machine. What is the difference in idea for using support vector machine for regression and classification? [8]
  - b) Define random forest. Explain the working of random forest algorithm in detail. [9]

#### OR

- Q2) a) Describe a situation when you would prefer using SVM over a neural network and why? [8]
  - b) Explain the following with respect to random forest. [9]
    - i) Bias ii) Variance
- Q3) a) Explain Backpropagation Algorithm with respect multilayer perceptron. [9]
  - b) How to train perceptron? State the reasons while perceptron training samples are given one by one instead of Whole. [9]

*P.T.O.* 

OR

<b>Q4</b> )	a)	Explain training procedures in multilayer perceptron in detail.	9]
	b)	Explain Bayesian networks in detail with suitable example.	9]
Q5)	a)	Explain the differences between supervised and unsupervised learning detail.	in 8]
	b)	Explain K means clustering algorithm in detail.	9]
		OR	
<b>Q6</b> )	a)	Write a short notes on [8	8]
		i) Association Rules	
		ii) PCA - Spectral clustering	
	b)	Explain Apriori Algorithm with an example in detail.	9]
Q7)	a)	Formalize a second - order Markov model. What are the parameter How can we calculate the probability of a given state sequence? How ca the parameters be learned for the case of an observable model?	s? an <b>9]</b>
	b)	Explain graphical models with respect to Hidden Markov models. [9	9]
		OR	
Q8)	a)	Write a short notes on [9	9]
		i) Junction trees	
		ii) Discrete Markov process	
	b)	State Bayes theorem. Elaborate Naive Bayes classifier with an example	е. 9]
		<b>Þ4 Þ4</b>	

2

[6354]-839

**PC-2674** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-840

# B.E. (Computer) HONOUR IN CYBER SECURITY Internet of Things and Embedded Security (2019 Pattern) (Semester - VII) (410401)

*Time* :  $2^{1/2}$  *Hours*] [Max. Marks : 70 Instructions to the candidates: 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 2) Figure to the right side indicates full marks. Neat diagrams must be drawn wherever necessary. 3) Assume suitable data, if necessary. **4**) Describe IoT security CONOPS document, Network and security *Q1*) a) integration? [8] Explain in details system security verification and validation (V&V) b) model. [9] OR Explain the following. [8] *Q2*) a) Incident management i) Compliance monitoring ii) Describe attribute based access control mechanism for IoT? [9] b) Describe cryptographic module principals for IoT? [9] **Q3**) a) b) Describe cryptographic controls built into IoT messaging protocols?[9] OR Describe the following: **Q4**) a) [9] Key derivation i) Key lifetime ii) What is Digital signature? Explain the steps involved in creating a Digital b) signature? [9]

[6354]-840

Q5)	a)	Explain IEEE 1609.2?	[8]
	b)	Explain identity life cycle with suitable diagram.	[9]
		OR	
<b>Q6</b> )	a)	Explain IoT IAM infrastructure 802-1X?	[8]
	b)	Discuss authorization & access control for IoT?	[9]
Q7)	a)	Explain global web identity management for IoT?	[9]
	b)	Describe local identity management model for IoT?	[9]
		OR	
<b>Q</b> 8)	a)	Explain network identity model for IoT?	[9]
	b)	Describe Identity Portrayal?	[9]



**PC-2675** 

[Total No. of Pages : 2

[Max. Marks : 70

### [6354]-841

# **B.E.** (Computer Engineering) (Honours) **Machine learning and Data Science** (2019 Pattern) (Semester - VII) (410501)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*] Instructions to the candidates:

- Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 1)
- Neat diagrams must be drawn whenever necessary. 2)
- Figures to the right indicate full marks. 3)

Q1)	a)	Explain the role of dendrograms in Choosing number clusters Hierarchical clustering?	in <b>[6]</b>
	b)	Explain supervised and unsupervised learning in detail	[6]
	c)	What is the K-Mean algorithm? Explain its steps with an example.	[6]
		OR	
Q2)	a)	What is Density-Based Spatial Clustering? Explain with suitable examp	les. [6]
	b)	For what type of data, Density-Based Spatial Clustering is suitable? Wh parameters are required by DBSCAN algorithm?	ich [6]
	c)	Explain KNN algorithm with an example.	[6]
Q3)	a)	Explain artificial neural networks? What are the types of artificial neuronetworks?	ural <b>[6]</b>
	b)	What is Perceptron? Explain the process of training a perceptron?	[6]
	c)	Explain Generalized delta learning rule in detail.	[6]

*P.T.O.* 

**SEAT No. :** 

OR

Q4)	a)	Explain Feed-forward and feedback neural networks.	[6]		
	b)	Explain the term Multilayer perceptron's with its limitations	[6]		
	c)	Explain Back propagation Algorithm in detail	[6]		
Q5)	a)	Explain CNN algorithm. Enlist and explain any two types of CNN mode	els. <b>[9]</b>		
	b)	Explain the terms "Valid Padding" and "Same Padding" in CNN. I down the hyper parameters of a Pooling Layer.	List [ <b>8</b> ]		
		OR			
<b>Q6</b> )	a)	Explain in detail gradient descent optimization?	[9]		
	b)	Difference between Recursive Neural Network and Recurrent Neu Network	ıral <b>[8]</b>		
Q7)	a)	Explain the following terms:	[9]		
		a) Stemming			
		b) Lemmatization			
	b)	Describe tokenization with an example	[8]		
	OR				
Q8)	a)	What is preprocessing? Explain method of text preprocessing	[9]		
	b)	Explain topic modeling with Latent Dirichlet Allocation algorithm	[8]		

### **F4 F4 F4**

# [6354]-841

2

**PC-2676** 

SEAT No. :

[Total No. of Pages : 2

### [6354]-842

# B.E. (Computer Engineering) HONOURS IN INTERNET OF THINGS Machine Learning for Internet of Things (2019 Pattern) (Semester - VII) (410601)

Time : 2 <sup>1</sup> / <sub>2</sub> Hours]		[Max. Marks .	: 70
Instr	ructio	ons to the candidates:	
	1)	Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8	
	2)	Figure to the right side indicates full marks.	
	3) 4)	Neat alagrams must be arawn wherever necessary. Assume suitable data, if necessary.	
Q1)	a)	Explain CNN with any one application.	[6]
	b)	Explain Random forest algorithm with working.	[6]
	c)	What are the steps to apply PCA in computer vision?	[6]
		OR	
Q2)	a)	Explain GANs with any one application.	[6]
	b)	Compare CNN with RNN.	[6]
	c)	Explain SVM with an example.	[6]
<b>Q3</b> )	a)	Explain Distributed Machine Learning with an example.	[6]
	b)	What is smart building? What are the analytics advantages?	[6]
	c)	Explain the concept of Algorithm optimization in Machine Learning.	[5]
		OR	
<b>Q4</b> )	a)	What is Edge Computing? Why are edge devices essential for IoT?	[6]
	b)	Explain Machine Learning Accelerator with an example.	[6]
	c)	Explain the concept of Hardware Implementation in Machine Learning	.[5]

1

Q5)	a)	Explain any one application for Embedded deep learning.	[9]
	b)	Explain in detail Real Time IoT imaging with Deep Neural Network.	[9]
		OR	
<b>Q6</b> )	a)	Explain any one application for deep learning for sensor data.	[9]
	b)	For Pre- training the network which deep learning architecture can used? Why?	be [ <b>8</b> ]
Q7)	a)	Explain IoT for Agriculture application using smart irrigation system.	[9]
	b)	What do you mean by IoT security using ML?	[8]
		OR	
<b>Q</b> 8)	a)	What is Remote Patient Monitoring? Explain with example.	[9]
	b)	Explain in detail Smart Transportation System.	[8]



SEAT No. :

PC-2677

[Total No. of Pages : 2

### [6354]-843

# B.E. (Computer Engineering) (Honour) Virtual Reality in Game Development (2019 Pattern) (Semester - VII) (410701)

<i>Time : 2<sup>1</sup>/<sub>2</sub> Hours</i> ] [N		Aax. Marks : 70
Instructio	ons to the candidates:	
1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6,Q.7 or Q.8.	
2)	Neat diagrams must be drawn whenever necessary.	
3)	Figures to the right indicate full marks.	
4)	Assume suitable data in necessary.	
<b>Q1</b> ) a)	Explain Persona template in detail	[6]
b)	Describe Expert Evaluations method used in learn stage.	[6]
c)	Virtual reality is both an art and a science. Justify	[6]
	OR	
<b>Q2</b> ) a)	Write short note on:	[6]
	i) Define Stage	
	ii) Make Stage	
	iii) Learn Stage	
b)	What is Task Analysis? How to do Task Analysis in the	Make Stage.[6]
c)	Describe SMART in define stage of iterative design	[6]
<b>03</b> ) a)	Comparison between Unity and Unreal Engine	[6]
Q3) a)	Comparison between Omry and Omear Englite.	[0]
b)	What are Fundamentals of sprite animation?	[6]
c)	Explain working with Unity's UI System.	[5]

*P.T.O.* 

<b>Q4</b> )	a)	Explain step to develop town view using unity.	[6]
	b)	Explain steps involved in creating project in Unity?	[6]
	c)	Explain steps to add sound and music in Unity	[5]
Q5)	a)	How to create a battle system in VR environment.	[6]
	b)	Explain workflow of Mecanim Animation System	[6]
	c)	Write unity code to prepare attack on a single enemy in a battle system.	.[6]
		OR	
<b>Q6</b> )	a)	State different pre-processor directives that Unity recognizes	[6]
	b)	How to create a shop and inventory using Unity	[6]
	c)	Explain step with code for designing battle state manager in Unity	[6]
Q7)	a)	List Design Guidelines to reduce Motion Sickness.	[6]
	b)	Illustrate physical issues involved with use of VR equipment.	[6]
	c)	Explain adverse health effects caused by Non-moving visual stimuli.	[5]
		OR	
<b>Q</b> 8)	a)	Explain Sensory Conflict Theory of motion sickness.	[6]
	b)	Write Short notes on:	[6]
		i) Binocular-Occlusion Conflict	
		ii) Flicker	
		iii) Aftereffects	
	c)	Explain unified model of motion sikness with diagram.	[5]
		NA NA NA	

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[6354]-843

2

### **PC2678**

SEAT No. :

[Total No. of Pages : 2

### [6354]-844

### **B.E.** (Civil)

### HONOR'S IN METRO CONSTRUCTION

### **Tunnel Engineering**

### (2019 Pattern) (Semester - VIII) (401303)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Draw neat figures wherever necessary.
- 4) Assume suitable data if necessary.

<b>Q1</b> )	a)	Explain in detail about the drilling and blasting method of tunneling.	[6]		
	b)	Explain about excavation process of tunnels.	[6]		
	c)	Explain about factors responsible for over break.	[6]		
		OR			
Q2)	a)	Explain about the TBM method of tunneling for metro rail.	[6]		
	b)	Write about problems of blasting for large tunnels.	[6]		
	c)	Explain about the dewatering.	[6]		
Q3)	a)	Explain about the sources of air pollution.	[6]		
	b)	Explain about monitoring and control in tunnel construction.	[6]		
	c)	Why ventilation systems in tunnel construction required.	[5]		
	OR				
<b>Q4</b> )	a)	Explain method of ventilation in underground space.	[6]		
	b)	Explain dust prevention in Tunnel Construction.	[6]		
	c)	Explain about use of inclinometer in tunneling.	[5]		

[Max. Marks : 70

Q5)	a)	Write about lighting requirements for threshold zones of tunnel lighting.[	6]
	b)	Explain about advances in road heading.	6]
	c)	Explain about advances in TBM technologies. [	6]
		OR	
Q6)	a)	Write about lighting requirements for interior zones of tunnel lighting.[	6]
	b)	Explain about rocks which were observed during Pune Metro Tunn Construction.	el 6]
	c)	Explain about line drilling and pre-splitting techniques of controlle blasting techniques.	ed 6]
Q7)	a)	Explain about floating tunnels.	6]
	b)	Explain about 'Incident Recall Technique (IRT)'.	6]
	c)	Explain in detail about evaluation of performance of supervisors on safety.[	5]
		OR	
Q8)	a)	Write about a safety audit in the tunnel. [	6]
	b)	Explain material safety data sheet (MSDS).	6]
	c)	Explain about safety survey and safety sampling. [	5]

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### **PC2679**

SEAT No. :

[Total No. of Pages : 2

### [6354]-845

### **B.E.** (Civil)

## HONORS IN ARCHITECTURE & TOWN PLANNING

### Land Use and Land Cover

### (2019 Pattern) (Semester - VIII) (401403)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours*]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data if necessary.
- *Q1*) a) Write down about significance of Surveys & planning parameters to be considered in city planning. [9]
  - b) Discuss applications of GIS and RS in LULC considering any case study.[9]

OR

- *Q2*) a) Write down about Different surveys required for city planning. [9]
  - b) Discuss concept Green & Sustainable Cities considering planning approaches and issues. [9]
- Q3) a) Write down different zones of land use & comment on the impact of industrial zone on the nearby agriculture zone. [8]
  - b) What are the policies of Govt. of Maharashtra regarding Tourism development? Explain the impact of tourism on local economy. [9]

#### OR

- Q4) a) Discuss about the defense/military zone. How it is different than the other zones? [8]
  - b) What is Green belt? Discuss in detail characteristics & significance of Green belt. [9]

*P.T.O.* 

[Max. Marks : 70

Q5)	a)	Write down objectives and principles of Urban Planning.	[9]
	b)	Explain Environmental aspects of land use planning.	[9]
		OR	
<b>Q6</b> )	a)	Write down UDCPR guidelines in land use planning.	[9]
	b)	Write down different norms related to Land use Planning.	[9]
Q7)	a)	Write down on Government policies about small and medium size towns	.[9]
	b)	Explain National Land Utilization Policy.	[8]
		OR	
Q8)	a)	Write down about Maharashtra land revenue code 1966.	[9]
	b)	What is the concept of Neighborhood planning? Discuss considering case study.	ig a [ <b>8</b> ]

**PC2680** 

[6354]-846

[Total No. of Pages : 2

[Max. Marks: 70

SEAT No. :

### **B.E.** (Mechanical)

# HONORS IN 3D PRINTING APPLICATIONS & ENTREPRENEURSHIP

### (2019 Pattern) (Semester - VIII) (402016 MJ)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data wherever necessary.

#### *Q1*) a) Describe the fabrication techniques of nanoparticle with its approaches?[10]

b) What is bio-ink? Explain its classification. [7]

#### OR

- **Q2**) a) Explain Inkjet based and extrusion 3D bioprinting with diagram? [10]
  - b) What are the challenges in 3D Bio-printing technology? [7]
- Q3) a) What are the Commercial use of 3D printed consumer products ? explain briefly.[10]
  - b) Explain the Design Flexibility in additive manufacturing? [8]

#### OR

- Q4) a) What are the challenges to managing AM operations in the consumer goods industry? [10]
  - b) Explain the operational productivity in additive manufacturing? [8]

<b>Q</b> 5) a)	Exp	plain the 3D Print Casting Patterns with	[10]
	i)	3D Printing Master Castings	
	ii)	Improved fabrication	
b)	Hov	w can wax be used for 3D printing?	[7]
		OR	
<b>Q6)</b> a)	Exp Ma	blain the Expression of Creativity, Functional, Aesthetics, Ergono nufacturing and Commercial requirements.	omics, [10]

- b) Explain the jewelry and metalwork of jewelry in Additive Manufacturing.[7]
- Q7) a) Explain the Factory Set-up and Layouts in Additive Manufacturing in briefly.[10]
  - b) Explain the Integrated Design Process in Additive Manufacturing briefly and its benefits. [8]

- *Q8*) a) What is the Entrepreneurship ? what are the types of entrepreneurship in Additive Manufacturing? [10]
  - b) What is the Design for Manufacturing and Assembly (DFMA) in Additive Manufacturing? [8]

### **PC2681**

SEAT No. :

[Total No. of Pages : 2

### [6354]-847

### **B.E.** (Mechanical)

## SUSTAINABLE ENERGY CONVERSION SYSTEMS Honors in Energy Management in Utility Systems (2019 Pattern) (Semester - VIII) (402026MJ)

Time : 2 <sup>1</sup> / <sub>2</sub> Hours]		[Max. Marks : 70	
Instr	uctio	ons to the candidates:	
	1)	Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.	
	2)	Neat diagrams must be drawn where ever necessary.	
	3)	Figures to the right side indicate full marks.	
	4)	Use of electronic pocket calculator is allowed.	
	5)	Assume suitable data, if necessary.	
<b>Q1</b> )	a)	Explain in details of Wind Energy Basics.	[5]
	b)	Difference between Vertical Axis turbine and Horizontal Axis	turbine.[6]
	c)	Define Wind Energy? Explain its Parameters.	[6]
		OR	
Q2)	a)	Explain Wind + Diesel power energy systems.	[5]
	b)	Difference between Up Wind and Down Wind Process.	[6]
	c)	Short note on	[6]
		i) Stall Control	
		ii) Pitch Control	
		iii) Offshore wind power	
Q3)	a)	What is Anaerobic Digestion explain in details.	[5]
	b)	With a neat sketch, explain Community biogas plants.	[6]
	c)	What is Gasification? Types of gasifies, Explain any one.	[7]
		OR	

<b>Q4</b> )	a)	Explain the Environment benefits of biochemical and thermo-chem conversion.	ical [ <b>5</b> ]
	b)	Write down any Five Utilization and advantages of briquetting.	[6]
	c)	Explain the term Industrial waste and Agro residues.	[7]
Q5)	a)	What are the Various forms of Energy Storage? Explain any one	[5]
	b)	Difference Between Conventional and Nonconventional Energy system	.[6]
	c)	Short note on Need and importance of Energy storage.	[6]
		OR	
<b>Q6</b> )	a)	Explain with example of Nonconventional Energy System.	[5]
	b)	Briefly explain Techno Commercial Analysis.	[6]
	c)	Explain any three variables Conventional Energy System.	[6]
Q7)	a)	Explain the Electronic ballast.	[5]
	b)	Explain the variables of Automatic power factor controllers.	[6]
	c)	Write short note on Soft starters with energy saver.	[7]
		OR	
<b>Q</b> 8)	a)	Write a short note on controllers?	[5]
	b)	Define IoT? Explain the challenges of IoT Development.	[6]
	c)	Short note on	[7]
		i) Occupancy sensors	
		ii) Energy efficient lighting controls	

## x x x

2

### PC2682

SEAT No. :

[Total No. of Pages : 2

[Max. Marks : 70

#### [6354]-848

### **B.E.** (Mechanical)

### HONORS IN ELECTRIC VEHICLE

### e-Vehicle Standards, Charging and Safety

### (2019 Pattern) (Semester - VIII) (302036MJ)

*Time : 2<sup>1</sup>/<sub>2</sub> Hours]* 

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.
- *Q1*) a) Describe different types of battery charging methods for electric vehicles?[9]
  - b) Explain the various emerging technologies and strategies for optimizing the integration of electric vehicles into the power grid? [8]

#### OR

- Q2) a) Explain interoperability in EV charging. [9]
  - b) Write a note on Electric Vehicle Charging and grid integration standards.[8]
- **Q3)** a) Explain the battery safety tests and events that are conducted to evaluate the robustness of electric vehicle batteries under various conditions. [9]
  - b) Explain significance of Thermal safety tests in eV? Explain any one type in detail. [9]

#### OR

- Q4) a) Explain the concept of "Testing for battery safety" with reliability and abuse test. [9]
  - b) What are electrical and mechanical test procedures for safety requirements of traction batteries? [9]

- Q5) a) Explain various Evaluation Techniques for Batteries and Battery Materials.[9]
  - b) What are the key parameters measured during electrochemical and thermal characterization of batteries? [8]

- *Q6*) a) Explain the concept of calorimetry and its significance in assessing the thermal stability and heat generation of batteries. [9]
  - b) Explain safety and abuse response for Li-ion Rechargeable Battery. [8]
- Q7) a) Explain in detail about EV charging infrastructures. Also, explain categoreis of charging stations. [9]
  - b) Explain Charging Methods & Power Ratings of Electric Vehicle. [9]

#### OR

- *Q8*) a) Explain the terms Current Demand Impact and Demand Minimization.[9]
  - b) Explain different terms related to EV charging infrastructure : [9]
    - i) Impacts on power system
    - ii) Environment
    - iii) Economy

### PC2683

[6354]-849

[Total No. of Pages : 2

## B.E. (Honors in System Engineering) SYSTEMS ENGINEERING MANAGEMENT (2019 Pattern) (Semester - VIII) (302046 MJ)

### *Time : 2<sup>1</sup>/<sub>2</sub> Hours]*

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary.

<b>Q1</b> )	a)	Explain with example the concept of information management activities	?[6]
	b)	What are the steps of risk profile?	[6]
	c)	Explain the term "risk analysis".	[4]
		OR	
Q2)	a)	What is a risk management activity?	[6]
	b)	What is plan risk management?	[6]
	c)	Explain in brief "information management process".	[4]
Q3)	a)	What are the activities in the evaluating stage of project management?	?[6]
	b)	What is the configuration status accounting process?	[6]
	c)	What are the common components of configuration management system?	?[6]
		OR	
Q4)	a)	Why do we perform configuration identification?	[6]
	b)	Explain the major activities required for configuration management?	[6]
	c)	Why is configuration status accounting important?	[6]

[Max. Marks : 70

Q5)	a)	How do you measure project performance?	[6]
	b)	Explain in brief about measurement plan in project development process	? <b>[6]</b>
	c)	What are the measurements for a model application?	[6]
		OR	
<b>Q6</b> )	a)	Explain the activities about modelling?	[6]
	b)	What are the ways to measure progress of activities in a project?	[6]
	c)	Explain the importance of project management measurement?	[6]
Q7)	a)	What is treat management?	[6]
	b)	What are the principles of quality assurance?	[6]
	c)	Explain the evaluation of an activity?	[6]
		OR	
<b>Q</b> 8)	a)	What is the quality assurance system in engineering?	[6]
	b)	Explain the process to maintain records and reports in proj management?	ject [ <b>6</b> ]
	c)	What is incident management?	[6]

PC-4996

SEAT No. :

[Total No. of Pages : 2

### [6354]-850

## B.E. (E & TC Engineering) HONORS IN ROBOTICS ARITIFICAL INTELLIGENCE IN ROBOTICS

### (2019 Pattern) (Semester - VIII) (404183 HR)

Time : 2½ Hours][Max. Marks]			ks : 70
Instruc	ions to the candidates	:	
-	) Answer $Q.1$ or $Q.2$	, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.	
	<i>Figures to the righ</i>	nt side indicate full marks.	
•	<i>Assume suitable do</i>	ata, if necessary.	
<b>Q1</b> ) a	What are uninfor	med search algorithm?	[6]
b	Explain Hill Clim	bing Search algorithm?	[6]
c	Explain Ant Colo	ony Optimization Technique?	[6]
		OR	
<b>Q2</b> ) a	What are informe	ed search algorithm?	[6]
b	Explain with example	mple real coded genetic algorithm?	[6]
c	How Tabu Search	h optimization algorithm works?	[6]
<b>Q3</b> ) a	What is Concept	of Machine Vision?	[6]
b	How image proc	essing is useful in Machine Vision and robotics?	[6]
c	Explain imaging Vision?	based automatic sorting and inspection used in M	achine [5]
		OR	
<b>Q4</b> ) a)	What are Machin Intelligence?	e Vision algorithms? List out algorithms used in Ar	tificial [6]
b	Explain Imaging in Artificial Intelli	based automatic sorting and inspection techniqu igence?	e used [6]
c	Write a short not	e on "Imaging based robot guidance".	[5]
			<i>P.T.O.</i>

<b>Q5</b> ) a)	Explain "Path Planning Robot Control in Dynamic Environments".	[6]
b)	Explain task Based Hybrid Closure Grasping Optimization Autonomous Robot Hand?	for <b>[6]</b>
c)	Explain accurate Motion Control of Fast Mobile Robots?	[5]
	OR	
<b>Q6</b> ) a)	What are the applications of intelligent systems for mobile Robot Mot Planning?	tion [ <b>6</b> ]
b)	Explain intelligent robotic system for obstacle avoidance?	[6]
c)	Write a short note on Autonomous robot Hand?	[5]
<b>Q7</b> ) a)	Applications of various intelligent systems for FMS function segmentation schemes including control?	nal <b>[9]</b>
b)	What is real time scheduling, tool management, process planning AS/RS Systems?	for <b>[9]</b>
	OR	
<b>Q8</b> ) a)	What is process planning in Artificial Intelligence in Flexible Automat Systems?	tion <b>[9]</b>
b)	What is route optimization for AS/RS systems?	[9]

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### PC2684

[6354]-852

[Total No. of Pages : 2

SEAT No. :

## B.E. (Printing Engineering) (Honors) BRAND & PACKAGING MANAGEMENT (2019 Pattern) (Semester - VIII) (408216)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of electronic pocket calculator is allowed.
- Q1) a) Explain why is it essential to have a deep understanding of the target audience when developing a visual language for a brand? Give specific reasons and examples.
  - b) Identify and explain any 4 key attributes that a brand may want to communicate through its visual language. How do these attributes contribute to brand recognition and differentiation? [10]

OR

- Q2) a) Explain the concept of brand consistency and its importance in visual language design. How can inconsistencies in visual language affect consumer perception and brand loyalty? [10]
  - b) Discuss the importance of understanding the brand identity before creating a visual language. [7]
- Q3) a) Explain the significance of a packaging design brief. Include example of how client requirements can influence design decisions, material choices, and branding strategies. [9]
  - b) Summarize the difference between demographics and psychographics when considering the audience for a packaging design. Provide examples of how each aspect can impact packaging design choices and branding strategies differently. [9]

- Q4) a) Describe the typical deliverables expected in a packaging design project. Include tangible items like design mockups, prototypes, and production-ready files, as well as any documentation or reports. [9]
  - b) Propose a step-by-step plan for conducting a comprehensive competitor analysis for a packaging design project. Include methods for gathering data, analyzing findings, and translating insights into design strategies.[9]
- Q5) a) Discuss the importance of encouraging creativity during the Ideation stage.[9]
  - b) Explain in detail how does the "Empathize" stage in Design Thinking facilitate understanding consumers' needs and preferences? [8]

- *Q6*) a) Discuss the significance of prototyping in the Design Thinking process and how it aids in refining and validating design concepts. [9]
  - b) Discuss the strategies designers can employ during the "Define" stage to analyze and articulate the identified needs and problems effectively? [8]
- Q7) a) Explain the statement "Ensuring high visibility on the shelf contribute to the impact of a product." [9]
  - b) Discuss the key elements that make a product's packaging relevant to its target audience. Discuss strategies which can be employed to ensure that a product's packaging induces sales effectively. [9]

#### OR

- *Q8*) a) Explain "understanding the target audience aid in creating packaging that resonates with them". [9]
  - b) Discuss the ways to use consumer feedback to improve the persuasive quality of a product's packaging. [9]

PC-4995

[Total No. of Pages : 2

**SEAT No. :** 

### [6354]-853

## B.E. (Artificial Intelligence and Machine Learning) HONOURS IN SOFT COMPUTING AND DEEP LEARNING (2019 Pattern) (Semester - VIII) (410303)

*Time : 2½ Hours]* 

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate marks.
- 4) Assume suitable data, if necessary.

<i>Q1</i> ) a)	Explain how genetic algorithm are different from evolution programming?	onary <b>[6]</b>
b)	What are operators in genetic algorithm? List and explain GA ope in brief?	erators [6]
c)	Explain Vncoding methods?	[6]
	OR	
<b>Q2</b> ) a)	What are types of crossover and mutation techniques?	[6]
b)	Mention application area of genetic algorithm?	[6]
c)	What is difference between genetic algorithm and genetic programming	ng? <b>[6]</b>
<b>Q3</b> ) a)	List out the strength and weakness of artificial neural network?	[6]
b)	Explain in brief architecture of multilayer feed-forward neural netwo	rk? <b>[6]</b>
c)	Explain how weights are updated in perceptron network?	[5]
	OR	
<b>Q4</b> ) a)	Explain Types of Artificial Neural Network (ANN).	[6]
b)	Explain Single layer and multilayer Perceptrons.	[6]
c)	Explain Self-Organizing Map in neural network?	[5]

<b>Q</b> 5) a)	Explain why to use deep learning?	[6]
b)	Explain in brief architecture of deep network?	[6]
c)	Explain different Deep Learning libraries?	[6]
	OR	
<b>Q6</b> ) a)	Explain Restricted Boltzman Machines in details?	[6]
b)	Explain different Deep Learning platform.	[6]
c)	Explain any one Use Cases of Deep Learning?	[6]
<b>Q7</b> ) a)	Explain in detail Convolution Neural Network(CNN)?	[6]
b)	Explain different Properties of CNN representations?	[6]
c)	List and explain different Applications of CNN?	[5]
	OR	
<b>Q8</b> ) a)	Explain in details Recurrent Neural Network (RNN)?	[6]
b)	Explain Sequential processing LSTM model in details?	[6]
c)	Explain difference between CNN and RNN?	[5]

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### PC2685

#### [6354]-854

[Total No. of Pages : 2

SEAT No. :

## B.E. (Honors in Cyber Security) INFORMATION SYSTEM MANAGEMENT (2019 Pattern) (Semester - VIII) (410403)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Draw neat figures wherever necessary.
- 4) Figures to the right indicates full marks.
- 5) Use of Calculator is allowed.
- 6) Assume Suitable data if necessary.

<b>Q1</b> )	a)	List and describe the components of IT infrastructure that firms need manage.	to [ <b>6</b> ]
	b)	Describe the following:	[6]
		i) web server,	
		ii) application server,	
		iii) multitiered client/server architecture.	
	c)	Enlist open-source software and Linux and explain their business benefits.	[5]
		OR	
Q2)	a)	Identify and describe competitive forces model to determine how much spend on IT infrastructure.	to [ <b>6</b> ]
	b)	Differentiate between Gird computing and Cloud Computing. [	[6]
	c)	List and Discuss advantages and Disadvantage of Green Computing. [	[5]
Q3)	a)	Distinguish between Tacit knowledge and Explicit knowledge. [	[6]

- b) List and describe the analytic functionalities provided by BI system. [6]
- c) List and explain the activities in Knowledge Business Value Chain. [6]

- Q4) a) Define knowledge and describe the important dimensions of knowledge.[6]
  - b) Compare two different management strategies for developing BI and BA capabilities. [6]
  - c) List and describe the elements of a business intelligence environment.[6]
- Q5) a) Identify and describe principle risk factors in information systems projects.
  - b) Identify & discuss what are the Consequences of Poor Project Management. [6]
  - c) Elaborate the role of project management software tools contribute to successful project management. [5]

- *Q6*) a) Identify and describe methods for documenting project plans. [6]
  - b) List and describe the variables addressed by project management. [6]
  - c) Distinguish between tangible and intangible benefits of Information System. [5]
- Q7) a) Compare and contrast between Distinguish between Block Chain & Bitcoin.
  - b) List and explore any four password management practices. [10]

#### OR

- *Q8*) a) Define Mobile Security and Explore any three types of Mobile attacks.**[8]** 
  - b) List Information Security Triad and discuss in detail with example. [10]

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[6354]-854

### PC2686

SEAT No. :

[Total No. of Pages : 2

### [6354]-855

## B.E. (Computer Engineering) HONORS IN DATA SCIENCE Artificial Intelligence for Big Data Analytics (2019 Pattern) (Semester - VIII) (410503)

$Time: 2^{1/2} Hours] \qquad [A]$		Hours] [Max. Mark	ks : 70
Instr	ructio	ns to the candidates:	
	1)	Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.	
	2)	Figures to the right side indicates full mark	
	3)	Draw neat diagram wherever necessary.	
	4)	Assume suitable data, if necessary.	
Q1)	a)	Explain learning models of ANN.	[6]
	b)	Explain Back propagation neural network with its architecture.	[8]
	c)	What are the limitations of MLP.	[4]
		OR	
Q2)	a)	Explain popular activation functions used in Neural Networks.	[8]
	b)	Explain Multilayer Perception.	[4]
	c)	Explain Gradient descent optimization using an example.	[6]
Q3)	a)	Explain Hadoop architecture and its components with proper diagram	m. <b>[8]</b>
	b)	Explain MapReduce as a functional programming model.	[6]
	c)	Define HDFS and YARN.	[4]
		OR	
Q4)	a)	Explain the primary components included with Spark.	[8]
	b)	Explain data flow in Hadoop streaming.	[6]
	c)	Explain features of Resilient Distributed datasets.	[4]

Q5)	a)	Explain in detail about Data mining functionalities.	[7]
	b)	What are the different Features of Hive in Big Data.	[6]
	c)	Explain HQL ir brief.	[4]
		OR	
<b>Q6</b> )	a)	Explain the Hive architecture in detail.	[7]
	b)	Explain the features of Spark MLlib learning algorithms.	[6]
	c)	Compare SQL and HiveQL.	[4]
Q7)	a)	Explain the steps involved in natural language processing.	[7]
	b)	Explain the concept of Semantic Analysis with suitable examples.	[6]
	c)	Explain object detection in Computer Vision.	[4]
		OR	
<b>Q</b> 8)	a)	What is NLP? Explain all the five phases of NLP.	[7]
	b)	Explain sentiment analysis with examples.	[6]
	c)	Explain any two applications of NLP.	[4]

### **PC2687**

[6354]-856

### B.E.

## HONOR'S IN INTERNET OF THINGS SECURITY (2019 Pattern) (Semester - VIII) (410603)

#### Time : 2<sup>1</sup>/2 Hours]

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

<i>01</i> ) a)	Explain in detail - Digita	al Signature with exam	ple.	[6]
2 - 1 1				L ~ 1

- b) Explain different Privacy Preservation Techniques in IoT security. [5]
- c) What is Identity Based Authentication? Explain with a suitable example.[6]

#### OR

<i>O2</i> ) a)	What is Public Key Based Au	thentication? Explain with	a suitable example.[6]
	· · · · · · · · · · · · · · · · · · ·		I I I I I I I I I I I I I I I I I I I

- b) Explain Existing Security Schemes for IoT. [5]
- c) What is Lightweight Cryptography? Explain with an example. [6]
- *Q3*) a) What are the Threats Caused in Maintenance of IoT? [6]
  - b) Explain Cloud Security for IoT, with a suitable example. [6]
  - c) How to provide IoT Security to machine learning applications? Explain with an example. [6]

#### OR

<b>Q4</b> ) a)	How can security be provided in the Network Layer IoT Architecture?[6]
b)	Explain - the data life cycle in IoT, with suitable example. [6]
c)	How can security be provided in the Application Interface Layer of IoT
	Architecture? [6]

[Max. Marks : 70

[Total No. of Pages : 2

SEAT No. :

#### **Q5**) a) What are the security concerns in social IoT? [6]

- b) List and explain the main potential attacks in 6LoWPAN. Discuss security protocols and privacy issues in 6LoWPAN. [6]
- c) How to maintain confidentiality and security for IoT-based healthcare applications? [6]

#### OR

- *Q6*) a) How to provide Security in Identification and Tracking Technologies?Explain with a suitable example. [6]
  - b) Using which security schemes information in Wireless Sensor Networks (WSNs) can be protected? [6]
  - c) What are the threats and challenges to achieving security in the identification and tracking technologies of the IoT Environment. [6]
- *Q7*) a) How can security be provided in Smart Cities? [6]
  - b) How can security be provided to Connected Cars? [5]
  - c) How can Blockchain Technology be used in the Security and Privacy of IoT?
    [6]

#### OR

*Q8*) Write Short Notes on the following :

a)	Blockchain-enabled food supply system	[6]
b)	Blockchain in IoT	[5]

c) Smart Home [6]

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**PC-4991** 

**SEAT No. :** 

[Total No. of Pages : 2

### [6354]-857

## B.E. (Honours in Virtual Reality and Augmented Reality) APPLICATION DEVELOPMENT USING AUGMENTED REALITY AND VIRTUAL REALITY (2019 Pattern) (Semester - VIII) (410703)

Time : 2<sup>1</sup>/<sub>2</sub> Hours] [Max. Marks : 70 Instructions to the candidates : 1) Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. 2) Neat diagrams must be drawn wherever necessary. 3) Figures to the right indicate full marks. 4) Assume suitable data, if necessary. What is ARCore? Explain the features of ARCore. *Q1*) a) [8] What is Vuforia? Explain the features of Vuforia. b) [5] Explain anatomy of SLAM algorithm. [5] c) OR Give a detailed overview of the key components involved in the structure *Q2*) a) of a SLAM algorithm. [6] b) What is Raycasting What are the parameters of the Raycasting and physics for AR. [6] Write a short note on Vuforia. **[6]** c) **03**) a) Explain the significance of User Experience (UX) in AR and VR applications and discuss how programming languages can play a role in improving UX. [8] Write syntax used for defining : [9] b) Classes i) **Functions** ii)

iii) Variables

<b>Q4</b> ) a)	What is unreal engine. What makes it useful for AR-VR [5]
b)	Explain features of C# that makes use of C# for AR and VR comfortable. [9]
c)	Explain with example if else structures with unreal engine. [3]
<b>Q5</b> ) a)	What is the structure and working principle of the HTC Vive VR device? [9]
b)	Advantages and Disadvantages of AR and VR technologies with respect to Exercise and Virtual Museums. [8]
	OR
<b>Q6</b> ) a)	What is the role of a tracking system in AR and how does it enhance the AR experience. [9]
b)	Write a note on Optical See- Through HMD, Virtual retinal systems. [8]
<b>Q7</b> ) a)	Why are human factors important in designing AR and VR experiences? [9]
b)	With respect to example explain how AR-VR is used in Telerobotic and Telepresence. [9]
	OR
<b>Q8</b> ) a)	How are AR and VR used in science and engineering for simulations, training and collaborative research? [8]
b)	How legal and human aspects can be handled in AR-VR. [6]

c) Explain limitations of virtual reality application. [4]

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