Total No. of Questions : 8]

SEAT No. :

PB3743

[Total No. of Pages : 2

[6262]-1
T.E.(Civil Engineering)
HYDROLOGY AND WATER RESOURCES ENGINEERING
(2019 Pattern) (Semester -I) (301001)

Time : 2½ 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.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 Q-GIS and its application in hydrology. **[10]**

b) Explain Rational formula and its importance. **[8]**

OR

Q2) a) Explain watershed delineation procedure using a topo sheet with neat sketches. **[10]**

b) Explain flood routing in detial. **[8]**

Q3) a) Explain how will you fix the capacity of reservoir using annual inflow and outflow. **[10]**

b) What are reservoir losses and suggest method to control leakages from reservoir. **[7]**

OR

Q4) a) What are various investigations required for reservoir planning. **[10]**

b) State measures to control reservoir sedimentation. **[7]**

Q5) a) Derive the formula to calculate discharge of a well in a confined aquifer and unconfined aquifer. **[10]**

b) What is water logging? Explain tile drain method and also state formula for spacing of tile drains. **[8]**

OR

P.T.O.

Q6) a) Explain reclamation of saline lands. **[10]**

b) State various types of tube wells and explain construction of slotted type tube well. **[8]**

Q7) a) Explain Piped Distribution Network (PDN) and state its advantages. **[10]**

b) Explain Hortons curve with neat sketch. **[7]**

OR

Q8) a) What is evaporation, state Meyer's formula and Rowher's formula and explain every term in formula. **[10]**

b) Differentiate between surface irrigation and subsurface irrigation and explain drip irrigation in detail. **[7]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3744

[Total No. of Pages : 3

[6262]-2

T.E. (Civil)

WATER SUPPLY ENGINEERING

(2019 Pattern) (Semester - I) (301002)

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) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculator is allowed.***

Q1) a) What is coagulation? Enlist the types of common coagulant? Why is it necessary? **[6]**

b) Design six units of slow sand filter for the following data : **[6]**

i) Population 50000

ii) Per capita demand 150 lit/cap/day

iii) Rate of filtration 180 lit/hr/sq. m.

iv) Length of each bed twice the breadth. Assume maximum demand of 1.8 the average daily demand, also assume that one unit is kept as a stand by.

c) What do you understand by flocculation? Why it is necessary? **[6]**

OR

Q2) a) A water treatment plant treats 300 m^3/hr of water. Design the circular Clariflocculator. Following parameters are expected to be designed i) Dimension of flocculator unit. ii) Power input by paddles to water. iii) Size and number of paddles. iv) Opening below flocculator. **[6]**

b) Explain the various filter troubles? How are they rectified? **[6]**

c) With neat sketch explain back washing of rapid sand gravity filter? **[6]**

P.T.O.

Q3) a) A filtered water discharge of 1 MLD has a chlorine demand of 4.8 mg/l. it is required to maintain a chlorine residual of 0.2 mg/l. Determine the quantity of bleaching powder necessary for six months (chlorine available 25 %)? **[6]**

b) Write short note on plain chlorination, post chlorination, super chlorination, and break point chlorination. **[6]**

c) Explain Zeolite process with neat sketch. **[6]**

OR

Q4) a) Alum dose of 20 mg/l is used to treat 50MLD of water workout quantity of alum required per month by the water treatment plant. Also calculate the amount of CO_2 released per day? **[6]**

b) State the various methods of desalination? Explain any one with sketch? **[6]**

c) State the various methods of removing excess fluorides from water? Explain any one in detail. **[6]**

Q5) a) Differentiate between grid iron system and dead-end system. **[4]**

b) Write the advantages of gravity and pumping system. **[4]**

c) Determine the balancing capacity of an ESR for a town having population 2 million and water supply rate of 280 lit/cap/l. the water is pumped continuously for 24 hr. breakup of demand is **[9]**

Time	Demand (lit/cap/l)
3 am - 9 am	80
9 am - 1 pm	50
1 pm - 7 pm	85
7 pm - 11 pm	30
11 pm -3 am	35

OR

Q6) a) A town with population of 2 lakh is to be supplied with water supply daily at 200 lit per head. The pumping is done from 6 am to 6 pm. The variation in demand is as follows: **[8]**

Time of the day	6 am -9 am	9 am -12 noon	12 noon - 3 pm	3 pm -6 pm	6 pm -9 pm
Demand	40%	10%	10%	15%	25%

Determine the capacity of the service reservoir by mass curve method.

b) State the various methods of distribution system? Explain any one. **[4]**

c) Explain water harvesting technology? **[5]**

Q7) a) What is packaged water treatment plant state the advantages of package water treatment plant? **[5]**

b) Explain the smart city mission and ATAL mission for rejuvenation and urban transformation mission. **[7]**

c) With sketch explain the one pipe system. **[5]**

OR

Q8) a) With sketch explain the Two pipe system. **[6]**

b) What is Jal Jeevan mission? State its implication in rural India. **[5]**

c) Why valves are provided in pipeline? State its types and explain any one with sketch? **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3745

[Total No. of Pages : 3

[6262]-3
T.E. (Civil)
DESIGN OF STEEL STRUCTURES
(2019 Pattern) (Semester - I) (301003)

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 and Q.7 or Q.8.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take f_y = 250 and f_e = 410 grade of steel.***
5) ***Take ultimate stress in bolt, f_{ub} = 400 N/mm^2.***
6) ***Assume suitable data, if necessary.***
7) ***Use of electronic pocket calculator, IS: 800-2007 and steel table are allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Define beam-Column with suitable sketches. **[3]**

b) Design a moment resisting base plate that can resist the given factored axial compressive load of 1500 kN and factored bending moment of 100 kNm, assuming that the concrete pedestal used is of M20 grade. The column section to which the base plate will be attached is ISHB 350 weighing 67.4 kg/m. **[14]**

OR

Q2) a) Differentiate between slab base and gusseted base. **[3]**

b) A column having effective length of 3.5 m is subjected to factored axial load of 400 kN and factored moment of 45 kNm. Design the column section. Check for section strength only. **[14]**

Q3) a) Explain in brief web buckling and web crippling with suitable sketches. **[4]**

b) A simply supported steel joist of 3.5 m effective span carries a working uniformly distributed load 50 kN/m on entire span and a point load of 30 kN at mid span. The section is laterally supported throughout the span. Design an appropriate section. Apply usual checks for strength along with check for deflection. **[14]**

OR

P.T.O

Q4) a) Explain modes of failure of beam with suitable sketches. **[4]**

b) Design a suitable I section for simply supported beam of span 4.5 m carrying a dead load of 30 kN/m and imposed load of 50 kN/m. The beam is laterally unsupported throughout the span. **[14]**

Q5) Design a gantry girder supporting an electronically operated crane to the following data: **[17]**

a) Capacity of crane = 120 kN

b) Span between crane rails = 20 m

c) Self-weight crane girder = 100 kN

d) Weight of crab, electric motor, hook etc. = 15 kN

e) Minimum hook approach = 1.2 m

f) Wheelbase = 2m

g) Span of Gantry = 5.5m

h) Weight of rails = 0.3 kN/m

OR

Q6) Determine panel point dead load, imposed load and wind load for the truss as shown in Figure 1. Assume design wind pressure as 1200 N/m^2, use A.C. Sheet and the C/C spacing of truss is 6 m. Assume self-weight of purlin as 120 N/m. **[17]**

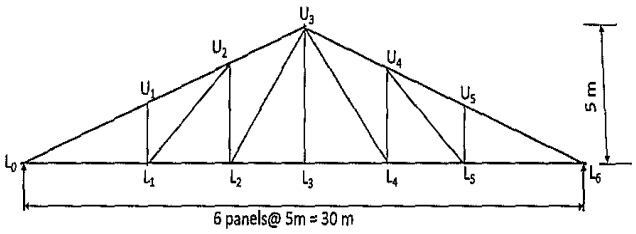


Fig. 1

Q7) a) Explain in brief IS provisions for length and spacing of intermittent weld. **[4]**

b) Design the cross-section of a simply supported welded plate girder with an effective span of 25 m. The girder is subjected to a working uniformly distributed load of 50 kN/m throughout the span, including self-weight. Assume that the compression flange is laterally supported throughout the span. Apply checks for bending and shear. **[14]**

OR

Q8) a) Explain in brief flange curtailment of plate girder. **[4]**

b) A simply supported welded plate girder has been designed for a span of 20 m and is subjected to a shear force of 1800 kN and a bending moment of 18500 kNm. The girder's cross-section comprises flanges that are 800 mm wide and 50 mm thick and a web that is 20 mm thick and 2500 mm deep. Assume stiff bearing length at support as 300 mm.

Design the intermittent welded connections between the flange and web, as well as the end bearing stiffener for the girder. **[14]**

Total No. of Questions : 8]

SEAT No. :

PB-3746

[Total No. of Pages : 4

[6262]-4
T.E. (Civil)
ENGINEERING ECONOMICS & FINANCIAL MANAGEMENT
(2019 Pattern) (Semester - I) (301004)

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 and Q.7 or Q.8.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief different features of contact costing. **[5]**

b) What are the different costs involved in contract account? **[5]**

c) A construction company undertakes large contracts. The following are the particulars related to contract carried during the year ended on 31 st March 2020.Prepare a contract account and find out notional profit. How much profit is to be transferred to P&L account and in reserve? **[8]**

Particulars	Amt.(Rs.)	Particulars	Amt.(Rs.)
Work certified	165000	Wages accrued on 31st March	6200
Work not certified	5600	Direct expenses	4900
Plant installed at site	12500	Material on hand	2700
Values of plant	17000	Material returned to store	750
Material sent to site	76300	Direct expenses accrued	920
Labor charges	69500	Contract price	190000
Establishment charges	4900	Cash received from contract	150000

OR

Q2) a) Discuss the role of financial manager in construction financial management. **[5]**

b) Explain the contents of format of contract account. **[5]**

P.T.O

c) A construction company undertakes large contracts. The following are the particulars related to contract carried during the year ended on 31 st March 2020.Prepare a contract account and find out notional profit. How much profit is to be transferred to P&L account and in reserve? **[8]**

Particulars	Amt.(Rs.)	Particulars	Amt.(Rs.)
Work certified	150000	Wages accrued on 31st March	5800
Work not certified	5100	Direct expenses	4520
Plant installed at site	12500	Material on hand	2700
Values of plant	20000	Material returned to store	950
Material sent to site	72400	Direct expenses accrued	800
Labor charges	70000	Contract price	230000
Establishment charges	6200	Cash received from contract	140000

Q3) a) Define capital budgeting and discuss payback period method with the help of example. **[5]**

b) How to calculate simple and compound interest? What is the difference between simple and compound interest payable on principal of Rs.20000 in 7 years at rate of interest of 7% per annum? **[6]**

c) The data below shows yearly Cash flows of projects. Use NPV method and decide which project is to be accepted? Consider 12 % discounting rate. **[6]**

Project	Initial investment (Rs.)	Yearly cash flows (R.s)	
		1	2
A	87000	56500	50000
B	145000	90000	85000

OR

Q4) a) What do you understated NPV method of capital budgeting? Explain with the help of suitable example. **[5]**

b) How to calculate simple and compound interest? What is the difference between simple and compound interest payable on principal of Rs.25000 in 8 years at rate of interest of 6% per annum? **[6]**

c) A building is constructed at cost of Rs.20 lakhs. Consider life of building to be 80 years and scrap value of building to be 10% of building cost. Determine depreciation in 30 year. Use straight line and constant percentage method. **[6]**

Q5) a) List out current assets and current liabilities included in working capital. **[5]**

b) List out different methods of inventory control and list out step by step procedure to conduct ABC analysis? **[6]**

c) The rare of use of cement from the store is 24000 bags per year. The cost of placing order is Rs.25. The cost of a cement bag is Rs. 350/-The cost of carrying inventory in percent per year is 0.25. Determine **[6]**

i) EOQ

ii) order time; consider lead time is one month

iii) No. of orders placed.

OR

Q6) a) List out methods of estimation of working capital and explanation of any one method in detail. **[5]**

b) Segregate items based on their annual usage, calculate percentage cumulative annual usage and draw ABC curve for the following data **[6]**

Items	Cement	Sand	Steel	Murum	Nails	Water
Annual Consumption	2000 bags	120 cum	4600 Kg	3200 cum	1100 kg	130,000 lit
Unit Cost (Rs.)	350 per bag	5000 per cum	50 per Kg	150 per cum	100 per kg	4 per lit.

c) Calculate working capital using the data as follows by considering 20 % contingencies. **[6]**

Particulars	Amt.(Rs.)	Particulars	Amt. (Rs.)
Bank balance	350000	Account payable	150000
Term loan	320000	Finished goods	140000
Payable unclaimed dividend	40000	Account receivable	220000
Commission receivable	90000	Staff provident fund	200000

Q7) a) Write a note on tax deduction against income from house property (section 24). **[5]**

b) Discuss tax system in India before implementation of GST also highlight on advantages of GST. **[5]**

c) Write a note on exemption on Property tax. And **[8]**

Calculate the payable property tax to be paid on property located in Chennai by using data as follows

Plinth area = 1500 sq.ft. Monthly rent notified = Rs.12 per sq.ft. Tax rate = 22 %,Library cess = 10%, consider 15 % rebate on age of building

OR

Q8) a) Write down composition of RBI and list out its main functions. **[5]**

b) Write a short note on **[5]**

i) SEBI and

ii) IRDA

c) Write a note on tax deduction against income from property. Also Calculate property tax for the RCC bungalow located in *Baramati*, having carpet area 250 sq.m. Consider Base value Rs.300 per sq.m. Use category factor = 1,Type of structure factor = 1, Bungalow constructed in 1982 (Age factor = 0.9), Tax rate = 7%. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB3747

[Total No. of Pages : 3

[6262]-5

T.E. (Civil Engineering)

ADVANCED FLUID MECHANICS AND HYDRAULIC MACHINES

(2019 Pattern) (Semester - I) (Elective - I) (301005a)

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) ***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) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator (non programmable) and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Water flows through a 2.91 km long pipeline at velocity of 2.16 m/s when the valve at the end of the pipe is fully open and the head acting there is 29.7 m. The valve is desired to be closed fully in 16 seconds in such a manner that the velocity of water in the pipe is decelerated uniformly. Calculate the required area of the valve opening at 5 and 10 seconds from start, if the initial opening area is equal to the pipe cross sectional area. **[5]**

b) Derive the following expression for emptying a hemispherical tank with orifice fitted at its bottom. **[6]**

$$T = \frac{\Pi}{C d.a.\sqrt{2g}}\left[\frac{4}{3}R\left(H_1^{3/2} - H_2^{3/2}\right) - \frac{2}{5}\left(H_1^{5/2} - H_2^{5/2}\right)\right]$$

c) Explain with neat sketch "Surge Tank" and its function. **[6]**

OR

Q2) a) Derive the following expression for emptying a tank through an orifice at its bottom. **[6]**

$$T = \frac{2A\left[\sqrt{H_1} - \sqrt{H_2}\right]}{C d.a.\sqrt{2g}}$$

P.T.O.

b) A cylindrical tank 12m high, containing water up to top is completely emptied through a hole located in the bottom in 8.4 minutes. How long would it take for the water level to drop from the top of the tank when full to 4m from the top? **[5]**

c) i) Explain with neat sketch "Water Hammer". **[3]**

ii) Explain with neat sketch "Types of Closure of Valve". **[3]**

Q3) a) Derive expression for the "work done by the jet" in case of flat plate inclined and moving in the direction of jet. **[6]**

b) A jet of water 80 mm diameter having a velocity of 20 m/s, strikes normally a flat smooth plate. Determine the thrust on the plate

i) if the plate at rest,

ii) if the plate is moving in the same direction as jet with a velocity of 6 m/s.

Also find the work done per second in each case and efficiency of the jet when the plate is moving. **[5]**

c) A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of jet. Find the normal force on the plate: **[6]**

i) when the plate is stationary.

ii) when the plate is moving with velocity of 15 m/s away from the jet.

Also determine the power and the efficiency of the jet when the plate is moving.

OR

Q4) a) A jet of water having a velocity of 15 m/s strikes a curved vane which is moving with a velocity of 5 m/s. The vane is symmetrical and is so shaped that the jet is deflected through 120°. Find the angle of jet at inlet of the vane so that there is no shock. What is the absolute velocity of jet at outlet in magnitude and direction and the work done per unit weight of the water. Assume the vane to be smooth. **[8]**

b) Derive the expression for the force exerted by jet on symmetrical stationary curved vane at centre. **[6]**

c) Explain with neat sketch: **[3]**

i) inlet velocity Triangle and

ii) Outlet Velocity Triangle.

Q5) a) Draw the neat sketch of hydroelectric power plant. Explain various elements of it. **[6]**

b) Derive the following expression for specific speed of turbine. **[6]**

$$N_s = \frac{N\sqrt{P}}{H^{5/4}}$$

c) A turbine develops 7355 kW under a head of 24.7m at 210 rpm. What is its specific speed? Indicate the type of turbine suitable for the purpose. If this turbine is tested in the laboratory where the head of water available in only 7.5m, what power will it develop and at what speed? **[6]**

OR

Q6) a) A Pelton wheel is to be designed for head of 70 m when running at 210 rpm. The Pelton wheel develops 95.80 kW shaft power. The velocity of bucket is = 0.46 times the velocity of jet, overall efficiency = 86% and coefficient of velocity is equal to 0.98. **[8]**

b) Draw the neat and labeled sketch of Francis turbine and explain the working of it. **[6]**

c) Explain in brief: "Model testing of turbine". **[4]**

Q7) a) A centrifugal pump is running at 1100 rpm. The outlet vane angle of impeller is 45° and velocity of flow at outlet is 2.6 m/s. The discharge though the pump is 210 lit/s when the pump is working against a total head of 20 m. If the manometric efficiency of the pump is 85%. **[6]**

Determine :

i) The diameter of impeller and

ii) The width of impeller at outlet.

b) A centrifugal pump with 1.25 m diameter runs at 210 rpm and pumps 1890 lit/sec, the average lift being 6.1 m. The angle which the vane makes at exit with the tangent to the impeller is 27° and the radial velocity of flow is 2.6 m/s. Determine the manometric efficiency and the least speed to start the pumping against the head of 6.1m, the inner diameter of the impeller being 0.6m **[6]**

c) Explain in brief with neat sketches "types of impellers" related with centrifugal pump. **[6]**

OR

Q8) a) A centrifugal pump delivers water against a net head of 15 meter and design speed of 1050 rpm the vanes are curved back to an angle of 30º with the periphery. The impeller diameter is 40 cm and width at outlet is 6 cm. Determine the discharge of pump if the manometric efficiency is 96%. **[6]**

b) Draw neat labeled sketch of a Centrifugal pump and Also, explain its working. **[6]**

c) Explain in brief "Various types of Efficiencies related with Centrifugal Pump". **[6]**

Total No. of Questions : 8]

SEAT No. :

PB3748

[Total No. of Pages :2

[6262]-6

T.E. (Civil Engineering)

RESEARCH METHODOLOGY AND IPR

(2019 Pattern) (Semester- I) (Elective-I) (301005-b)

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 diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data, if necessary and clearly state.***

Q1) a) "Processing of data implies editing, coding, classification and tabulation". Describe in brief these four operations pointing out the significance of each in context of research study. **[9]**

b) Explain how would researcher work out the following statistical measures which often used? **[8]**

i) Coefficient of variation;

ii) Arithmetic average;

iii) Coefficient of skewness;

iv) Regression equation of X on Y;

OR

Q2) a) State the characteristics of Quantitative data. **[9]**

b) What are the various types of interview? Explain the various advantages and limitations of interview. **[8]**

Q3) a) Write a brief note on the 'task of interpretation' in the context of research methodology. **[8]**

b) Write a short note on 'Documentation' in the context of a research report. **[9]**

OR

P.T.O.

Q4) a) Describe the qualitative and quantitative data interpretation methods. **[8]**

b) Write short notes on the following: **[9]**

i) The techniques of writing report;

ii) Characteristics of a good research report;

iii) Bibliography and its importance in context of research report;

iv) Rewriting and polishing of report.

Q5) a) Discuss about the Rights under the 1976 copyright act. **[9]**

b) Write the advantages and disadvantages of TRIPs. **[9]**

OR

Q6) a) Explain when the terminations of transfers of copyrights take place. **[9]**

b) Explain different types of intellectual property in detail. **[9]**

Q7) a) Discuss the grounds on which the registration of a patent can be refused? **[9]**

b) Define Industrial Design and discuss the need to protect it as an intellectual property. **[9]**

OR

Q8) a) What is the criterion for commercialization of patent? **[9]**

b) Describe Copyright and the works protected under copyright act. Briefly explain the process of obtaining copyright. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3749

[Total No. of Pages : 2

[6262]-7

T.E. (Civil)

CONSTRUCTION MANAGEMENT

(2019 Pattern) (Semester - I) (301005C) (Elective - I)

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 diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss need and importance of labour laws associated with construction sector by explaining two laws. **[6]**

b) What are the various means of finance? Explain any one in detail. **[6]**

c) Explain workman's compensation act & construction workers act. **[6]**

OR

Q2) a) Explain Interstate Migrant Workers act and the Minimum wages act. **[6]**

b) Explain Project Cash Flow analysis considering construction site & list out various inflows & outflows. **[6]**

c) Explain Construction Project Balance Sheet with an example. **[6]**

Q3) a) Explain various steps involved in the process of Risk Management. **[6]**

b) Explain the role of value engineering in construction with respect to time & cost aspects. **[6]**

c) Enlist mathematical tools used in Risk management process and explain any one in detail with its applications. **[6]**

OR

Q4) a) Define Risk. Enlist various risk involved in construction & Explain any method of risk mitigation. **[6]**

b) Explain energy cost escalation and state its impact on infrastructure project. **[6]**

c) Define the process of Value Engineering & state its application. **[6]**

P.T.O.

Q5) a) Explain the process of Material Management & draw Materials Flow System Chart. **[6]**

b) Write short note **[6]**

i) Stores Management

ii) Supply Chain Management

c) Explain Inventory control techniques and state its importance. **[5]**

OR

Q6) a) Explain the objectives, functions and scope of material management in construction. **[6]**

b) Define Economic Order Quantity (EOQ). State assumptions of EOQ model & discuss the equation. **[6]**

c) Explain the concept of Logistics and state its importance. **[5]**

Q7) a) Explain Staffing policy and patterns in construction organization. **[6]**

b) Enlist various types of trainings and explain any one in detail. **[6]**

c) Define Artificial Intelligence technique and explain its application in Civil engineering. **[5]**

OR

Q8) a) Write short note on following HR terms **[6]**

i) Recruitment & Selection

ii) Performance Appraisal

b) Differentiate between artificial neural network (ANN) & Genetic Algorithm. **[6]**

c) Define HR. Explain the process of Human Resource Management & Human Resource development process. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3750

[Total No. of Pages :2

[6262]-8

T.E. (Civil Engineering)

ADVANCED CONCRETE TECHNOLOGY

(2019 Pattern) (Semester- I) (Elective-I) (301005d)

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 in bold to the right, indicate full marks.***
3) ***Neat diagrams should be drawn wherever necessary.***

Q1) a) What are the functions of air-entraining admixtures, superplasticizers, and accelerators? **[9]**

b) Explain how water-reducing admixtures function. **[9]**

OR

Q2) a) Explain the functions of chemical admixtures used in concrete. **[9]**

b) What are corrosion-inhibiting admixtures and shrinkage reducing admixtures? **[9]**

Q3) a) List the advantages and applications of glass fibers reinforced concrete. **[8]**

b) What are synthetic fibers? How do they affect the properties of concrete? **[9]**

OR

Q4) a) List the advantages of using polypropylene fibers in concrete. **[8]**

b) Explain the balling effect. **[9]**

P.T.O.

Q5) a) How can plastic shrinkage be minimized? **[9]**

b) Explain the mechanism involved in autogenous shrinkage. **[9]**

OR

Q6) a) What are the transport properties of concrete? **[9]**

b) Explain carbonation in concrete. **[9]**

Q7) a) Explain the working of ultrasonic pulse velocity meter. **[8]**

b) What is corrosion? How is it measured? **[9]**

OR

Q8) a) What are concrete cores? How are they extracted? **[8]**

b) Explain the permeability test on concrete. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3751

[Total No. of Pages :3

[6262]-9

T.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

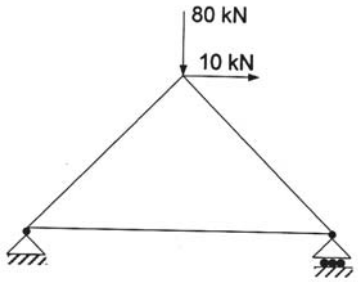
(2019 Pattern) (Semester- I) (Elective-I) (301005-e)

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 non-programmable electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Assessment will be based on complete solution and not on final answer.***

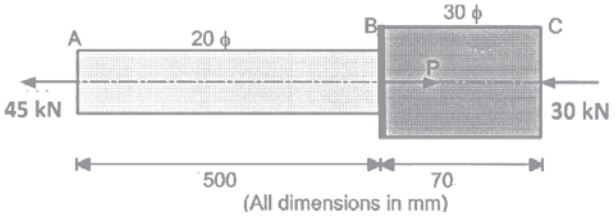
Q1) Using stiffness member approach, analyse the given equilateral truss, with one end hinged and one supported by roller support and fine the member forces. Take member length as 3.5 m **[18]**



OR

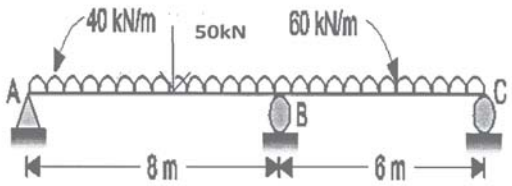
Q2) a) Derive the member stiffness matrix for a bar element. **[4]**

b) For the given bar subjected to axial forces, determine the displacements at A and C. Consider end B as fixed. Portion AB of length 500 mm has 20 mm diameter and BC bar of length 70 mm has 30 mm diameter. Also find the corresponding strains and stresses. Determine the reaction P at the support B. **[14]**



P.T.O.

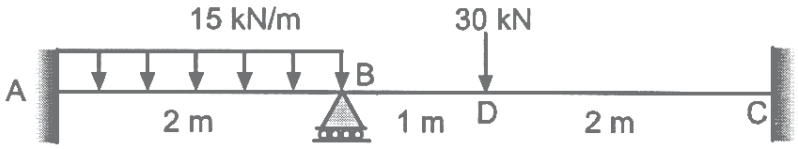
Q3) A beam ABC is subjected to udl of 40kN/m on AB span (8m) and 60 kN/m on BC span (6m). Additionally there is a point load of 50 kN acting at center of AB span. Analyse the continuous beam using stiffness member approach. Find the rotational displacement at A, B, and C. Find the reactions and draw the shear force and bending moment diagram. **[17]**



OR

Q4) a) Derive the stiffness matrix for plane frame member. **[8]**

b) Determine the rotation at B for the beam shown in the figure. **[9]**

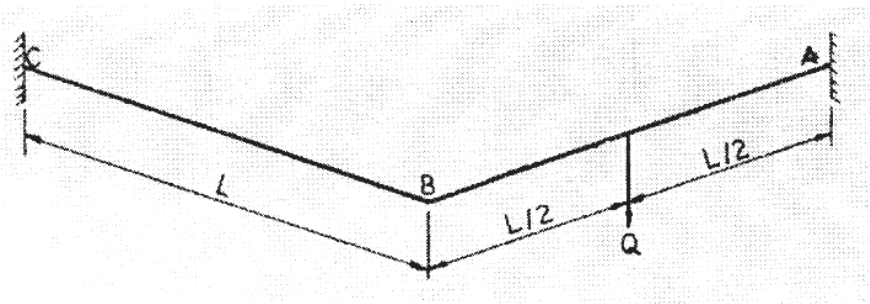


Q5) a) Signify the importance of transformation matrix. Derive the transformation matrix for grid member. **[9]**

b) Derive the stiffness matrix for grid member. **[8]**

OR

Q6) Analyse the grid structure as shown in Figure. The grid consisting of two perpendicular members AB and BC fixed at A and C. Both members are rigidly connected at B. The grid is subjected to point load of Q = 80 kN at midpoint of AB. Length of both members is 3 m. Assume GJ/EI = 0.8 for both the members and using structure approach, analyse the grid and find the displacements at B. **[17]**



Q7) a) Derive the stiffness matrix for a space frame member by drawing neat sketches. **[9]**

b) Write the flow chart for beam problem solution using stiffness matrix method. **[9]**

OR

Q8) a) Write flowchart for solution of plane frame or plane truss problem using stiffness matrix method. **[9]**

b) Derive the member stiffness matrix for space truss element for local axis. Write the global stiffness matrix for space truss element. Show the direction cosines with a neat sketch. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3752

[Total No. of Pages :3

[6262]-10

T.E. (Civil)

ADVANCED MECHANICS OF STRUCTURES

(2019 Pattern) (Semester- I) (Elective-I) (301005 f)

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) ***Neat diagrams 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.***

Q1) a) A simply Supported beam is loaded and supported as shown in fig. 1. Determine support reaction at A, Shear force & Bending Moment at C by drawing influence line diagram. **[9]**

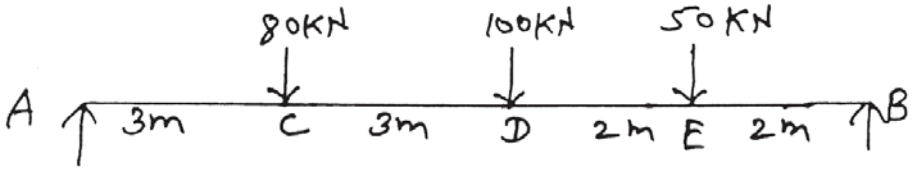


Fig. 1

b) Draw the influence line diagrams for forces in the member U_2U_3, U_2L_2 and L_2L_3 of the truss as shown in fig. 2. **[8]**

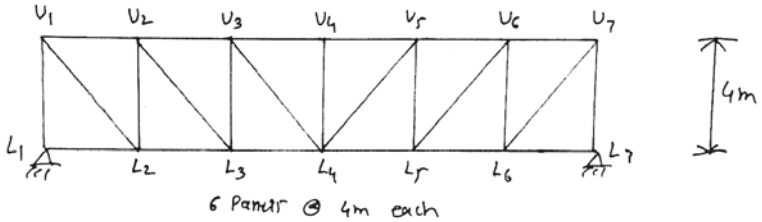


Fig. 2

OR

P.T.O.

Q2) a) A simply supported beam is loaded & supported as shown in fig. 3. Determine Support Reactions, Shear & Moment at C by drawing influence line diagram. **[9]**

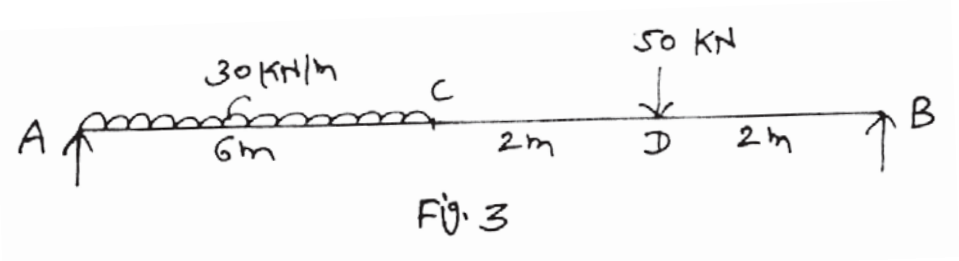


Fig. 3

b) Draw the influence line diagram for the member U_2U_3, L_2L_3, and U_2L_2 of a truss as shown in fig. 4. **[8]**

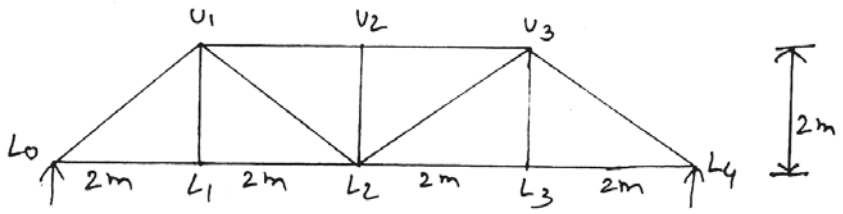


Fig. 4

Q3) a) A simply supported beam of 10 m span is carrying a rolling UDL of 4 m length with intensity of 20 kN/m moving from left to right. Determine:**[12]**

i) Maximum Reactions

ii) Maximum negative & positive shear force & Maximum Bending Moment at a section 4 m from left support

iii) Absolute Maximum Bending Moment anywhere in the span.

b) Two wheel loads 50 kN & 150 kN spaced at 2m move on a grider of 12m long. Find the maximum positive and negative shear force at a section 3 m from left end. Any wheel load can lead the other. **[6]**

OR

Q4) a) A simply supported beam of 20 m span is carrying a rolling UDL of intensity 40 kN/m with length larger than the span. Detrmine **[12]**

i) Maximum Reactions

ii) Maximum negative & positive shear force & Maximum Bending Moment at a section 8 m from left support

iii) Absolute Maximum Bending Moment anywhere in the span.

b) An uniformly distributed load of span 8 m having intensity has 25 kN/m moving on simply supported beam of span 6 m. Draw Influence line diagram for shear force and bending moment at distance 2.5 m from left support. **[6]**

Q5) A quarter circle beam fixed at one end and free at other end carrying Point load 'P' at free end. Determine the deflection at the free end and sketch the shear force, Bending Moment and Torsional moment Diagrams. Assume flexural rigidity (EI) = Torsional rigidity (GJ). **[17]**

OR

Q6) Derive an expression for semi-circular beam simply supported on three supported equally spaced support. **[17]**

Q7) a) A three hinged parabolic arch of 16 m span & 3m central rise carries a UDL of length 8m of intensity 25 kN/m on the left half of the span. Find reactions at support, Horizontal thrust, Bending Moment, Normal Thrust, Radial Shear at 4m from left support. **[12]**

b) Derive the expression for horizontal thrust when entire span of two hinged parabolic arch is loaded with udl of intensity 'w' kN/m. **[6]**

OR

Q8) a) A parabolic arch is hinged at the springing, which are at the same level. The span is 48m with a central rise of 6m. It carries a point load of 160 kN at the crown. If $I = I_0 \sec\theta$, Calculate the normal thrust, radial shear and bending moment at the left and quarter span. **[12]**

b) A three hinged parabolic arch of 20m span & 4m central rise carries a point load of 150 kN at 4m horizontally from the left hand hinge. Calculate the normal thrust & radial shear at a section under the point load. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB3753

[Total No. of Pages : 3

[6262]-11

T.E. (Civil Engineering)

WASTE WATER ENGINEERING

(2019 Pattern) (Semester - II) (301012)

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 diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of cell phone is prohibited in the examination hail.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain the term with respect to activated sludge process. **[6]**

i) Hydraulic Retention Time (HRT),

ii) Solid Retention Time (SRT),

iii) Mixed Liquor Suspended solids (MLSS),

Food to microorganism ratio (F/M ratio)

b) An aeration tank of Volume 2000 m^3 treating 10000 m^3/day of Waste water with influent BOD 150 mg/l aimed to reduce BOD to 30 mg/l. Find F/M ratio used in the design. Take MLSS : 3000 mg/l **[4]**

c) An average operation data for conventional activated sludge treatment is as follows **[8]**

A	Wastewater flow	20000 m^3/d
B	Volume of aeration tank	3000 m^3
C	Influent BOD	200 mg/l
D	BOD removal from primary sedimentation tank	30%
E	Effluent BOD	10 mg/l
F	MLSS	2000 mg/l

Based on the information determine

i) Aeration period (hour)

ii) E/M ratio

iii) Percentage efficiency of biochemical oxygen demand removal.

OR

P.T.O.

Q2) a) Conventional activated sludge plant is designed for a town to treat settled domestic sewage with diffused air aeration system for the given data as follows **[6]**

i) Population of town: 1 lakh

ii) Per capita sewage contribution: 100 lpcd

iii) Settled sewage BOD = 100 mg/l

iv) Effluent BOD desired = 10mg/l

v) MLSS in aeration tank = 3000mg/l

vi) F/M = 0.2

Find

1) BOD loading in Kg/d,

2) Aeration tank volume

3) Volumetric loading in kg BOD/m^3.

b) Write short note on Rotating Biological Contractors (RBC). **[4]**

c) What do you understand by biological treatment of wastewater? List the different types of microorganisms and explain their role in wastewater treatment. **[8]**

Q3) a) Explain wastewater treatment principle of phytoremediation technology with neat sketch and give its application. **[9]**

b) A town having a population of 1.2 lakhs is producing sewage at a rate of 100 lpcd having 200 mg/l of BOD. A trickling filter having recirculation ratio 1.5 is design to produce effluent of BOD 20mg/l. The operating depth of filter is 2.5m. Find the diameter of the trickling filter is m. **[9]**

OR

Q4) a) Determine the size of a high-rate trickling filter for the following data; **[9]**

i) Sewage flow = 8 MLD

ii) Recirculation ratio = 1.5

iii) BOD of sewage = 230 mg/l

iv) BOD removed in primary sedimentation tank = 30%

v) Final effluent BOD = 20 mg/l

vi) Depth of filter = 3 m

b) What are Oxidation ponds? Explain the bacteria - algae symbiosis with a neat sketch. **[9]**

Q5) a) Design a septic tank for 290 users. Water allowance is 120 L per head per day. Assume suitable data if required. **[9]**

b) Explain the working principle with neat sketch of following terms with the advantages and applications: **[9]**

i) Packed bed reactor PBR),

ii) Sequential batch reactor (SBR)

OR

Q6) a) Explain the working principle with neat sketch of following terms with the advantages and applications: **[3+6]**

i) Up-flow Anaerobic Sludge Blanket (UASB)

ii) Moving bed bio reactor (MBBR)

b) Explain with a neat sketch the working of a septic tank. Design a septic tank for 300 users. Water allowance is 120 L per head per day. Assume suitable data if required. **[3+6]**

Q7) a) Write a short note on sludge drying bed. **[5]**

b) What is a Sludge? Why Sludge digestion is necessary. In activated sludge process, l MLD (by volume) of secondary sludge has to be returned to keep the required MLSS concentration in the aeration tank. This sludge has a water content of 99%. If the sludge water content is reduced to 98%, what volume of the sludge will be needed to be recycled? **[7]**

c) Explain what do you understand by primary and secondary sludge. **[4]**

OR

Q8) a) Explain the anaerobic sludge digestion process. Write a short note on sludge drying bed. **[5]**

b) Sedimentation tank is treating the flow of 5 MLD containing 300 ppm of suspended solids. Tank removes around 50% of suspended solids. Calculate the quantity of sludge produce per day in bulk and weight if **[7]**

i) Moisture content of the sludge is 97%

ii) Moisture content of the sludge is 95%

c) Explain what do you understand by primary and secondary sludge. **[4]**

Total No. of Questions : 8]

SEAT No. : ____

PB3754

[Total No. of Pages : 7

[6262]-12

T.E. (Civil)

DESIGN OF RC STRUCTURES

(2019 Pattern) (Semester - II) (301013)

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) ***Figures to the right indicate full marks.***
3) ***IS 456-2000 and non programmable calculator are allowed in the examination.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Mere reproduction from IS Code as answer, will not be given full credit.***
6) ***If necessary, assume suitable data and indicate clearly.***

Q1) a) Design any intermediate flight of a dog legged staircase of a residential building as shown in Figure 1 with the following data: **[13]**

i) Floor to floor height = 3.06m

ii) Rise = 170mm; Tread = 250mm; Width of flight = 1.0m

iii) Width of supporting beams = 230mm

iv) Live load = 3.5 kN/m^2; Floor finish 0.5 kN/m^2

v) Material = M25, Fe 500

vi) Draw details of reinforcement. Use LSM approach.

b) Explain in detail zoning of shear reinforcement. **[5]**

OR

Q2) Design a simply supported reinforced concrete floor beam B5 as shown in Figure 1 with following data : **[18]**

a) Center to center Span of beam = 3.73 m

b) Width of supporting columns = 300mm

c) Beam width = 230 mm

d) The beam supports slab of thickness 120mm on one side of beam

e) For slab- Live load = 2kN/m^2; Floor finish = 1.0 kN/m^2

f) The wall on this beam is 230 mm thick and 2.7 m high.

g) Material- M30, Fe 500

h) Show details of reinforcement along with zoning of shear reinforcement. Use LSM.

P.T.O.

Q3) Design a continuous floor beam B8-B9-B10 as shown in Figure 1 using IS code coefficients (or moment distribution). Thickness of the all floor slab is 120 mm, live load and floor finish load on all slabs are 2.5 kN/m^2 and 1.5 kN/m^2, respectively. The wall on this beam is 150 mm thick and 2.7 m high. Use M 25 and Fe 415 steel. Design longitudinal reinforcement for all the spans and support for flexure. Design shear reinforcement only for beam B19. Draw neat sketch showing details of main and shear reinforcement. Use LSM. **[17]**

OR

Q4) Continuous RC beam ABCD of rectangular section is simply supported at A and D and continuous over support B and C. Span AB = 4.2m, BC 6.0m and CD = 5.2m. The beam carries working dead load of 22 kN/m (including its self-weight) and working live load of 19 kN/m. The beam supports 120mm slab on one side. Calculate design moment for span BC and support C after 20 % redistribution of moments by considering proper load case. Design span BC and support C for flexure only. Draw the reinforcement details.

Material- Concrete of grade M25, Fe 500 reinforcement. **[17]**

Q5) Design an axially loaded short column C 10 as shown in Figure 1 from terrace to footing. level (floor wise four parts of column) for a G + 2 building with following details: **[18]**

a) Floor to Floor height = 3.3 m, consider both ends fixed.

b) Height of column below plinth = 2.2 m

c) Live load on all slabs = 3 kN/m^2

d) Floor Finish Load = 1.0 kN/m^2

e) Water Proofing Load on roof slab = 1.5 kN/m^2

f) Wall thickness = 150 mm (Internal)

g) Slab thickness = 120 mm and Size of beams = 230 × 450 mm Material M 25 and Fe 500 used. Show detailed floorwise load & design calculations. Draw section of column showing reinforcement details for each floor.

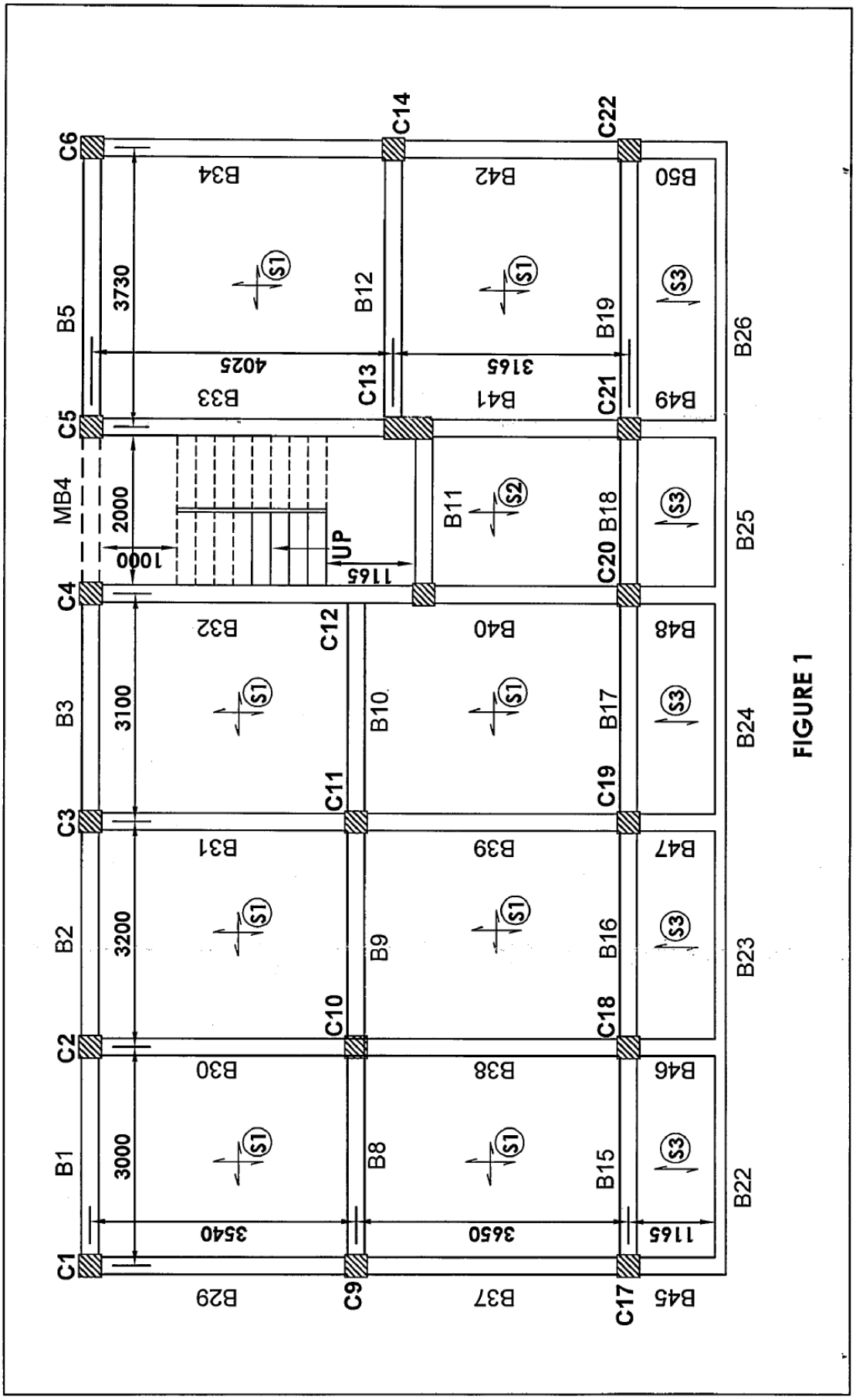
OR

Q6) Design a bi-axial short column by limit state method with material M25 and Fe 500 to carry working load of 900 kN and working moment of 50 kN-m about major axis bisecting the depth of column and 30 kN-m about minor axis bisecting the width of column. The unsupported length of column is 3.9m. The column is fixed at one end and hinged at the other. Show details of reinforcement in plan and sectional. elevation. **[18]**

Q7) Design an isolated pad footing for a working axial load of 900 kN. The effective length of column is 3.5 m. Use M25 grade of concrete and Fe 500 grade of steel. SBC of soil is 250 kN/m^2. Show detailed design calculations and reinforcement details in plan and sectional elevation. Column size 300 × 450mm.**[17]**

OR

Q8) Design a slab type rectangular combined footing for two columns A and B subjected to working axial load 850 kN and 950 kN, respectively. Center to center to distance between two columns is 2.6m. Size of both the columns is 400 × 400mm. Safe bearing capacity of soil is l60kN/m^2. Use M30 concrete and Fe500 steel. Neglect check for one way shear. Show reinforcement details in sectional elevation. **[17]**


C6
C14
C22
B34
B42
B50
S1
S3
B5
3730
B12
B19
B26
4025
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C21
B33
B41
B49
C5
MB4
2000
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1165
B11
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B30
B38
B46
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B45

FIGURE 1

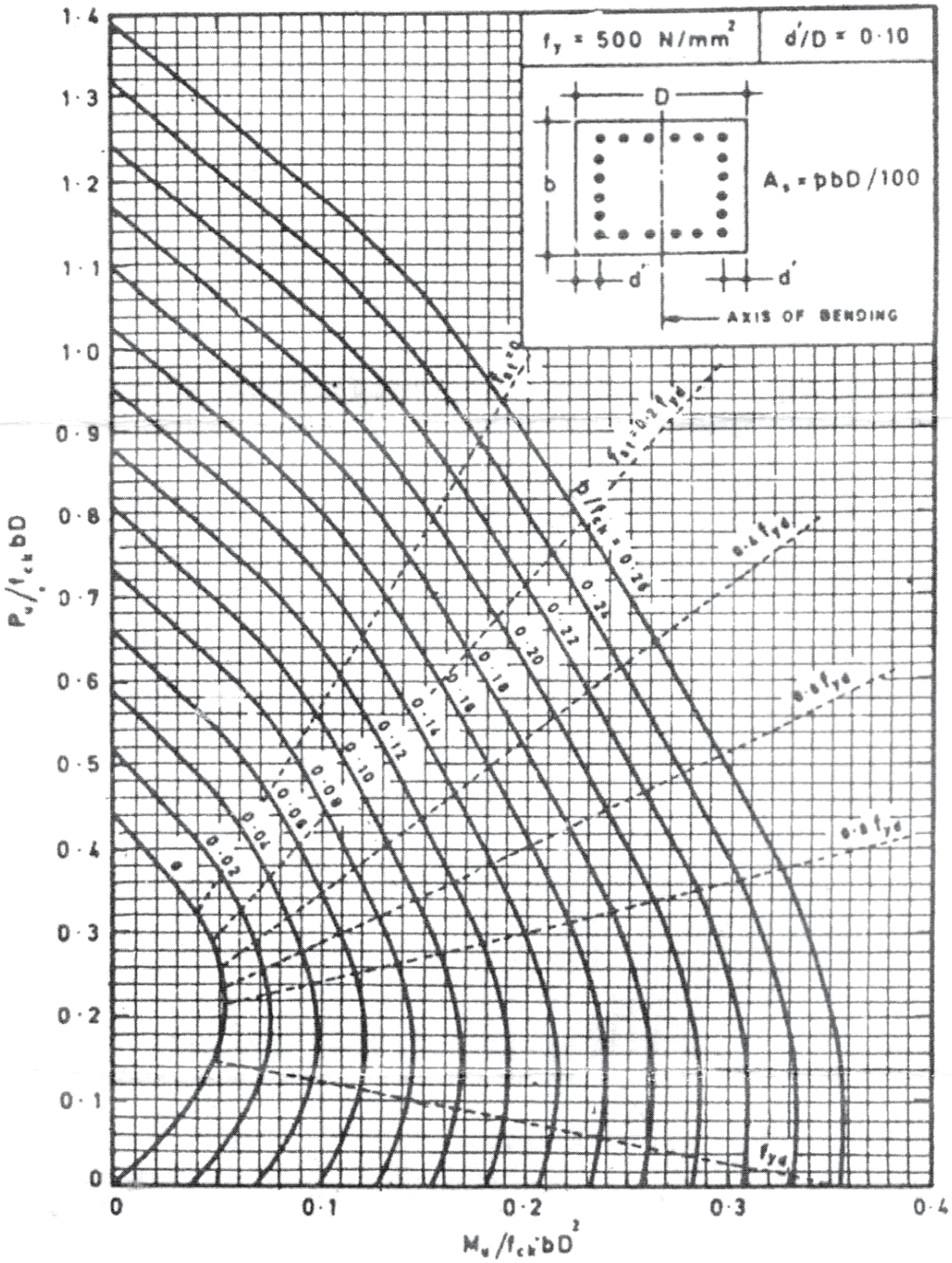

Chart No 1: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

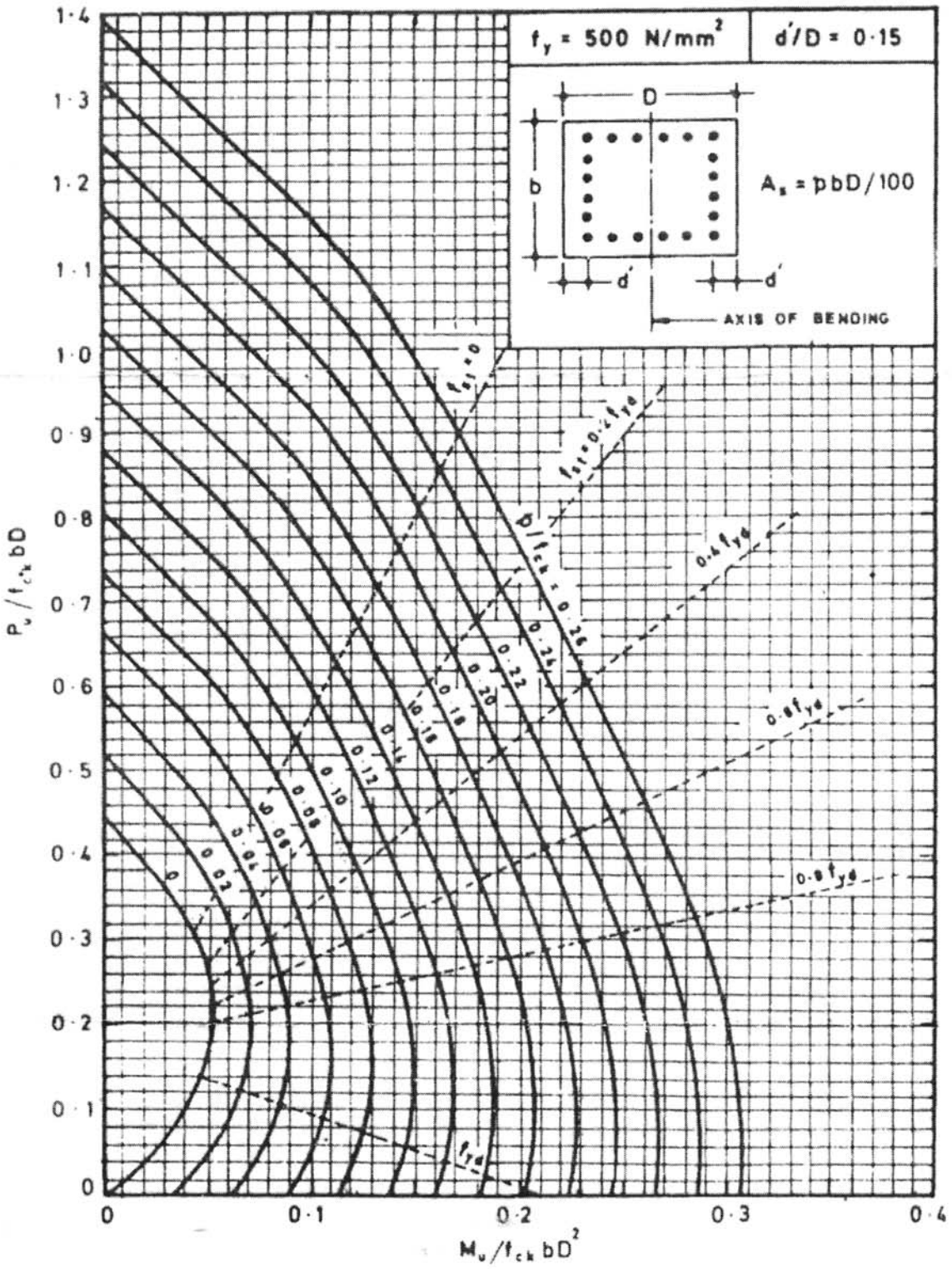

Chart No 2: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

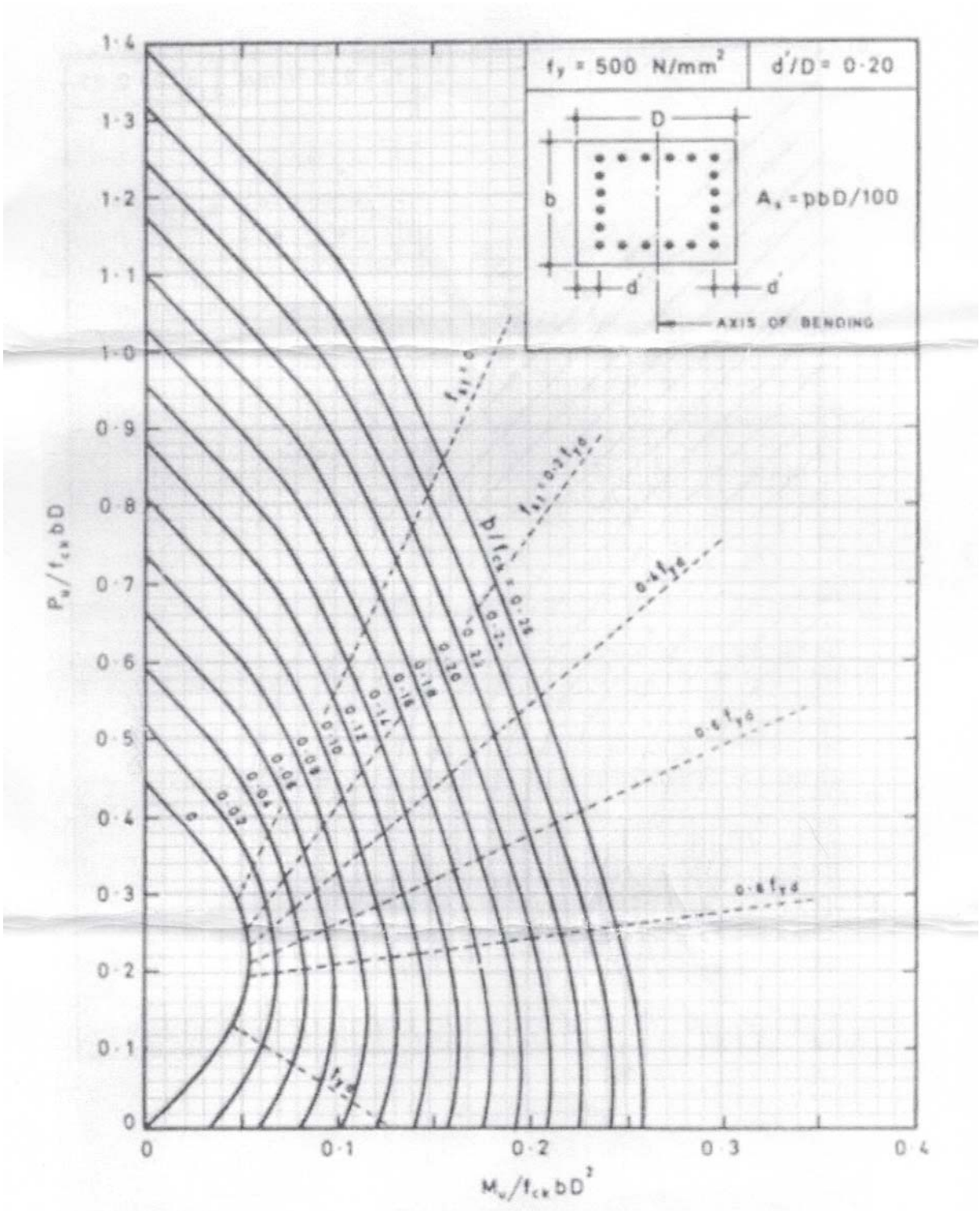

Chart No 3: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

Total No. of Questions : 8]

SEAT No. :

PB3755

[Total No. of Pages :2

[6262]-13

T.E. (Civil Engineering)

REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM

(2019 Pattern) (Semester- II) (301014)

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.***
5) ***Use of electronic pocket calculator is allowed in the examination.***

Q1) a) What are the three segments of GPS? Describe them briefly. **[6]**

b) Write a short note on following: **[6]**

i) GLONASS system

ii) Galileo system.

c) Write a note on types of GPS tracking. **[5]**

OR

Q2) a) Describe sources of error in SBPS. **[6]**

b) Define IRNSS and illustrate its structure. **[6]**

c) What is augmentation and explain about satellite-based augmentation. **[5]**

Q3) a) Explain in detail spectral signature curve with neat sketch. **[6]**

b) Differentiate between supervised and unsupervised image classification. **[6]**

c) Write down the need of digital image processing. **[6]**

OR

P.T.O.

Q4) a) Write a note on digital image and analog image. **[6]**

b) Define Triangular Irregular Network Model (TIN) and its applications. **[6]**

c) Discuss the steps in image processing system. **[6]**

Q5) a) Illustrate the advantages of data storage in GIS. **[6]**

b) Discuss the difference between drafting software's and GIS. **[6]**

c) What are the functionalities of GIS? **[5]**

OR

Q6) a) Write in detail about various components of GIS. **[6]**

b) Define Geographic Information System (GIS). What are the various sources from which data can be derived to be used for GIS? **[6]**

c) Discuss the concept of data transformation in GIS. **[5]**

Q7) a) Discuss differences between raster and vector data formats. What type of data is raster format best suited for? **[6]**

b) Explain the application of GIS in Demarcation of Dam Catchment. **[6]**

c) Illustrate the different projection systems and explain any one in detail. **[6]**

OR

Q8) a) Enumerate different Attribute Data models and explain any one of them. **[6]**

b) Explain in detail how to use remote sensing data in GIS. **[6]**

c) What is Georeferencing of GIS data? And explain its importance in the field of GIS? **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3756

[Total No. of Pages : 3

[6262]-14
T.E. (CIVIL)
Advanced Engineering Geology with Rock Mechanics
(2019 Pattern) (Semester - II) (301015 a) (Elective - II)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams should be drawn wherever necessary.***

Q1) a) Explain case studies of historical buildings constructed without consideration of geology and now facing serious problems. **[6]**

b) Write in detail on treatments given to fracture/fracture zone. **[6]**

c) Write a note on Compact basalt as construction material. **[6]**

OR

Q2) a) What are favorable conditions/characteristics of the rock for the purpose of construction material? **[6]**

b) What is R.I.S.? Explain R.I.S. with case study, in Deccan Trap area. **[6]**

c) Explain in detail the role of Geology in urban development and planning **[6]**

Q3) a) Define rock mechanics. Explain the importance of it in civil engineering. **[6]**

P.T.O.

b) Calculate RQD recovery and Core recovery from following table. **[6]**

Run in m	Piece No.	Length in cm	Nature of fracture
2-5 m	1	15	J
	2	11	J
	3	80	M
	4	45	M
	5	60	M
	6	12	J
	7	7	J
	8	6	J
	9	8	J
5 - 8 m	10	88	M
	11	65	M
	12	77	M

c) Calculate apparent resistivity values at different depth zones. **[6]**

Sr.No	R	A	apparent resistivity
1	1.45	1	?
2	1.21	2	?
3	1.75	3	?
4	1.40	4	?
5	1.22	5	?
6	1.10	10	?

OR

Q4) a) What is Electrical Resistivity method of Geophysical Exploration? Explain Wenner method. **[6]**

b) What is R.Q.D.? Is this system useful for Decan trap rocks? Explain **[6]**

c) Describe Q-system of classification of rock masses. **[6]**

Q5) a) Discuss the strength and water tightness characters of Amygdaloidal Basalt from dam foundation point of view. **[6]**

b) Discuss relationship between local Geology and location of Spillway in Deccan Trap. **[6]**

c) What are the reasons of tail channel erosion in Deccan Trap area? **[5]**

OR

Q6) a) Write case study illustrating the failure of major projects owing to negligence of geological studies. **[6]**

b) Write a note on suitability of amygdaloidal basalt for percolation tank. **[6]**

c) Explain treatment to be given to a dyke crossing dam alignment. **[5]**

Q7) a) Explain in detail engineering geological investigations for tunneling. **[6]**

b) Discuss with suitable examples suitability of compact basalts from tunneling point of view. **[6]**

c) Explain in brief safe bearing capacity during bridge construction. **[5]**

OR

Q8) a) Describe various unfavorable field characters of rocks during tunneling. **[6]**

b) Can we locate a pier of bridge partly on weathered rock and on dyke? **[6]**

c) Whether the tunnels are suitable through limestone and quartzite. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3757

[Total No. of Pages : 3

[6262]-15
T.E. (CIVIL)
Soft Computing Techniques
(2019 Pattern) (Semester - II) (301015 (b)) (Elective - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Your answers will be valued as a whole.***
3) ***Assume suitable data, if necessary.***

Q1) a) Discuss the following points with reference to FFBP Network: Data Division, Testing of network, Number of hidden neurons. **[9]**

b) Determine the functional value of the 3 × 2 × 1 neural network in forward pass with the following data. Inputs [6,6,8], First layer weights (input to hidden): [0.4 -0.5 0.6; -0.3 0.8 -0.7], First layer bias: [3 ; -3.7], Second layer weights (hidden layer to output layer): [0.35 0.55], Second layer bias: [2]. Use sigmoidal transfer function between the first layer and hidden layer and Linear function between the hidden layer and output layer **[9]**

OR

Q2) a) Justify the necessity of testing a neural network. Discuss any two performance functions **[9]**

b) Determine the functional value of the 3 × 2 × 1 neural network in forward pass with the following data. Inputs [6.6.8]. First layer weights (input to hidden): [0.4 –0.5 0.6; –0.3 0.8 -0.7], First layer bias: [3 ; -3.7]. Second layer weights (hidden layer to output layer): [0.35 0.55], Second layer bias: [2]. Use sigmoidal transfer function between the first layer and hidden layer and Linear function between the hidden layer and output layer **[9]**

P.T.O.

Q3) a) Distinguish between Recurrent networks and Radial basis function networks with suitable example for each **[8]**

b) Discuss working of self-organized feature maps with a suitable example.**[9]**

OR

Q4) a) Distinguish between Radial basis function networks and Generalized regression neural networks **[8]**

b) The power developed by a water turbine(P) depends upon the rotational speed N, Operating head(H), Gravitational acceleration(g), diameter(D) and breath (B) of the runner, density (ρ) and viscosity (μ) of water. Design a 3 layered neural network using the above parameters and give the following details: **[9]**

i) Input and output parameters

ii) Architecture with figure

iii) Size of weight and Bias matrix

iv) Activation function/s between the layers

v) Performance function/s

Q5) a) Discuss the Genetic operators in Genetic Algorithm in detail. **[9]**

b) Explain the basic working of Support vector Machine. What are hard margin and soft Margin SVMs? **[9]**

OR

Q6) a) Discuss in detail an application of Genetic Algorithm in Civil Engineering **[9]**

b) What is a kernel in SVM? Why do we use kernels in SVM? Discuss any one kernel in detail **[9]**

Q7) a) Discuss the working of Model Tree and Random Forest Regression **[8]**

b) 28-day Compressive strength of concrete (in MPa) depends on the quantity (in Kg/m^3) of Cement, Fine aggregate, coarse aggregate and water. Design a model using Random Forest, using the above parameters and give the following details: **[9]**

i) Input and output parameters

ii) No. of trees

iii) Data Division

iv) Out of bag estimates

v) Performance function/s

OR

Q8) a) Discuss the need of Out of Bag estimates in Random Forest. Explain Bagging in Random Forest **[8]**

b) The power developed by a water turbine(P) depends upon the rotational speed N, Operating head (H). Gravitational acceleration (g), diameter (D) and breath (B) of the runner, density (ρ) and viscosity (μ) of water. Design a Model using Model Tree using the above parameters and give the following details: **[9]**

i) Input and output parameters

ii) No. of rules

iii) Splitting criteria

iv) Standardization of data

v) Performance function/s

Total No. of Questions : 8]

SEAT No. :

PB-4481

[Total No. of Pages : 2

[6262]-16R
T.E. (Civil)
ADVANCED SURVEYING
(2019 Pattern) (Semester - II) (Elective - II) (301015 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) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the Cartesian, local and projected coordinates for earth resources mapping. **[6]**

b) Explain the elements of spherical trigonometry. **[4]**

c) Explain the analytical method of determining the position of boat in hydrographic surveying. **[8]**

OR

Q2) a) Define spherical triangle and explain its properties. **[6]**

b) Write a Short note on **[6]**

i) MSL determination by GPS,

ii) Sounding by GPS.

c) The following observations were made on three points A, B and C from a boat at O with the help of sextant. Station B and O being on same side of AC. Calculate the distances of the boat from the three stations. The angles AOB and BOC were found to be 30°25' and 45°25' respectively. The angle ABC measured 130°10'. AB = 4000m, BC = 4995 m. **[6]**

Q3) a) Define vertical photograph, tilted photograph and oblique photograph. **[6]**

b) Define ground control points, explain their role in Photogrammetry. **[4]**

c) The scale of aerial photograph is 1 : 10000, effective at an average elevation of terrain of 500 m. The size of aerial photograph is 230mm × 230mm. Focal length of camera lens is 20 cm. Speed of aircraft is 180 kmph, longitudinal overlap is 60% and side overlap is 30%. Determine the number of photographs required to cover an area of 30 km × 22.5 km. Also determine exposure interval and flying height. **[7]**

P.T.O.

OR

Q4) a) Explain in detail flight planning with neat sketch. **[6]**

b) Write a short note on digital photogrammetry. **[4]**

c) A pair of photograph is taken with a camera having focal length 15 cm. The scale of photography is 1 : 10000 and photo base is 5.65 cm. The measured parallax of a vertical control point having an elevation 140 in is 87.28 mm. Compute the elevation of another point P whose measured parallax is 84.18 mm. **[7]**

Q5) a) Explain the components of ideal remote sensing system. **[6]**

b) Differentiate between LIDAR and GPR. **[6]**

c) Write a note on raster and vector model in GIS. **[6]**

OR

Q6) a) What is raster and vector data? How do you analyze the satellite image for civil engineering projects, draw sketches to support your answer? **[6]**

b) Explain Remote sensing applications in disaster management with suitable example. **[6]**

c) What is GIS? Explain the components of GIS. **[6]**

Q7) a) Explain the segments of GPS. **[6]**

b) Explain the basic principle of GPS and its applications in Civil Engineering. **[5]**

c) Differentiate between absolute positioning and relative positioning. **[6]**

OR

Q8) a) Explain the working principle of GPS. What are the differences between hand held GPS and differential GPS. **[8]**

b) Write a note on segments of GPS. **[4]**

c) Explain in detail the applications of GPS in watershed management analysis. **[5]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3759

[Total No. of Pages : 2

[6262]-17
T.E. (Civil)
Advanced Geotechnical Engineering (Theory)
(2019 Pattern) (Semester - II) (301015 (d)) (Elective - II)

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 suitaable data if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain the principle of the direct shear test. What are the advantages of this test? What are its limitations? **[6]**

b) Explain coulomb's law for shearing strength of soils and its modification by Terzaghi. **[6]**

c) In a triaxial shear test conducted on a soil sample having a cohesion of 12 kN/m^2 and angle of shearing resistance of 36°, the cell pressure was 200 kN/m^2. Determine the value of the deviator stress at failure. **[6]**

OR

Q2) a) What are the three standard triaxial shear tests with respect to drainage conditions? Explain with reasons the situations for which each test is to be preferred. **[6]**

b) Explain the following: **[6]**

i) Differentiate between a box shear test and a triaxial shear test for soils.

ii) Differentiate between shear strength parameters obtained from total and effective stress considerations.

c) What is effect of pore pressure in strength of soil? **[6]**

P.T.O.

Q3) a) Draw and explain the stress path (t-s.s') for stress produced below foundation due to undrained loading. **[6]**

b) Undrained triaxial compression test results are given below. Plot the stress path in $\sigma_a - \sigma_r$ **[6]**

σ_1 (kPa)	σ_3 (kPa)	u (kPa)
400	400	200
450		265
480		300
496		324
498		432

c) State and explain the variants of cambridge plot. **[5]**

OR

Q4) a) Differentiate between UU test, CU test and CD test. **[6]**

b) Write a short note on pore pressure parameters. **[6]**

c) State and explain the variants of MIT plot. **[5]**

Q5) a) What are the objectives of soil Stabilization. **[9]**

b) Explain the soil bitumen stabilization. **[9]**

OR

Q6) a) Explain cement stabilization of soil. **[9]**

b) Explain classification of stabilizing agents and stabilization processes. **[9]**

Q7) a) Write a short note on **[9]**

i) Sand Drains

ii) Compaction piles

b) Write a short note on In-situ ground improvement by compaction piles. **[8]**

OR

Q8) a) Explain Deep mixing method of ground improvement. **[9]**

b) Explain vibroflotation process in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3760

[Total No. of Pages : 2

[6262]-18

T.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

(2019 Pattern) (Semester - II) (301015E) (Elective-II)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain: **[9]**
i) Development Plan
ii) Satellite town

b) Enlist Principles of neighborhood planning. Explain any two. **[9]**

OR

Q2) a) Explain various levels of town-planning with their importance. **[9]**

b) Explain MRTP Act, 1966 in your own words. **[9]**

Q3) a) Elaborate the importance of different civic surveys for DP proposal. **[9]**

b) Explain the functioning of MMRDA. **[8]**

OR

Q4) a) Explain the hierarchy of any two urban roads with examples. **[8]**

b) Explain the organization of MHADA and its role in housing sector. **[9]**

Q5) a) Explain importance of MahaRERA along with its key components. **[9]**

b) Enlist and elaborate three aspects each for URDPFI and AMRUT guidelines. **[9]**

OR

P.T.O.

Q6) a) Explain RERA registration in detail. **[9]**

b) What is meant by AMRUT guidelines? What is its importance? **[9]**

Q7) a) Explain GPS and its applications. **[8]**

b) Write a detailed note on "Special townships". **[9]**

OR

Q8) a) Write a short note on CRZ and its importance in development. **[8]**

b) What do you understand by rural planning & enlist the strategies for the same. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3761

[Total No. of Pages : 2

[6262]-19

T.E. (Civil Engg.)

SOLID WASTE MANAGEMENT

(2019 Pattern) (Semester - II) (301015f) (Elective - II)

Time : 2½ 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) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of scientific calculator is allowed.***

Q1) a) Suggest and justify the criteria adopted for the execution of vermicomposting. **[6]**

b) Explain the mechanical volume reduction method of processing technique. **[6]**

c) State the terms related to Solid waste management **[6]**

i) Segregation

ii) Recovery

iii) Recycling

iv) Reuse

OR

Q2) a) What is the importance of 3R principle in solid waste management? **[6]**

b) Specify the role of transfer stations in municipal solid waste management. **[6]**

c) Explain the integrated waste management. **[6]**

Q3) a) What are the factors affecting anaerobic digestion? **[6]**

b) Write the environmental impacts of waste to energy system. **[6]**

c) Suggest the relevant situations for the disposal of solid waste through incineration. **[5]**

OR

P.T.O.

Q4) a) Describe the incineration technologies and air emissions and its control in detail. Explain the following: **[6]**

i) Pyrolysis

ii) Refuse-derived fuel

iii) Bio gasification

b) How to estimate of low and high heating value of any material. **[6]**

c) Write working principle, advantages and disadvantages of anaerobic digestion process. **[5]**

Q5) a) Explain area method of landfilling and state the factors to be considered for site selection. **[6]**

b) Write methods of slope stability analysis. **[6]**

c) Describe the factors that affect the production of leachate and landfill gas in the landfill. **[6]**

OR

Q6) a) Write short notes on legal aspects of solid waste disposal. **[6]**

b) Enlist methods of Biomining and explain any one method of it. **[6]**

c) Identify the adverse effects of a landfill leachate and list appropriate control measures. **[6]**

Q7) a) Suggest the appropriate method for disposal of industrial solid waste and need of its recycling. **[6]**

b) List the sources of generation of biomedical waste. **[6]**

c) Suggest various management technologies for biomedical waste. **[5]**

OR

Q8) a) Discuss the current scenario of recycling of E- waste in India. **[6]**

b) Explain any one case study of processing and reuse of construction & demolition waste. **[6]**

c) Write short note on to life cycle assessment (LCA) in solid waste management. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3762

[Total No. of Pages : 3

[6262]-20
T.E.(Chemical Engg.)
MASS TRANSFER - I
(2019 Pattern)(Semester -I)(309341)

Time : 2½ 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.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 Gas Absorption? Explain equilibrium in gas absorption? **[8]**

b) An ammoina air mixture containing 2% by volume ammonia is to be scrubbed with water at 20 ^{o}C in a tower packed with 1.27cm rasching rings. The water and gas rates are 1170 Kg/hr m^2 each, based on empty tower cross section. Estimate the height of the tower required if 98% of the ammonia in the entering gas is to be absorbed. The tower operates at 1 atm.pressure. The equilibrium relationship is given by the following equation Ye = 0.746X.

Where,Ye = Mole fraction of ammonia in air.

X = Mole fraction of ammonia in solution with water.

The height of transfer unit may be taken as equal to 2 meter. **[9]**

OR

Q2) a) A packed tower is designed to recover 98% CO_2 from a gas mixture containing 10%CO_2 & 90% air using water The equilibrium relation is given as Y= 14X.

Where Y=KgCO_2/Kg dry air & X= Kg CO_2/Kg water. The water to gas rate is kept 30% more than the minimum value. Calculate the height of tower if (HTU) OG=1m. **[9]**

b) Explain Choice of Solvent for Absorption? **[8]**

Q3) a) Define following terms **[8]**

i) Absolute Humidity
ii) Saturation Humidity
iii) Percentage Humidity
iv) Humid Heat

P.T.O.

b) The air in a room is at 26.7^{0}C & a pressure of 101.325KPa & contains water vapor with a partial pressure 2.76KPa. Calculate **[9]**

i) Humidity
ii) Saturation Humidity
iii) Percentage Humidity
iv) Percentage Relative Humidity
v) Relative Humidity
vi) Humid Heat
vii) Humid Volume.

Data: Vapour pressure of water at 26.7^{0}C is 3.5 KPa

OR

Q4) a) Explain the Vapour pressure of water & physical states and also Psychometric Chart? **[8]**

b) A gas (B) - Benzene (A) mixture is saturated at 1 std.atm 50^{0}C. Calculate the absolute humidity if B is **[9]**

i) Nitrogen
ii) Carbon dioxide and
iii) Oxygen

(Data: PA=0.362 std-atm)

Q5) a) What are the different types of agitators used in mechanically agitated vessels? Explain? **[9]**

b) What are the different types of Column? Explain in detail? **[9]**

OR

Q6) a) Explain Wetted well column & its application? **[9]**

b) What is Tray efficiency? Explain types of Tray efficiencies? **[9]**

Q7) a) Explain experimental determination of Rate of drying curve? **[8]**

b) A porous dry solid was dried under constant drying conditions in a batch dryer, It took 5 hrs. to reduce the moisture from 30% to 10%. All the moisture content on dry basis. how long will it take to dry a sample of the above solid from 36% to 6% under the same drying conditions? **[10]**

OR

Q8) a) What is the time required for Drying? Derive the equation to calculate time required in constant rate period. **[6]**

b) A batch of solid for which the following table of data applies is to be dried from 25% to 6% (wet basis) moisture under conditions identical to those for which the data were tabulated. The initial weight of the wet solid is 300 kg & the drying surface is 1 m^2/8 kg dry weight. **[12]**
Determine the time for drying?

X Kgmoisture/ Kg dry solid	0.35	0.25	0.2	0.18	0.16	0.14	0.12	0.10	0.09	0.08	0.064
R Kgmoisture/ hr.m^2	0.3	0.3	0.3	0.266	0.239	0.208	0.18	0.15	0.097	0.07	0.025

Total No. of Questions : 8]

SEAT No. :

PB3763

[Total No. of Pages :2

[6262]-21
T.E. (Chemical Engineering)
CHEMICAL TECHNOLOGY - II
(2019 Pattern) (Semester-I) (309342)

Time : 2½ 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 diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) a) Explain production of coke by coke oven co-product method. Give its major engineering problems. **[9]**

b) Describe the production of steel with neat diagram. **[9]**

OR

Q2) a) Describe the process of manufacturing of Portland cement. Write the metal oxides composition necessary in the portland cement. **[9]**

b) Describe carbonization of coal and the effect of temperature on the products obtained? **[9]**

Q3) a) Explain the preparation of paint with a typical formulation, mention the function of each ingredient. **[9]**

b) Describe the major engineering problems for the production of water gas and producer gas. **[8]**

OR

Q4) a) Explain steps in paint manufacturing and factors affecting the viscosity of paints. **[9]**

b) Give the classification of dyes based on various parameters. **[8]**

P.T.O.

Q5) a) Discuss different types of agrochemicals with their applications. **[9]**

b) Explain manufacturing of pencillin with major engineering problems. **[9]**

OR

Q6) a) Describe in detail about plant growth regulators and yield stimulators. **[9]**

b) Enlist Antibiotics with their properties and applications. **[9]**

Q7) a) Explain production of cumene by propylene alkylation of benzene. **[9]**

b) Explain the manufacturing of Formaldehyde. **[8]**

OR

Q8) a) Describe production of styrene with its engineering problems. **[9]**

b) Explain production of Phthalic Anhydride with neat process flow diagram. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3764

[Total No. of Pages : 2

[6262]-22
T.E. CHEMICAL
Chemical Engineering Mathematics
(2019 Pattern) (Semester - I) (309343)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3or 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.***

Q1) a) Evaluate $\int_{-1}^{1} e^x dx$ by Simpson's 1/3 rule. **[5]**

b) Evaluate $\int_{1}^{2} (x^3+1)dx$ by Simpson's 3/8 rule. **[6]**

c) Evaluate the integral $I = \int_{a}^{b} (x^3+1)dx$ by the interval (1,2). **[6]**

OR

Q2) a) Evaluate $\int_{0}^{\pi/2} \sqrt{\sin x}\, dx$ by Simpson's 1/3 rule. **[5]**

b) Evaluate $\int_{0}^{\pi/2} \sqrt{\sin x}\, dx$ by Simpson's 3/8 rule. **[6]**

c) Evaluate the integral $I = \int_{a}^{b} (x^3+1)dx$ by the interval (1,1.5). **[6]**

Q3) a) Solve the equation by using Taylor series method $y' = x^2 + y^2$ for x = 0.25 and x = 0.5 given y(0) = 1. **[8]**

b) Solve y'=l-y, y(0)=0 by modified Euler's method and obtain y at x = 0.l,0.2,0.3. **[10]**

OR

P.T.O.

Q4) Solve the equation by using Runge Kutta second order midpoint method and Ralston's method to numerically integrate equation $f(x,y) = -2x^3 + 12x^2 - 20x + 8.5$ from x=0 to x=4 using a step size of 0.5. Initial condition at x=0 is y=1. **[18]**

Q5) Solve numerically the wave equation **[17]**

$f_u(x,t) = 4 f_{xx}(x,t) \quad 0 \le x \le 5$

with the boundary conditions

$f(0,t) = 0$ and $f(5,t) = 0$

and initial values $f(x, 0) = f(x) = x(5 - x)$

$f_1(x, 0) = g(x) = 0$ Consider h = l.

OR

Q6) a) Consider a steel plate of size 5 cm * 15 cm. If two of the sides are held at 100°C and the other two sides are held at 0°C, what are the steady state temperature at interior points assuming a grid size of 5 cm * 5 cm. **[10]**

b) Solve the Poisson equation $g(x, y) = 2x^2 y^2$ over the square domain $0 \le x \le 3$ and $0 \le y \le 3$ with f = 0 on the boundary and h = 1. **[7]**

Q7) a) What is Simplex method? Explain the method in detail. **[10]**

b) What are the six steps of optimization? Enlist and Explain. **[8]**

OR

Q8) Maximize $Z = x_1 + 3x_2$ **[18]**

Subject to $x_1 + 2x_2 \le 10$

$0 \le x_1 \le 5,$

$0 \le x_2 \le 4$

Total No. of Questions : 8]

SEAT No. :

PB-3765

[Total No. of Pages : 3

[6262]-23

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING THERMODYNAMICS

(2019 Pattern) (Semester - I) (309344)

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) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the following terms with relevant equations : **[9]**

i) Duhem's theorem

ii) Gibb's phase rule

iii) Due point and Bubble point curves

b) What is degree of freedom in thermodynamics? Determine the degree of freedom for the following vapor liquid equilibrium system with three species A, B, and C. **[9]**

i) A, B, and C are present in both gas and one single liquid phase.

ii) A, B, and C are present in gas phase but only A and B are present in the single liquid phase.

OR

Q2) a) Explain the following terms with relevant equations : **[9]**

i) Raoult's law

ii) Henry's law

iii) Modified Raoult's law

b) Explain phase rule for non- reacting systems with suitable examples. **[9]**

P.T.O.

Q3) a) Explain liquid - liquid equilibrium diagram on triangular co-ordinates for a system in which two pairs are partially soluble. **[9]**

b) The azeotrope of the ethanol benzene system has a composition of 44.8% ethanol with a boiling point of 341.4 K at 101.3 KPa. At this temperature the vapor pressure of ethanol is 68.9 KPa and the vapor pressure of Benzene is 67.4 KPa. What are the activity coefficients in a solution containing 10% alcohol? **[8]**

OR

Q4) a) Explain in detail, high boiling and low boiling azeotropes. Discuss the effect of Temperature for pressure on Azeotropic composition. **[9]**

b) List the different methods to check the consistency of VLE data. Explain Any one method in detail. **[8]**

Q5) a) A gas mixture containing 2 moles nitrogen, 7 moles hydrogen and 1 mole ammonia initially, is undergoing the following reaction : **[9]**

$$N_2 + 3H_2 \leftarrow\rightarrow 2NH_3$$

Derive expressions for the mole fractions of various components in the reaction mixture in terms of the extent of reaction.

b) For a closed system in which a chemical reaction represented by the following general equation is allowed to reach a state of equilibrium at a given temperature and pressure. **[9]**

$$aA + bB \leftarrow\rightarrow lL + mM$$

Prove that :

$$\sum \mu_i \nu_i = 0$$

Where μ_i is chemical potential for species *i* and

ν_i is a stoichiometric coefficient for species *i* in the reaction mixture

OR

Q6) a) Consider a vessel that initially contains only n_0 mol of water vapor. If decomposition occurs according to the reaction **[9]**

$$H_2O \rightarrow H_2 + ½\ O_2$$

find expressions that relate the number of moles and the mole fraction of each chemical species to the reaction coordinate ε.

b) What is the effect of temperature on reaction equilibrium constant? Derive the following expression: **[9]**

$$\boxed{\frac{d \ln K}{dT} = \frac{\Delta H^\circ}{RT^2}}$$

Q7) a) The standard heat of formation and standard free energy of formation of ammonia at 298 K are – 46,100 J/mol and -16,500 J/mol respectively. Calculate the equilibrium constant for the reaction. **[9]**

b) Explain the working of Fuel Cell with detailed schematic. **[8]**

OR

Q8) a) Show that the equilibrium constant in the decomposition of calcium carbonate into CO_2 and lime is equal to the partial pressure of CO_2. Explain how would you estimate the decomposition pressure? What would happen if the CO_2 pressure is reduced below this value? **[9]**

b) Derive the relationship between mole fraction of species in multiple reactions and the extent of reactions. **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB3766

[Total No. of Pages : 2

[6262]-24
T.E. (Chemical)
CHEMICAL INDUSTRY MANAGEMENT
(2019 Pattern) (Semester-I) (309345 A) (Elective - I)

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 and Q.7 or Q.8.***
2) ***Neat diagrams 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 the industrial purchasing process with quotation comparative statement. **[9]**

b) Explain Economic Ordering Quantity (EOQ). Derive $Q = \sqrt{(\frac{2PD}{HC})}$

where, Q = Economic Ordering Quantity, C = Unit cost of Production, D =Annual Production, P = Set up cost for quantity Q, H = Inventory carrying cost/ handling cost. **[8]**

OR

Q2) Explain the following (any three) **[17]**

a) LIFO

b) FIFO

c) Inventory Control

d) Principles of lending

Q3) a) Explain in detail Marketing Mix. **[8]**

b) Write an explanatory note on advertising. **[10]**

OR

Q4) a) Explain in any two pricing strategies in detail with suitable example. **[10]**

b) Explain in detail sales promotion. **[8]**

P.T.O.

Q5) a) Write a explanatory note on Patent and patent rights. **[10]**

b) Explain in detail business cycle with different phases of business cycle. **[8]**

OR

Q6) a) Describe the Total Quality Management (TQM). **[10]**

b) Explain ISO along with it's types. **[8]**

Q7) a) Explain FERA in detail. **[9]**

b) Define work measurement. Explain the objectives and procedures of work measurement. **[8]**

OR

Q8) a) Write a brief note on concept of Monopolies and Restrictive Trade Practices (MRTP) Act. **[9]**

b) Write a note on Patent Act, 1970. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3767

[Total No. of Pages : 2

[6262]-25
T.E. (Chemical Engineering)
FOOD TECHNOLOGY
(2019 Pattern) (Semester-I) (Elective - I) (309345 B)

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) ***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 table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Write short notes on preservation of fruits and vegetables by **[16]**

a) Chemicals

b) Salt

OR

Q2) a) Discuss about various types of storage of fruits and vegetables. **[8]**

b) Write short note on Fruit and Vegetable juices. **[8]**

Q3) a) Explain theory of size reduction equipment's and effect of size reduction on foods. **[9]**

b) Explain applications and effect on food materials for freezing. **[9]**

OR

Q4) Write Short Notes on. **[18]**

a) Evaporation extrusion theory and equipment's.

b) Baking theory and equipment's.

Q5) Write short notes on food packaing techniques in: **[18]**

a) Plywood and wire bound boxes.

b) Corrugated and fibre board boxes.

OR

P.T.O.

Q6) Describe following techniques of foodstuff. **[18]**

a) Packaging methods for prevention of food stuff.

b) Shelf life of packaged foodstuff.

Q7) a) Explain quality assessment of food materials in fruits and vegetables. **[9]**

b) Explain concept of USFDA and ISO 9000 in food quality assurance. **[9]**

OR

Q8) a) Write short note on Food regulations, grades, and standards. **[9]**

b) Explain food adulteration and food safety, basis, trends and composition of India's foreign trade. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3768

[Total No. of Pages : 2

[6262]-26
T.E. (Chemical Engineering)
POLYMER ENGINEERING
(2019 Pattern) (Semester-I) (309345 C) (Elective -I)

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 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) Write a detailed note on the below. **[17]**

a) M_n

b) M_w

c) M_v

OR

Q2) Explain in detail with proper examples the effect of molecular weight on engineering properties of the polymers. **[17]**

Q3) What do you mean by Copolymers? Explain in detail the kinetics of Coordination polymerization. **[18]**

OR

Q4) With a proper example, explain in detail the kinetics of free radical polymerization. **[18]**

Q5) Explain the need of the additives during the polymer processing. Give the various examples and the need of them. **[17]**

OR

Q6) What are the different Plasticizers and UV stabilizers used in the polymer industries? Explain in detail their uses and the needs. **[17]**

P.T.O.

Q7) With a neat and labelled diagram and reactions, explain the production of Polyethylene in detail. **[18]**

Q8) With a neat and labelled diagram and reactions, explain the production of Polyester in detail. **[18]**

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Total No. of Questions : 8]

SEAT No. :

PB3769

[Total No. of Pages : 2

[6262]-27
T.E. (Chemical Engineering)
DOWNSTREAM PROCESSING
(2019 Pattern) (Semester- I) (Elective - I) (309345 D)

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 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain cryogenic distillation. **[9]**

b) Explain desulfurization of coal industry. **[9]**

OR

Q2) a) Explain gas recovery system in industry. **[9]**

b) Give the details of the petrochemical off gases. **[9]**

Q3) Write short notes on: **[18]**

a) Azeotropic distillation

b) Pressure swing distillation

OR

Q4) Write short notes on: **[18]**

a) Extractive distillation.

b) Column sequences.

Q5) Write short notes on: **[18]**

a) Molecular sieves.

b) Hydrogel process.

OR

Q6) Write short notes on: **[18]**

a) Catalytic properties of molecular sieves.

b) Zeolites.

P.T.O.

Q7) a) Explain separation process synthesis for non azeotropic mixtures. **[8]**

b) Give the details of physical and chemical properties of ion exchange resins. **[8]**

OR

Q8) a) Explain selectivity and applications of ion exchange. **[8]**

b) Explain non-ideal liquid mixtures separations. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PB3770

[Total No. of Pages : 2

[6262]-28

T.E. (Chemical)

CHEMICAL REACTION ENGINEERING - I

(2019 Pattern) (Semester - II) (309348)

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 whenever necessary***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Derive performance equation for Mixed Flow Reactor. **[9]**

b) Derive performance equation for Batch Reactor. **[9]**

OR

Q2) a) Homogeneous liquid phase reaction takes place in mixed flow reactor with 50% conversion. The original reactor is replaced by another mixed flow reactor having volume of 10 times that of original reactor, all else remain unchanged, Obtain the conversion in the new reactor. **[6]**

b) With help of suitable example explain auto-catalytic reactions. **[6]**

c) Write a short note on reactors of different types in a series. **[6]**

Q3) a) Explain the series, parallel and independent reactions. Provide appropriate examples. **[12]**

b) Derive the relationship for C_{Rf} in terms of ψ for Continuously Stirred Tank Reactor in case of parallel reactions. **[5]**

OR

Q4) In CSTR, reactant A produces product R and S by parallel reaction, rate of formation of R = 0.6 C_A^2 and rate of formation of S = 2 C_A. A feed with C_{A0} = 40 mol/m^3 enters a CSTR and mixture of A, R and S leaves the reactor. Find C_R, C_S and τ for 80% conversion in CSTR. **[17]**

P.T.O.

Q5) a) The pyrolysis of ethane proceeds with an activation energy of about 300 kJ/mol. How much faster is the decomposition at 650°C compared to 450°C? **[8]**

b) Explain effect of temperature on heat of reaction with detailed explanation. **[10]**

OR

Q6) a) Discuss the Van't Hoff isotherm equation. **[6]**

b) Explain non-adiabatic operation in detail. **[12]**

Q7) Plot C(t) and E(t) curves as functions of time based on following tracer output concentration data. **[17]**

Time *t* (min)	0	2	5	10	15	20	25	30	40
Output Conc. (gm/lit fluid)	0	3	5	15	27	14	8	4	0.5

Determine the fraction of material leaving the reactor that has spent between 12 to 23 minutes in the reactor. Also determine fraction of material spending more than 35 minutes in the reactor.

OR

Q8) Write notes on (any four): **[17]**

a) Non ideality in Reactor operation

b) Segregated flow model

c) C and E Curve

d) Dispersion Model

e) Micro and Macro Mixing of fluids

Total No. of Questions : 8]

SEAT No. : ____

PB3771

[Total No. of Pages : 3

[6262]-29

T.E. (Chemical Engineering)

MASS TRANSFER - II

(2019 Pattern) (Semester - II) (309349)

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) Carbon Disulphide is used to extract iodine from its saturated solution in water in a single stage extraction. The distribution coefficient is given by K = Y/X = 588.2, where Y is gm of Iodine/1lit. of CS_2 and X is gm of Iodine/1lit. of water. Calculate the concentration of Iodine in the aqueous phase if 1 litre of saturated aqueous solution containing 0.3 gm of Iodine/litre of water at 293K and contacted with 50ml of CS_2 by stirring. **[8]**

b) Differentiate between the Solvent Extraction and Distillation for separation of liquid mixtures. **[5]**

c) Discuss on the minimum solvent requirement for counter-current Solvent Extraction in case of immiscible solvents. **[5]**

OR

Q2) a) Discuss on Binodal Solubility Curve with triangular diagram in solvent Extraction. **[5]**

b) Enlist and explain the selection criteria of solvent for Solvent Extraction. **[5]**

c) A solution containing 5% acetaldehyde and 95% Toluene is to be extracted with water in five stage crosscurrent extraction to extract Acetaldehyde. Toluene and water are essentially immiscible. 25 kg of water is used per 100 kg of feed each time. Calculate the amount of Acetaldehyde extracted and the final concentration of the exit solution. **[8]**

The equilibrium is Y = 2.20 X

Where Y = kg of Acetaldehyde/kg of water

X = kg of nicotine/kg of Toluene

P.T.O.

Q3) a) Explain applications of leaching and the factors affecting the rate of leaching. **[7]**

b) Explain the construction and mechanism of Bollman (Basket) Extractor for leaching operation with neat diagram. **[10]**

OR

Q4) a) Oil is be extracted from meal by means of benzene using continuous counter-current leaching unit. The unit treats 1000 kg of meal (on completely exhausted solids basis) per hour. The untreated meal contains 365 kg of oil and 30 kg of benzene. The solvent used contains 14 kg of oil and 590 kg of benzene. The exhausted solids contain 55 kg of oil and 451 kg of benzene. Find the number of stages required. The entrainment data is:**[10]**

Kg of oil/kg of solution	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Kg of solution/kg of solid	0.5	0.505	0.515	0.53	0.55	0.517	0.595	0.62

b) Explain the graphical representation of equilibrium characteristics of Leaching operation for constant underflow and no solid in overflow with diagram and proper notations. **[7]**

Q5) a) Discuss on the principle, equilibria and rate of ion Exchange process in details. **[8]**

b) Describe the adsorption Isotherms in adsorption operation. Explain the Breakthrough Curve in detail giving its significance and mention the factors affecting the shape. **[10]**

OR

Q6) a) A solution of washed raw cane sugar is coloured by the presence of small amounts of impurities. The solution is to be decolourised by treatment with an adsorptive carbon in contact filtration plant. The original solution has a colour concentration of 9.6 measured on an arbitrary scale and it is desired to reduce the colour of 0.96. Calculate the necessary dosage of fresh carbon per 1000kg solution for two stage crosscurrent process. **[10]**

The data for an equilibrium isotherm is as follows

Kg carbon/kg solution	0	0.001	0.004	0.008	0.02	0.04
Equilibrium Colour	9.6	8.6	6.3	4.3	1.7	0.7

b) Explain Pressure Swing Adsorption and Temperature Swing Adsorption with their applications. **[8]**

Q7) a) Classify the crystallizers and give the significance of vacuum Crystallizer. **[8]**

b) Elaborate the Factors affecting the rate of crystallization and the Classification of Crystallizers based on applications. **[9]**

OR

Q8) a) A Solution contains 500 Kg Na_2SO_4 and 2500 kg of water. It is cooled from 333K to 283K in an agitated mild steel vessel. Weight of the vessel is 750 Kg. 2.0% water is lost by evaporation. Crystals of Na_2SO_4. 10 H_2O are formed. Calculate the yield of crystals and the heat to be removed? **[9]**

Data: Solubility At 285K : 8.9 Kg/100 Kg water.

Heat capacity of solution : 3.6 KJ/Kg K.

Heat Capacity of M.S : 0.5 KJ/KgK.

Heat of Solution : –78.5 MJ/KMo1.

Latent heat of Vaporization : 2395 KJ/Kg.

b) Define the terms in membrane processes; **[8]**

i) Rejection

ii) Permeability

iii) Membrane fouling

iv) Cake Resistance

Total No. of Questions : 8]

SEAT No. : ____

PB3772

[Total No. of Pages :2

[6262]-30

T.E. (Chemical Engineering)

TRANSPORT PHENOMENA

(2019 Pattern) (Semester- II) (309350)

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) What is rate of evaporation of chloropicrin into air at 298 K?

Total pressure = 770 mm Hg, diffusivity = 0.088 cm^2/sec, vapor pressure = 23.81 mm Hg, $Z_2–Z_1$ = 11.14 cm, density of chloropicrin = 1.65 g/cm^3, S = 2.29 cm^2. **[6]**

b) Derive the expression of molar flux, concentration profile and average concentration for diffusion through stagnant gas. **[11]**

OR

Q2) a) Derive the expression of molar flux, concentration profile and average concentration for diffusion with homogeneous chemical reaction. **[11]**

b) State the boundary conditions to solve mass transfer problems. **[6]**

Q3) a) Use Navier Stoke's equation of motion to derive Hagen Poiseuille equation. **[12]**

b) Give significance of different types of derivatives. **[6]**

OR

Q4) a) Derive Newton's second law of motion. **[12]**

b) Explain macroscopic energy balance equation. **[6]**

P.T.O.

Q5) a) Derive Burke Plummer equation for turbulent flow of fluid through packed bed. **[11]**

b) Explain macroscopic mass balance equation. **[6]**

OR

Q6) a) Show that for laminar flow of fluid through the tube f = 16/Re. **[6]**

b) Derive expression of fanning friction factor. **[11]**

Q7) a) Explain Martinnelli's analogy. **[9]**

b) A spherical water droplet, 0.05 cm in diameter is falling at velocity of 215 cm/sec through dry, still air at 1 atm pressure. Estimate instantaneous rate of evaporation from the drop if drop surface is at 21° C and air at 60°C. Vapor pressure of water at 21°C is 0.0247 atm. Assume pseudo steady state condition and $k_{xm} = 1.35 \times 10^{-3}$ mol $s^{-1}cm^{-2}$. **[9]**

OR

Q8) a) Explain in detail about Reynold's, Prandtl's and Chilton-colburn J-factor Analogy. **[9]**

b) Explain co-relation of binary mass transfer coefficient in one phase at low mass transfer rates. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3773

[Total No. of Pages : 2

[6262]-31

T.E. (Chemical Engineering)

ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES

(2019 Pattern) (Semester - II) (309351A) (Elective-II)

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) Which are the best practices those should be followed in Paper and Pulp industry for conversation of energy. **[17]**

OR

Q2) a) Explain Demand and supply of Energy. **[10]**

b) Write down motivation program for implementing conservation measures. **[7]**

Q3) a) Which are different function of Energy Manager? **[10]**

b) Write in details about waste heat utilization for energy conservation in process industries. Give suitable examples? **[8]**

OR

Q4) Which are different organization energy conservation programs? Explain Plant, division, corporate, level organization in details. **[18]**

Q5) a) How energy conservation can be achieved in boilers? **[8]**

b) Distinguish between Batch & continuous process in contest of energy saving. **[10]**

OR

Q6) Which are different safety guidelines for compressors, fans, heat pumps and cooling systems to save energy. **[18]**

P.T.O.

Q7) Explain waste minimization and its classification, housekeeping, process change, recycling, product modification, waste minimization methodology steps, benefits of waste minimization in Sugar industry. **[17]**

OR

Q8) a) Prepare a detailed study report for dairy industry. **[10]**

b) Explain the role of equipment manufacturer in the development and future prospects for a process industry. **[7]**

Total No. of Questions : 8]

SEAT No. :

PB-3774

[Total No. of Pages : 2

[6262]-32

T.E. (Chemical Engg.)

PROCESS INSTRUMENTATION AND CONTROL

(2019 Pattern) (Semester - II) (309351B) (Elective - II)

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 diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, suite rule, Mollier charts, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain classification of Pressure measuring instruments. **[8]**

b) Explain with diagram, construction and working LVDT as pressure measuring device. **[8]**

OR

Q2) a) Explain with diagram, construction and working of Diaphragms. **[8]**

b) What are different types of manometers? With neat sketch explain inclined leg manometer. **[8]**

Q3) a) Explain with diagram, construction, working and flow equation of orifice meter plate. **[10]**

b) Explain classification of flow measuring instruments. **[8]**

OR

Q4) a) Explain classification of level measuring instruments. **[8]**

b) Explain with diagram, construction and working of air purge level measurement method. **[10]**

P.T.O.

Q5) Describe with neat diagram the following techniques of composition analysis. **[18]**

a) Gas Chromatography

b) Mass Spectroscopy

OR

Q6) a) Write short notes on: **[10]**

i) pH meter

ii) HPLC

b) Explain principle with diagram, construction, working of liquid chromatography. **[8]**

Q7) a) Describe the heat exchanger automatic control system with block diagram. **[9]**

b) Explain modes of control action. **[9]**

OR

Q8) a) Derive the dynamic response equation of first order system for step change. **[9]**

b) State difference between first order and second order system. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3775

[Total No. of Pages : 2

[6262]-33

T.E. (Chemical Engg.)

CORROSION ENGINEERING

(2019 Pattern) (Semester - II) (309351C) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.l 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) a) Explain in Detail about uniform attack. **[5]**

b) Explain in Detail about fretting corrosion in Steel and its Remedial Measure. **[8]**

c) What is stress corrosion cracking? Explain in Detail. **[5]**

OR

Q2) a) What is intergranular Corrosion, Explain in Detail? **[5]**

b) Explain in Detail about dezincification. **[5]**

c) Discuss Remedial Measure for cavitation, erosion. **[8]**

Q3) a) Write a short note on. **[15]**

i) Mechanisms of Oxidation

ii) Corrosion of iron and steel

iii) High temperature oxidation

b) What is Corrosion? **[2]**

OR

Q4) a) Explain different theories of corrosion with suitable example. **[8]**

b) What is Pilling Bedworth ratio and explain the mechanism of Oxidation. **[9]**

P.T.O.

Q5) a) Explain in detail the role of Zink in Galvanizing. **[5]**

b) What is High temperature oxidation? Explain with Example **[6]**

c) Write a short note on Alloying **[6]**

OR

Q6) a) Explain the Modification required in Material to prevent Corrosion. **[10]**

b) Explain in Detail about reaction occurred in Corrosion, with Example. **[7]**

Q7) a) Explain Different types of Corrosion and Preventive Method for it. **[10]**

b) What is Coating? Explain with Example. **[8]**

OR

Q8) Write a short note on. **[18]**

a) Heat treatment

b) Anodic protection

c) Passivity

Total No. of Questions : 8]

SEAT No. :

PB-3776

[Total No. of Pages : 2

[6262]-34

T.E. (Chemical Engineering)

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

(2019 Pattern) (Semester - II) (309351D) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***AnswerQ.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.***

Q1) a) Define the following terms **[5]**

i) Learning Rate

ii) Loss function

b) Explain adaptive and learning system in detail. **[5]**

c) What are different components of expert system, schematically represent them while describing them in brief. **[8]**

OR

Q2) a) Write down benefits of expert systems and limitations of expert system. **[10]**

b) Explain the six-stage development of expert systems. **[8]**

Q3) a) What is deductive retrieval? **[7]**

b) List at least five advantages of using ANN models. **[5]**

c) Write down ten capabilities of expert systems. **[5]**

OR

Q4) a) What is second order logic in artificial intelligence? **[7]**

b) Write down four tools of expert system in detail. **[10]**

P.T.O.

Q5) a) What are factors that can cause ANN modelling difficulties? **[8]**

b) What is fuzzy logic and genetic algorithm? **[10]**

OR

Q6) a) Explain Goal Trees employed in Problem Decomposition. **[10]**

b) Explain rule-based systems. **[8]**

Q7) a) Explain rule-based expert systems. **[8]**

b) When to use and not to use expert system? **[5]**

c) Explain activation function in brief. **[4]**

OR

Q8) a) What are different steps involved in methodology of modeling and simulating of a continuous process using knowledge-based systems? **[10]**

b) What is unified framework for planning? **[7]**

Total No. of Questions : 8]

SEAT No. :

PB3777

[Total No. of Pages : 3

[6262]-35
T.E.(Computer Engineering/AIDS)
DATABASE MANAGEMENT SYSTEMS
(2019 Pattern) (Semester -I) (310241)

Time : 2½ 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.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 functional dependency? Explain its use in database design. **[9]**

Consider the following schema.

Student (RollNo, Branch_code, Marks_Obtained, Exam_Name, Total_Marks)

Identify the functional dependencies and check whether the given schema is in 3NF or not. If not justify and convert the schema into 3NF.

b) Explain following Codd's rules with suitable examples: **[8]**

i) Guaranteed Access Rule
ii) Comprehensive Data Sub-Language Rule
iii) Integrity Independence
iv) Systematic Treatment of NULL Values.

OR

Q2) a) What is the impact of insert, update & delete anomaly on overall design of database? How normalization is used to remove these anomalies? **[8]**

b) What is decomposition? Consider the relation F (FN, PN, C, D) with the following Functional Dependencies: **[9]**

FD1: FN, PN ->C
FD2: C ->D
FD3: D -> F

If F is decomposed in to F1 (FN,PN,C) and F2 (C,D). check decomposition is lossless or lossy?

P.T.O.

Q3) a) What is recoverable schedule? Why is recoverability of schedule desirable?Are there any circumstance under Which it could be desirable to allow non recoverable schedular? Explain your answer. **[9]**

b) State and explain the ACID properties. During its execution a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain the situations when each state transition occours. **[9]**

OR

Q4) a) What is R-timestamp (Q) and W-timestamp(Q). Explain the necessary condition used by time stamp ordering protocol to execute for a read/write operation. [9]

b) What is conflict serializability? Check following schedule is conflict serializable or not? Also, explain the concept of conflict equivalent schedule. **[9]**

T1	T2	T3	T4
R(X)			
R(Z)			
	W(X)		
		R(Y)	
		W(Y)	
			W(X)
			W(Y)
			W(Z)

R(X) denotes read operation on data item X by transaction Ti.
W(X) denotes read operation on data item X by transaction Ti.

Q5) a) List the different NOSQL data models. Explain document store NOSQL data model with example. **[8]**

b) Draw and explain architecture of Distributed database system. State the reasons for building distributed database systems. **[9]**

OR

Q6) a) Explain Structured, Semi-structured and Unstructured data types with examples. **[9]**

b) Describe the following operations with MongoDB syntax: **[8]**

i) Map-Reduce ii) Aggregation pipeline

Q7) a) What is the significance of XML databases? Explain with proper example when to use XML database. **[9]**

b) Explain how encoding and decoding of JSON object is done JAVA with example. **[9]**

OR

Q8) a) Write a short note on complex data types: **[9]**

i) Semi-structured data

ii) Features of semi-structured data models

b) What is Deductive Database. Explain its features and state its advantanges over traditional database. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3778

[Total No. of Pages :4

[6262]-36
T.E. (Computer Engineering)
THEORY OF COMPUTATION
(2019 Pattern) (Semester-I) (310242)

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 indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is context free Grammar? Define CFG. What are the capabilities of CFG? **[8]**

Give a context Free Grammar for the following language

$L = \{ w \in \{a, b\}^* \mid w \text{ is a palindrome of odd length} \}$.

b) i) What is Derivation in CFG?

ii) What is relation of parse tree for derivation in CFG?

iii) What is leftmost derivation and Rightmost derivation?

iv) Explain leftmost derivation and Rightmost derivation with parse tree. Derive the string a-b+c using leftmost derivation and Rightmost derivation for the CFG having production rule.

G = {S = S + S

S = S -S

S = a | b | c

} **[10]**

OR

P.T.O.

Q2) a) When do we say that CFG is in Greibach Normal Form (GNF)? Explain the steps to convert CFG to GNF for following Grammars **[12]**

G1 = {S → aAB | aB, A → aA | a, B → bB | b}

G2 = {S → aAB | aB, A → aA | ε, B → bB | ε}

G3 = {S → XB | AA

A → a | SA

B → b

X → a }

b) i) What is ambiguity in CFG? What is relation of parse tree for finding ambiguity in CFG.

ii) What is leftmost derivation and Rightmost derivation?

iii) Explain leftmost derivation and Rightmost derivation and ambiguity for the CFG having production rule.

G = { S = aSb | SS

S = ∈ }

[6]

Q3) a) What is pushdown automata? Define PDA pictorially and mathematically with respect to input tape, stack, finite control and Instanteous description.

Design a PDA for accepting a language $\{a^n b^{2n} | n>=1\}$ **[8]**

b) Construct a context free grammar which accepts N (A), where **[10]**

A = ({q0, q1}, {0, 1}, {Z0, Z}, δ ,q0, Z0, φ where δ is given by

δ (q0, 1, Z0) = {(q0, Z Z0)}

δ (q0, ε , Z0) = {(q0, ε)}

δ (q0, 1, Z) = {(q0, Z Z)}

δ (q0, 0, Z) = {(q1, Z)}

δ (q1, 1, Z) = {(q1, ε)}

δ (q1, 0, Z0) = {(q0, Z0)}

OR

Q4) a) Design a PDA for accepting a language $\{0^n1^m0^n \mid m, n>=1\}$. **[6]**

b) Draw a PDA for the CFG given below: **[6]**

$S \rightarrow aSb$

$S \rightarrow a \mid b \mid \varepsilon$

And simulate PDA to recognize "aaabb".

c) Design a push down automation to recognize the language generated by the following **[6]**

grammar :

$S \rightarrow S + S \mid S * S \mid 4 \mid 2$

Show the acceptance of the input string 2 + 2*4 by this PDA.

Q5) a) Elaborate the following terms with proper examples **[4]**

i) Universal Turing Machine (UTM)

ii) Recursively Enumerable Languages

b) Design a TM that multiplies two unary numbers over $\Sigma = \{1\}$. Write simulation for the string 11*111. **[7]**

c) Construct a TM for the language $L = \{0^n1^n2^n\}$ where $n \geq 1$. **[6]**

OR

Q6) a) Construct a TM for substraction of two unary numbers f(a-b) = c where a is always greater than b. **[5]**

b) What is undecidability? How do we prove universal language is undecidable? What is the relation between undecidability and reducibility theory. **[12]**

Q7) a) What do you mean by polynomial time reduction? Explain with an example of SAT. **[7]**

b) Explain the following terms with respect to computations complexity with example. **[10]**

i) Solvable Vs Unsolvable problem

ii) Decidable Vs. Undecidable problem

iii) P Vs NP problem

OR

Q8) a) Explain in brief the term "recursively enumerable". **[6]**

b) Explain examples of problems in NP. **[6]**

c) Differentiate between P class and NP class. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3779

[Total No. of Pages : 2

[6262]-37

T.E. (Computer Engineering)

SYSTEMS PROGRAMMING AND OPERATING SYSTEM

(2019 Pattern) (Semester - I) (310243)

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) Explain Differences between static link library and dynamic link library. **[8]**

b) What are the different types of Loaders ? Explain compile and Go loader in detail. **[9]**

OR

Q2) a) What is absolute loader? Explain design of absolute loader with suitable example and flowcharts. **[9]**

b) Explain Design of Direct linking loaders. **[8]**

Q3) a) Compare Compilers and Interpreters. **[8]**

b) What is YAAC? Explain working of YAAC with suitable diagram. **[9]**

OR

Q4) a) Define token, pattern, lexemes & lexical error. **[8]**

b) What is a compiler? Explain any two phases of compiler with suitable diagram. **[9]**

P.T.O.

Q5) a) Explain Preemptive and Non preemptive scheduling in detail. **[9]**

b) What is Operating System ?Explain various operating system services in detail. **[9]**

OR

Q6) a) What is Thread? Explain Thread Lifecycle in detail. **[9]**

b) Explain any two scheduling algorithm with suitable example. **[9]**

Q7) a) Explain Paging and segmentation with suitable example in detail. **[9]**

b) Explain following placement strategies: First Fit, Best Fit, Next Fit and Worst Fit. **[9]**

OR

Q8) a) Explain any two page replacement algorithms in detail. **[9]**

b) Define and Explain **[9]**

Virtual Memory

Translation Lookaside buffer

Thrashing

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

PB-3780

[6262]-38
T.E. (Computer Engineering)
COMPUTER NETWORK AND SECURITY
(2019 Pattern) (Semester - I) (310244)

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) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) Differentiate between Circuit Switching and Packet Switching **[6]**

b) Give short note on RIP. **[6]**

c) 192.168.5.71 / 26 for given address find out the **[6]**

i) Subnet mask?

ii) What is first ip address for given series?

iii) What is last ip address for given series?

OR

Q2) a) Draw and explain Header format of IPV6. **[6]**

b) Give short note on BGP. **[6]**

c) List and explain functions of Network Layer. **[6]**

Q3) a) Draw and explain TCP header format. **[6]**

b) List and explain transport layer services **[6]**

c) e2 a7 00 0D 00 20 74 9e 0e ff 00 00 00 01 00 00 00 using this UDP hexadecimal dump find out in decimal numbers **[6]**

i) Source port no

ii) Destination port no

iii) Total length of user datagrarn.

P.T.O

OR

Q4) a) Draw and explain UDP header format. **[6]**

b) What is socket? What are different types of socket? Explain socket functions used in connection oriented services with diagram. **[6]**

c) Explain SCTP protocol in detail. **[6]**

Q5) a) What is HTTP? Explain HTTP request and reply messages. **[9]**

b) Write short notes on SMTP and MIME. **[8]**

OR

Q6) a) What is DHCP? Explain DHCP working with client state diagram. **[9]**

b) Write short notes on POP3 and Webmail. **[8]**

Q7) a) Draw and explain ITU-T X.800 Security Architecture for OSI. **[6]**

b) Give short note on HTTPS. **[6]**

c) Give short note on IDS. **[5]**

OR

Q8) a) Differentiate between Symmetric and Asymmetric Key Cryptography. **[6]**

b) Explain SSL in detail. **[6]**

c) Give short note on Firewalls. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3781

[Total No. of Pages : 2

[6262]-39

T.E. (Computer Engineering)

INTERNET OF THINGS & EMBEDDED SYSTEMS

(2019 Pattern) (Semester-I) (310245 A) (Elective- I)

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 and Q.7 or Q.8.***
2) ***Draw neat & labelled diagrams if necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Discuss the various steps in IoT design methodology? **[6]**

b) Demonstrate the use of RFID with the help of suitable IoT application. **[6]**

c) Explain M2M communication in detail. **[5]**

OR

Q2) a) Describe device and component integration for IoT based home automation system. **[6]**

b) Demonstrate the working of push-pull communication model using diagram with suitable application. **[6]**

c) What are horizontal and vertical of IoT applications? **[5]**

Q3) a) What is 6LoWPAN? 6LoWPAN and EPC standardization. **[6]**

b) Explain SCADA protocol standardization. **[6]**

c) What is MQTT and explain in detail. **[6]**

OR

Q4) a) Explain LoRA based smart Irrigation system. **[6]**

b) Explain MODBUS protocol in detail. **[6]**

c) Examine that why ZigBee is popular than Wi-Fi and Bluetooth in IoT. **[6]**

P.T.O.

Q5) a) Define software define networking & Explain architecture of SDN. **[6]**

b) Write a short note on cloud standardization. **[6]**

c) Describe the IoT messaging mechanisms called WAMP (Auto Bahn for IoT). **[6]**

OR

Q6) a) Define Cloud of Things & What is cloud communication API? **[6]**

b) Explain the Python Web application framework Django. **[6]**

c) Explain the different cloud-based services offered by Amazon for IoT. **[6]**

Q7) a) Write a short note on Light weight cryptography. **[6]**

b) What is Activity Modelling of Threats? & Explain access control issue with respect to IoT security. **[6]**

c) What are the different vulnerabilities of IoT and how to handle? **[5]**

OR

Q8) a) Examine how threat model is useful in securing IoT applications. **[6]**

b) List out security requirements for IoT base systems. & Discuss some vulnerabilities in IoT. **[6]**

c) What are the challenges in designing the IoT application. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3782

[Total No. of Pages : 2

[6262]-40

T.E. (Computer)/(Artificial Intelligence and Data Science)
HUMAN COMPUTER INTERFACE
(2019 Pattern) (Semester- I) (310245 B) (Elective- I)

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 and 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) What is meant by design? Which are the important points needed to consider for designing? **[6]**

b) Explain what is mean by human error in detail. **[6]**

c) List out Eight golden rules. **[6]**

OR

Q2) a) Explain the process of design using suitable example. **[6]**

b) Discuss the Software Life cycle used in HCI system using appropriate example. **[6]**

c) Elaborate Graphical User Interface in Detail. **[6]**

Q3) a) Elaborate Evaluation framework using following point: **[6]**

i) Paradigms and Techniques

ii) DECIDE: a framework to Guide Evaluation

b) Elaborate usability assessment in the design process. **[6]**

c) Explain formative and summative evaluation. **[5]**

OR

Q4) a) Explain analytic methods and model-based analysis.Write short note on usability specification for evaluation. **[6]**

b) Elaborate GOMS model. **[6]**

c) Elaborate universal design principles in detail. **[5]**

Q5) a) explain vision-based Hand Gesture Recognition System using HCI paradigms. **[6]**

b) What is mean by paradigm? Explain in detail. **[6]**

c) What is mean by ubiquitous computing? Which are the applications of it? Explain with suitable example. **[6]**

OR

P.T.O.

Q6) a) Explain the following terms: **[6]**

i) Sensor-based interaction

ii) Context-aware interaction

iii) Data integrity and data immunity

b) Elaborate the term auditing versus editing using Nielson heuristic principles. **[6]**

c) Explain "Five stage framework" using suitable HCI system. **[6]**

Q7) a) Explain Norman's principles of Design in software. **[6]**

b) Elaborate designing for mobile and other devices in detail. **[6]**

c) Write short note on: **[5]**

i) Mobile form factors

ii) Handheld format apps

iii) Tablet format apps

iv) Mini-tablet format apps

v) Mobile Navigation

OR

Q8) a) What is the significance of "navigation and toolbars" in HCI? Explain. **[6]**

b) Discuss the drawers used in HCI system. Explain item-level drawers in detail. **[6]**

c) Describe the term "Inter-app Integration" in detail. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3783

[Total No. of Pages : 2

[6262]-41
T.E. (Computer Engineering)
DISTRIBUTED SYSTEMS
(2019 Pattern) (Semester-I) (310245 C) (Elective - I)

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) How Lamport's Logical Clocks and Vector Clocks differ in handling events and timestamps? **[6]**

b) Compare the Bully Algorithm and the Ring Algorithm for leader election in distributed systems. **[6]**

c) What are the challenges and potential pitfalls of implementing clock synchronization in a large - scale distributed system? **[6]**

OR

Q2) a) What is Lamport's Logical Clock? How do they work? **[6]**

b) How does the token-ring algorithm work in the context of mutual exclusion? **[6]**

c) Explain, How Gossip-Based Contribution can be applied for data aggregation? **[6]**

Q3) a) What is the fundamental purpose of names, identifiers, and addresses in distributed systems? **[5]**

b) What is the underlying principle of attributed-based naming? **[6]**

c) Analyze the architectural components and principles of distributed file systems. **[6]**

OR

Q4) a) Give differences between flat naming and structured naming in the context of distributed systems? **[5]**

b) Explain with an example where attribute-based naming would be effective in distributed systems. **[6]**

c) Compare and contrast the file service architectures of Suns Network File System and the Andrew File System. **[6]**

P.T.O.

Q5) a) Evaluate the strengths and weaknesses of various consistency protocols in maintaining data consistency. **[8]**

b) Describe the data-centric consistency model with respect to **[10]**

i) Objective of data-centric consistency models

ii) Fundamental concept behind consistent ordering of operations.

iii) Example of data-centric consistency model

iv) Key principles of Continuous Consistency

v) Advantages of Continuous Consistency

OR

Q6) a) Evaluate the performance and efficiency of replica management strategies in distributed environments. **[8]**

b) Describe the principles of client-centric consistency models, including **[10]**

i) Eventual Consistency

ii) Monotonic Reads

iii) Monotonic Writes

iv) Read Your Writes

v) Writes Follow Reads

Q7) a) What is the Paxos consensus algorithm? What is its primary purpose in distributed systems? **[6]**

b) Give the advantages of point-to-point communication in terms of data reliability in client-server interactions? **[5]**

c) Describe the key components and principles of distributed commit in reliable group communication. **[6]**

OR

Q8) a) What is atomic multicast in reliable group communication? Explain with an example. **[6]**

b) How does the RPC work in a distributed system to handle failures and ensure reliability? **[5]**

c) Describe the practical application of distributed commit in a distributed group communication system. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB3784

[Total No. of Pages : 2

[6262]-42
T.E. (Computer Engineering)
SOFTWARE PROJECT MANAGEMENT
(2019 Pattern) (Semester-I) (310245 D)(Elective-I)

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 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 critical path concept and its remedies. **[6]**

b) Which are the different tools to visualize progress of project for monitoring the project progress? **[6]**

c) How many activity relationships are used in software project management? Explain any two relationships in detail. **[6]**

OR

Q2) a) Explain critical and non-critical activities. **[6]**

b) What is meant by forward pass and backward pass? And Differentiate between those. **[6]**

c) Explain formulating a network model in detail with the neat diagram. **[6]**

Q3) a) Explain Basili and Weiss data collection methodology in detail. **[6]**

b) Apply Earned Value Analysis to suitable example and find out values of PV, AC, EV, SV, CV, SPI, CPI. **[6]**

c) Write short note on: **[5]**

i) Kanban Boards

ii) Project Calendars.

OR

Q4) a) Explain any two steps of Project Cost management. **[6]**

b) How to track the project effectively? **[6]**

c) Explain in detail change control process with neat diagram. **[5]**

P.T.O.

Q5) a) Differentiate between predictive versus Empirical management. **[6]**

b) Explain three stages of Agile project with suitable example. **[6]**

c) Enlist and describe best practices of project scheduling in an Agile environment. **[6]**

OR

Q6) a) Compare Non-Agile and Agile projects. And suggest how to choose the correct Approach. **[6]**

b) Explain scrum model with suitable example and analyze its effects when compared with traditional approach. **[6]**

c) Write roles and responsibilities in Agile project management. **[6]**

Q7) a) Explain the Oldham, Hackman job characteristic model with example. **[6]**

b) Explain influencing elements of organization behavior. **[6]**

c) Explain seven strategies for managing dispersed teams. **[5]**

OR

Q8) a) Write short note on Communication Plan. **[6]**

b) What is health and safety management in project management? **[6]**

c) What is Decision Making? Explain its types. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB4430

[6262]-43

[Total No. of Pages : 3

T.E. (Computer Engineering)

DATA SCIENCE AND BIG DATA ANALYTICS

(2019 Pattern) (Semester- II) (310251)

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.***
5) ***Use of Scientific Calculator is permitted.***

Q1) a) What is the data Preparation phase in Data Analytics Lifecycle. What is the Analytics Sandbox and ETLT process in this phase? **[8]**

b) List out different stakeholders of an analytics project. What they usually expect at the conclusion (key outputs) of a project? **[8]**

OR

Q2) a) List out the activities to be carried out in model planning and model building phase. What are different tools used for these phases? **[8]**

b) What is linear regression, and what are its primary objectives? What is the difference between simple linear regression and multiple linear regression? How do you evaluate the performance of linear regression?**[8]**

Q3) a) What is logistic regression, and how does it differ from linear regression? What is the sigmoid function, and what role does it play in logistic regression? **[9]**

b) Suppose you are given a dataset containing information about whether emails are spam or not spam, along with two features: the presence of the word "offer" (1 for present, 0 for absent) and the presence of the word "free" (1 for present, 0 for absent). You are tasked with classifying a new email with the following feature values: "offer"=1 and "free"=1.**[9]**

P.T.O.

Given the training dataset:

Email	Offer	Free	Spam
1	1	0	No
2	0	1	Yes
3	1	1	Yes
4	0	1	No
5	1	1	Yes

Calculate the probability that the new email is spam using Naive Bayes.

OR

Q4) a) How does the Apriori algorithm discover frequent itemsets in a dataset? What is the role of support and confidence in the context of association rule mining using the Apriori algoritm? **[9]**

b) Explain the process of building a decision tree? What are the criteria used for splitting nodes in a decision tree? **[9]**

Q5) a) Suppose you have the following dataset containing the coordinates of points in a 2-dimensional space: **[9]**

Point	X Coordinate	Y Coordinate
A	2	3
B	4	7
C	3	5
D	6	9
E	8	6
F	7	8

Perform K-means clustering on this dataset with K = 2. Assume the initial centroids to be (2,3) and (8,6). Compute the new centroids after each iteration until convergence, and assign points to their nearest centroids.

b) How do you handle noise and irrelevant information in text data during preprocessing? Explain the terms bag of words and TF IDF in text analytics. **[9]**

OR

Q6) a) Explain how hierarchical clustering can be used for visualizing hierarchical relationships in data with suitable example? What are some real-world applications of hierarchical clustering? **[9]**

b) What is the holdout method, and how does it work? Explain the difference between training set, validation set, and test set in the holdout method.**[9]**

Q7) a) What is a histogram? How is it used to visualize the distribution of data? How is it different from a density plot? **[9]**

b) What is the Hadoop ecosystem, and what are its primary components? What is MapReduce, and how does it fit into the Hadoop ecosystem?**[9]**

OR

Q8) a) What is a box plot? Explain the different components of a box plot? How do you interpret the median, quartiles, and whiskers in a box plot? What does the interquartile range (IQR) represent in a box plot? **[9]**

b) Explain the role of Apache Pig in data processing workflows on Hadoop? What is Apache Spark, and how does it complement Hadoop for big data processing? **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3785

[Total No. of Pages : 2

[6262]-44

T.E. (Computer Engineering)

WEB TECHNOLOGY

(2019 Pattern) (Semester - II) (310252)

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) ***Figures to the right side indicate full marks.***

Q1) a) Explain doGet() & dopost() methods of servet. Differentiate do Get Vs do Post (Min 04). **[9]**

b) What is XML DTDs? Explain with example. Differentiate XML DTDs Vs XML schema (Min.04). **[9]**

OR

Q2) a) Explain the senlet lifecycle. Explain session management using cookies and URL Rewriting. **[12]**

b) Write note on AJAX. **[6]**

Q3) a) Explain the JSP support for MVC paradigm. **[8]**

b) Explain struts framework with respect to architecture, actions, interceptors & exception handling. **[9]**

OR

Q4) a) Explain JSP lifecycle. Differentiate JSP Vs Servlet. (Min.04). **[9]**

b) Explain the concept of web services. Explain in brief WSDL & SOAP. **[8]**

Q5) a) Explain various types of Arrays in PHP. Explain each with example code. **[9]**

b) Explain the following :

i) WAP & WML **[4]**

ii) C# Vs Java **[5]**

OR

P.T.O.

Q6) a) Explain the PHP with MySQL using example. **[6]**

b) Write note on : **[12]**

i) Session tracking in PHP.

ii) NET framework

iii) NodeJS

Q7) a) Explain Ruby with its advantages. Explain control statements in Ruby. **[10]**

b) Explain EJB concept & five basic example of using EJB. **[7]**

OR

Q8) a) Explain the arrays in Ruby. Explain Rails with AJAX. **[10]**

b) Explain Document Request in Rails. **[4]**

c) Explain advantages of Ruby and Rails. **[3]**

Total No. of Questions : 8]

SEAT No. :

PB3786

[Total No. of Pages :2

[6262]-45

T.E. (Computer Engineering)

ARTIFICIAL INTELLIGENCE

(2019 Pattern) (Semester- II) (310253)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer four 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.***

Q1) a) List all problem solving strategies. What is backtracking, explain with n queen problem. **[8]**

b) Write Minimax Search Algorithm for two players. How use of alpha and beta cut-offs will improve performance? **[9]**

OR

Q2) a) Define Game theory, Differentiate between stochastic and partial games with examples. **[9]**

b) Define is Constraint satisfaction problem, state the types of consistencies solve the following Crypt Arithmetic Problem. **[8]**

```
  B A S E
+ B A L L
-----------
  G A M E S
```

Q3) a) What is an Agent? Name any 5 agents around you explain knowledge based agent with Wumpus World.
List and explain in short the various steps of knowledge engineering process
Consider the following axioms:
If a triangle is equilateral then it is isosceles. **[9]**

b) If a triangle is isosceles, then its two sides AB and AC are equal.
If AB and AC are equal, then angle B and C are equal.
ABC is an equilateral triangle.
Represent these facts in predicate logic. **[9]**

OR

P.T.O.

Q4) a) Write the following sentences in FOL(using types of quantifiers) **[9]**

i) All birds fly

ii) Some boys play cricket

iii) A first cousin is a child of a parent's sibling

iv) You can fool all the people some of the time, and some of the people all the time, but you cannot fool all the people all the time.

b) What is Knowledge Representation using propositional logic? Compare propositional and predicate Logic. **[9]**

Q5) a) Explain Forward Chaining and Backward Chaining. With its properties, advantages and disadvantages. **[9]**

b) Explain: **[8]**

i) Unification in FOL

ii) Reasoning with Default information

OR

Q6) a) Explain FOL inference for following Quantifiers. **[8]**

i) Universal Generalization

ii) Universal Instantiation

iii) Existential Instantiation

iv) Existential introduction

b) What is Ontological Engineering, in details with its categories object and Model. **[9]**

Q7) a) Explain with an example Goal Stack Planning (STRIPS algorithm). **[5]**

b) Explain with example, how planning is different from problem solving. **[5]**

c) Explain AI components and AI architecture **[8]**

OR

Q8) a) Explain Planning in non deterministic domain. **[5]**

b) Explain. **[5]**

i) Importance of planning

ii) Algorithm for classical planning

c) What is AI explain scope of AI in all walks of Life also explain future opprotunities with AI. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3787

[Total No. of Pages : 2

[6262]-46

T.E. (Computer Engg.)

INFORMATION SECURITY

(2019 Pattern) (Semester - II) (310254A) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt Qi 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 side indicate full marks.***

Q1) a) Explain Public Key Cryptography in detail? **[8]**

b) Explain ECC for the finite field with points $y^2 = x^3+ax+b$? **[8]**

c) Explain Chinese reminder Theorem? **[6]**

OR

Q2) a) Explain RSA algorithm in detail? With suitable example? **[8]**

b) Explain ElGamal encryption system for public key cryptography? **[8]**

c) Explain Simultaneous linear congruences with suitable example? **[6]**

Q3) a) What services are provided by IPSec? What is the difference between transport mode and tunnel mode in IPSec? **[8]**

b) Explain the MD5 algorithm in brief? **[8]**

OR

Q4) a) Explain SHA algorithm with message authentication functions? **[8]**

b) Compare between IPSec and TLS? With suitable example? **[8]**

P.T.O.

Q5) a) What are Intrusion Prevention policies? Explain in brief? **[8]**

b) Discuss operating system security in detail? **[8]**

OR

Q6) a) Explain multi-level RBAC system? **[8]**

b) Explain packet filtering firewall in detail? **[8]**

Q7) a) Write a short note on Cyber Terrorism with perspective of Social Engineering? Take suitable example? **[8]**

b) Explain Cyber Stalking and Indian IT act? **[8]**

OR

Q8) a) Write short note on Amendments of IT ACT in India? **[8]**

b) Write short notes on keyloggers and spyware? Also explain the severity of the incident? **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3788

[Total No. of Pages : 2

[6262]-47

T.E. (Computer Engineering & AIDS)

AUGMENTED AND VIRTUAL REALITY

(2019 Pattern) (Semester - II) (310254B) (Elective-II)

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 wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is rendering system? Describe different methods of aural rendering. **[9]**

b) Explain in detail how the virtual world is represented. Describe how haptic information is used in a VR experience. **[9]**

OR

Q2) a) What is visual rendering system? Explain geometrically based rendering systems. **[9]**

b) Explain how vision is used in a VR Experience **[9]**

Q3) a) State and explain different forms of manipulating a virtual world. **[9]**

b) What are the four categories of substance in the virtual world? Explain each in detail. **[8]**

OR

Q4) a) Define the following terms **[10]**

i) The static world
ii) Cartoon physics
iii) Newtonian physics
iv) Aristotelian physics
v) Choreographed physics

b) What is Wayfinding? Enlist real and virtual-world aids to improve wayfinding in navigation. **[7]**

P.T.O.

Q5) a) What is augmented reality? Enlist different ingredients of an augmented reality experience. **[9]**

b) What are major hardware components for augmented reality systems? **[9]**

OR

Q6) a) What are different categories of sensors that are used in AR systems? **[9]**

b) What is Depth Cues? Explain Monoscopic and Stereoscopic image depth in detail. **[9]**

Q7) a) What is mobile augmented reality? State advantages and disadvantages of mobile augmented reality. **[9]**

b) What is marker based and marker-less tracking system in augmented reality? **[8]**

OR

Q8) a) Describe different software used to create content for the augmented reality application. **[9]**

b) What is content? Explain in short how visual content are created. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3789

[Total No. of Pages : 2

[6262]-48

T.E. (Computer / Artificial Intelligence and Data Science Engineering)

CLOUD COMPUTING

(2019 Pattern) (Semester - II) (310254C) (Elective-II)

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. 7or 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) What is virtualization? What is Type 1 Hypervisor and Type 2 Hypervisor? **[6]**

b) Explain Virtual clustering in detail? **[6]**

c) Explain Virtualization in grid computing? **[6]**

OR

Q2) a) Explain Virtualization Application and Pitfalls of Virtualization? **[6]**

b) Explain Network and Storage Virtualization? **[6]**

c) Explain virtual machine migration technique in detail? **[6]**

Q3) a) What is AWS? What are the services provided by AWS? **[6]**

b) Explain amazon S3 and Amazon EC2? **[6]**

c) Explain SQL Azure in detail? **[5]**

OR

Q4) a) Explain Google App Engine with its installation steps? **[6]**

b) Draw and explain Architecture of Amazon Dynamo? **[6]**

c) Differentiate between Dynamo DB and Amazon S3? **[5]**

P.T.O.

Q5) a) What is role of Confidentiality, Integrity and Availability in Cloud Computing? **[6]**

b) Explain types of Risks in Cloud Computing? **[6]**

c) Explain the secure cloud software testing? **[6]**

OR

Q6) a) Explain the cloud security services in details? **[6]**

b) Write a short note on content level security? **[6]**

c) Compare server side and client-side encryption? **[6]**

Q7) a) Explain the mobile cloud computing? **[6]**

b) Explain docker with its Architecture? **[6]**

c) Explain the application of IOT and cloud in your home? **[5]**

OR

Q8) a) What is Energy aware cloud computing? Explain in details? **[6]**

b) Explain container & Kubernetes in detail? **[6]**

c) Explain Distributed cloud computing? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3790

[Total No. of Pages : 3

[6262]-49

T.E. (Computer / Artificial Intelligence and Data Science Engineering)

SOFTWARE MODELING AND ARCHITECTURE

(2019 Pattern) (Semester - II) (310254D) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

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) Draw State machine diagram for ATM system. **[6]**

b) Draw activity diagram for the library case study shown below. List all activities used in the diagram. **[6]**

Library Case study: Following is a process to issue a book:

Every book has a barcode sticker pasted on it. Every employee has Icard on which aiso barcode sticker is pasted. Employee has to select a book and has to approach librarian. Librarian scans the barcode of the book with barcode scanner. Then employee has to scan barcode on I card with barcode scanner. Librarian has to ensure book details, employee details and finalize the issue transaction of the book. Librarian tells return date to an employee.

Following is the process to return the book:

Employee has to carry the book to the librarian and librarian has to initiate the return transaction. Employee has to scan barcode sticker of I-card and book with barcode scanner. System calculates fine by using fine calculation rules. Librarian asks for fine amount to employee if any. Employees pay the fine. Librarian finalizes the return transaction. Note that, in above system, if barcode scanner does not work, librarian should be able to enter data using keyboard. There should be provision of providing rules of fine calculation. Even if employee doesn't have barcode sticker on I - card, librarian should be able to input employee id manually.

c) Differentiate between State machine diagram and Advanced State Machine diagram. **[5]**

P.T.O.

OR

Q2) a) Explain the significance of timing diagram with a suitable example. **[6]**

b) Draw the sequence diagram (s) for the following case study. **[6]**

Online Course Reservation System:

The requirement form the customer is got and the requirements about the course registration are defined. The requirements are analyzed and defined so that is enables the student to efficiency select a course through registration system. Whenever the student comes to join the course he/she should be provided with the list of course available in the college. The system should maintain a list of professor who is teaching the course. At the end of the course the student must be provided with the certificate for the completion of the course.

c) Enlist and Explain different types of nodes and control flow in activity diagram with example. **[5]**

Q3) a) What is an Architectural Patterns? Explain different types of Common software architecture structures. **[6]**

b) What is the software architecture? What are the three different views of architecture? Explain the component of 4+1 architectural view model. **[6]**

c) Why to use software architecture? Explain Importance of Software Architecture in detail. **[5]**

OR

Q4) a) Explain the different Quality Attributes and Considerations required for in software development. **[6]**

b) Explain the importance of object oriented software architecture and its applicability in software development? **[6]**

c) Write a short note on Software Architectural Structure and Views. **[5]**

Q5) a) Explain Software Architecture Documentation and its Quality Attributes. **[6]**

b) Explain the real time software architecture with a suitable example. **[6]**

c) Write a short note on following **[6]**

i) Notations used in Documenting Software Architecture

ii) Choosing views

iii) Combining views

OR

Q6) a) Illustrate how Software Architecture used in Agile Projects with example. **[6]**

b) Explain synchronous communication pattern in Client server architecture with example. **[6]**

c) Explain Software Architecture in the Life Cycle. **[6]**

Q7) a) What is Behavioral Pattern? In which situation you use the Behavioral pattern? **[6]**

b) Illustrate different approaches to select appropriate Design Patterns. **[6]**

c) What is Observer Behavioral pattern? Explain Observer Behavioral in detail with the applicability of singleton creational pattern. **[6]**

OR

Q8) a) Draw the structure of observer pattern with suitable class diagram including subject and observer. **[6]**

b) Explain types of Structural Pattern in detail with examples. **[6]**

c) What is singleton pattern? Explain one example scenario where you will singleton pattern to get applied. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB3791

[Total No. of Pages :2

[6262]-50

T.E. (Artificial Intelligence and Data Science Engg.)
COMPUTER NETWORKS
(2019 Pattern) (Semester-I) (317521)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Question 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 indicates full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain any two routing protocols. **[6]**

b) Write short note on Network Address Translation. **[6]**

c) Explain Link State Routing Algorithm with example. **[6]**

OR

Q2) a) Explain Distance Vector Routing Algorithm with example. **[6]**

b) Explain. **[6]**

i) Address Resolution Protocal (ARP)

ii) Internet Control Message Protocal (ICMP)

c) Explain the concepts of classful (A, B, C, D & E) & Classless addressing. **[6]**

Q3) a) Discuss the quality of service (QoS) parameters in computer network. **[6]**

b) What is the difference between TCP and UDP, Explain TCP header format in detail. **[6]**

c) Explain RTP protocol in detail. **[5]**

OR

Q4) a) Draw and Explain TCP header format in details? **[6]**

b) What are the techniques to improve Quality of Service (QoS)? **[6]**

c) Explain different elements of Transport protocal. **[5]**

P.T.O.

Q5) a) What is HTTP? Explain HTTP request and reply message format. **[6]**

b) Explain SNMP protocol in details. **[6]**

c) Explain DNS frame format. **[6]**

OR

Q6) a) Explain FTP? Can we specify file transfer file in a Web page? Explain with the help of suitable example. **[6]**

b) Explain simple mail transfer protocol. **[6]**

c) Write a short note on **[6]**

i) POP3

ii) TELNET

Q7) a) Explain IEEE 802.15 and IEEE 802.16 in details. **[6]**

b) Explain Binary Exponential Back off Algorithm. **[6]**

c) Explain various frame formats. **[5]**

OR

Q8) a) Explain 802.11 a/b/g in details. **[6]**

b) Explain CSMA/CD in details. **[6]**

c) Differentiate between Pure ALOHA & Slotted ALOHA. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3792

[Total No. of Pages : 2

[6262]-51
T.E. (AI & DS)
Web Technology
(2019 Pattern) (Semester - I) (310252)

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) ***Figures to the right indicate full marks.***

Q1) a) Explain servlet architecture. Explain servlet life cycle. **[8]**

b) Explain XML with respect to XML declaration, DOM based XML processing. **[6]**

c) Explain concept of transforming XML documents **[3]**

OR

Q2) a) Explain the following:

i) URL rewriting **[4]**

ii) MySQL and Java servlets. **[4]**

b) Explain the concept of AJAX and its working. Explain advantages of AJAX. **[9]**

Q3) a) Explain the concept of JSP. Explain the JSP life cycle. Also differentiate JSP Vs servlets (min.04) **[12]**

b) Explain struts with respect to its architecture, actions & interceptors. **[6]**

OR

P.T.O.

Q4) a) Explain the Javabeans classes and JSP with example. **[9]**

b) What are web services. Explain the concept of WSDL. **[9]**

Q5) a) Explain PHP with basic code block for displaying Hello world and list the advantages of PHP over JSP (min 04) **[8]**

b) Write note on: **[10]**

i) . NET framework

ii) C#

OR

Q6) a) Explain the session tracking and management in PHP. **[8]**

b) Explain the following : **[10]**

i) NodeJS

ii) WAP & WML

Q7) a) Explain the control statements and arrays in Ruby. **[10]**

b) Explain the concept of layouts & document requests in Rails. **[7]**

OR

Q8) a) Explain the classes in Ruby. Elaborate on pattern matching in Ruby. **[8]**

b) Write note on:

i) EJB **[5]**

ii) Rails with AJAX **[4]**

Total No. of Questions : 8]

SEAT No. :

PB-3793

[Total No. of Pages : 2

[6262]-52
T.E. (Artificial Intelligence & Data Science)
ARTIFICIAL INTELLIGENCE
(2019 Pattern) (Semester - I) (310253)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer four 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.***

Q1) a) Explain min Max and Alpha Beta pruning algorithm for adversarial search with example **[9]**

b) Define and explain Constraints satisfaction problem. **[9]**

OR

Q2) a) Explain with example graph coloring problem. **[9]**

b) How Al technique is used to solve tic-tac-toe problem. **[9]**

Q3) a) Explain Wumpus world environment giving its PEAS description. **[9]**

b) Explain different inference rules in FOL with suitable example. **[8]**

OR

Q4) a) Write an propositional logic for the statement, **[10]**

i) "All birds fly"

ii) "Every man respect his parents"

b) Differentiate between propositional logic and First order logic. **[7]**

Q5) a) Explain Forward chaining algorithm with the help of example. **[9]**

b) Write and explain the steps of knowledge engineering process. **[9]**

P.T.O

OR

Q6) a) Explain Backward chaining algorithm with the help of example. **[9]**

b) Write a short note on **[9]**

i) Resolution and

ii) Unification

Q7) a) Write a short note on planning agent, state goal and action representation **[6]**

b) Explain different components of planning system. **[6]**

c) Explain the components of AI. **[5]**

OR

Q8) a) What are the types of planning? Explain in detail. **[6]**

b) Explain Classical Planning and its advantages with Example. **[6]**

c) Write note On hierarchical task network planning. **[5]**

Total No. of Questions : 8] **SEAT No. :**

PB3794 **[Total No. of Pages : 2**

[6262]-53

T.E. (Artificial Intelligence and Data Science)

EMBEDDED SYSTEMS & SECURITY

(2019 Pattern) (Semester-I) (317522 A) (Elective -I)

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 and Q.7 or Q.8.***
2) ***Assume Suitable data, if necessary.***

Q1) a) Differentiate between Assembly Language and High-Level Language. **[6]**

b) Compare C and Embedded C **[6]**

c) Write short note on Macros and Preprocessor in C. **[5]**

OR

Q2) a) Compare Cross-Compiler and a Compiler. **[6]**

b) Explain Simulator, Emulator and Debugging in Embedded System. **[6]**

c) Explain different types of files generated during cross compilation. **[5]**

Q3) a) What are the Characteristics of a real-time operating system? **[6]**

b) Explain what is Semaphore, use of Semaphore and types of Semaphore? **[6]**

c) Explain in short following Scheduling algorithms **[6]**

i) First In First Out (FIFO)

ii) Shortest Job First (SJF)

OR

Q4) a) Explain following types of Multitasking in Operating Systems **[6]**

i) Preemptive Multitasking

ii) Cooperative Multitasking

P.T.O.

b) Explain Inter-task communication and synchronization options in RTOS System. **[6]**

c) What is uCOS-II? Explain in detail. **[6]**

Q5) a) Explain the Embedded Linux Architecture with diagram. **[6]**

b) Explain advantages of Embedded Linux. **[6]**

c) Explain features of Linux Kernel. **[5]**

OR

Q6) a) Elaborate the Root File System in Linux. **[6]**

b) Write a short note on Device Driver. **[6]**

c) What is Boot Loader? Explain in detail. **[5]**

Q7) a) Explain any three types of Network-based attacks on Embedded Systems. **[6]**

b) Write short note on Effects of Attacks on embedded systems. **[6]**

c) Which are the Software-based attacks on Embedded Systems? **[6]**

OR

Q8) a) Explain Challenges in security of Embedded Systems. **[6]**

b) Which are the Countermeasures of security attacks? **[6]**

c) Explain Cold boot attack? **[6]**

Total No. of Questions : 8]

SEAT No. :

PB3795

[Total No. of Pages : 2

[6262]-54

T.E.(Artificial Intelligence and Data Science)/(Information Technology)

DESIGN THINKING

(2019 Pattern)(Semester -I)(314445 C) (Elective - I)

Time : 2½ 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.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) How the Design principles tool is applied in design phase. **[8]**

b) How the progress Idea Generation takes in design thinking. **[9]**

OR

Q2) a) How to use Deconstruct & Reconstruct for Ideation. **[6]**

b) What is storytelling? What you can do with storytelling the tool. **[6]**

c) What is an ideate phase in design thinking? Explain methods to Ideate. **[5]**

Q3) a) What is dark horse prototype how to do it and when we need it. **[9]**

b) Why is prototyping important? In Design Thinking how do we used prototype. **[9]**

OR

Q4) a) What are the advantages and disadvantages of using a prototype in design thinking? **[6]**

b) How to implement Critical Function Prototype? **[6]**

c) What is Paper Prototyping, Digital Prototyping? Explain **[6]**

Q5) a) Discuss how 'Feedback Capture Grid' is used to test my prototyped ideas quickly and simply. **[8]**

b) What is A/B testing? How it is carried out in test phase? **[9]**

OR

P.T.O.

Q6) a) Discuss how 'Testing Sheet' will help designers to prepare the test sequence and document the test results. **[8]**

b) What is the purpose of the Evolve Phase? Explain Viability Analysis (Impact Evaluation) in detail. **[9]**

Q7) a) Discuss the case study "Reimagining the Trade Show Experience at IBM" in detail. **[9]**

b) Explain IBM Design Thinking: A Framework To Help Teams Continuously Understand and Deliver. **[9]**

OR

Q8) a) How The Good Kitchen helped Improving the nutrition of the elderly, explain in detail. **[9]**

b) How "Social Networking at Me You Health" is designed using design thinking tools? **[9]**

Total No. of Questions : 8] **SEAT No. :**

PB3796 **[Total No. of Pages : 2**

[6262]-55
T.E. (Artificial Intelligence and Data Science)
PATTERN RECOGNITION
(2019 Pattern) (Semester-I) (317522 B)(Elective-I)

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 and 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) Explain the concept of a grammar-based approach in pattern recognition with example? **[6]**

b) Explain the fundamental elements of formal grammars used in computer science and linguistics? **[6]**

c) Explain the concept of recognition of syntactic descriptions in formal language theory and its significance in the field of computational linguistics? **[6]**

OR

Q2) a) Explain the CYK (Cocke-Younger-Kasami) parsing algorithm? **[6]**

b) Explain the concept of Augmented Transition Networks (ATN) in the context of parsing? **[6]**

c) Discuss the applications of Stochastic Grammars in the field of speech recognition? **[6]**

Q3) a) Explain the concept of graph based structural representation? **[6]**

b) Discuss the problem formulation and key considerations when tackling the task of learning grammars? **[6]**

c) Explain the concept of Grammatical Inference (GI) and its significance in machine learning? **[5]**

OR

P.T.O.

Q4) a) Discuss the fundamental steps and considerations involved in generating constrained grammars? **[6]**

b) Discuss the challenges and limitations of Grammatical Inference appoaches? **[6]**

c) What are the challenges and limitations of measuring similarity in attributed graphs? **[5]**

Q5) a) Discuss the different neural network structures commonly used in pattern recognition applications? **[6]**

b) Discuss the concept of physical neural networks and their applications in computing? **[6]**

c) Explain the working principles and key components of Artificial neural network (ANN)? **[6]**

OR

Q6) a) Explain the architecture of network-based pattern associators? **[6]**

b) What is a Matrix Approach in Linear Associative Mappings? **[6]**

c) What is the role of neural networks in pattern recognition, and how do they differ from traditional pattern recognition techniques? **[6]**

Q7) a) Explain multilayer feedforward network with neat diagram? **[6]**

b) Explain the concept of Delta Rule in detail? **[6]**

c) What are the common ways for extending dimensionality reduction for units in hidden layers? **[5]**

OR

Q8) a) What is the role of the activation function in a Pattern Associator for character classification, and how does it affect the recognition process? **[6]**

b) Explain adaptive resonance architecture in detail? **[6]**

c) What are the key components of a Kohonen map, and how do the input data and weigth vectors interact in the learning process? **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3797

[Total No. of Pages : 2

[6262]-56

T.E. (Artificial Intelligence and Data Science)

DATA SCIENCE

(2019 Pattern) (Semester - II) (317529)

Time : 2½ Hours] ***[Max. Marks : 70***

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 is Data Analytics Life Cycle? **[6]**

b) Draw the diagram of the data analytics life cycle in big data and briefly explain the Model Planning phase. **[6]**

c) Write a note on the Data Preparation phase with its steps. **[6]**

OR

Q2) a) Explain in detail how the model-building phase is built by a team in the data analytics life cycle. **[6]**

b) List and explain the steps in the Data Preparation phase of the data analytics lifecycle. **[6]**

c) Explain challenges in the Model building phase. **[6]**

Q3) a) What do you mean by Linear Regression? Elaborate the types. **[6]**

b) Explain the Apriori algorithm with an example. **[6]**

c) Write a short note on the following: **[6]**

i) FP growth

ii) Decision Tree Classification

OR

Q4) a) Explain Data transformation using function and mapping. **[6]**

b) Write a short note on the following: **[6]**

i) Removing duplicates from the data set.

ii) Handling missing data.

c) Explain association rules with examples. **[6]**

P.T.O.

Q5) a) What is clustering? Explain hierarchical clustering with an example. **[6]**

b) Explain the Holdout method and Random Sub Sampling method. **[6]**

c) Discuss parameter tuning and optimization. **[5]**

OR

Q6) a) Short Note on: **[6]**

i) AUC-ROC Curves

ii) Elbow plot

b) What is clustering? Explain k - means algorithm. **[6]**

c) Write a short note on : **[5]**

i) Time series Analysis

ii) TF-IDF.

Q7) a) What is data Visualization? List and explain any one type of data visualization. **[6]**

b) With a suitable example explain and draw a Box plot and explain its usage. **[6]**

c) Discuss various challenges to Big data Visualization. **[5]**

OR

Q8) a) Define data visualization. What are the different methods of data visualization explain in detail. **[6]**

b) Explain in detail the Hadoop Ecosystem with a suitable diagram. **[6]**

c) With a suitable example explain the Scatter plot and explain its usage. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3798

[Total No. of Pages : 2

[6262]-57

T.E. (Artificial Intelligence and Data Science Engineering)

CYBER SECURITY

(2019 Pattern) (Semester - II) (317530)

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 whenever necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) Explain Public Key Cryptography. **[6]**

b) Perform encryption and decryption using RSA algorithm for p=l 7, q=31, e = 7 and M = 2. **[6]**

c) Explain the operations of Kerberos. **[6]**

OR

Q2) a) Explain operation of MD5 message digest algorithm. **[6]**

b) User A and B use the Diffie-Helliman key exchange technique with a common prime q = 71 and a primitive root $\alpha = 7$. **[6]**

i) If user A has private key $X_A = 5$, what is A's public key Y_A?

ii) If user B has private key $X_B = 12$, what is B's public key Y_B?

iii) What is the shared secret key?

c) Explain X.509 Authentication Service. **[6]**

Q3) a) List and explain components of IPSec protocol. **[6]**

b) What is VPN? Explain components of VPN. **[6]**

c) Explain working of PGP in details. **[6]**

OR

P.T.O.

Q4) a) List and explain various participants involved in Secure Electronic Transaction (SET). **[6]**

b) Describe the SSL protocol in details. **[6]**

c) What is S/MIME'? What are the benefits of S/MIME? **[6]**

Q5) a) Explain the architecture of firewall. **[6]**

b) What is trusted system? Explain in brief. **[6]**

c) Difference between IDS and IPS. **[5]**

OR

Q6) a) List and explain types of Intrusion Detection System. **[6]**

b) What is access control security service? **[6]**

c) Describe operation of packet filtering firewall. **[5]**

Q7) a) What is Cyber Staking. **[6]**

b) Write short note on Mobile Hacking. **[6]**

c) Explain Indian IT Act. **[5]**

OR

Q8) a) Explain PII impact level with examples. **[6]**

b) Write short note on Cybercrime. **[6]**

c) Write Advantages of cyber law. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3799

[6262]-58

[Total No. of Pages :2

T.E. (Artificial Intelligence and Data Science)

ARTIFICIAL NEURAL NETWORK

(2019 Pattern) (Semester- II) (317531)

Time : 2½ Hours] ***[Max. Marks : 70***

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) How does Hopefield network work and state its limitations. **[6]**

b) Exemplify stimulated annealing with its advantages and disadvantages. **[6]**

c) Define: **[6]**

i) Pattern association

ii) Pattern classification

iii) Pattern mapping tasks

OR

Q2) a) Explain in detail stochastic gradient approach. **[6]**

b) State basic functional units of ANN for pattern recognition tasks. **[6]**

c) What is catastrophic forgetting in neural network? **[6]**

Q3) a) Why Kohonens network are called self organizing maps? **[6]**

b) What is Adaptive Resonance Theory and its applications? **[6]**

c) Define following: **[6]**

i) Learning vector quantization

ii) Adaptive pattern classification

OR

P.T.O.

Q4) a) How to recognize character using ART network? **[6]**

b) What is competitive learning in neural network and its limitations? **[6]**

c) Explain SOM architecture and its uses. **[6]**

Q5) a) Why do we prefer Convolution Neural Networks(CNN) Over Artificial Neural Networks(ANN) for image data as input? **[6]**

b) Write short note on: **[6]**

i) AlexNET

ii) VGG-16

iii) Residual networks

c) Explain the role of the flattening layer in CNN. **[5]**

OR

Q6) a) What exactly is a CNN and how does it work? **[6]**

b) Define bias and variance. What is bias-variance trade-off? **[6]**

c) What do we use a pooling layer in a CNN? **[5]**

Q7) a) Explain automatic language translation with its three basic rules. **[6]**

b) Exemplify recognition of Olympic Games symbols. **[6]**

c) What is NET talk? **[5]**

OR

Q8) a) Exemplify pattern classification? **[6]**

b) Write a short note on: **[6]**

i) Texture classification

ii) Texture segmentation

c) Illustrate about Neocognitron? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3800

[Total No. of Pages : 2

[6262]-59

T.E. (Artificial Intelligence and Data Science Engineering)

ROBOTICS AND AUTOMATION

(2019 Pattern) (Semester - II) (317532A) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are Danavit Hartenberg parameter used for? How do we define DH parameter? **[6]**

b) What are the difference between forward and reverse Dynamic? **[6]**

c) What is Euler Lagrange equation of motion? Explain? **[6]**

OR

Q2) a) What are the difference between forward and reverse Kinematics? **[6]**

b) What is Newton Euler equation of motion, Explain? **[6]**

c) What is Jacobian in robotics? Explain? **[6]**

Q3) a) What are the different types of Grippers? Explain mechanical grippers with specification **[6]**

b) Enlist what are the various process tools which can be used as a end effectors. Explain any one in detail. **[6]**

c) Explain Types of Power system in Robotics? **[6]**

OR

Q4) a) Compare pneumatic & hydraulic grippers. **[6]**

b) Which devices can be used as end effectors? How to achieve end effector interface **[6]**

c) Explain Types of Motion conversion in robotics? **[6]**

P.T.O.

Q5) a) Explain, how do we integrate sensors and actuators? **[6]**

b) What are the functions of adaptive control? Explain? **[6]**

c) What are the types of PID control? Explain? **[5]**

OR

Q6) a) How Artificial Intelligence used in robotics, Explain? **[6]**

b) Explain Open loop and close loop with example? **[6]**

c) What is the architecture of Microcontroller in Embedded system **[5]**

Q7) a) Classify different languages/methods used for robotics programming. Explain the structure of VAL language command along with example. **[6]**

b) Explain any three basic commands in VAL-II with example. **[5]**

c) Explain motion control, hand control, program control commands used in robotic programming with example. **[5]**

OR

Q8) a) Explain any one of the following robotic application using VAL program **[6]**

i) Pick and place applications

ii) Palletizing application using VAL

b) Using VAL-II programming language explain simple pick and place application. **[6]**

c) Explain WAIT,SIGNAL and DELAY command used in robotics for communication using simple application. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3801

[Total No. of Pages : 2

[6262]-60

T.E. (Artificial Intelligence and Data Science)

NATURAL LANGUAGE PROCESSING

(2019 Pattern) (Semester - II) (317532B) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve questions 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) ***Figures to the right indicates full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain Context Free Grammar and Grammar rules For English in detail. **[8]**

b) Write short note based on constituency parsing. **[9]**

i) Ambiguity

ii) Partial Parsing

iii) CCG Parsing

OR

Q2) a) Elaborate dependency relations and dependency formalism of dependency parsing. **[8]**

b) Write short note based on constituency parsing. **[9]**

i) Ambiguity

ii) Span based neural constituency parsing

iii) CKY Parsing

Q3) a) Explain Word senses and relation between various senses. **[8]**

b) Explain lexicon for sentiment-Emotions, sentiment and affect lexicons, Creating Affect Lexicons by Human Labeling with suitable example.**[9]**

OR

P.T.O.

Q4) a) Write down about WordNet and wordsense disambituition in detail. **[8]**

b) Explain lexicon for sentiment-Semi-supervised Induction of Affect Lexicons, Supervised Learning of Word Sentiment, Using Lexicons for Sentiment. Recognition with suitable example. **[9]**

Q5) a) Explain need ot Machine Translation (MT) with suitable example. Which are the problems of Machine Translation? **[9]**

b) Write short note on:

i) Knowledge based MT System **[5]**

ii) Encoder-decoder architecture **[4]**

OR

Q6) a) Explain Machine Translation (MT) approaches with suitable example. Describe Direct Machine Translation in detail. **[9]**

b) Write short note on:

i) Statistical Machine Translation (SMT) **[5]**

ii) Neural Machine Translation **[4]**

Q7) a) Elaborate Information retrieval-Vector space Model in detail. **[9]**

b) Write short note on: **[9]**

i) Categorization

ii) Summarization

iii) Sentiment Analysis

OR

Q8) a) Discuss Information Extraction using Sequence Labelling in detail. **[9]**

b) Write short note on: **[9]**

i) Named Entity Recognition.

ii) Analyzing text with NLTK

iii) Chatbot using Dialogflow

Total No. of Questions : 8]

SEAT No. :

PB3802

[Total No. of Pages : 2

[6262]-62
T.E.(Electrical Engineering)
INDUSTRIAL AND TECHNOLOGY MANAGEMENT
(2019 Pattern)(Semester -I)(303141)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1or 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-progammable calculator is allowed.***

Q1) a) What are the different forms of IPR? Explain any one in detail. **[4]**

b) Write a short note on: **[6]**

i) HR planning

ii) Recruitment

c) Explain in detail about Training and Development. **[8]**

OR

Q2) a) Write a criteria for securing Patents. **[4]**

b) What do you understand Human Resource Management? Explain in detail. **[6]**

c) Write a short note on Patent format and Patent structure. **[8]**

Q3) a) What are the 7 QC tools? Explain in detail. **[3]**

b) Write a short note on Poka Yoke (Mistake Proofing) **[6]**

c) Explain in details for the ISO9001:2000 Quality Management System Standard. **[8]**

OR

Q4) a) What is TQM? Explain in details. **[3]**

b) What are Basic software used for inventory management? Explain any one in detail. **[6]**

c) Write a short note on: **[8]**

i) ISO14001:2004

ii) ISO10004:2012

P.T.O.

Q5) a) Explain in detail with example Profit and loss statement. **[4]**

b) What do you understand about Meaning of Market and Marketing strategy? **[6]**

c) What do you understand cost Concept? What are the different types of costs? Explain in details. **[8]**

OR

Q6) a) Define financial management. Explain different type of taxes in detail. **[4]**

b) Explain market characteristics and its types in detail. **[6]**

c) What are the different methods of selling? Explain in details. **[8]**

Q7) a) Explain Motivation and theories of work motivation. **[3]**

b) What are the different stages of group dynamics? Explain in details. **[6]**

c) Write a short note on: **[8]**

i) Government policies

ii) Incentives

OR

Q8) a) Explain in details of McClelland's Three Needs Theory **[3]**

b) What are the different types of Leadership? Explain any three leadership in detail. **[6]**

c) Explain in details any Case study on small scale industries in India. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3803

[Total No. of Pages :2

[6262]-63
T.E. (Electrical Engineering)
POWER ELECTRONICS
(2019 Pattern) (Semester-I) (303142)

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) ***Figures to the right indicates 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 difference between 1 - phase half - controlled converter and fully controlled converter. **[4]**

b) Explain single phase dual converter with R-Load. **[6]**

c) Explain the operation of single phase fully controlled bridge converter with RL load. Draw waveforms of output voltage and current for $\alpha = 60^{\circ}$ with continuous conduction. **[8]**

OR

Q2) a) Compare Circulating & non circulating current mode of dual converter. **[4]**

b) Describe working of single - phase semi converter with R load. Draw waveforms of load voltage, load current for $\alpha = 60^{o}$. **[6]**

c) A single phase fully controlled converter is connected to R Load of $10\,\Omega$. The input voltage to the bridge is 230 V. Calculate. **[8]**

i) Average and RMS load voltage

ii) Average and RMS load current

Firing angle is 60 degrees.

Q3) a) Draw output voltage & current waveform of single - phase AC voltage regulator with RL load. **[3]**

b) Explain working of three phase semi controlled converter with R Load and firing angle of 30 degrees. Draw output voltage waveforms. **[6]**

c) Explain operation of two stage AC voltage regulator with an output waveform for RL load. **[8]**

OR

P.T.O.

Q4) a) What is two stage AC voltage regulator? Draw neat diagram with R load. **[3]**

b) Explain single phase AC voltage regulator feeding R load. Draw output voltage waveform for firing angle of 60^{o}. **[6]**

c) Explain working of three phase fully controlled converter with RL Load and firing angle of 60 degrees. Draw output voltage waveforms. **[8]**

Q5) a) Explain working of single - phase full bridge voltage source Inverter connected to RL load with neat circuit diagram. Draw output voltage and current waveforms. **[9]**

b) Explain sinusoidal PWM technique for inverters. How voltage and freq. control is achieved? **[8]**

OR

Q6) a) State different voltage control techniques used in single phase inverter. Elaborate any two methods in detail. **[9]**

b) Explain with circuit diagram and waveforms operation of single phase current source inverter. **[8]**

Q7) a) Explain working of three phase voltage source inverter in 180^{o} mode of operation. For star connected load draw output voltage waveforms. Show devices conducting in each step. **[10]**

b) What is necessity of using Multilevel Inverters? Draw circuit diagram of H bridge multilevel Inverter. **[4]**

c) What are different harmonic elimination techniques in inverter? Explain any one method. **[4]**

OR

Q8) a) Explain working of three phase voltage source inverter in 120^{o} mode of operation. For star connected load draw output voltage waveforms.**[10]**

b) Compare multi-pulse and multilevel inverters. **[4]**

c) Draw a neat diagram and explain Flying capacitor multilevel converter.**[4]**

Total No. of Questions : 8]

SEAT No. :

PB-3804

[Total No. of Pages : 3

[6262]-64
T.E. (Electrical Engineering)
ELECTRICAL MACHINES - II
(2019 Pattern) (Semester - I) (303143)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2; Q3 or Q4; Q5 or Q6; Q7or 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) Draw the equivalent circuit diagram of 3 phase synchronous motor & state, why it is called doubly fed motor? **[4]**

b) What is significance of load angle δ ? With neat sketch, explain it for NO losses & with losses. **[6]**

c) A 2300 V three phase star connected synchronous motor has armature resistance of 0.2 ohm/ph. and synchronous reactance of 2.0 ohm/ph. The motor is operated at 0.5 leading power factor and takes a current of 180 A from supply. Calculate back EMF generated in the motor & load angle δ . **[8]**

OR

Q2) a) Sketch V and inverted V curves of synchronous motor and show the power factor regions. **[4]**

b) What is hunting in synchronous motor? How to minimise it? Explain.**[6]**

c) A 3-Ph, 415 V, 50 Hz, star connected synchronous motor has Ra = 0 & Xs= 0.8 Ω / ph. If the input power remains constant at 30 kW, Calculate: generated emf / ph and torque angle at (i) unity pf (ii) 0.8 lagging pf. **[8]**

P.T.O.

Q3) a) State the methods of speed control of 3 phase Induction motor on stator & rotor side. **[3]**

b) Draw the block diagram & explain the V/f method of speed control of 3 phase induction motor. **[6]**

c) Draw the neat construction diagram and explain the working of variable reluctance stepper motor. Show the truth table. How to reverse the direction of rotation. **[8]**

OR

Q4) a) Calculate step angle & resolution of 3-ph stepper motor with 08 stator poles & 06 rotor poles. **[3]**

b) What is the Energy Efficient three phase Induction Motor? How to achieve it? **[6]**

c) With the neat schematic diagram describe the construction and working of PM D.C. motor. State its applications. **[8]**

Q5) a) Draw the torque –armature current characteristics of AC and DC series motor & comment on armature current & torque. **[4]**

b) Compare the performance of universal motor on AC & DC supply. **[6]**

c) A series motor having resistance 40Ω & inductance 0.3 H when connected to 240 V DC supply draws a current of 1 A and runs at 2000 rpm. If it is supplied by 240 V ,50 Hz AC supply with current of 1.5 A; Calculate i) speed ii) power factor **[8]**

OR

Q6) a) What are the modifications necessary in construction of dc series motor to operate it on ac supply? **[4]**

b) Draw the approximate phasor diagram of AC series motor & explain.**[6]**

c) Compare conductively compensated and inductively compensated series motor. **[8]**

Q7) a) State the types of 1-ph induction motors. Write applications of capacitor start lM. **[3]**

b) Draw the equivalent circuit of 1 –ph induction motor for no load and blocked rotor test . Write the necessary formulae used. **[6]**

c) Sketch the torque-slip characteristics of 1–ph Induction motor based on double field revolving theory. Prove , how the 1–ph induction motor is not self-starting by mathematically & graphically. **[8]**

OR

Q8) a) What are the necessary conditions to make 1–ph induction motor self-starting? **[3]**

b) Compare single phase motor with 3 phase induction motor. **[6]**

c) 500W, 240 V, 50 Hz, single phase capacitor start induction motor has following constants Main winding: Zm=4. 5 +j 3.7 Ω & Auxiliary winding; Za= 9.5 +j3.5 Ω , Determine value of C which will develop maximum starting torque. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3805

[Total No. of Pages : 2

[6262]-65
T.E. (Electrical Engineering)
ELECTRICAL INSTALLATION DESIGN AND CONDITION BASED MAINTENANCE
(2019 Pattern) (Semester - I) (303144)

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) ***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 - programmble calculator is allowed.***

Q1) a) What is the importance and necessity of maintenance? **[4]**

b) What are the different failure modes of transformer? Explain in detail. **[6]**

c) Explain planned and preventative maintenance of alternator. **[8]**

OR

Q2) a) Write a short note on Dissolved gas analysis. **[4]**

b) Explain the process of condition monitoring of on load tap changer. **[6]**

c) How transformer oil gets contaminated? With suitable diagram explain the reconditioning process of transformer oil. **[8]**

Q3) a) Write a short note on Quotation. **[3]**

b) What are the qualities of good estimator? **[6]**

c) What is Tender? State & explain Guidelines for inviting tenders. **[8]**

OR

Q4) a) Write a short note on Price Catalogue. **[3]**

b) State and explain essential elements of estimating and costing. **[6]**

c) Explain how to calculate labor rates for internal wiring. **[8]**

P.T.O

Q5) a) Write a short note on Current carrying Capacity for conductor size calculations. **[4]**

b) Write down all rules for residential wiring work. **[6]**

c) Explain the procedure of installation of underground LT service line. **[8]**

OR

Q6) a) Write a short note on Voltage Drop for conductor size calculations. **[4]**

b) Explain various residential wiring methods with diagrams. **[6]**

c) A single room house receives supply voltage of 200 V. Length of wire from switch fuse unit to the working point is 33 meters. The current requirement is only 5 Ampere. Referring standard table find suitable size of conductor so that voltage drop is within the limit. **[8]**

Size of Conductor		2 Cables D.C. or Single-phase A.C.		3 or 4 Cables of balanced 3-phase		4 Cables D.C.	
Normal area sq. mm.	Number and diameter of wire in mm.	Current rating in amperes	Approx. length of run for volt-drop in Metres	Current rating in Amperes	Approx. Length of run for 1 volt drop in meters	Current rating in Amperes	Approx. length of run for 1 volt drop in metres
1.5	1/1.40	10	2.3	9	2.9	9	2.5
2.5	1/1.80	15	2.5	12	3.6	11	3.4
4.0	1/2.24	20	2.9	17	3.9	15	4.1
6.0	1/2.80	27	3.4	24	4.3	21	4.3
10.0	1/3.55	34	4.3	31	5.4	27	5.4
16.0	7/1.70	43	5.4	38	7.0	35	6.8
25.0	7/2.24	59	6.8	54	8.5	48	8.5
35.0	7/2.50	69	7.2	62	9.3	55	9.0
50.0	7/3.0 19/1.80	91	7.9	82	10.1	69	10.0

Q7) a) List out the methods for administering artificial respiration. **[3]**

b) Explain with neat diagram Insulation resistance test between installation and earth. **[6]**

c) Write a short note on CAT Ratings and CAT rated instruments. **[8]**

OR

Q8) a) List out contents of First Aid Box. **[3]**

b) What is the use of Guard Terminal in IR test? Explain in detail. **[6]**

c) Classify Hazardous area and explain how they can be prevented. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3806

[Total No. of Pages :2

[6262]-66

T.E. (Electrical Engineering)

ADVANCED MICROCONTROLLER AND EMBEDDED SYSTEMS

(2019 Pattern) (Semester- I) (Elective-I) (303145A)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) List the step for compare mode programming of CCP module of PIC18. **[4]**

b) Explain bit configuration of CCP1CON. **[6]**

c) Write a C program to create 2 KHz PWM frequency with 75% duty cycle on CCP1 pin. Assume XTAL = 10Mhz. **[8]**

OR

Q2) a) Describe programming steps of PWM mode. **[4]**

b) Explain how time period and duty cycle is set for generation of a waveform using PWM mode of CCP module. **[6]**

c) Write a program to generate a square wave with frequency 10 kHz and 50% duty cycle on the CCP1 pin, use Timer1. **[8]**

Q3) a) Differentiate between Interrupt method and polling method. **[3]**

b) Explain interrupt structure of PIC 18 with neat diagram. **[6]**

c) Write a C program to toggle an LED connected to pin RB7 on occurrence of an interrupt INTO. **[8]**

OR

Q4) a) Explain use of INTOIF in INTCON. **[3]**

b) What the steps in executing an interrupt. **[6]**

c) Write a program to generate a square wave that is half the frequency of signal applied at INTO on PORTB.5. **[8]**

P.T.O.

Q5) a) Which bits are used to set the conversion time of ADC? **[4]**

b) Explain bit configuration of ADCON0. **[6]**

c) Write a C program to get data from Channel 0 (AN0) using ADC interrupt and displays the result on PORTC and PORTD. **[8]**

OR

Q6) a) State the features of ADC of PIC18F458. **[4]**

b) State the Sensors used for temperature measurement. Draw flow chart for temperature measurement using ADC of PIC 18. **[6]**

c) With the help of interfacing diagram explain how PC microcontroller can be used to measure temperature using LM35. **[8]**

Q7) a) Explain importance of TSR in serial communication. **[3]**

b) Write a program for PIC18 to transfer the letter 'T' serially at the baud rate of 9600, continuously. Assume XTAL = 10MHz. **[6]**

c) Draw and explain Serial communication USART transmit block diagram. **[8]**

OR

Q8) a) Explain how 8 and 9 bit data is transmitted in serial communication? **[3]**

b) Write down programming steps to transfer data serially. **[6]**

c) What are the steps for SPI read and write protocol for single byte? **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3807

[Total No. of Pages : 3

[6262]-67
T.E. (Electrical)
DIGITAL SIGNAL PROCESSING
(2019 Pattern) (Semester - I) (303145 B) (Elective - 1B)

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) ***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) State and prove following properties of DTFT **[8]**

i) Linearity

ii) Time Shifting

b) For the sequence given below find the frequency response, plot magnitude and phase response for $\omega = -\pi$ to π with step size of $\frac{\pi}{3}$ **[9]**

$$h(n) = \frac{1}{2}[\delta(n+2) + \delta(n-2)]$$

OR

Q2) a) Explain frequency response of first order system. **[8]**

b) Find the discrete time Fourier transform of following if exists. If does not exists give the reason. **[9]**

i) $0.25^n u(n)$

ii) $\delta(n-1) - \delta(n+1)$

iii) $3^n u(n)$

P.T.O.

Q3) a) Prove the relation between **[8]**

i) Z-transform and DTFT

ii) Z-transform and DFT.

b) Find the DFT of the sequence $x(n) = \{1, 1, 1, 1\}$ using DIT FFT algorithm. **[9]**

OR

Q4) a) State and prove following properties of DFT **[8]**

i) Linearity

ii) Time delay

b) Find circular convolution of following sequence. **[9]**

$x_1(n) = \{1, 2, 0, 1\}$ and $x_2(n) = \{2, 2, 1, 1\}$

From circular convolution obtain linear convolution.

Q5) a) State following statements are true or false with justification **[6]**

i) To get correct information of any signal sampling frequency must be equal to greater than maximum frequency present in the signal.

ii) In filter realization, number of memory location required in direct form-II structure are less than direct form-I structure

b) For the analog transfer function $H(s) = \dfrac{2}{(s+3)(s+2)}$. Determine $H(z)$ using bilinear transformation method. Assume T = 1 sec. **[6]**

c) Compare FIR and IIR filters. **[6]**

OR

Q6) a) Obtain direct form-I and direct form-II realization for the system described by difference equation. **[8]**

$$y(n) = \frac{1}{2}y(n-1) - \frac{1}{4}y(n-2) + x(n) + \frac{2}{5}x(n-1)$$

b) Design low pass IIR filter using following specifications **[10]**

$\alpha_p = 1dB$, $\alpha_s = 22dB$, F_p, $= 1kHz$, $F_s = 10kHz$.

Use bilinear transformation to convert analog filter into digital filter with sampling frequency of 100Hz.

Q7) a) Design an ideal low pass filter with frequency response **[10]**

$$H_d(e^{j\omega}) = 1 \text{ for } -\frac{\pi}{2} \le |\omega| \le \frac{\pi}{2}$$

$$H_d(e^{j\omega}) = 0 \text{ for all other values of } \omega$$

Find the values of $h(n)$ for N = 7.

b) Explain any one method used to determine frequency of a signal using DSP. **[8]**

OR

Q8) a) Obtain direct form realization of system function **[6]**

$H(z) = 1 + 2z^{-1} - 3z^{-2} - 8z^{-4}$

b) Differentiate between Analog and Digital Filters. **[6]**

c) Write short note on "Application of DSP for protective relaying". **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB3808

[Total No. of Pages : 3

[6262]-69

T.E. (Electrical)

POWER SYSTEM - II

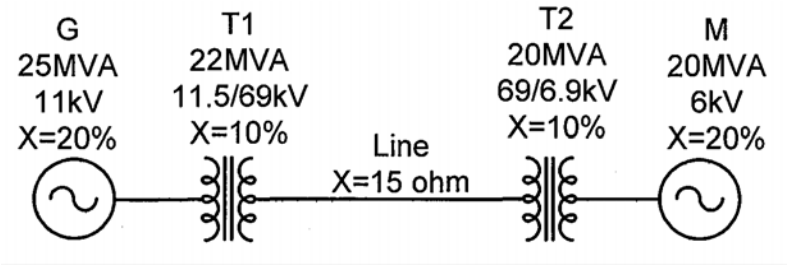
(2019 Pattern) (Semester - II) (303148)

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) ***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.***

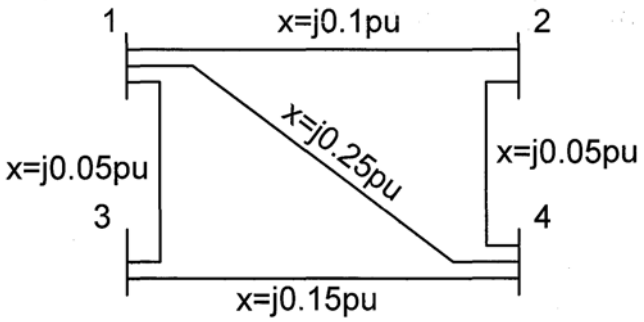
Q1) a) Take base MVA = 25MVA and base kV = 69kV on transmission network and draw per unit reactance diagram to these base values. **[10]**



b) What are the assumptions made in fast decoupled load flow? Elaborate each assumption with justification. **[7]**

OR

Q2) a) Find the Y-BUS of the following system. **[10]**



b) State the advantages and disadvantages of per unit system in power system analysis. **[7]**

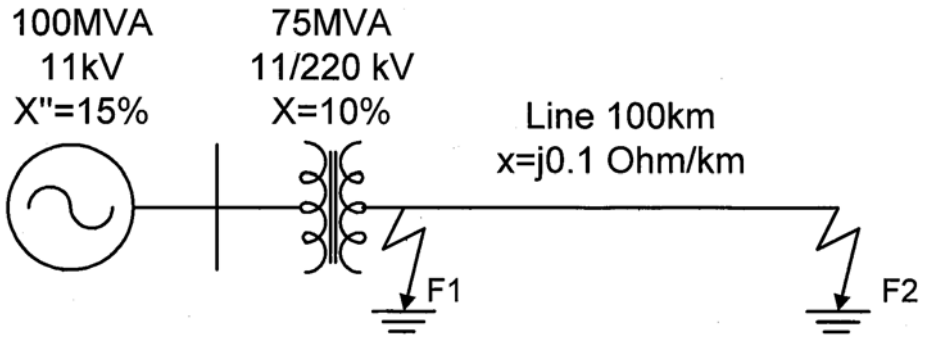
P.T.O.

Q3) a) Calculate fault current in kA, if the three-phase bolted fault is **[10]**

i) at point Fl and

ii) At point F2.

(Take base of 11kV and 100MVA on generator)



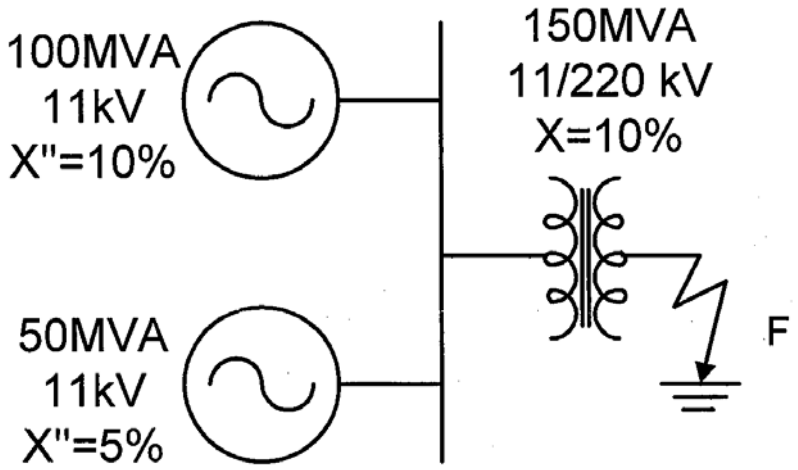
b) State whether the following statements are true or false with justification**[7]**

i) In case of a phase fault at the terminal of an unloaded alternator, the sub-transient state current is smaller than the transient and steady state current.

ii) The three-phase fault is more severe when the fault is far away from the generator terminal.

OR

Q4) a) If three-phase fault occurs at point F, find the fault current supplied by each generator in kA. Take base of 100MVA, 11kV on generator side.**[10]**



b) What are the different types of current limiting reactors? Explain any one in detail with advantages and disadvantages. **[7]**

Q5) a) A three-phase 100MVA synchronous generator with line-to-line voltage of 11kV is subjected to a line-to-ground fault. The sequence reactance are x_1 = j0.3*pu*, x_2 = *j*0.l*pu* and x_0 = *j*0.05*pu*. **[10]**

i) Find the fault current supplied by the alternator.

ii) If the neutral of the alternator is ground through a resistance of 0.1 pu, find the fault current.

b) In three phase transmission line, show that positive, negative and zero sequence impedance $Z_1 = Z_2 = Z_s - Z_m$ and $Z_0 = Z_s + 2Z_m$ where Z_s is self impedance and Z_m is mutual impedance of lines. **[8]**

OR

Q6) a) Across a star-connected symmetrical impedance load of 10Ω is have per phase voltage of $V_a = 100\angle 0°V$, $V_b = 95\angle -120°V$, $V_a = 105\angle 115°V$. Find line currents using symmetrical components. **[10]**

b) Derive the equation of fault current in line to line fault. **[8]**

Q7) a) Draw the complete single line diagram of HVDC system showing all components and elaborate on any three components in detail. **[10]**

b) Compare HVDC and EHVAC transmission systems. **[8]**

OR

Q8) a) What are different types of HVDC link? With neat diagram, elaborate each type in details. **[10]**

b) What are different control strategies used in HVDC transmissions? Elaborate any two in detail. **[8]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3809

[Total No. of Pages : 2

[6262]-70

T.E. (Electrical Engineering)

COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES

(2019 Pattern) (Semester - II) (303149)

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) ***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) Derive the equation for magnetizing current in terms of magnetizing volt-amperes, and no load current for three phase transformers. **[8]**

b) Explain the significance voltage regulation in transformers. By making changes in the design of transformers, explain how it can be controlled to standard values of voltage regulation. **[9]**

OR

Q2) a) With the help of neat figures, Explain the mechanical forces developed by leakage fluxes and their effect in the transformers. Also explain how to limit these forces developed in the design stage of transformer. **[8]**

b) A 500 kVA, 11000/433 V, 50 Hz, three phase delta-star, core type transformer has 500 turns on h.v. winding. The height of the winding is 0.6 m and the length of mean turn 1.3 m. calculate the instantaneous radial force on the h.v. winding if the short circuit occurs at the terminals of l.v. winding with h.v. energized. The leakage impedance id 5 %. The doubling effect multiplier as 1.8. Also calculate force at full load. **[9]**

Q3) a) Derive the output equation for AC machines. From the same kVA input equation for the three phase induction motor. **[9]**

b) Determine the main dimensions of three phase, 70 h.p., 415 V, star connected, 6- pole, 50- Hz induction motor for which the specific electric and specific magnetic loadings are 32000 A/m and 0.51 wb/m^2 respectively. The motor has power factor of 0.91 and efficiency of 90 per cent. Assume pole pitch equal to core length. **[9]**

OR

P.T.O.

Q4) a) Explain the factors considered while selecting the values of specific electric loading in the design of three phase induction motor. **[9]**

b) Draw the winding diagram for any one phase for a 4-pole, 24 slots, three phase mush connected stator of induction motor. **[9]**

Q5) a) Explain the factors affecting length of air gap of three phase induction motor. **[9]**

b) Explain the rules that are considered for selecting the rotor slots. **[5]**

c) List the methods used to reduce the harmonic torques produced in three phase induction motor. **[4]**

OR

Q6) a) Derive the equation for the end-ring current with usual symbols and their units. **[9]**

b) A 10 h.p., three phase, 4-pole, 50 Hz, 415 V, Star connected induction motor has 54 stator slots, each containing 9 conductors. Calculate the values of bar and end ring currents. The number of rotor bars is 64. The machine efficiency 85 % and power factor is 0.85. Assume the rotor mmf as 85% of stator mmf. If the current density is 5 A/mm^2, determine the bar and end-ring size. **[9]**

Q7) a) Explain the effect of length of air-gap on magnetizing current and no-load current of three phase induction motor. What are the components of total mmf of magnetizing circuit of three phase induction motor? **[8]**

b) Discuss the various losses taking place in various parts of the three phase induction motor. **[9]**

OR

Q8) a) With suitable sketches, explain the various leakage fluxes produced in the three phase induction motor. **[8]**

b) Explain the advantages of digital computers in the design of electrical machines. Plot Explain the flowchart for calculating the main dimensions of three phase induction motor. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4400

[Total No. of Pages : 2

[6262]-71

T.E. (Electrical Engineering)

CONTROL SYSTEM ENGINEERING

(2019 Pattern) (Semester-II) (303150)

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) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain two special cases of Routh Hurwitz criterion to determine stability. **[8]**

b) Sketch the root locus, for unity feedback system determines range of values of K and comment on stability. **[10]**

$$G(s) = k/s(s+3)(s+6)$$

OR

Q2) a) Explain any four rules for construction of root locus with example? **[8]**

b) The OLTF of a unity feedback system is given by **[10]**

$$G(s) = k / s(s+1)(s+3)(s+4).$$

Find value of K for the stability of system, using Rouths stability criteria.

Q3) a) Explain different frequency domain specifications. **[7]**

b) Sketch polar plot for the system given. Also determine GM and PM.

$G(s)\,H(s) = k/s\,(s+1)\,(s+2)$. **[10]**

OR

P.T.O.

Q4) a) Explain briefly stability criteria for Nyquist plot with example. **[7]**

b) Draw Nyquist plot for the system whose open loop transfer function is

$$G(s) = k/(s+2)(s^2+4)$$ **[10]**

Q5) a) State advantages of Bode plot **[6]**

b) Draw Bode plot for a unity feedback system with G(S) given as. Also GM, PM and comment on stability of system.

$$G(s) = 100(s+3) / s\,(s+1)\,(s+5).$$ **[12]**

OR

Q6) a) Explain terms gain cross over frequency, phase cross over frequency, gain margin and phase margin in Bode, plot. **[6]**

b) Sketch bode plot and Find the gain margin and phase margin for a unity feedback system having

$$G(s) = 10 / s\,(s+1)\,(s+10)$$ **[12]**

Q7) a) Obtain the tuning of PID controller for a unity feedback system with open loop transfer functions as using Ziegler Nichols method

$$G(s) = 1 / s\,(s+1)\,(s+3)$$ **[10]**

b) Derive the transfer function of armature control D.C. servo motor? **[07]**

OR

Q8) a) Draw block diagram and Explain P, PI, PID controller. **[10]**

b) Draw the circuit diagram of lead compensator network and derive transfer function also plot pole-zero location in S-plane? **[07]**

Total No. of Questions : 8]

SEAT No. :

PB-3810

[Total No. of Pages : 2

[6262]-72

T.E. (Electrical Engineering)

IOT AND ITS APPLICATIONS IN ELECTRICAL ENGINEERING

(2019 Pattern) (Semester - II) (303151A) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve 01 or 02,03 or 04, 05 or 06,07 or 08.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicates full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Three LEDs are connected to pin nos. 5, 6 and 7 of Arduino UNO board. Write a program in C to glow the LED one by one with a delay of 2 seconds continuously. **[9]**

b) Explain with syntax and example, following control statements in Python. **[9]**

i) Nested if-else

ii) While loop

iii) For loop

OR

Q2) a) Write a short note on Raspbian Integrated Development Environment (IDE) **[9]**

b) Write a program in Python to accept lower and upper limit of a range of numbers from user and print all the odd numbers in that range. **[9]**

Q3) a) Write a program to read data from DHT11 sensor and display it on serial monitor using Arduino IDE. Sensor is connected to D4 pin of Node MCU. **[9]**

b) Differentiate between digital and analog sensors. Give two examples of each type. **[8]**

OR

P.T.O.

Q4) a) Write a program to read data from LM35 sensor and display the temperature in °F and °C every 2 seconds on serial monitor using Arduino IDE. Sensor is connected to D4 pin of NodeMCU. **[9]**

b) Explain with a neat diagram, interfacing of stepper motor with NodeMCU **[8]**

Q5) a) State and explain salient features of IEEE 802.11 standard for Wi-Fi technology. **[9]**

b) Write a short note on Zigbee communication technology. **[9]**

OR

Q6) a) State and explain salient features of Bluetooth communication technology. **[9]**

b) Write a short note on GLowPAN communication technology. **[9]**

Q7) a) Explain in detail Data Analysis in IoT system. **[9]**

b) State and explain the steps in reading the sensor data and send it to cloud platform. **[8]**

OR

Q8) a) What is API in IOT Cloud ? Explain in short, its 4 types. **[9]**

b) With a suitable block diagram, explain simple IOT application of Home Automation. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3811

[Total No. of Pages : 2

[6262]-73

T.E. (Electrical Engineering)

ELECTRICAL MOBILITY

(2019 Pattern) (Semester - II) (303151B) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q 3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Why Balancing of cells is required in battery? Explain any two Active cell balancing method with neat diagram. **[9]**

b) Explain Constant current charging algorithm used in battery charging. **[8]**

OR

Q2) a) State various SOC estimation methods used in batteries, Explain any two methods. **[9]**

b) Draw block diagram of Battery Management System and explain it. **[8]**

Q3) a) Draw and Explain Antilock Brake System In Electric vehicle. **[9]**

b) Draw Control Architecture of HEV and all electronic control systems. **[9]**

OR

Q4) a) Explain energy consumption of Electric Vehicle in braking. **[9]**

b) Draw schematic diagram of series HEV drive train and explain its working. **[9]**

P.T.O.

Q5) a) Write a note on sizing the motor for electric hybrid vehicles. **[9]**

b) Write KW rating of AC chargers. Explain Fast Charger types and state applications. **[8]**

OR

Q6) a) Explain BLDC drives for HEV and list advantages of it. **[9]**

b) Write note on battery swapping. **[8]**

Q7) a) Compare V2H, V2V and V2G (any 3 points). **[9]**

b) Explain V2G concept and state advantages of V2G **[9]**

OR

Q8) a) Draw Flowchart for EV Charging Infrastructure and explain it. **[9]**

b) Draw and Explain Diagram for modeling of V2G ancillary serives. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3812

[Total No. of Pages : 2

[6262]-74

T.E. (Electrical Engineering)

CYBERNETICS ENGINEERING

(2019 Pattern) (Semester - II) (303151C) (Elective-II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer any one question from each pair of questions: Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7&Q.8***
2) ***Figures to the right side indicate full marks.***

Q1) a) Explain the terms transfer function, poles, zero and pole-zero plot and explain types of control systems. **[9]**

b) What do you mean by a multivariable control system? Give example. **[8]**

OR

Q2) a) Draw the block diagram of the adaptive control system and explain it with a Model Reference Adaptive Scheme. **[9]**

b) List out differentiating points for linear and nonlinear control system. **[8]**

Q3) a) Describe the components of the electrical system used in mathematical modeling **[8]**

b) Describe how the linearization of the nonlinear system is carried out. **[9]**

OR

Q4) a) Explain the use of software tools in mathematical modeling. **[8]**

b) Obtain the representation of separately excited DC motor using linear ordinary differential equations **[9]**

P.T.O.

Q5) a) Sketch computer architecture and explain it. **[8]**

b) What are various analog and digital interfaces? **[10]**

OR

Q6) a) What are the different system components needed for embedded and industrial applications? Explain them. **[8]**

b) How data communication is carried out in the industrial environmental.**[10]**

Q7) a) Define optimization. List out at least five applications of optimization.**[8]**

b) Explain the particle swarm optimization method using the example. **[10]**

OR

Q8) a) Write a statement about an optimization problem **[8]**

b) Describe the Genetic Algorithm using examples **[10]**

Total No. of Questions : 8]

SEAT No. :

PB3813

[Total No. of Pages : 2

[6262]-75

T.E. (Electrical)

ENERGY MANAGEMENT

(2019 Pattern) (Semester - II) (303151D) (Elective - II)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables in allowed.***

Q1) a) Discuss various tariff structures conducive to energy management. Explain mechanism levy of penalties and rebates for demand management. **[9]**

b) Discuss the implementation demand side management for domestic and commercial consumers. **[9]**

OR

Q2) a) Explain limitations of Supply Side Management. **[8]**

b) i) Explain features of ISO 50001- Energy Management.

ii) Solar thermal applications for energy management.

[10]

Q3) a) Why energy audit is important? Explain steps in detailed energy audit.**[9]**

b) Explain in detailed cumulative sum of difference method. How energy saving can realised from this method? **[8]**

OR

Q4) a) Discuss use of various instruments for energy audit. **[9]**

b) Discuss importance of data analytics. Also discuss data quality processing of energy audit. **[8]**

P.T.O.

Q5) a) For energy conservative project initial investment of Rs. 1000000 is required. The revenue generation for six years is Rs. 225000 each. Using discounting factor of 10% calculate net present value of the project. **[9]**

b) Discuss the financial appraisal criteria for economic feasibility. **[9]**

OR

Q6) a) During energy audit it is decided to replace worn out induction motors with new high efficiency motors of same capacity. The specification of motors are given below. Calculate payback period by taking rate of electricity as Rs. 6/kWh and demand rate as Rs. 350/kVA/month. **[9]**

Description	Old motor	Energy Efficiency Motors
Rating of machine	50HP	50HP
Number of motors	5	5
Operating hours per annum	6500	6500
Efficiency near full load	89%	93%
Power factor near full load	0.85 lag	0.89 lag
Capital cost	--	Rs. 600000/- (each)
Scrap value	Rs. 125000/-(each)	--

b) Discuss energy audit case study of Sugar Industry. **[9]**

Q7) a) Discuss measures to reduce losses in Transmission and Distribution Systems. **[9]**

b) Explain various electrical energy efficient systems. **[8]**

OR

Q8) a) Discuss energy saving options in motor and drive systems. **[9]**

b) Explain energy conservation in compressor system. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3814

[Total No. of Pages : 2

[6262]-76
T.E.(Electronics)
POWER AND INDUSTRIAL ELECTRONICS
(2019 Pattern) (Semester -I) (304201)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1or 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) Illustrate Three Phase Controlled Rectifier Using IGBT. **[8]**

b) Illustrate Single Phase PWM Rectifier using IGBT. **[9]**

OR

Q2) a) Explain Three Phase Semi converter for R Load with suitable waveforms. **[8]**

b) Elaborate Single Phase Full converter for R Load with suitable waveforms. **[9]**

Q3) a) What is Chopper? Illustrate Step down chopper for R load in details. **[9]**

b) A chopper circuit is operating on TRC principle at a frequency of 2KHz on a 220V d.c.supply. If the load voltage is 170V , compute the conduction and blocking period of thyristor in each cycle. **[9]**

OR

Q4) a) Explain 2 quadrant & 4 quadrant choppers in details. **[9]**

b) Write a short note on SMPS. **[9]**

Q5) a) Illustrate Single phase full bridge inverter for R loads. **[9]**

b) Write a short note on Need of PWM inverters. **[8]**

OR

Q6) a) Elaborate Voltage control of single phase inverters. **[9]**

b) Elaborate three Phase voltage Source inverter 120 degree mode for balanced star R load. **[8]**

P.T.O.

Q7) a) Elaborate Induction heating applications. **[9]**

b) Write a short note on HVDC transmission system. **[9]**

OR

Q8) a) Illustrate Battery Charging Application. **[9]**

b) Explain UPS: ON-line and OFF line. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3815

[Total No. of Pages :2

[6262]-77
T.E. (Electronics Engineering)
ELECTROMAGNETIC WAVES & PROPAGATION THEORY
(2019 Pattern) (Semester-I) (304202)

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) ***Figures to the right indicates full marks.***
3) ***Assume &Mention the suitable data.***

Q1) a) Write Maxwells equations for static field. **[8]**

b) Write Maxwells equations for Time varying field. **[8]**

c) Define Displacement current density. **[2]**

OR

Q2) a) Write Maxwell's equations for pure conductor. **[8]**

b) Write Maxwell's equations for pure dielectric medium. **[8]**

c) State faraday's law of emf. **[2]**

Q3) a) Derive expressions of Wave (Uniform plane wave) in free space. **[8]**

b) Define skin depth. **[3]**

c) Explain Linear, Circular and Elliptical polarization of wave. **[6]**

OR

Q4) a) Derive uniform plane wave equation using Maxwell's equations. **[10]**

b) Explain modes of wave propagation. **[7]**

P.T.O.

Q5) a) Derive expression of characteristic impedance of transmission of line. **[7]**

b) Explain impedance transformation in low loss transmission line. **[8]**

c) Define transmission line. **[2]**

OR

Q6) a) Define propagation constant, characteristic impedance, Reflection coefficient & write their equation. **[9]**

b) Describe primary constants in transmission line. **[8]**

Q7) a) What is waveguide. Explain its types. **[8]**

b) Explain cut off wavelength, guide wavelength, phase velocity, wave impedance & group velocity. **[10]**

OR

Q8) a) Explain TE & TM modes of waveguides. **[8]**

b) Explain Rectangular waveguides in detail. **[4]**

c) What is cavity resonator. Give structural details of striplines. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3816

[Total No. of Pages : 2

[6262]-78
T.E. (Electronics/E&TC)
DATABASE MANAGEMENT
(2019 Pattern) (Semester - I) (304183)

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 from following questions.***
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 any three SQL data types with example. **[6]**

b) Explain use of group by having clause and order by clause. **[6]**

c) Explain the any three aggregate functions in MYSQL with suitable example. **[6]**

OR

Q2) a) Explain any three string functions used in MYSQL with example. **[6]**

b) Differentiate between Primary key and Foreign key. **[6]**

c) Explain three types of outer join. **[6]**

Q3) a) Explain two phase locking protocol with example. **[6]**

b) What are the ACID properties of the transaction? **[6]**

c) Explain the concept of serial schedule and serializable schedule. **[5]**

OR

Q4) a) Explain when deadlock occurs and how to recover if dead lock takes place. **[6]**

b) Explain advantages of concurrent execution of transactions. **[6]**

c) Explain the concept of recoverable and non recoverable schedules with suitable example. **[5]**

P.T.O

Q5) a) Explain client server architecture with suitable database application. **[6]**

b) Draw and explain memory structure of instance in Oracle architecture. **[6]**

c) Draw and explain 3-tier web architecture. **[6]**

OR

Q6) a) Explain virtualization in multicore processor. **[6]**

b) Explain shared disk architecture with its advantages and disadvantages. **[6]**

c) Explain the intra query parallelism query evaluation technique. **[6]**

Q7) a) Explain the types of distributed database system. **[6]**

b) Draw and explain client-server architecture for DDBMS. **[6]**

c) Explain data fragmentation types in distributed database design (any two). **[5]**

OR

Q8) a) Explain the advantages of distributed database management system? **[6]**

b) What is distributed transaction? Explain the types of system failure modes (any two). **[6]**

c) Explain two phase commit protocol in distributed database. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3817

[Total No. of Pages : 2

[6262]-79
T.E. (Electronic Engineering)
MICROCONTROLLERS AND APPLICATIONS
(2019 Pattern) (Semester - I) (304204)

Time : 2½ 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.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the TCON (timer control) register of timer of 8051 microcontroller in detail. **[6]**

b) Write a program for the 8051 to transfer "YES" serially at 9600 baud, 8-bit data, 1 stop bit, do this continuously. **[6]**

c) Explain motion detector sensor with pin diagram. Draw interfacing of motion detector with 8051 microcontroller also write an embedded c program for the same/to turn on the buzzer. **[8]**

OR

Q2) a) Draw interfacing of opto-isolator with 8051 microcontroller also write an embedded c program for the same. **[6]**

b) Draw interfacing diagram of DAC 0808 with 8051 microcontroller, write an embedded c program to generate triangular waveform. **[6]**

c) A switch is connected to pin P2.7. Draw interfacing diagram and write an Embedded C program to monitor the status of SW and perform the following : **[8]**

i) If SW=0, the stepper motor moves clockwise.

ii) If SW= 1, the stepper motor moves counterclockwise.

Q3) a) Draw and explain the block diagram of Timer 1 of PIC18Fxx microcontroller in 16 bit mode. **[8]**

P.T.O

b) Explain the following instructions of PICI8FXX microcontroller. **[8]**

i) MOVLW

ii) ADDWF

iii) XORLW

iv) RLCF

OR

Q4) a) Explain program memory organization of PICI 8FXXX microcontroller with neat diagram. **[8]**

b) Draw and explain architecture/block diagram of PICl8Fxxx microcontroller. **[8]**

Q5) a) Explain capture mode operation in timer of PIC 18FXXX with neat diagram and write programming steps for the same. Give difference between compare mode and capture mode. **[8]**

b) Draw LED interfacing diagram to PIC1 8FXXX and write Embedded C program to blink LEDs. **[8]**

OR

Q6) a) Draw Interfacing of keypad with PIC 18FXXX microcontroller and explain key pressed detection with the help of flow chart. **[8]**

b) Draw and explain Interrupt structure of PIC18F458 microcontroller. **[8]**

Q7) a) Draw and explain digital multimeter using 8051 microcontroller. Also write algorithm for the same. **[9]**

b) Draw and explain water level monitoring and control using PIC18FXXX microcontroller Also write algorithm for the same. **[9]**

OR

Q8) a) Draw and explain block diagram of data acquisition system for temperature measurement using any one microcontroller. Also write algorithm for the same. **[9]**

b) Design home protection system using PICl8Fxxx. Write algorithm and embedded c program for same. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3818

[Total No. of Pages : 2

[6262]-80

T.E. (Electronics Engineering)

INSTRUMENTATION SYSTEMS

(2019 Pattern) (Semester - I) (304205) (Elective-I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, and Q7or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain Static, Stagnation and dynamic pressure in static tube. **[6]**

b) With the help of neat diagram explain working of Pitot tube flow meter. **[6]**

c) With the help of neat diagram explain working of variable area meter/ Rotameter. State its advantages and disadvantages. **[8]**

OR

Q2) a) With the help of neat diagram explain working of transit time ultrasonic flow Meters. **[6]**

b) With the help of neat diagram explain capacitance level sensor for conductive Liquid. **[6]**

c) With the help of neat diagram explain Radiation type level detection and Hydrostatic Pressure type Level Sensor. **[8]**

Q3) a) With the help of neat diagram explain linear absolute optical encoder. Compare Absolute optical encoder and incremental optical encoder. **[8]**

b) Explain structure of CMOS image sensor cell. Compare CCD and CMOS sensor. **[8]**

OR

P.T.O.

Q4) a) Draw construction diagram and explain working of phototransistor. Compare Photo diode and Photo transistor. **[8]**

b) Explain linear and rotary resistive displacement transducer and capacitive displacement transducer. **[8]**

Q5) a) With the help of neat construction diagram explain Hall Effect Magnetic field sensors and PZT sensors and actuators. **[8]**

b) With the help of neat block diagram explain Smart sensor. State its advantages. **[8]**

OR

Q6) a) With the help of neat construction diagram explain Magneto-Resistive Elements (MRE) and Magneto transistors. **[8]**

b) Explain surface micromachining process with the help of neat diagram. **[8]**

Q7) a) What is actuator? Explain structure of actuator. Compare sensors and actuators. **[6]**

b) With the help of neat diagram explain Pressure control valve. **[6]**

c) Draw relay driver circuit using transistor and explain design of relay driver circuit using transistor. **[6]**

OR

Q8) a) Draw and explain Valve Actuation Symbol. **[6]**

b) With the help of neat diagram explain the operation of solenoid actuators. **[6]**

c) With the help of neat diagram explain double acting cylinder. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3819

[Total No. of Pages : 2

[6262]-81

T.E. (Electronics Engineering)

MACHINE LEARNING

(2019 Pattern) (Semester - I) (304205) (Elective-I)

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) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What do you understand by first order logic in artificial intelligence? Which are the types of quantifiers? Explain each quantifier by giving suitable example. **[9]**

b) Explain forward and backward chaining in artificial intelligence. **[9]**

OR

Q2) a) Compare prepositional and first order logic **[8]**

b) What are Bayesian networks. Why are they called probabilistic models? Explain Bayesian networks with the help of suitable example. **[10]**

Q3) a) What do you understand by Syntactic analysis? What are the challenges in syntactic analysis? Explain the concept of Augmented grammars.**[10]**

b) In Natural Language Processing, what are the ambiguity? How the ambiguities can be addressed by disambiguation? **[8]**

OR

Q4) a) Which are the probabilistic language models? List various probabilistic language modes. Explain any one in detail. **[10]**

b) Explain Semantic interpretation. How it can be used for probabilistic language processing? **[8]**

P.T.O.

Q5) a) What is Reinforcement learning? Give 2 examples of reinforcement learning. Compare and contrast between reinforcement learning and supervised learning **[8]**

b) What are the different types of learning in machine learning? Explain inductive learning. **[10]**

OR

Q6) a) What do you understand by passive reinforcement learning and active reinforcement learning. Give one example and explain. **[8]**

b) What do you understand by learning decision tree? Explain the decision tree learning with the help of an example. **[10]**

Q7) a) Draw a single neuron structure. Explain working principle of neuron. List various applications of neural networks. Explain any one application. **[8]**

b) With the help of neat block diagram, explain how an induction motor can be controlled using fuzzy logic controller. **[8]**

OR

Q8) a) What is fuzzy logic? Explain fuzzy semantics in artificial intelligence. What are pros and cons of fuzzy logic? **[8]**

b) What do you understand by PWM controller? With the help of block diagram explain how an PWM controller can be designed using neural networks. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3820

[Total No. of Pages : 2

[6262]-82

T.E. (Electronics/E&TC)

FUNDAMENTALS OF JAVA PROGRAMMING

(2019 Pattern) (Semester - I) (304185C) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Inheritance and types of Inheritances in java. **[8]**

b) With the help of proper example, explain use of super keyword. **[5]**

c) Write a program to calculate the length of a string. **[5]**

OR

Q2) a) Explain static and dynamic polymorphism with suitable example. **[8]**

b) What is an array? How to declare an array in Java? Compare C array with Java Array **[5]**

c) Write a program using command line argument to add two number **[5]**

Q3) a) What is the difference between interface and class? **[4]**

b) Design a package containing a class which defines a method to find area of circle. Import it in java application to calculate area of a circle. **[8]**

c) How do we add class or interface to a package? Explain with suitable example **[5]**

OR

P.T.O.

Q4) a) What is an interface in java ? How do we create it? Give the example to create and to implement the interface. **[8]**

b) What is a package? Explain with the help of a simple example. **[9]**

Q5) a) Differentiate between multithreading and Multitasking **[5]**

b) Explain life cycle of an applet **[8]**

c) Explain try and catch block. **[5]**

OR

Q6) a) What is Multithreading? Explain ways to create a thread in java. **[9]**

b) Write a program to handle arithmetic exception. **[5]**

c) Write a simple java program to create an applet. **[4]**

Q7) a) List difference between swing and AWT in Java. **[5]**

b) Write a Java program using Swing to create text field. **[8]**

c) Explain the classes associated with file handling **[4]**

OR

Q8) a) Create application to create window in Java deriving from Frame class to display message “Welcome to World of Java” **[7]**

b) Explain the hierarchy of AWT. **[5]**

c) Write a code in Java to open a file for writing **[5]**

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 3

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[6262]-83
T.E. (Electronic)
DATA COMMUNICATION
(2019 Pattern) (Semester - I) (304205D) (Elective - I)

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 from following questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) The parity check bits of a (7, 4) block code are generated by **[9]**

C5 = dl+d2+d3

C6 = dl+d2+d3

C7 = d2+d3+d4

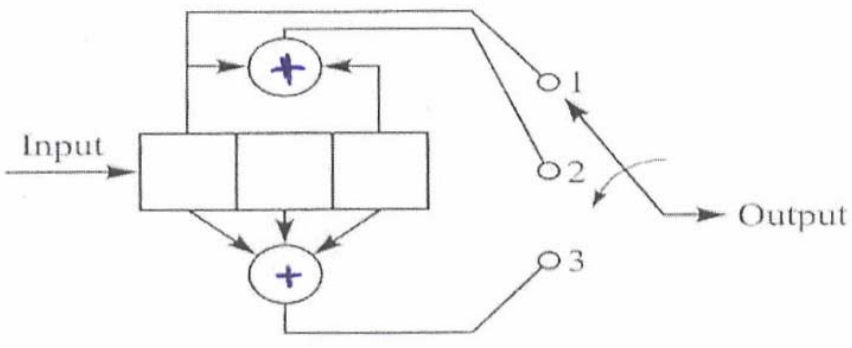
Where dl, d2, d3 and d4 are the message digits.

Find the generator matrix and parity check matrix for this code.

Find the minimum weight of this code.

Find error detecting capability of this code

b)



For the above convolutional encoder Draw the State diagram, code tree and find codeword for 10111 **[9]**

OR

P.T.O

Q2) a) Obtain the code words for the (6,3) LBC which has the generator Matrix of **[9]**

1 1 0 1 0 0

0 1 1 0 1 0

1 0 1 0 0 1

If code word C=101 110 is Transmitted and received code word is r =001110

obtain the correct code word

b) Explain in detail Go back N and stop and wait ARQ system. **[9]**

Q3) a) Apply shannon fano coding procedure to find the coding efficiency for the following message ensemble. Probabilities (0.4, 0.1, 0.1, 0.1, 0.08,0.08,0.4). **[9]**

b) Write a note on : **[9]**

i) Bandwidth SNR trade-off

ii) Use of orthogonal signal to achieve shannons limit

OR

Q4) a) Prove that, **[9]**

H (x,y) = H (x/y) + H (y)

H (x,y) = H (y/x) + H (x)

b) Apply Huffman encoding to following message ensemble. Find efficiency. **[9]**

x=[x1 x2 x3 x4 x5 x6 x7]

probabilities = [03,0.2,0.2,0.15,0.1,0.05]

Q5) a) Explain QPSK transmitter and receiver with neat block diagram with signal space and spectrum **[9]**

b) Explain ASK in detail with the help of transmitter and receiver block diagram with signal space and spectrum **[9]**

OR

Q6) a) Explain with the help of neat block diagram 16-bit QAM transmitter and receiver. with signal space **[9]**

b) Explain OFDM transmitter and receiver with neat block diagram and spectrum. **[9]**

Q7) a) Write a note on pure and slotted ALOHA **[8]**

b) Consider a Fast hop -SS system with binary FSK, 2 hops/symbol and a PN sequence with binary message 010010010000. The message is transmitted using following PN sequence {010, 110, 101, 100, 000, 101, 011, 001, 001, 111, 011 .....} plot the output frequency for input message **[8]**

OR

Q8) a) Explain the working of DS-SS transmitter & receiver with neat block diagram. **[8]**

b) Compare slow frequency hopping and fast frequency hopping. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3822

[Total No. of Pages : 2

[6262]-84

T.E. (Electronics Engineering)

COMPUTER NETWORKS

(2019 Pattern) (Semester - I) (304205) (Elective-I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer any one Question out of Q. No. 1 or 2, Q. No. 3 or 4 ,Q. No 5 or 6 and Q.No.7 or 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicatefull marks.***
4) ***Assume suitable data; jf necessary.***

Q1) a) Explain in detail flow control and error control function of Data Link Layer. **[8]**

b) What is the function of MAC layer? List the various multiple access techniques. Describe in brief any one controlled access protocol. **[9]**

OR

Q2) a) What is the significance of sliding window protocol? With neat diagram explain Go Back N & Selective Repeat Protocol. **[7]**

b) Describe in brief Data Link layer in IEEE 802.11 LAN. **[8]**

c) List the various connecting devices used in computer network. **[2]**

Q3) a) Explain IPV6 addressing technique **[6]**

b) With neat sketch explain IPV4 datagram format. **[6]**

c) How congestion control and QoS is maintained at transport layer? **[6]**

OR

P.T.O.

Q4) a) Explain in brief ARP and RARP address mapping protocol. **[8]**

b) With neat diagram explain Distance Vector Routing algorithm. **[8]**

c) List the functions of transport layer. **[2]**

Q5) a) With an example explain how to write a web page using HTML programming **[8]**

b) What is use of FTP & TFTP? Describe FTP in detail. **[9]**

OR

Q6) a) Explain http & www protocols. **[8]**

b) Explain in brief Ping & SNMP **[9]**

Q7) a) What is use of network monitoring software? **[6]**

b) How UTP Cabling with their standard is utilized for PC to PC communication **[6]**

c) What is use of Network tester? **[6]**

OR

Q8) a) Describe in brief uses of Cisco packet tracer and N52 software. **[9]**

b) Explain in detail use of Protocol Analyzer **[9]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3823

[Total No. of Pages : 2

[6262]-85

T.E. (Electronics Engineering)

FUNDAMENTALS OF HDL

(2019 Pattern) (Semester - II) (304212)

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) ***Figures to the right side indicate full marks.***

Q1) a) Differentiate between CPLD and FPGAs. **[8]**

b) Explain the need of PLD? Explain technologies involved in detail. **[9]**

i) Discrete technology

ii) Application specific integrated circuit

iii) PLD technology

OR

Q2) a) Explain macrocell of FPGA with neat diagram. **[8]**

b) Describe in brief types of FPGA technologies. **[9]**

Q3) a) Write HDL description of a full adder using Procedure. **[9]**

b) What are the differences between Procedure and Task. **[9]**

OR

Q4) a) Write VHDL function syntax with example. **[9]**

b) Explain difference between Task and Function. **[9]**

Q5) a) Explain different Verilog operators with example in detail. **[8]**

b) Explain the following data types in Verilog: **[9]**

i) Net

ii) Parameters

iii) Registers

OR

P.T.O.

Q6) a) Find the value of following expressions if the two unsigned variables A = 4'B1101 and B = 4'B1001 **[8]**

i) {A&&B}

ii) (A||B)

iii) {4{A}, 2{B}}

iv) B>>2

b) Write down short notes on following. **[9]**

i) Arrays

ii) Variables & Constant declaration

Q7) a) Explain with example dataflow modelling style in verilog. **[9]**

b) Write structural Level in verilog HDL for 4:1 Mux using 2:1 Mux **[9]**

OR

Q8) a) What are the elements in Verilog structural modeling style. **[9]**

b) Write Verilog code for JK flipflop with truthtable in behavioural style. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3824

[Total No. of Pages : 2

[6262]-86

T.E. (Electronics Engineering)

EMBEDDED PROCESSORS AND APPLICATIONS

(2019 Pattern) (Semester - II) (304213)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the function of Pin connect block of LPC 2148. Explain the PINSEL 0, and PINSEL 1 registers. **[6]**

b) Draw interfacing diagram of Relay with LPC 2148. Write an Embedded C program to turn ON and OFF relay. **[6]**

c) Explain following registers of GPIO of LPC2148 with example. **[8]**

i) IODIR

ii) IOSET

iii) IOCLR

iv) IOPIN

OR

Q2) a) Draw diagram interfacing for LED's at P 1.24 and P 1.31 of LPC 2148. Write embedded C program to blink LED connected to LPC 2148. Also draw flow chart. **[6]**

b) Draw pin diagram of 16 × 2 LCD. Explain the functions of the pins. **[6]**

c) List features of LPC 2148. Draw the block diagram (Architecture) of LPC 2148 and explain the functions of each block in brief. **[8]**

Q3) a) Interface GSM module with LPC 2148. Explain any four AT commands. Write an algorithm and draw flow chart for sending the message through GSM module. **[8]**

b) List features of UART 1 of LPC 2148 processor. Give the difference between UART 0 and UART 1. Explain Transmit Holding Register and Receiver Buffer Register. **[8]**

OR

P.T.O.

Q4) a) Explain DAC Register of on chip DAC of LPC 2148. Write an Embedded C program to generate Saw tooth/Ramp waveform generation using on chip DAC. Also Write algorithm and draw flowchart. **[8]**

b) List the features of on chip ADC in ARM7 LPC 2148. With the help of format explain the functions of ADC Control Register and ADC Data Registers of on chip ADC of ARM7 LPC 2148. **[8]**

Q5) a) Explain evolution of ARM processor architecture. Explain the advanced 3 stage pipeline and Operating Modes of the Cortex-M3 processor with suitable diagram. **[8]**

b) What is ARM Cortex series? Explain how ARM cortex series is suitable for embedded system design. Write the applications of ARM cortex series? **[8]**

OR

Q6) a) Explain the following w.r.t Cortex M3 **[8]**

i) Registers in Cortex-M3 processor

ii) Non-Vectored Interrupt Controller

iii) Tail-Chaining in NVIC

iv) Bus Interface and Debugging Support

b) What is CMSIS standard? Draw and explain the structure of CMSIS standard. **[8]**

Q7) a) Define Embedded System. Explain the characteristics of Embedded System. **[6]**

b) Explain case study of Smart energy meter using loT with detailed diagram. **[6]**

c) Draw and explain the block diagram of Embedded system with loT. **[6]**

OR

Q8) a) Explain case study of Waste Management for Smart City using IoT with detailed diagram. **[6]**

b) Draw architecture of Internet of Things. Explain functions of different layer. **[6]**

c) Explain Sensors and Actuators with suitable examples. Give difference between Sensors and Actuators. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3825

[Total No. of Pages : 2

[6262]-87

T.E. (Electronics)

INDUSTRIAL MANAGEMENT

(2019 Pattern) (Semester - II) (304214)

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.***

Q1) a) Describe in details different types of Qualities, Describe the different stages of Quality Management. **[9]**

b) What is the 5S? Explain in details 5S. **[9]**

OR

Q2) a) Explain different phases of quality management. **[9]**

b) What are the different ISO-Quality Management System Standard? **[9]**

Q3) a) What is Social Responsibility of Business? Explain in details. **[9]**

b) What are the different changing concepts of Business and Objectives of Business? **[8]**

OR

Q4) a) What is Business ethics? Explain the benefits of Business ethics. **[9]**

b) What is Social audit of business? Explain its importance. **[8]**

Q5) a) What is mean by Private Sector? Explain the characteristics and importance of private sector. **[9]**

b) Discuss the Sole Proprietorship on following points, **[9]**

i) Definition & Concept

ii) Features

iii) Merits & Demerits

OR

P.T.O.

Q6) a) Compare between Private Limited and Public Limited forms of business. **[9]**

b) Discuss the Service Sector business on following points, **[9]**

i) Definition and Concept

ii) Service sector activities

iii) SWOT analysis of Indian Service Sector

Q7) a) What is an Entrepreneur? Classify the types of entrepreneur according to different categories? **[9]**

b) Describe the Identification of business opportunities in details. **[8]**

OR

Q8) a) What is mean by business proposal? How to write business proposal, explain it step by step? **[9]**

b) With respective source of finance for business explain below agencies, **[8]**

i) Source of finance from government agencies

ii) Source of finance from non-government agencies

▽▽▽▽

Total No. of Questions : 8]

SEAT No. : ____

PB3826

[Total No. of Pages : 2

[6262]-88

T.E. (Electronics Engineering)

PLC & AUTOMATION

(2019 Pattern) (Semester - II) (304215A) (Elective - II)

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.***

Q1) a) List timer and counters used in PLC programing? **[7]**

Draw a ladder diagram using timer function for a two motor system having a following conditions,

i) The start switch 1 starts motor 1, and after 30 seconds motor 2 starts.

ii) The stop switch 2 stops motor 1 and after 25 seconds motor 2 will stops.

iii) When Switch 3 is press both I and 2 motor will stop

b) Design ladder logic for a system using comparisons instructions, **[7]**

Motor 1 starts as soon as the PLC starts as soon as PLC starts. After 10 seconds,

Motor 1 goes OFF and Motor 2 starts. After 5 seconds Motor 2 goes OFF and

Motor 3 Starts. After another 10 seconds Motor 2 restarts and after 5 seconds it stops and Motor 1 starts and cycle is repeated?

c) Which are the arithmetic functions used in PLC programming? **[4]**

OR

P.T.O.

Q2) a) Design ladder logic for a system controlling a liquid level for a set value using Timer and comparisons instructions? **[7]**

b) Explain in details PID control of continues process? **[7]**

c) List and explain data handling Instructions? **[4]**

Q3) a) List the parameters need to be check while PLC installation? Write in your own words how do you protect PLC from Electrical noise and Voltage variation & Surge? **[6]**

b) What do you mean by Program Editing & Commissioning of PLC? List general steps followed when commissioning a PLC system? **[6]**

c) Explain in details Grounding of PLC systems in industrial aspect? **[5]**

OR

Q4) a) Extend your view on Troubleshooting of a PLC system for following sections, **[6]**

i) Processor module,

ii) Input & Output malfunctions

b) Which are the preventive maintenance tasks should be carried for PLC systems? **[6]**

c) Which are circuit protections are used in PLC explain any one in details. **[5]**

Q5) a) Explain with block diagram SCADA system. **[9]**

b) What is RTU & MTU ? Explain its functions with diagram. **[9]**

OR

Q6) a) What is HMI? Explain Interfacing technique of PLC with HMI. **[9]**

b) Illustrate MTU operating interfaces & applications? **[9]**

Q7) a) List the Types of communication interface? Explain Serial communication with its advantages? **[6]**

b) Explain working of Modbus and Fieldbus? **[6]**

c) Which Types of networking channels used in PLC? Discuss any one in brief'? **[5]**

OR

Q8) a) What is CAN? Explain working principle of it in detail? **[6]**

b) List Advantages of standard industrial network? **[6]**

c) Write the characteristics of Profibus-DP? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3827

[Total No. of Pages : 2

[6262]-89

T.E. (E & TC/Electronics Engineering)

ADVANCED JAVA PROGRAMMING

(2019 Pattern) (Semester - II) (304195 C) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve question 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 AWT component? Explain some AWT component. **[9]**

b) Write a program which stores the list of strings in an ArryList and then displays the contents of the list. **[9]**

OR

Q2) a) Explain about Sets, Sequence, and Map. **[9]**

b) Develop a GUI which accepts the information regarding the marks of all subjects of a student in the examination. **[9]**

Q3) a) Explain the execution of SQL commands while handling the database. **[8]**

b) What is a JDBC? Explain Types of JDBC Driver. **[9]**

OR

Q4) a) What is Prepared Statement? Write a Java Program to insert Student Name and Branch Name into Student table using Prepared Statement. **[8]**

b) Write a program to insert and retrive the data from the database using JDBC. **[9]**

Q5) a) Explain the various method of registering and gaining access to the remote object? **[9]**

b) What is RMI? Explain with neat diagram the RMI Architecture. **[9]**

OR

P.T.O.

Q6) a) Write a short note on: **[9]**

i) RMI Registry

ii) Naming and Directory Services

b) Develop an RMI application which accepts a string or a number and checks that string or number is palindrome or not. **[9]**

Q7) a) Write a short note on: **[8]**

i) Java.net package

ii) Cookies

b) Write a program to create a simple calculator application using servlet. **[9]**

OR

Q8) a) What is servlet? Explain with neat diagram Life cycle of a Servlet. **[8]**

b) Explain InetAddress Class and factory method. Write a Java program to find the IP address of your machine. **[9]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3828

[Total No. of Pages : 3

[6262]-90

T.E. (Electronics Engineering)

DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - II) (304215) (Elective - II)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Find out H(Z) using impulse invariance method at 5Hz sampling frequency from $H(S)=\frac{2}{(s+1)(s+2)}$. **[10]**

b) Give Comparison in between impulse invariance method and bilinear transformation. **[4]**

c) What is Gibbs Phenomenon? What are the ways to minimize the adverse effects of the same? **[4]**

OR

Q2) a) The transfer function of analog filter is : **[10]**

$$H(S)=\frac{3}{(s+3)(s+2)}$$ with T_s = 0.1 sec

Design the digital IIR filter using BLT

b) Give Comparison in FIR and IIR Filter. **[4]**

c) What is the finite word length effect in filter design? **[4]**

P.T.O.

Q3) a) Obtain direct from I and II realization of a system described by **[10]**

$$y(n)-\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)+\frac{1}{2}x(n-1)$$

b) Realize the following system function using minimum number of multipliers. **[8]**

i) $H(Z)=1+\frac{1}{3}z^{-1}+\frac{1}{4}z^{-2}+\frac{1}{4}z^{-3}\frac{1}{3}z^{-4}+z^{-5}$

ii) $H(Z)=\left(1+z^{-1}\right)\left(1+\frac{1}{2}z^{-1}+\frac{1}{2}z^{-2}+z^{-3}\right)$

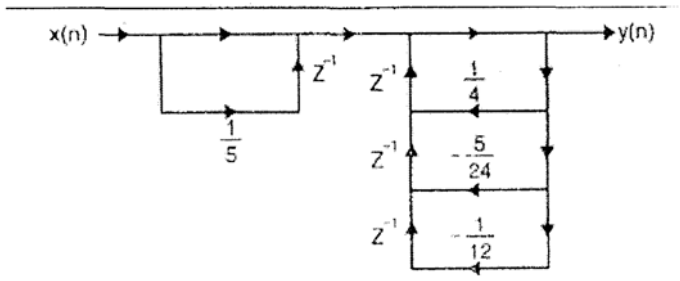
OR

Q4) a) The transfer function of a discrete causal system is given as follows:**[10]**

$$H(Z)=\frac{1-z^{-1}}{1-0.2z^{-1}-0.15z^{-2}}$$

Find the difference equation and draw cascade form

b) For the graphs given below write the difference equation and system function. **[8]**



Q5) a) A signal $x[n]$ at sampling frequency of 2.048 KHz is to be decimated by a factor of 32 to yield a signal at sampling frequency of 64Hz. The signal band of interest extends from 0 to 30 Hz. The anti-aliasing filter should satisfy the following specifications: **[10]**

Passband deviation : 0.01db

Stop band deviation : 80db

Pass band : 0-30Hz

Stop band : 32-64Hz

The signal components in the range from 30-32Hz should be protected from aliasing. Design a suitable one stage decimator.

b) What is multirate DSP? Explain sampling rate conversion with its advantages and disadvantages. **[8]**

OR

Q6) a) Implement two stage decimator for the following specifications: **[10]**

Sampling rate of input signal: 20000Hz

M : 100

Passband : 0 to 40 Hz.

Transition band : 40 to 50 Hz

Passband ripple : 0.0 1

Stop band ripple : 0.002

b) What is the principle of interpolation? Describe the expression for interpolated signal of the output. **[8]**

Q7) a) Compare the features of DSP Processor and microprocessor with respect to architecture. **[8]**

b) Write a short note on:- Real Time DSP applications to Speech Signal Processing. **[8]**

OR

Q8) a) Draw the functional block diagram of Texas instruments TMS320C54XX DSP processor. **[8]**

b) Write a short note on:- DSP in Biomedical Signal Processing application. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB3829

[Total No. of Pages : 3

[6262]-91

T.E. (Electronics Engineering)

FIBER OPTIC COMMUNICATION

(2019 Pattern) (Semester - II) (304215) (Elective - II)

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) ***Figures to the right side indicate full Marks.***
3) ***Assume the suitable data, if necessary.***

Q1) a) When a light pulse propagates through the optical fiber, attenuation of the signal (light pulse) takes place. List the important factors responsible for power loss in optical fiber. Explain each factor in brief. **[8]**

b) When the mean optical power launched into an 8km length of fiber is 120μW. the mean optical power at the fiber output is 3μW. Estimate:**[10]**

i) The overall signal attenuation or loss in decibels through the fiber assuming there are no connectors or splices.

ii) The signal attenuation per kilometer for the fiber.

iii) The overall signal attenuation for a 10km optical link using the same fiber with splices at 1 Km intervals, each giving an attenuation of 1 db.

iv) The numerical input and output power ratio in (iii).

OR

Q2) a) A MMSI fiber gives a total pulse broadening of 95 ns over a 5 km length. Estimate the bandwidth-length product for the fibre when a non-return to zero (NRZ) digital code is used. An engineer, not satisfied with this product plans to use a SMSI fiber that could give a bandwidth-length product of 10 GHz.km. Estimate the rms pulse broadening of this fiber over a 40 km digital link (without repeaters)that uses RZ code. **[8]**

P.T.O.

b) Explain the various design techniques for tailoring the dispersion optimization of single mode fibers. **[10]**

i) Dispersion-Shifted and Dispersion-Flattened Fibers

ii) Dispersion-flattened Fiber (DFF)

iii) Polarization Maintaining Fibers.

Q3) a) Explain the working of PIN photo detector with relevant diagrams. **[9]**

b) Demonstrate double heterostructure laser diode with energy band diagram and refracfive index profile. **[8]**

OR

Q4) a) Draw the structure of Avalanche photodiode (APD) along with electrical field profile that exists in the various regions of APD structure. Explain the working and also explain why it is also called Reach through APD (RAPD). **[9]**

b) A typical LED has spectral width of 40 nm, average value of dispersion 0.07 ns/(nm.km), link length 6 km, bandwidth 400 MHz.km and mode mixing parameter q = 0.7. Calculate tmat and tmod. **[8]**

Q5) a) With a neat diagram, describe the working of an Erbium doped fibre amplifier : **[9]**

b) Explain the optical components: optical isolators, circulators and Fiber Bragg grating (FBG) for multiplexers & De-multiplexers. **[9]**

OR

Q6) a) Compare the SOA, EDFA and the Raman amplifiers in relation to the provision of amplification within optical fiber communication systems.**[9]**

b) Describe 2 × 2 fiber coupler and its various losses. **[9]**

Q7) a) With the help of block diagram, explain Rise Time Budget for an optical power loss model of a point to point link. **[9]**

b) An engineer has the following components available: **[8]**

GaAlAs laser diode operating at 850 nm and capable of coupling 1 mW (0 dBm) into a fiber.

Ten sections of cable each of which is 500 m long, has a 4 dB/km attenuation, and has connectors on both ends.

Connector loss of 2 dB/connector

A *pin* photodiode receiver

An avalanche photodiode receiver

Using these components, the engineer wishes to construct a 5-km link operating at 20 Mb/s. If the sensitivity of a *pin* and APD receivers are –45 and –56 dBm, respectively, which should be used if a 6-dB system operating margin is required.

OR

Q8) a) Explain the power budget with the help of power loss model for point to point link. Also give the graphical representation of a link loss budget.**[9]**

b) Write short notes on : **[8]**

i) Optical power budget

ii) Multichannel transmission techniques

x x x

Total No. of Questions : 8]

SEAT No. : ____

PB3830

[Total No. of Pages : 2

[6262]-92

T.E. (Electronics Engineering)

e-MOBILITY

(2019 Pattern) (Semester - II) (Elective - II) (304215)

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 and waveforms must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of nonprogrammable calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain construction & working of Sodium based batteries. **[7]**

b) Explain role of Ultra capacitors in energy storage system. **[5]**

c) Compare various energy storage systems. **[5]**

OR

Q2) a) Compare Sodium based battery & Nickel based battery. **[5]**

b) Explain hydraulic energy storage system. **[6]**

c) What are various typs of lithium batteries? Explain construction & working of any one battery. **[6]**

Q3) a) What are requirements for a battery charger in EVs. Explain in brief. **[6]**

b) Explain Soft-switching in power converter for inductive charging. **[5]**

c) Explain with block diagram OFF board conductive charging. **[6]**

OR

Q4) a) Explain need of Charge equalization in battery charger. **[6]**

b) Explain various battery indication methods. **[5]**

c) Explain with diagram working of basic charger circuit. **[6]**

P.T.O.

Q5) a) Explain Move-and-charge zone. **[6]**

b) Explain North American EV Plug Standards. **[6]**

c) Explain Fast Charging station. **[6]**

OR

Q6) a) Explain various types of EV charging connectors. **[6]**

b) Explain Combined Charging System (CCS). **[6]**

c) Explain occasional Charging station. **[6]**

Q7) a) Explain ROLL & RPL. **[4]**

b) Explain with diagram 6LoWPAN protocol? Give its applications. **[5]**

c) Explain CAN Bus, 12C, LIN Bus protocol. **[9]**

OR

Q8) a) Explain with diagram Power line carrier communication. **[6]**

b) What is Ethernet? Why it is used? Give its advantages & disadvantages. **[6]**

c) Explain DNP3, IEC 61850 protocols. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB3831

[Total No. of Pages : 3

[6262]-93
T.E.(E&TC)
DIGITAL COMMUNICATION
(2019 Pattern) (Semester -I) (304181)

Time : 2½ 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.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 OFDM? Draw and Explain block diagram of generation and reception of the OFDM. **[8]**

b) Compare BPSK, QPSK and M-ary PSK **[9]**

OR

Q2) a) What is M-ary FSK? Draw and Explain Block diagram of generation and reception of the M-ary FSK. **[8]**

b) Calculate bandwidth requirement and minimum separation of signal points in signal space for **[9]**
BPSK
QPSK
16PSK
Given that input bit rate is 8kbps and energy per bit duration is $1\times10^{-4}J$.

Q3) a) Explain spread spectrum transmission and reception process in SS communication with neat block diagram. **[9]**

b) The information bit duration in DS-BPSK spread spectrum communication system is 4ms while the chipping rate is 1 MHz. Assuming an average error probability of10^{-5} for proper defection of message signal. Calculate the jamming margin. Given Q(4.25)= 10^{-5} **[9]**

OR

P.T.O.

Q4) a) Write a short note on following: **[9]**

i) Slow FHSS

ii) Fast FHSS

b) What is PN sequence? Explain properties of PN sequence. **[9]**

Q5) a) Explain difference type of discrete memoryless channel. **[8]**

b) Find coding efficiency of a source encoder generating messages with probability 1/4,1/8,1/2,1/8 using Shannon-fano coding technique. **[9]**

OR

Q6) a) A 3 bit PCM system generates 1,000 samples per second, if the quantized samples produced by the system have Probabilites {1/4,1/4,1/8,1/8,1/16,1/16,1/16,1/16,}. Find the rate of information . If the samples are equiprobable. What will be the rate of information? **[8]**

b) Apply Huffman coding for the following message ensemble. **[9]**

X=[x1 x2 x3 x4 x5 x6 x7]

P=[0.45 0.15 0.1 0.1 0.08 0.08 0.04] and find coding efficiency

Q7) a) For a systematic linear block code, the three parity check digits, are given by **[9]**

$$C_4 = d_1 \oplus d_2 \oplus d_3$$

$$C_5 = d_1 \oplus d_2$$

$$C_6 = d_1 \oplus d_3$$

i) Construct Generator Matrix

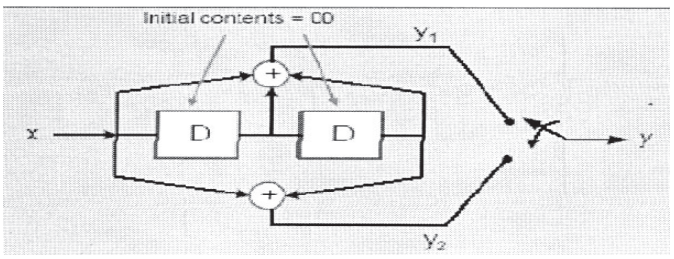
ii) Construct All Code generated by this matrix

iii) Determine error correcting capability

iv) Prepare suitable decoding table

v) Decode the received words 0 0 0 1 1 0

b) **[9]**



For given convolutional encoder draw three graphical representation.

OR

Q8) a) Draw the encoder and syndrome calculator for the generator polynomial $g(x) = 1 + x^2 + x^3$ and obtain the syndrome for the received codeword 1 0 0 1 0 1 1 **[9]**

b) Explain properties of Linear block code and cyclic codes with suitable example **[9]**

Total No. of Questions :8]

SEAT No. :

PB3832

[Total No. of Pages : 3

[6262]-94
T.E.(Electronics & Telecommunication)
ELECTROMAGNETIC FIELD THEORY
(2019 Pattern)(Semester -I)(304182)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.No.1or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Derive the boundary condition between Conductor and Free space for static electric field. **[8]**

b) Derive an expression for energy stored and energy density in electrostatic field. **[9]**

OR

Q2) a) For a parallel plate capacitor area of plate A=12 cm^2 spacing between plates d=5 mm, separated by dielectric of $\varepsilon_r = 12$, connected to a 40 V battery find: Capacitance, Electric field intensity E, flux density D and an energy stored in the capacitor. **[8]**

b) Region-1 is semi-infinite space in which $2x - 5y > 0$, while for region-2, $2x - 5y < 0$. Let $\mu r_1 = 3, \mu r_2 = 4, H_1 = 30\ a_x$' A/m. Find B_1, H_{t2}, H_{N2} and H_2. (Magnetic flux density in region 1-B_1, Tangential component of Magnetic field intensity in region 2 - H_{t2}, Normal component of Magnetic field intensity in region 2-H_{N2} and Magnetic field intensity in region 2-H_2). **[9]**

Q3) a) State and explain Maxwell's equations for time varying field in detail. **[10]**

b) State and explain the Faradays ' law and Lenz's law with suitable example. **[8]**

OR

Q4) a) At frequency of 3000 MHz, the dielectric constant of ice made from pure water has values of 3.20, while the loss tangent is 0.0009. If a uniform plane wave with a amplitude of 100 V/m at $z = 0$ is propagating through such ice, find the time-average power density at $z = 0$ and $z = 10$ m for the given frequency. **[8]**

P.T.O.

b) Let $\mu = 10^{-5}$ H/m = 4 × 10^{-9}F/m, $\sigma = 0$, and $\rho v = 0$. Find k (including units) so that each of the following pairs of fields satisfies Maxwell's equations:

(i) D = $6a_x$-2y a_y+2z a_z nC/m^2, H =kx a_x +10y a_y - 25z a_zA/m;

(ii) E = (20y – kt)a_x V/m, H=(y+2×10^6t)a_zA/m. **[10]**

Q5) a) Derive the Helmholtz Wave Equation in terms of electric field intensity and magnetic field intensity for the charge free region. **[8]**

b) A 9.375-GHz unifrom plane wave is propagating in polyethylene with $\varepsilon_r = 2.26$, $\mu_r = 1$. If the amplitude of the electric field intensity is 500 V/m and the material is assumed to be lossless, find: **[10]**

i) The phase constant

ii) The wavelength in the polyethlene

iii) The velocity of propagation

iv) The intrinsic impedance

v) The amplitude of the magic field intensity.

OR

Q6) a) Define the terms: Phase velocity ,Group Velocity, propagation constant, wavelength and intrinsic impedance. **[8]**

b) Derive the expression for reflection coefficient and transmission coefficient for normal incidence of uniform plane wave. **[10]**

Q7) a) A lossless transmission line with Z_0=75 Ω is 30m long and operates at 2MHz. The line is terminated with a load Z_L=90 + j60 Ω. If velocity u=0.6c on the line, where C is velocity of light using Smith chart **[10]**

i) Reflection coefficient

ii) Standing wave ratio

iii) Input impedance

iv) Load admittance

b) State and explain primary and secondary constants of transmission line. **[7]**

OR

Q8) a) A generator of 1v, 1 KHz supplies power to a 100 Km open wire transmission line terminated in Z0. The line parameters are, R=10.4 Ω / Km, L=0.00367 H/Km, G=0.8×10^{-6} mho/Km,

C=0.00835×10^{-6} F/Km.

Calculate Z_0 α, β, λ, and velocity (v). **[9]**

b) Derive general, soution of transmission line. Also explain its physical significance. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3833

[Total No. of Pages : 2

[6262]-95
T.E. (E & TC)
MICROCONTROLLERS
(2019 Pattern) (Semester - I) (304184)

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 and 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) Compare P1C10, PIC 12, PIC 16 and PIC 18. **[8]**

b) Draw and explain program memory organization of PlC l8F4550. **[8]**

OR

Q2) a) Draw and explain the data memory organization of PIC 18F4550. **[8]**

b) Draw and explain the architecture of PIC 18F4550. **[8]**

Q3) a) Explain capture mode of PlC microcontroller, discuss the role of PIR register in capture mode. **[9]**

b) Explain the operation of T0CON and T1CON register of PIC 18F4550. **[9]**

OR

Q4) a) Write an embedded c program to generate square wave of 1KHz with the duty cycle of 25% and prescale 1:16. **[10]**

b) Draw and explain the interrupt structure in priority mode of PIC microcontroller. **[8]**

P.T.O

Q5) a) Draw and explain an interfacing of switch, relay and buzzer with PIC microcontroller. Write the pseudocode to turn relay ON and Buzzer OFF when switch 1 is pressed and turn relay OFF and Buzzer ON when switch 2 is pressed. **[9]**

b) Draw an interfacing diagram of 4*4 keyboard matrix, write pseudocode to display keycode of key pressed. **[9]**

OR

Q6) a) Draw an interfacing diagram of ultrasonic sensor with PIC 18F, write embedded c code to identify the object. **[9]**

b) Dram an interfacing of 8 bit LCD with PIC 18F4550 display message "E&TC Dept" . **[9]**

Q7) a) Compare SPI, RS232 and I2C protocol. **[9]**

b) Explain MSSP SPI mode of PICl8F4550. **[9]**

OR

Q8) a) What is BRGH register? Explain how to calculate baud rate in USART. **[8]**

b) Draw an interfacing diagram of EEPROM with PIC 18F4550 write pseudocode to write the contents in EEPROM. **[10]**

Total No. of Questions : 8]

SEAT No. :

PB-3834

[Total No. of Pages : 3

[6262]-96

T.E. (E & TC)

DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - I) (304185(A)) (Elective - I)

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) ***Your answer will be valued as a whole***
5) ***Use logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed***
6) ***Assume Suitable data if necessary.***

Q1) a) The first five points of the 8-point DFT of a real valued sequence are [0.25, 0.125–j0.30l8, 0.125–j0.0518, 0]. Determine remaining three points. **[6]**

b) Bring out the difference between DFT and FT with suitable examples. **[6]**

c) Determine sequence x(n) from its DFT, X(k) = [4, 1–j , –2 , l + j] **[6]**

OR

Q2) a) Given two sequences of length 4 are x(n) = [0, 1, 2, 3] and h(n) = [2, 1, 1, 2]. Find the circular convolution. **[6]**

b) Compute the Discrete Fourier Transform of the sequence $x(n) = \cos\frac{n\pi}{2}$ for N = 4 using decimation in frequency FFT algorithm. **[6]**

c) Draw a flow graph of DIF of 8 point DFT computation. **[6]**

P.T.O.

Q3) a) Design a single pole lowpass digital filter with a 3dB bandwidth of 0.2π using the bilinear transformation applied to the Analog filter. **[9]**

$$H(s) = \frac{\Omega c}{s + \Omega c}$$

Here Ωc is the 3dB bandwidth of the analog filter.

b) An analog filter has the following system function. Convert this filter into a digital filter using bilinear transformation. **[8]**

$$H(s) = \frac{1}{(s+2)^2 (s+1)}$$

OR

Q4) a) Obtain Direct form-I, Direct form-II and Cascade structures for the following system. **[9]**

$Y(n) = -0.1Y(n-1) - 0.72Y(n-2) + 0.7X(n) - 0.2X(n-2)$

b) Convert the analog filter with system function H(s) into a digital IIR filter by using Impulse Invariance method. **[8]**

$$H(s) = \frac{(s+0.1)}{(s+0.1)^2 + 9}$$

Q5) a) Determine the coefficients of a linear phase FIR filter of length M = 15, which has a symmetric unit sample response. The frequency response satisfies the function. **[6]**

$$H\left(\frac{2\pi k}{15}\right) = \{1 \quad k = 0,1,2,3$$
$$= \{0.4 \quad k = 4$$
$$= \{0 \quad k = 5,6,7$$

b) Write a short note on linear phase filter. **[6]**

c) Explain Gibbs phenomenon. **[6]**

OR

Q6) a) Explain the procedure for designing FIR filters using windows. **[6]**

b) Design an FIR Linear phase digital filter with frequency response. **[6]**

$$H_d(w) = \{1 \quad \text{for } |w| \leq \frac{\pi}{6}$$

$$= \{0 \quad \text{for } \frac{\pi}{6} \leq |w| \leq \pi$$

c) What are the advantages and disadvantages of FIR FILTERS? **[6]**

Q7) a) Write short note on application of DSP for ECG signal analysis. **[9]**

b) With the help of block diagram explain the automatic volume controlapplication. **[8]**

OR

Q8) a) What is spectrogram? What are their types?Explain its significance and application. **[9]**

b) Explain voiced and unvoiced speech signal? Explain its significance in speech processing. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PB-3835

[Total No. of Pages : 2

[6262]-97

T.E. (Electronics & Telecommunication Engineering)

ELECTRONIC MEASUREMENT

(2019 Pattern) (Semester - I) (304185(B)) (Elective-I)

Time : 2½ Hours] ***[Max. Marks : 70***

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; No. 7 or Q. No.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 with Block diagram Characteristics of Pulse generator **[6]**

b) Explain noise generator and its role in measurement systems **[6]**

c) With the help of block diagram, explain digital signal generator. **[6]**

OR

Q2) a) With the help of block diagram explain the operation of function generator. **[6]**

b) With the help of block diagram explain the function of microwave signal generator. **[6]**

c) What is Audio and RF signal range? Why to use Audio and RF signal generator **[6]**

Q3) a) Why to use DSO? What are the applications of DSO? **[6]**

b) Draw block diagram of DSO **[5]**

c) Illustrate the z - modulation and x-y mode operation. **[6]**

OR

P.T.O.

Q4) a) Why to use power oscilloscope and what are the applications of Power Oscilloscope **[6]**

b) Draw block diagram of Power Oscilloscope **[5]**

c) Compare CRO and DSO on the basis of specifications. **[6]**

Q5) a) with the help of block diagram explain LCD display. Explain all functional pins. **[6]**

b) Why to strip chart recorder? How it works? **[6]**

c) Draw Block diagram of Strip Chart recorder **[5]**

OR

Q6) a) What is Universal Counter/Timers? Why it is useful **[4]**

b) What is Period Mode, Time Interval mode and Ratio mode? Explain above modes with suitable diagram **[8]**

c) Why to use acquisition cards? Explain its use **[5]**

Q7) a) What is Automatic Test Equipment (ATE)? What are its benefits? **[6]**

b) What is OTDR? Why to use it? Draw its Block Diagram? **[6]**

c) Explain industrial revolution and their impact on Industrial automation? **[6]**

OR

Q8) a) Why to use Network Analyzer? What are their applications? **[6]**

b) Explain with the help of block diagram field strength meter?. **[6]**

c) Explain use of Logic Analyser? Draw its block diagram **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3836

[Total No. of Pages : 2

[6262]-98

T.E. (Electronics & Telecommunication Engineering)

COMPUTER NETWORKS

(2019 Pattern) (Semester - I) (304185(D)) (Elective-I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer any Four questions.***
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 IPV4 and IPV6? **[6]**

b) List and explain the different types of Addresses used in IPV4? **[6]**

c) Explain the need of Subnet mask in subnetting? **[6]**

OR

Q2) a) Compare between Classful and Classless Addressing? **[6]**

b) Explain network id and host id. **[6]**

c) Explain the services provided by Network Layer. **[6]**

Q3) a) Differentiate between MAC and IP Address? **[9]**

b) Differentiate between OSPF and BGP? **[8]**

OR

Q4) a) Explain unicast routing and multicast routing protocol. **[9]**

b) What is routing? Explain the distance vector routing algorithm. **[8]**

P.T.O.

Q5) a) Explain UDP protocol and its features with relevant diagram. **[9]**

b) Explain the term Connection release with suitable diagram? **[8]**

OR

Q6) a) What is Multiplexing and DeMultiplexing? Explain in Detail **[9]**

b) Explain various transport layer quality of services parameters. **[8]**

Q7) a) Explain simple mail transfer protocol. **[6]**

b) Explain in brief about TELNET? **[6]**

c) Explain dynamic host configuration protocol. **[6]**

OR

Q8) a) Write a short note on Electronic Mail System? **[6]**

b) Explain in detail various FTP Commands? **[6]**

c) Explain FTP protocol. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB3837

[Total No. of Pages : 2

[6262]-99
T.E. (E & Tc Engineering)
CELLULAR NETWORKS
(2019 Pattern) (Semester - II) (304192)

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 necesary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of loarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Describe with neat diagram the significance of Cell Geometry in Cellular Networks. **[6]**

b) With neat diagram explain various components of Cellular Network Architecture. **[5]**

c) Write in brief, the Conception of cell splitting and Cell sectoring in Cellular Networks. **[6]**

OR

Q2) a) Explain in brief Frequency assignments and Frequency reuse channels in Cellular radio system design. **[6]**

b) Define roaming. With neat diagram explain significance of roaming in cellular systems with algorithms. **[5]**

c) Classify and explain with neat diagram the handover in cellular systems with Handoff algorithms. **[6]**

Q3) a) Write a brief note that includes a neat diagram of the wireless system's Tele-Traffic System model. **[6]**

b) Explain the significance of link budget analysis for wireless systems. **[6]**

c) Explain the term Blocking Probability and its expression to calculate the Blocking Probability. **[6]**

OR

P.T.O.

Q4) a) List and explain various impact does Teletraffic Theory possess on wireless system planning. **[6]**

b) Explain the significance of steady state analysis process in wireless system planning process. **[6]**

c) Explain in detail the link-budget expression for the required transmitted power. **[6]**

Q5) a) With diagram explain components of 5G Network Architecture. **[6]**

b) Describe the operation of wireless local area network with diagram. **[6]**

c) Explain in brief with diagram a LTE-A radio protocol Architecture. **[5]**

OR

Q6) a) Compare 3G and 4G mobile generation network. **[6]**

b) Explain the operation of infrastructure based and adhoc WLAN with neat diagram. **[6]**

c) With block diagram, explain GSM architecture. **[5]**

Q7) a) Explain one Scheduling algorithms for real-time traffic with diagram in mobile communication. **[6]**

b) With neat diagram, explain in brief different steps in the scheduler design for mobile communication. **[6]**

c) Explain with neat diagram, the operation of Network coding in mobile communication. **[6]**

OR

Q8) a) Explain Layered Analysis in mobile communication. **[6]**

b) Explain in brief following QoS parameters : - **[6]**

i) Throughput

ii) Latency

iii) Packet Loss

c) Explain in brief following QoE parameters :- **[6]**

i) Peak Signal to Noise Ratio

ii) Video Quality Metric

iii) Mean Opinion Score

✪ ✪ ✪

Total No. of Questions : 8]

SEAT No. : ____

PB3838

[Total No. of Pages : 3

[6262]-100

T.E. (Electronics & Telecommunication Engineering)

PROJECT MANAGEMENT

(2019 Pattern) (Semester - II) (304193)

Time : 2½ Hours] ***[Max. Marks : 70***

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) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a note on Change Management. **[5]**

b) Explain the principles involved in conflict management. **[6]**

c) Enlist various organisational structures? Explain any one in details. **[6]**

OR

Q2) a) Write a note on team management. **[5]**

b) What is need of diversity management. Explain in detail. **[6]**

c) State various leadership styles and explain any two in brief. **[6]**

Q3) a) Explain the Project Evaluation and Review Technique (PERT). **[6]**

b) Write a note on project budget. **[6]**

c) Explain the following with respect to Network diagram ES, LS, Critical Path, Float, Total float and Slack. **[6]**

OR

Q4) a) Explain the critical path Method. **[6]**

b) Explain the resource allocation in Project Management. **[6]**

P.T.O.

c) A project has the following timeschedules. **[6]**

Activity	Time in weeks	Activity	Time in weeks
(1-2)	4	(5-7)	8
(1-3)	1	(6-8)	1
(2-4)	1	(7-8)	2
(3-4)	1	(8-9)	1
(3-5)	6	(8-10)	8
(4-9)	5	(9-10)	7
(5-6)	4		

construct the network diagram and compute

i) Early start and Early Finish for each event.

ii) Float for each activity.

iii) Critical path and its duration.

Q5) a) Write a note on project management tool : JIRA. **[6]**

b) Explain the process of risk management. **[6]**

c) What is Significance of conducting Feasibility studies in finance Management. **[6]**

OR

Q6) a) Write a note on project management tool : TRELLO. **[6]**

b) Explain the process of project financial management. **[6]**

c) Write a note on Risk Analysis. **[6]**

Q7) a) Write a short note on **[6]**

i) Trademarks

ii) Licensing

b) Identify the characteristics of successful entrepreneurs. **[6]**

c) Describe product development process. **[5]**

OR

Q8) a) Define the factors impacting emergence of entrepreneurship. Explain in brief. **[6]**

b) Write short note on **[6]**

i) Copy right

ii) Trade secret

c) Describe in detail about entrepreneurship process. **[5]**

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Total No. of Questions : 8]

SEAT No. : ____

PB-3839

[Total No. of Pages : 2

[6262]-101
T.E. (E& TC Engineering)
POWER DEVICES & CIRCUITS
(2019 Pattern) (Semester - II) (304194)

Time : 2½ 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 and waveforms must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non programmable calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain working of single phase full bridge inverter for R load with input & output waveforms. Derive an expression for rms o/p voltage. **[7]**

b) The single-phase half-bridge inverter has a resistive load of $R = 2.4\ \Omega$ and the dc input voltage is $Vs = 48V$. Determine (a) the rms output voltage at the fundamental frequency $Vo1$, (b) the output power Po, (c) the average and peak currents of each transistor. **[6]**

c) Explain effect of Cross conduction in inverter. **[4]**

OR

Q2) a) Draw a three phase inverter for balanced star R load. Explain its operation of 180° mode with gate signals & output waveforms. **[12]**

b) Compare 120° mode with 180° mode in three phase bridge inverter. **[5]**

Q3) a) Give classification of choppers? Explain operation of two quadrant chopper with circuit diagram. **[6]**

b) Explain various control strategies in DC chopper. **[6]**

c) Explain with block schematic working of SMPS. **[6]**

OR

P.T.O.

Q4) a) Explain with neat diagram the operation of 4 quadrant chopper with dc motor as a load. **[8]**

b) The step down dc chopper has a resistive load of $R = 10\,\Omega$ and the input voltage is $Vs = 220$ V. When the converter switch remains on, its voltage drop is $Vch = 2$ V and the chopping frequency is $f = 1$ kHz. If the duty cycle is 50%, determine (a) the average output voltage Va, (b) the rms output voltage Vo, (c) the converter efficiency. **[6]**

c) Compare step up & step down choppers. **[4]**

Q5) a) Explain with neat diagram working of snubber circuit used in power devices protection. **[7]**

b) Explain with neat diagram working of isolation transformer. **[4]**

c) What is EMI? Explain various sources & minimizing techniques of EMI **[6]**

OR

Q6) a) What is the need of resonant converter? Explain ZCS resonant converter with circuit & waveforms. **[8]**

b) Explain the role of heat sink? Draw its thermal equivalent circuit. **[5]**

c) Compare resonant converters: ZVS with ZCS. **[4]**

Q7) a) Explain single phase full converter drive for single phase separately excited dc motor. **[6]**

b) Explain operation of On-line UPS with block schematic. **[6]**

c) Explain with neat diagram variable voltage type three phase induction motor drive. **[6]**

OR

Q8) a) Draw & explain single phase full wave ac voltage controller for resistive load with o/p voltage waveforms. **[6]**

b) Explain with diagram architecture of EVs battery charger. **[6]**

c) Explain working of electronic ballast with block schematic. **[6]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3840

[Total No. of Pages : 2

[6262]-102

T.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2019 Pattern) (Semester - II) (304195(A)) (Elective - II)

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) ***Your answers will be valued as a whole.***
5) ***Assume suitable data, if necessary.***
6) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

Q1) a) Explain in brief Adaptive thresholding and how it is achieved through Otsu's method. **[6]**

b) What is edge linking? Explain its approaches. **[6]**

c) What is region growing? Explain techniques of region splitting and region merging. **[6]**

OR

Q2) a) How are discontinuties detected in Image? With the help of suitable mask explain point detection and line detection. **[6]**

b) Explain different stages in carry edge detection in detail. **[6]**

c) Explain how Hough Transform is useful for edge linking. **[6]**

Q3) a) What is DCT? Give forward and reverse transform equations and important properties of DCT. How DCT helps to achieve compression. **[6]**

b) Explain Quantitative and Qualitative fidelity criteria in image compression. **[6]**

c) Explain how motion estimation plays important role in video compression? Explain Block based motion estimation. **[5]**

OR

P.T.O.

Q4) a) Explain image compression using JPEG with suitable block diagram. **[6]**

b) Differentiate between Lossless and lossy compression. Explain one technique from each of them. **[6]**

c) What is entropy of an image? Write significance of it in image compression. **[5]**

Q5) a) What is noise model? Explain any three noise models. **[6]**

b) How Weiner filter is used for restoration of images in the presence of noise. **[6]**

c) Explain the method of estimation of degradation function. **[6]**

OR

Q6) a) Draw and explain Image degradation model. **[6]**

b) How the constrained Least square filtering is used for image restoration. **[6]**

c) Explain the three Geometric transformation in the images. **[6]**

Q7) a) What is image classification? Explain one image classification algorithm in detail. **[6]**

b) Explain in detail character recognition with it's steps in detail. **[6]**

c) Explain object recognition using structural method. **[5]**

OR

Q8) a) Explain the recognition based on decision theoretic methods. **[6]**

b) Explain content based image retrival application in detail. **[6]**

c) Explain how Deep learning using CNN is useful in classification of images. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3841

[Total No. of Pages : 2

[6262]-103

T.E. (E & TC)

SENSORS IN AUTOMATION

(2019 Pattern) (Semester - II) (304195(B)) (Elective - II)

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) ***Figures to the right side indicates full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a short note (any three) **[12]**

i) Pressure scales

ii) Bernoulli's theorem

iii) Orifice

iv) Hall effect Sensors

b) What is E8FC-25D. **[5]**

OR

Q2) a) What is basic Principle of capacitive elements Explain with the help diagram. **[6]**

b) Why installation & calibration need to be understand by an engineer. **[5]**

c) Compare Inductive & Capacitive proximity switch. **[6]**

Q3) a) Explain working principle of hall effect sensor with labeled diagram .Write application of hall effect sensor. **[9]**

b) What is Gyroscope, which are three basic types of Gyroscope, Explain working of any one type in detail? **[9]**

OR

P.T.O.

Q4) a) Explain working principle of potentiometric displacement sensors with diagram. Write its applications. **[9]**

b) What are Optical encoders? Explain its working principle with diagram and write its applications. **[9]**

Q5) a) List out advantages and disadvantages of RFID Sensor. **[8]**

b) Enlist properties and specification of Arduino Data Sheet MLX90614 non-contact temperature sensor. **[5]**

c) Enlist Gas sensors with example. **[4]**

OR

Q6) a) Explain in detail about working principle of photo transistor and photo diode with example. **[8]**

b) How the Ultrasonic proximity detector works for motion detection. **[5]**

c) What are the different sensors used for Environmental studies. **[4]**

Q7) a) What is a data acquisition system? What are different types of data acquisition systems? Explain any one DAS system. **[7]**

b) With the help of block diagram explain the IOT Functional blocks. **[5]**

c) Explain SDI-12 Interface in details using block diagram. **[4]**

d) Explain various application of IOT. **[2]**

OR

Q8) a) Describe the different components of IOT with the help of Block diagram. **[6]**

b) Explain the IOT based Engine Management system with the help of block diagram. **[6]**

c) What are different types of sensors in IOT? **[4]**

d) State application of DAC. **[2]**

Total No. of Questions : 8]

SEAT No. : ____

PB3842

[Total No. of Pages :2

[6262]-104

T.E. (E & TC)

EMBEDDED PROCESSOR

(2019 Pattern) (Semester- II) (Elective-II) (304195D)

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.***
5) ***Use of Calculator is allowed.***

Q1) a) Draw and explain interfacing diagram of GSM using UART with LPC 2148. What are AT commands? **[6]**

b) Explain UART module of LPC2148 in short. **[6]**

c) List the features of on chip ADC of LPC2148. Explain the function of bits in ADC Control Register. **[6]**

OR

Q2) a) Draw an interfacing diagram of DHT11 with LPC2148 and write an algorithm to display the temperature on LCD. **[6]**

b) Write the SFR associated with DAC & with algorithm explain how DAC can be used to generate ramp waveforms. **[6]**

c) Draw an interfacing diagram of servomotor with LPC2148 and write down the code to rotate the motor in clockwise direction. **[6]**

Q3) a) Write the features of STM32F4xx. **[9]**

b) Explain CMSIS Standard use for Firmware development. **[8]**

OR

Q4) a) Draw and explain the memory map of STM32F4xx. **[9]**

b) Differentiate between CORTEX A, R, M processors **[8]**

P.T.O.

Q5) a) Enlist various registers required to configure Serial Communication of STM32F4xx Microcontroller. Explain any one with suitable example. **[6]**

b) Draw an interfacing diagram to interface LDR sensor with STM32F4xx microcontroller and write algorithm/ flowchart to display the light parameter on LCD. **[6]**

c) Enlist various registers required to configure Timers of STM32F4xx Microcontroller. Explain any one with suitable example. **[6]**

OR

Q6) a) Draw an interfacing diagram and write a C program to blink LED's connected to Pin numbers (Port D) PD12,13,14 and 15 using STM32F4xx Controller. **[6]**

b) Draw an interfacing diagram and write a C program to interface "7-Segment" with STM32F4xx controller and display count digit "1" or "7" on it. **[6]**

c) Draw an interfacing diagram to interface MQ3 sensor with STM32F4xx and write algorithm/ flowchart to display the Gas percentage parameter. **[6]**

Q7) a) Draw an interfacing diagram and write a C program to interface accelerometer MPU 6050 using STM32F4xx microcontroller. **[9]**

b) Draw an interfacing diagram and write a C program to interface Ultrasonic Sensor HC-SR04 using STM32F4xx microcontroller. **[8]**

OR

Q8) a) Write the features of CAN bus? Explain CAN bus frame? **[9]**

b) Draw an interfacing diagram and write algorithm to Control DC Motor using PWM using STM32F4xx microcontroller. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB3843

[6262]-105

[Total No. of Pages :2

T.E. (Electronics and Telecommunication Engineering)

NETWORKS SECURITY

(2019 Pattern) (Semester- II) (Elective-II) (304195)

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) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Discuss the background of RC4 and its initialization of S processes and stream generation. **[8]**

b) Explain the subkey generation in the Blowfish algorithm. **[8]**

OR

Q2) a) Which basic steps are performed in one round of operation in DES? Explain in detail. **[8]**

b) Explain the RSA algorithm with suitable example. **[8]**

Q3) a) What is a message authentication code? What is the difference between a message authentication code and a one-way hash function? **[7]**

b) What type of attacks are addressed by message authentication? **[7]**

c) Write a short note on: Digital signatures. **[4]**

OR

Q4) a) What changes in HMAC are required in order to replace one underlying hash function with another? **[7]**

b) How the Authentication Applications such as Kerberos work? Explain in detail. **[7]**

c) Explain Hash Function. **[4]**

P.T.O.

Q5) a) Explain in detail PGP Pretty Good Privacy concept and services provided by PGP. **[6]**

b) What is R64 conversion? Why is R64 conversion useful for an e-mail application. **[6]**

c) What is IP security overview, explain IP Security architecture. **[6]**

OR

Q6) a) Write short note on Encapsulating Security payload. **[6]**

b) Describe Key management use in email security. **[6]**

c) Explain in brief S/MIME protocol. **[6]**

Q7) a) Explain Firewall design principles and discuss types of firewalls. **[9]**

b) List and briefly explain three classes of intruders. **[9]**

OR

Q8) Write short notes: **[18]**

a) Web security considerations

b) Secret splitting

c) Secure Inter-branch Payment Transactions

Total No. of Questions : 8]

SEAT No. :

PB3844

[Total No. of Pages : 3

[6262]-106
T.E.(Electronics &Computer Engineering)
DATABASE MANAGEMENT SYSTEMS
(2019 Pattern) (Semester -I) (310341)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1or 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 neccessary.***

Q1) a) Explain PL/SQL stored procedures with syntax.Compare PL/SQL stored procedure and stored function. **[6]**

b) Consider the following schema- **[6]**
student (rollno, name, class, fees_paid,)
Write SQL queries for following requirements-
i) Retrieve all records from the student table.
ii) Retrieve rollno and name from the student table.
iii) Retrieve the rollno and names of students whose fees_paid is less than 30000.
iv) Delete all records from the student table who have paid the fees greater than30000.

c) Explain any four types of join operations in SQL with example. **[8]**

OR

Q2) a) Explain any six aggregate functions in SQL by giving suitable example. **[6]**

b) Explain SQL ORDER BY and WHERE Clause with example. **[6]**

c) Explain the following SQL DML statements by giving suitable example. **[8]**
i) SELECT
ii) INSERT
iii) UPDATE
iv) DELETE

P.T.O.

Q3) a) Explain concept of schedule in DBMS transaction in detail.with the help of transaction states diagram explain the different transaction states in DBMS during its execution. **[8]**

b) Explain the need of concurreny control in DBMS. Explain time stamp based concurrency control. **[8]**

OR

Q4) a) Explain the concept of serializable schedule. Explain veiw serializable schedule with example. Compare conflict and view serializability. **[8]**

b) Check whether the given non-serial schedule is conflict serializable or not. If serializable, find conflict equivalent schedule. **[8]**

T1	T2	T3
	R(X)	
		R(X)
W(Y)		
	W(X)	
		R(Y)
	W(Y)	

Q5) a) Explain need and goal of parallel databases. Draw and explain two types of parallel database architectures. **[8]**

b) Explain data replication and data fragmentation in distributed data storage. **[8]**

OR

Q6) a) What are commit protocols in distributed DBMS? Explain two phase commit protocol in detail with necessary illustration. **[8]**

b) What is parallel databases? Explain performance parameters for parallel databases. [**8]**

Q7) a) Explain structured, unstructured, and semi-structured data and provide examples for each type. **[9]**

b) Discuss the BASE properties of NoSQL dastabases. Compare ACID and BASE properties. Write advantages and disadvantages of BASE properties. **[9]**

OR

Q8) a) Expalin in short following Types of NoSQL Databases **[9]**

i) Key-value Pair Based

ii) Column-oriented

iii) Document-oriented

b) Explain the syntax and usage of CRUD operations (Create, Read, Update, Delete) in MongoDB with suitable examples. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3845

[Total No. of Pages : 2

[6262]-107
T.E. (Electronics and Computer Engineering)
ADVANCED JAVA PROGRAMMING
(2019 Pattern) (Semester-I) (310342)

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 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data, if necessary.***

Q1) a) Define Applet. Explain the types of Applet with suitable diagram in detail. **[6]**

b) Describe the various sections of Web page in the context of Applet. **[6]**

c) Compose an Applet program to change the Foreground and Background Color. **[5]**

OR

Q2) a) Explain with suitable example to pass parameters to an Applet using <PARAM> tag. **[6]**

b) Explain the following Swing components in detail: **[6]**

i) JButton ii) Comboboxes.

c) Compose a Java Applet program to implement a JCheck Box class. **[5]**

Q3) a) Describe the following: **[6]**

i) Foreground Events and Background Events.

ii) Event Classes.

b) Sketch and explain the hierarchy of classes in the java. awt package. **[6]**

c) Compose a program to implement the Java AWT Button. **[5]**

OR

Q4) a) Explain in detail about the event handling mechanism in Java. **[6]**

b) Explain the concept of Inner Classes and Anonymous Inner Classes with suitable example. **[6]**

c) Write a Java program to handle mouse events implementing the MouseListener interface. **[5]**

P.T.O.

Q5) a) Explain Flow and Border layout management classes with examples of each. **[6]**

b) Describe the following: **[6]**

i) JMenu

ii) JMenuitem.

c) Describe the Arraylist Class in Java Collection framework with suitable example. **[6]**

OR

Q6) a) Explain the Java AWT container and components in detail. Define the containers window and panel. **[6]**

b) Describe the Collection Framework. Explain Map Interface in detail. **[6]**

c) Compose a Java Swing program to implement a simple Notepad application consisting of JFrame, JMenubar, Jmenu (file, edit, help) and JMenuitem (copy, paste). **[6]**

Q7) a) Sketch the JDBC architecture, Using JDBC, explain in detail about the steps to connect to the database in java. **[6]**

b) Explain in detail about the overview of the JDBC process. **[6]**

c) Develop a program to insert a table having the fields such as Roll NO., Name, Mobile NO, and also retrieve the same data from the database using JDBC. **[6]**

OR

Q8) a) Compare between prepared statement & Callable Statement? **[6]**

b) Develop a program to insert and retrieve the data from the database using JDBC. **[6]**

c) Explain how SQL Exception help to determine the cause of the error encounters during execution of JDBC process. **[6]**

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SEAT No. :

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T.E. (Electronics & Computer Engineering)
DATA COMMUNICATION
(2019 Pattern) (Semester - I) (310343)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answers the Q.1 or Q.2 and Q.3 or Q.4 and 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) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain QPSK with its Transmitter. **[8]**

b) Explain M-ary FSK in detail with the help of Transmitter and Receiver. **[8]**

OR

Q2) a) For a given data (101101), draw the modulated output waveforms for **[8]**

i) BASK
ii) BFSK
iii) BPSK
iv) QPSK

b) Explain with the help of neat block diagram Explain Binary Frequency Shift Keying (BFSK) Transmitter and receiver. **[8]**

Q3) a) Explain different Multiple Access Techniques in detail. **[9]**

b) A PN sequence is generated using feedback shift resisters of length $m = 4$, Find the generated output sequence if the initial contents of the shift register are 1000. If the chip rate is 10^7 chips/sec. Find the following Parameter **[9]**

i) Design PN sequence
ii) Chip Duration
iii) Length of PN sequence
iv) Duration of PN Sequence

OR

P.T.O.

Q4) a) With the help of mathematical expressions and block diagram explain DS-SS system. **[9]**

b) Write a short note on **[9]**

i) Pure ALOHA

ii) Slotted ALOHA

iii) CSMA

Q5) a) Apply Shannon Fano coding procedure to find the coding efficiency for the following Message ensemble. $X_1 = 1/4$, $X_2 = 1/8$, $X_3 = 1/16$, $X_4 = 1/16$, $X_5 = 1/16$, $X_6 = 1/4$, $X_7 = 1/16$ $X_8 = 1/18$ Take M = 2. **[9]**

b) Define information rate, Entropy, Mutual information and channel capacity, Minimum Distance. **[9]**

OR

Q6) a) An information source produces a sequence of independent symbols having the following probabilities. $S_1 = 1/3$, $S_2 = 1/27$, $S_3 = 1/3$, $S_4 = 1/9$, $S_5 = 1/9$, $S_6 = 1/27$, $S_7 = 1/27$ .Construct using Huffman binary encoding procedure and find its efficiency. **[9]**

b) State and Explain shannons theorem on channel capacity. **[9]**

Q7) a) Explain in detail ARQ Stop and Wait & Selective repeat ARQ. **[6]**

b) Explain the need of Error detection and Error Correction. **[6]**

c) What is Generator matrix and parity matrix? What is their role? **[6]**

OR

Q8) a) The Generator matrix of a particular (6, 3) block code is given below. Find all code vectors of this code **[8]**

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

b) Compare Forward error correction and Automatic repeat request. **[4]**

c) Write a short note on Linear block code. **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3847

[Total No. of Pages : 2

[6262]-109

T.E. (Electronics & Computer Engineering)

MICROCONTROLLER AND APPLICATIONS

(2019 Pattern) (Semester - I) (310344)

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 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Draw interfacing diagram and write a C program for the 8051 microcontroller to transfer the letter "A" serially at 4800 baud continuously. Use 8 bit data and 1 stop bit. **[6]**

b) Draw interfacing diagram of opto - isolator with 8051 microcontroller. Also write an Embedded C program for same. **[6]**

c) Explain the working principle of motion detector (PIR) sensor. Draw interfacing diagram of motion detector sensor and buzzer with 8051 microcontroller and write an Embedded C program to turn on buzzer when motion is detected. **[8]**

OR

Q2) a) Interface buzzer with 8051 microcontroller. Write an Embedded C program for the same. **[6]**

b) Draw interfacing diagram of DAC to 8051 microcontroller and write an Embedded C program to generate sine wave form. **[6]**

c) Draw interfacing diagram of stepper motor with 8051 microcontroller. Write an Embedded C program to rotate stepper motor continuously in clockwise direction. **[8]**

Q3) a) Explain in detail any four addressing modes of MSP430 microcontroller. **[8]**

b) Explain in detail: **[8]**

i) Low power modes in MSP430 microcontroller.

ii) Compare FRAM and Flash memory

P.T.O

OR

Q4) a) State the function of following registers of MSP430 microcontroller : **[8]**

i) Status Register

ii) Program Counter

iii) Stack pointer

b) List features and applications of variants of MSP430 family MSP430x2x, MSP430x4x, MSP430x5x. **[8]**

Q5) a) Write an Embedded C program for blinking of LED with and without switch using MSP430. Also draw its interfacing diagram. **[8]**

b) Interface relay with MSP430 microcontroller. Write an Embedded C program for the same and draw its flowchart. **[8]**

OR

Q6) a) Draw interfacing diagram of IR sensor with MSP430 microcontroller. Also write the Embedded C program for the same along with its flowchart. **[8]**

b) Draw and explain interrupt structure of MSP430. **[8]**

Q7) a) Explain with neat block diagram DAS using 8051 microcontroller. **[9]**

b) Design environment Monitoring System using MSP430 microcontroller. Also draw the flowchart for same. **[9]**

OR

Q8) a) Design Home Automation System using MSP430 microcontroller. Also draw the flowchart for same. **[9]**

b) Design frequency counter using 8051 microcontroller which will display the result of various frequency ranges on LCD. Also write the algorithm for same. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3848

[Total No. of Pages : 2

[6262]-110

T.E. (Electronics & Computer Engineering)

DISTRIBUTED SYSTEMS

(2019 Pattern) (Semester - I) (310345(A)) (Elective - I)

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 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Briefly discuss the architecture and server operation of NFS. **[6]**

b) Explain file service architecture and Andrew file system with suitable sketch. **[6]**

c) What is Identifiers? Explain the Uniform Resource Identifiers, Uniform Resource Locator and Uniform Resource Names. **[8]**

OR

Q2) a) What are the features of P2P system? What are the advantages and disadvantages of P2P system? **[6]**

b) Write short notes on Napster and Peer to Peer Middleware. **[6]**

c) Explain the following in details **[8]**

i) File system access model and its sharing semantics.

ii) Lightweight Directory Access Protocol

Q3) a) Explain the terms: Clocks, Clock Skew, Clock Drift, Co-ordinated Universal Time. **[8]**

b) Explain the following : **[8]**

i) Active replication

ii) Passive replication

iii) Ring based election algorithm.

iv) Bully election algorithm.

OR

P.T.O

Q4) a) What is a transaction? Explain flat transaction and nested transaction with suitable example. **[8]**

b) What is a deadlock in distributed system? Explain with example. How deadlock can be recovered? **[8]**

Q5) a) What is load balancing? What is the goal of load balancing algorithms? What are the rules of load balancing operation? What is static load balancing? **[8]**

b) What is Global Scheduling? With the help of neat diagram explain Global Scheduling Architecture. **[8]**

OR

Q6) a) Explain process migration. What are the different steps involved in process migration? What are the desirable features of a good process migration mechanism? **[8]**

b) How to implement thread package? Explain the different ways of Remote execution of thread? What is the component of faults? **[8]**

Q7) a) What is Coda distributed file system? State the features of Coda distributed file system. **[6]**

b) What do you mean by Google file system? How does the Google file system work? State the features of Google file system. **[6]**

c) With the help of neat diagram explain Network File System (NFS) of distributed file system. **[6]**

OR

Q8) a) Explain characteristics of Distributed File System. **[6]**

b) What is need of Distributed File System? Explain challenges associated with distributed file system. **[6]**

c) Explain: design constraints/issues of Google File System. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3849

[Total No. of Pages : 2

[6262]-111

T.E. (Electronics & Computer Engineering)

BLOCKCHAIN TECHNOLOGY

(Elective - I) (2019 Pattern) (Semester - I) (310345B)

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 and Q.7 or Q.8.***
2) ***Assume suitable data, wherever necessary.***
3) ***Draw neat & indicative figures.***

Q1) a) Compare asymmetric & symmetric cryptography. **[6]**

b) Describe distributed hash table. **[6]**

c) Describe cryptography primitives. **[6]**

OR

Q2) a) Explain working of message Authentication code. **[6]**

b) Describe Hashing in blockchain technology. **[6]**

c) Describe Distributed Hash tables in Blockchain. **[6]**

Q3) a) Explain how ethereum work? **[6]**

b) Explain the working of proof of work consensus algorithm. **[6]**

c) Explain ethereum development tools. **[6]**

OR

Q4) a) Explain proof of stake consensus algorithm. **[6]**

b) Compare proof of Burn & proof of stake consensus algorithms. **[6]**

c) Write features of ethereum. **[6]**

Q5) a) What is Bitcoin? Write the history of Bitcoin. **[6]**

b) Draw & explain the structure of merkel Tree. **[6]**

c) Explain types of Bitcoin wallets. **[5]**

P.T.O

OR

Q6) a) Describe the process in Bitcoin transactions. **[6]**

b) Describe the feature of virtual currency : Bitcoin. **[6]**

c) Describe Bitcoin clients in detail. **[5]**

Q7) a) Describe the integration of Blockchain technology with cloud computing: feasibility, features & applications. **[7]**

b) Describe the benefits of implementing Blockchain technology with allied/ advance technology such as Artificial Intelligence. **[4]**

c) Describe the integration of Blockchain Technology with Robotics automation. **[6]**

OR

Q8) Discuss the features & scope of integrating blockchain technology with :

a) Internet of Things (IoT). **[7]**

b) Machine learning applications. **[4]**

c) Cloud of Things. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3850

[Total No. of Pages : 2

[6262]-112

T.E. (Electronics and Computer Engg.)

DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - I) (310345C) (Elective-I)

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. 7or 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) Explain the design of FIR filters using windows. **[9]**

b) What are the advantages of bilinear transformation method over impulse invariance method for IIR filters **[9]**

OR

Q2) a) Explain Properties of FIR filters **[9]**

b) Write a short note on butter worth filter approximation **[9]**

Q3) a) Draw the direct form- I and II structures for the following systems. **[8]**

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

ii) $y(n) = 0.5 [x(n) + x(n-1)]$

b) Explain direct form structure of for FIR system in detail **[9]**

OR

Q4) a) Explain cascade form structure for IIR filter. **[8]**

b) Obtain the system function H (z) for h (n) = {4, 2,-2,-3} and draw a direct form FIR filter structure. **[9]**

P.T.O.

Q5) a) What is the role of anti-aliasing filter and anti-imaging filter in decimator and interpolator? **[9]**

b) What are the different applications of multirate digital signal processing **[9]**

OR

Q6) a) Explain the various methods of converting a sampling rate by non-integer factors. **[9]**

b) What is principle of interpolation? Derive the expression for interpolated signal at the output. **[9]**

Q7) a) Explain any one application of Biomedical Signal Processing. **[8]**

b) With the help of block diagram explain the basic elements of DSP system. **[9]**

OR

Q8) a) Explain the features of a digital signal processing. **[8]**

b) What are the Difference between DSP processor & microprocessor? **[9]**

Total No. of Questions : 8]

SEAT No. : ____

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[Total No. of Pages : 2

[6262]-113

T.E. (Electronics and Computer Engg.)

SENSORS AND APPLICATIONS

(2019 Pattern) (Semester - I) (310345D) (Elective-I)

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. 7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) Explain with neat sketches the working principle of **[8]**

i) Doppler type ultrasonic flow meter and

ii) Transit time ultrasonic flow meter.

b) Describe with neat sketch electromagnetic flow meter. **[9]**

OR

Q2) a) Explain working principle of hydrostatic pressure type of level measurement technique. **[8]**

b) Explain with a neat sketch working principle of rotameter. Can a rotameter be used in a horizontal pipe line? If not, explain why? **[9]**

Q3) a) Explain with neat sketch working principle of thermal accelerometer. State applications of accelerometers. **[8]**

b) Explain working principle of Geiger Muller counter used for detection of nuclear radiation. **[9]**

OR

Q4) a) Explain the process of charge transfer in CMOS image sensors. **[8]**

b) Explain with neat sketch working principle of incremental optical encoder.

P.T.O.

what is the use of index pulse in incremental encoder? Explain how an incremental encoder is used to sense direction of rotation of shaft. **[9]**

Q5) a) Explain working principle of PZT actuators. State its applications. **[9]**

b) Explain magneto-transistor and magneto-resistive elements (MRE). **[9]**

OR

Q6) a) Write a short note on surface micromachining for MEMS devices. **[9]**

b) Explain with neat block diagram the concept of SMART sensor system. **[9]**

Q7) a) Draw and explain the symbols of following pneumatic valves. **[6]**

i) 5X2 valve

ii) 4X2 valve

iii) 3X2 valve

b) Explain how a solenoid is used as an actuator. **[6]**

c) Draw control valve characteristics and explain the terms **[6]**

i) Quick Opening

ii) Linear and

iii) Equal Percentage.

OR

Q8) a) A 5V control signal is to be used to turn ON and OFF a pump operating on 230VAC. Explain a relay driver circuit which can be used for this application. **[6]**

b) Explain control of single acting cylinder using an appropriate directional control valve. **[6]**

c) Explain how actuators are classified. Explain any one type of actuators. **[6]**

Total No. of Questions : 8]

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T.E. (Electronics and Computer Engineering)

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

(2019 Pattern) (Semester - II) (310352)

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) Explain COCOMO model for project estimation with suitable example. **[8]**

b) What is project scheduling? What are the basic principles of project scheduling? **[6]**

c) What is a task network in project scheduling? **[4]**

OR

Q2) a) Compare Lines of code(LOC) and Function Point(FP) based estimation of software. **[8]**

b) What is a timeline chart? Explain with suitable example. **[6]**

c) What are the categories of software Engineering resources? **[4]**

Q3) a) List out different design model.Explain Interface design model in detail. **[7]**

b) Explain the design concept: Functional Independence. A design should have high cohesive and low coupling. Justify. **[6]**

c) Write a short note on: Modelling Component level design. **[4]**

OR

Q4) a) Why is software architecture being important? Explain Data centered Architecture style in detail. **[7]**

b) What is design engineering in software engineering? Explain the design concept: Modularity, Refactoring. **[6]**

c) What is the difference between abstraction and refinement? **[4]**

P.T.O.

Q5) a) Explain RMMM plan with suitable example. **[8]**

b) Explain SCM repository in detail. What are the advantages of SCM repository? **[6]**

c) What are the different categories of risk? **[4]**

OR

Q6) a) What are the layers of the SCM process? Explain each in detail. **[8]**

b) Explain Risk identification and assessment process for a software project. **[6]**

c) Write a short note on: Risk table. **[4]**

Q7) a) What is software testing? Explain software testing strategies for software development. **[7]**

b) How Top down and Bottom up integration testing is achieved? **[6]**

c) Compare Alpha and Beta Testing. **[4]**

OR

Q8) a) Explain Defect life cycle in detail. **[7]**

b) What is test plan, test scenario and test cases? How to write test cases for Login Page. **[6]**

c) Differentiate between verification and validation. **[4]**

Total No. of Questions : 8]

SEAT No. : [ ]

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[6262]-115

T.E. (Electronics & Computer Engineering)

COMPUTER NETWORKS & SECURITY

(2019 Pattern) (Semester - II) (310353)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What are noiseless and noisy channels? **[4]**

b) Explain CYCLIC CODES? Explain CRC code with example. **[6]**

c) Explain Multiple access techniques-Channelization in detail. **[6]**

OR

Q2) a) Write difference between Hub and Bridge. **[4]**

b) Explain POINT- TO-POINT PROTOCOL (PPP)? Which services Provided by PPP. **[6]**

c) Explain following Ethernet types (Any 2)- **[6]**

i) Bridged,

ii) Switched,

iii) FulI duplex

Q3) a) Short note (Any 1) **[6]**

i) RARP

ii) IPv4 datagram

b) Explain working of DHCP with suitable diagram. **[6]**

c) Explain architecture of Internet Control Message Protocol (ICMP). **[6]**

OR

P.T.O.

Q4) a) Short note (Any 1) **[6]**

i) ARP

ii) IGMP

b) Explain Routing? Explain different types of Routing Algorithms. **[6]**

c) Compare Connection-Oriented and Connectionless Service with respect to Data Reliability, Congestion, Bandwidth Requirement, Authentication with example. **[6]**

Q5) a) Explain File Transfer Protocol (FTP) in Application Layer. **[4]**

b) What is the socket ( ) function in socket programming? Explain elements of socket? **[6]**

c) Write short note on any two of following Application Layer Protocols: DNS, FTP, SMTP, And MIME Protocols. **[8]**

OR

Q6) a) Explain any 4 Features of MIME. **[4]**

b) Explain Domain Name System with suitable diagram. **[6]**

c) Which are different commands used in SMTP? Explain. **[8]**

Q7) a) What are secret key algorithms public key algorithms? **[4]**

b) What are the 3 main types of cryptographic algorithms? **[6]**

c) What are the 4 types of attacks in network security? **[8]**

OR

Q8) a) Write Features of Cryptography in detail. **[4]**

b) Compare Encryption and Cryptography. **[6]**

c) Which tools is used to allow simulating networks? List any 4 tools. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3854

[Total No. of Pages : 2

[6262]-116

T.E. (Electronics and Computer Engg.)

EMBEDDED PROCESSORS & APPLICATIONS

(2019 Pattern) (Semester - II) (310354)

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 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, if necessary.***

Q1) a) What is interfacing? What are the advantages of using LPC2148 instead of other processors in embedded system? **[9]**

b) Draw and explain interfacing of on chip DAC with LPC2148 with flowchart. **[9]**

OR

Q2) a) Write down the characteristic features of UART of LPC2148. **[4]**

b) Write an embedded C program to transmit character 'A' to PC. **[6]**

c) Interface of LPC 2148 with PC using UART. Draw interfacing diagram and explain it. **[8]**

Q3) a) What are the features and advantages of ARM CORTEX M3 in embedded system **[8]**

b) Differentiate CORTEX A, CORTEX M, CORTEX R processors. **[5]**

c) Write a note on ARM processor development. **[5]**

OR

Q4) a) Write down the specifications of ARM CORTEX M3. **[5]**

b) Draw detailed architecture of ARM CORTEX M3. **[8]**

c) Compare between ARM Cortex-M3 and ARM 7 **[5]**

P.T.O.

Q5) a) Explain programmer model of ARM CORTEX M4 with neat labelled diagram. **[9]**

b) Desktop PC on HyperTerminal. Assume (UART, 9600 Baud Rate) **[8]**

OR

Q6) a) Write a note on different types of timers of STM32F4xx. **[6]**

b) Draw an diagram or flowchart to interface Seven segments LED with STM32F4xx microcontroller. **[6]**

c) Compare ARM Cortex M3 with ARM Cortex M4 **[5]**

Q7) a) What is IoT? Enlist the characteristics of IoT. **[8]**

b) Write a note on Sensors and actuators **[6]**

c) Write down the characteristics of Embedded System **[3]**

OR

Q8) a) Draw and explain basic block diagram of Embedded System with IoT **[8]**

b) Explain any one of the below with flow/block diagram

Agriculture automation **[9]**

OR

Health monitoring system

Total No. of Questions : 8]

SEAT No. :

PB4401

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[6262]-117

T.E. (Electronics and Computer Engineering)

SOFTWARE MODELING AND DESIGN

(2019 Pattern) (Semester - II) (Elective - II) (310355 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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What is an activity diagram? Explain the basic elements of an activity diagram. **[6]**

b) What are some limitations or challenges associated with using activity diagrams? **[6]**

c) Explain the basic components of a sequence diagram. What are the Differences between an Activity diagram and a Flowchart? **[8]**

OR

Q2) a) Describe the difference between association roles and link names in a collaboration diagram. **[6]**

b) What is a state diagram, and what is its purpose in software engineering? Explain Triggers and Ports related to state diagram. **[6]**

c) Explain the key differences between state diagrams, sequence diagrams, and activity diagrams in software modeling. **[8]**

Q3) a) What is object-oriented constraints language? Explain Object Oriented Constraints Language. **[8]**

b) Explain Method Design Using UML Activity Diagram. **[8]**

OR

Q4) a) Describe Object Relation Mapping and Table Class Mapping. **[8]**

b) Describe Macro-Level Design Process. **[8]**

P.T.O.

Q5) a) Explain General Responsibility Assignment Software Patterns. **[8]**

b) Explain Types of design patterns in brief. **[8]**

OR

Q6) a) Describe the Facade pattern and its used in providing a simplified interface to a complex system. **[8]**

b) Explain the difference between structural design patterns and other categories of design patterns, such as creational and behavioral patterns. **[8]**

Q7) a) Describe the role of software architecture in shaping the structure, behavior and performance of a software system. **[9]**

b) Explain designing Client/Server Software Architecture. **[9]**

OR

Q8) a) Explain designing Component-Based Software Architectures. **[9]**

b) Explain designing Concurrent and Real Time Software Architectures. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3855

[6262]-118

[Total No. of Pages :2

T.E. (Electronics and Computer Engineering)
ADVANCED DATABASE MANAGEMENT SYSTEMS
(2019 Pattern) (Semester- II) (Elective-II) (310355B)

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) What is NoSQL database? Explain two types of NoSQL databases. **[6]**

b) Where do we use MongoDB? Explain features of MongoDB. **[6]**

c) What is XML? Why is XML important? What are the benefits of using XML? **[8]**

OR

Q2) a) Why should we use MongoDB? Give difference between MongoDB & RDBMS. **[6]**

b) What is Column-Oriented NoSQL database? How does a Column-Oriented NoSQL database Work? **[6]**

c) Describe any four NoSQL database development tools in detail. **[8]**

Q3) a) Explain components of Data Warehouse. Explain star schema in detail with example. **[8]**

b) Write a short note on: **[8]**

i) Decision support system.

ii) Snowflake schema

OR

Q4) a) Draw and explain Data Warehouse architecture. **[8]**

b) What is OLAP? Explain different types of OLAP in detail. **[8]**

P.T.O.

Q5) a) Draw and explain architecture of Data Mining. **[8]**

b) Explain predictive and descriptive algorithms in Data Mining. **[8]**

OR

Q6) a) What is KDD-Knowledge Discovery in Databases? Explain KDD seven step process in detail. **[8]**

b) Explain benefits of Data Mining. Explain any two application of Data Mining in detail. **[8]**

Q7) a) Compare Spatial and Temporal databases. **[6]**

b) What are active databases? Elaborate with example. **[6]**

c) Explain Mobile databases in detail with examples. **[6]**

OR

Q8) a) Explain Multimedia databases in detail with examples. **[6]**

b) Explain geographical information systems in detail with examples. **[6]**

c) Explain Deductive database in detail with example. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB3856

[6262]-119

[Total No. of Pages :2

T.E. (Electronics & Computer Engineering)

POWER ELECTRONICS

(2019 Pattern) (Semester- II) (Elective-II) (310355C)

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.***
5) ***Use of nonprogrammable calculator is allowed.***

Q1) a) What are the effects of freewheeling diode used in full converter with R-L load? **[4]**

b) Draw & explain single phase full converter for R-L load with circuit diagram & waveforms for: **[13]**

i) Rectifier mode ($\alpha < 90°$)

ii) Inversion mode ($\alpha > 90°$)

Derive an expression for its average o/p voltage.

OR

Q2) a) Compare symmetrical & asymmetrical configurations in single phase semiconverters with R-L load. **[6]**

b) Explain with circuit diagram three phase Half controlled converter with R load. Draw load current and load voltage waveforms with $\alpha = 60°$ and $\alpha = 90°$. **[11]**

Q3) a) Explain with circuit diagram single phase full wave AC voltage controller for R-load with i/p voltage & o/p voltage & current waveforms. **[6]**

b) A step down chopper is operated from dc supply voltage of 230V. It has resistive load with $R = 10\Omega$. When chopper operates, voltage drop across chopper is 2V. If duty cycle is 40% calculate: **[6]**

i) Average & rms o/p voltages

ii) Average & rms o/p currents

iii) Chopper efficiency

P.T.O.

c) Explain with diagrams various control techniques in DC chopper operation. **[6]**

OR

Q4) a) Explain with circuit diagram operation of step up chopper and derive an expression for its o/p voltage: $V_O = \frac{Vs}{(1-D)}$ where D is duty cycle. **[8]**

b) Explain operation of four quadrant chopper with circuit diagram. **[6]**

c) A step up chopper is operated from 200V dc supply and it provides 360V output. If chopping frequency is 5KHz, calculate ON & Off times of chopper. **[4]**

Q5) a) How feedback diodes differ from freewheeling diodes? **[4]**

b) Explain working of single phase full bridge inverter for R-L load with input & output waveforms. **[7]**

c) Single phase full bridge inverter is operated from 100V dc supply, it has a resistive load of R = 10Ω. Find: **[6]**

i) rms o/p voltages at third & fifth harmonic (V_{O3} & V_{O5})

ii) Distortion factor (DF) of 3rd harmonic component

iii) Total harmonic distortion (THD)

OR

Q6) a) Draw & explain control circuit for single phase inverters using PWM IC LM3524. **[5]**

b) Draw a three phase inverter for balanced star R load? Explain its operation of 120° mode with gate signals & output waveforms. **[12]**

Q7) a) What is UPS? Explain operation of both online & offline UPS with block schematic. **[12]**

b) Explain with diagram architecture of EVs battery charger. **[6]**

OR

Q8) a) Write battery Charging Applications & Induction heating applications. **[6]**

b) Explain with block diagram HVDC transmission system. **[6]**

c) Explain various performance parameters of batteries used in EVs. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB3857

[6262]-120

[Total No. of Pages :2

T.E. (Electronics and Computer Engineering)

PLC and Automation

(2019 Pattern) (Semester- II) (Elective-II) (310355D)

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) Explain following arithmetic functions. **[8]**

i) MUL

ii) SQRT

iii) LN

iv) SUB

b) Draw a ladder diagram for following statement: **[10]**

Motor 1 (M1) starts as soon as start switch is ON; after 10 Seconds M1 goes off and Motor 2 (M2) starts. After 5 seconds M2 goes OFF and M3 starts. After 10 Seconds M3 goes off, M1 Starts and the cycle is repeated. When stop switch is ON, all Motors are stop.

OR

Q2) a) Explain following arithmetic functions. **[8]**

i) CMP==

ii) CMP<>

iii) CMP>

iv) CMO <=

b) Draw a ladder diagram for a two-motor system having the following conditions:

The start push button starts Motor 1;10 seconds later Motor 2 will start. The stop Push button stops Motor 1;15 seconds later Motor 2 stops. **[10]**

P.T.O.

Q3) a) Explain Grounding, voltage variations & surges, Circuit protection in connection with PLC. **[9]**

b) Explain necessity of program editing and commissioning. **[9]**

OR

Q4) a) How you can overcome the effect of Input and Output malfunction? **[9]**

b) Explain concept of PLC maintenance. **[9]**

Q5) a) Explain PID with neat diagram and required equations. **[9]**

b) Explain RTU and MTU. **[8]**

OR

Q6) a) Explain block diagram of SCADA. **[9]**

b) Explain HMI and it's interfacing with PLC. **[8]**

Q7) a) Explain types of networking channels. **[8]**

b) Write short note on **[9]**

i) Serial communication

ii) PROFIBUS PA/DP

iii) DeviceNet

OR

Q8) a) What are advantages of standard industrial network? **[8]**

b) Write short note on **[9]**

i) Data Communication

ii) CAN

iii) ControlNet

Total No. of Questions : 8]

SEAT No. :

PB-3858

[Total No. of Pages : 2

[6262]-121
T.E.(Information Technology Engineering)
Theory of Computation
(2019 Pattern) (Semester-I) (314441)

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 marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is an ambiguous grammar? Explain with a suitable example. **[4]**

b) What is Regular Grammar? Explain types of regular grammar. **[5]**

c) Convert the following grammar to GNF. **[9]**

$S \rightarrow AB$

$A \rightarrow BSB \mid BB \mid b$

$B \rightarrow aAb \mid a$

OR

Q2) a) Write CFG for the language $L = \{ a^i b^j c^k \mid i = j + k \ \& \ j, k >= 1 \}$ **[6]**

b) Convert the following RLG to FA. **[6]**

$S \rightarrow 0A \mid 1B \mid 0 \mid 1$

$A \rightarrow 0S \mid 1B \mid 1$

$B \rightarrow 0A \mid 1S$

c) Explain any three closure properties of Context Free language. **[6]**

Q3) a) Define Push down Automata. Explain different types of PDA. Explain. any two applications of PDA. **[6]**

b) Write a note on Instantaneous Description of PDA with an example **[5]**

P.T.O.

c) Convert the following CFG to PDA that accepts the same language by empty stack. **[6]**

$S \rightarrow 0S1 \mid A$

$A \rightarrow 1A0 \mid S \mid \varepsilon$

OR

Q4) a) Compare Finite Automata and Pushdown Automata. **[4]**

b) Design a Pushdown Automata for the following language. **[7]**

$L=\{0^a1^b2^c \mid a+c=b\}$

c) Design Post Machine for $L=\{0^n1^n \mid n \geq 0\}$ **[6]**

Q5) a) Write a note on Universal turing Machine **[6]**

b) Explain Church Turing hypothesis. **[3]**

c) Define Turing machine and design a right shifting TM over alphabet {0,1} with an example. **[9]**

OR

Q6) a) Construct a Turing Machine to replace string '110' by '101' in a binary input string. Write down transition table along with diagram. **[10]**

b) Discuss the following terms **[8]**

i) Post Correspondence Problem

ii) Halting Problem of Turing Machine

Q7) a) What do you mean by NP problems? Justify why the Travelling Salesman problem is a NP problem. **[8]**

b) Define decidability of problem with suitable example. Describe un- decidable problems for context-free Grammar. **[9]**

OR

Q8) a) Write short note on : **[9]**

i) A Simple Un-decidable problem

ii) Measuring Complexity

b) Explain in detail Cook's theorem. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3859

[Total No. of Pages : 2

[6262]-122
T.E. (Information Technology)
OPERATING SYSTEMS
(2019 Pattern) (Semester-I) (314442)

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) Explain the following with example **[9]**

i) Mutual Exclusion

ii) Synchronization

iii) Race condition

b) What is Critical Section problem? Explain readers- writers problem.**[9]**

OR

Q2) a) Enlist different IPC techniques. Differentiate between named pipe and unnamed pipe with suitable example. **[9]**

b) What is Critical Section problem? Give semaphore solution for producer-consumer problem. **[9]**

Q3) a) What is page Fault? For the given reference string with 3- page frame available, determine the number of page faults for FIFO and LRU algorithms: 3,5,7,2,1,5,4,6,7,4,1,2. **[9]**

b) Explain Demand paging with the help of neat diagram. **[8]**

OR

Q4) a) Explain Buddy System with the help of neat diagram and example. **[9]**

b) What is segmentation? How address Translation is performed in segmentation system? **[8]**

P.T.O.

Q5) a) Assume a disk with 200 tracks and the disk request queue has random requests in it as follows: 55,58,39,18,90,160,150,38,184. **[12]**

Find the no of tracks traversed and average seek length if

i) SSTF

ii) SCAN

iii) C-SCAN is used and initially head is at track no 100.

b) What are typical operations that may be performed on a directory? **[6]**

OR

Q6) a) What is I/O buffering? Why I/O buffering is needed? State and explain different approaches of I/O buffering. **[9]**

b) Explain with example any three disk scheduling criteria. **[9]**

Q7) a) List down the phases of a compiler. Explain with suitable example. **[9]**

b) Explain macro call and macro expansion with suitable example. **[8]**

OR

Q8) a) What is Loader? What are the basic functions of loaders? **[10]**

b) What is system software? Explain any four system software in brief? **[7]**

Total No. of Questions : 8]

SEAT No. :

PB-3860

[Total No. of Pages : 4

[6262]-123

T.E. (IT)

MACHINE LEARNING

(2019 Pattern) (Semester - I) (314443)

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) a) State and explain need of Regression analysis. **[4]**

b) How gradient descent does helps to optimize linear regression model? **[6]**

c) What are the different ways to prevent overfitting and underfitting. **[8]**

OR

Q2) a) What are different cost functions to access the performance of linear Regression model? In the given Dataset the outliers represent anomalies. Which cost function will be more suitable and why? **[5]**

b) Define of Multivariate Regression and State advantages and disadvantages of Multivariate Regression. **[5]**

c) Consider the following data : **[8]**

	Prize in Rs	Amount Demanded
1	10	40
2	11	38
3	16	48
4	18	40
5	20	60

i) Find values of $\beta 0$ and $\beta 1$ w.r.t. linear regression model which best fits given data.

ii) Interpret and explain equation of regression line.

iii) Estimate the likely demand when the price is Rs.15.

P.T.O.

Q3) a) Consider following data. Which feature will be selected as a root node? Use Information Gain. Played football is dependent feature. **[10]**

Outlook	Temperature	Humidity	Wind	Played football (Yes/No)
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

b) Define and Explain following terms **[7]**

i) Bayesian Network

ii) Advantages and disadvantages of Naïve Bayes Classifier

OR

Q4) a) For the given data set apply Naive Bayes Classifier and predict the Class for Type of Type of family structure=Single Parent, Age group=Young, and Income status=Low **[10]**

Type of family structure	Age group	Income status	Will they buy a car
Nuclear	Young	Low	Yes
Extended	Old	Low	No
Childless	Middle-aged	Low	No
Childless	Young	Medium	Yes
Single Parent	Middle-aged	Medium	Yes
Childless	Young	Low	No
Nuclear	Old	High	Yes
Nuclear	Middle-aged	Medium	Yes
Extended	Middle-aged	High	Yes
Single Parent	Old	Low	No

b) Define and explain following terms **[7]**

i) Minority Class

ii) Gini Index

iii) Entropy

iv) Information Gain

Q5) a) Find all association rules in the following database in the following database with minimum support =2 and minimum confidence = 75%. **[10]**

Transactions	Data Items
1	Bread, Milk, Diaper
2	Bread, Milk, Diaper, Coke
3	Diaper, Beer, Eggs
4	Bread, Milk, Coke

b) State & explain with appropriate example different types of linkage use in clustering. **[8]**

OR

Q6) a) Explain following Terms **[8]**

i) Rule

ii) Support

iii) Lift

iv) Confidence

b) Apply KNN on the Following data. Find class of person whose height is 170 cm and weight is 57 kg. Consider value K =5 and use Euclidian distance formula. **[10]**

Height (CM)	Weight (KG)	Class
167	51	Underweight
182	62	Normal
176	69	Normal
173	64	Normal
172	65	Normal
174	56	Underweight
169	58	Normal
173	57	Normal
170	55	Normal

Q7) a) With the help of suitable diagram explain Biological Neuron. **[5]**

b) Explain the architecture of feed forward neural network. State its limitations. **[7]**

c) What is deep learning? Explain different applications of deep learning. **[5]**

OR

Q8) a) What is perceptron? Explain multilayer perceptron in detail. **[5]**

b) Explain why we use non-linearity function? State and explain three types of neurons that add non-linearity in their computations. **[7]**

c) What is ANN? Explain McCulloch Pitts Neuron. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PB-3861

[Total No. of Pages : 2

[6262]-124

T.E. (Information Technology)

HUMAN COMPUTER INTERACTION

(2019 Pattern) (Semester - I) (314444)

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 indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What are Norman's seven principles for reducing complex jobs to simple one? **[8]**

b) How does making a call differ when using: **[9]**

i) Smart Cellphone

ii) Land line phone

How have been these devices been designed to consider the following:

i) The kind of users

ii) Types of activity being supported

iii) Contexts of use

OR

Q2) a) What exactly are mental models and why do they matter in interface design? **[5]**

b) Explain Low-fidelity and High-fidelity prototypes. **[6]**

c) Write a short note on the following: **[6]**

i) Linguistic Model

ii) Physical and device Model

P.T.O.

Q3) a) Consider two different ATM machines, one giving away the cash & then ejecting the bank card & the other one ejecting the bank card first & then dispensing the cash. Which is a better interface from interaction design point of view? justify. **[9]**

b) Explain the principle of Learnability and principle of Flexibility with relevant examples. **[9]**

OR

Q4) a) Write a Scenario for making an online transaction using any mobile phone-based application. **[6]**

b) What is design? What is the golden rule of design? Draw the process of interaction design. **[6]**

c) Draw and explain Model -View- Controller (MVC) framework for any suitable application. **[6]**

Q5) a) Cognitive Walk through is one of the important techniques with reference to HCI. Justify the statement with a suitable example of your own. **[8]**

b) Draw and explain User Interface Management System architecture. **[9]**

OR

Q6) a) How will you apply the DECIDE framework to any online booking system? Explain it with necessary diagram and suitable explanation.**[10]**

b) What do you mean by evaluation? What are the goals of evaluation? Explain any one category of evaluation in detail. **[7]**

Q7) a) What do you mean by design thinking? Explain its 5 stages in detail?**[9]**

b) Differentiate between smart devices and handheld devices. **[5]**

c) Mention your opinion regarding the future of HCI with an example. **[4]**

OR

Q8) a) Define the term Ubiquitous computing? Explain it in detail with reference to some suitable examples. **[9]**

b) Mention a real life example of Augmented Reality and Virtual Reality. **[5]**

c) What challenges will be faced by designer while designing interfaces for smart wrist bands. **[4]**

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Total No. of Questions : 8]

SEAT No. :

PB-3862

[Total No. of Pages : 2

[6262]-125

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHM

(2019 Pattern) (Semester - I) (314445(A)) (Elective - I)

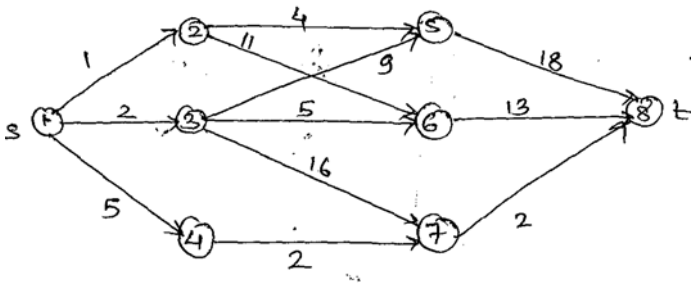
Time : 2½ Hours] *[Max. Marks : 70*

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.***

Q1) a) Define and explain Travelling Salesperson problem using dynamic programming. **[9]**

b) What is Multistage Graph? Find the minimum cost path from source (s) to sink(t) of the multistage graph given below. **[9]**



OR

Q2) a) Explain Principle of Optimality? Differentiate between backtracking and dynamic method. **[9]**

b) Solve the following instance of Knapsack problem by dynamic programming approach:
n = 6, M = 165 and (pl, p2, p3, p4, p5, p6) = (wl, w2, w3, w4, w5, w6) = (100, 50, 20, 10, 7, 3). **[9]**

Q3) a) Explain 8-Queen problem and explain the following terms with respect to 8-Queens problem. **[8]**

i) State space tree
ii) Live node
iii) Static tree
iv) Solution state
v) Answer state

P.T.O

b) Discuss and analyze problem of graph coloring using backtracking with the help of example. **[9]**

OR

Q4) a) State the principle of backtracking and write backtracking algorithm for N-Queen problem. **[8]**

b) Let W = {5, 7, 10, 12, 15, 18, 20} and M = 35. Find all possible subsets of W that sum to M. Construct the portion of state space tree. **[9]**

Q5) a) Explain the following : **[9]**

i) Bounding Function

ii) Branch & Bond

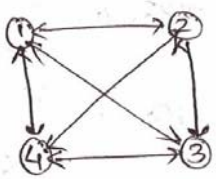
iii) LC search

b) Write an algorithm for FIFO branch & bound. **[9]**

OR

Q6) What is traveling salesperson problem? Find solution to the following TSP using branch & bound. **[18]**

$$\begin{bmatrix} \infty & 10 & 15 & 20 \\ 5 & \infty & 9 & 10 \\ 6 & 13 & \infty & 12 \\ 8 & 8 & 9 & \infty \end{bmatrix}$$



Q7) a) What do you mean by P, NP, NP – Hard and NP complete problem? Give an example of each category. **[9]**

b) Prove that 3-SAT is NP complete. **[8]**

OR

Q8) a) Differentiate between **[9]**

i) P and NP class

ii) NP complete and NP-Hard class

b) Prove that vertex cover problem is NP complete. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PB-3863

[Total No. of Pages : 2

[6262]-126

T.E. (Information Technology)

ADVANCED DATABASE & MANAGEMENT SYSTEM

(2019 Pattern) (Semester - I) (314445B) (Elective-I)

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. 7or 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 NoSQL databases and explain the primary differences between NoSQL databases and traditional relational databases. **[9]**

b) Explain the CAP theorem and its relevance to NoSQL databases. How does it impact the design and functionality of NoSQL databases? **[9]**

OR

Q2) a) Explain different types of NoSQL databases, including document-oriented, key-value, column-family, and graph databases. **[9]**

b) Describe how XML and JSON documents can be validated against a schema definition. **[9]**

Q3) a) Explain the key components of a typical data warehousing architecture, Also Explain Characteristics of Data Warehousing. **[9]**

b) Describe the differences between OLAP (Online Analytical Processing) and OLTP (Online Transaction Processing) systems, emphasizing their roles within a data warehousing architecture. **[8]**

OR

Q4) a) List and explain the basic operations supported by OLAP systems, such as slice-and-dice, drill-down, roll-up, and pivot. **[9]**

b) Explain the advantages and disadvantages of using a star schema versus a snowflake schema in a data warehouse design. **[8]**

P.T.O.

Q5) a) List and describe the steps involved in the KDD process in details. **[8]**

b) Explain data mining techniques, such as classification, clustering, association rule mining in details. **[9]**

OR

Q6) a) Draw the architecture of data mining and explain its components. **[8]**

b) Define predictive and descriptive algorithms in the context of data mining. Explain their primary purposes and differences. **[9]**

Q7) a) Explain Active database concepts with triggers in details. **[9]**

b) Write a short note on **[9]**

i) Mobile databases

ii) Multimedia Databases

iii) Geographical Information system

OR

Q8) a) Explain Deductive database concepts with proper example. **[9]**

b) Write a short note on : **[9]**

i) Temporal Databases

ii) Spatial Databases

iii) Genome data management.

Total No. of Questions : 8]

SEAT No. :

PB-3864

[Total No. of Pages : 2

[6262]-128

T.E. (Information Technology)

INTERNET OF THINGS

(2019 Pattern) (Semester - I) (314445D) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer 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.***
4) ***Assume Suitable data, if necessary.***

Q1) a) What is Bluetooth? Explain in detail Bluetooth Technology. **[8]**

b) List different application layer protocols? Draw & explain Message Queue Telemetry Transport (MQTT) protocol used in IOT with suitable examples. **[9]**

OR

Q2) a) Enlist & Explain Different IP Based Protocols used in Internet. **[8]**

b) Explain how data Management done in IOT through Data Aggregation and Dissemination methods such as Flooding, Gossiping and SPIN.**[9]**

Q3) a) Differentiate between Arduino and Raspberry? Draw and explain interfacing of LED using Raspberry Pi with the Python code? **[9]**

b) Draw and explain interfacing of Temperature & Humidity sensor (DHT 11) using Arduino with program? **[9]**

OR

Q4) a) What is Raspberry Pi. ? Explain Steps of Installation of OS of Raspberry Pi also Draw and explain interfacing of Switch & LED using Raspberry Pi with the Python code? **[9]**

b) Draw and explain interfacing of DC Motor using Arduino with program? **[9]**

P.T.O.

Q5) a) What is mean by IOT Cloud? Explain Thing Speak Cloud with suitable example. **[8]**

b) Explain different types of possible security issues and attacks of IOT Systems. **[9]**

OR

Q6) a) Differentiate between SaaS, PaaS & IaaS. **[8]**

b) What is mean by IoT Threat modelling? What are the Steps for Threat modeling? Discuss Thread Modeling FRAMEWORKs: STRIDE & DREAD. **[9]**

Q7) a) Describe with suitable diagrams applications of IOT in Smoke/Gas Detector for Home Automation System. **[9]**

b) Explain applications of IOT in Retail Management for Inventory Management, Smart Payments? **[9]**

OR

Q8) a) Explain applications of IOT in smart Agriculture as a Smart Irrigation, Greenhouse Control? **[9]**

b) Describe with suitable diagrams applications of IOT in Smart Fitness & Health Monitoring? **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3865

[Total No. of Pages : 2

[6262]-129

T.E. (Information Technology Engineering)

COMPUTER NETWORKS AND SECURITY

(2019 Pattern) (Semester - II) (314451)

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) Explain the connection establishment and data transfer phase in the following routing protocols with suitable diagram. **[9]**

i) AODV

ii) DSDV

b) Explain with diagram Layered Architecture for Sensor Network. **[9]**

OR

Q2) a) Differentiate between infrastructure network and infrastructure less network. **[6]**

b) What are hidden station and exposed station problem in WLAN. **[6]**

c) Explain Distributed Denial of Service attacks. **[6]**

Q3) a) What is network attack? Write short note on following with suitable example? **[8]**

i) Active attack

ii) Passive attack

b) What is Cipher Feedback Mode (CFM)? Explain the process of CFM with suitable diagram. **[9]**

OR

P.T.O.

Q4) a) What is Electronic Code Book (ECB)? Explain the process of ECB with suitable diagram. **[5]**

b) Describe the following network security threats **[6]**

i) Unauthorized access

ii) Distributed Denial of Service (DDoS) attacks

c) Differentiate between Active attack and Passive attack **[6]**

Q5) a) Define and list various computer network security mechanisms Also write short notes on the following terms **[9]**

i) Encryption

ii) Decryption

b) Define and explain digital signature. What are the applications of digital signature. **[9]**

OR

Q6) a) Define the following mathematical preliminaries and also explain the following in brief **[9]**

i) Prime numbers

ii) Group

b) What is Cryptography? also explain the following terms **[9]**

i) Public key encryption

ii) Hash function

Q7) a) What is Cyber terrorism? What is an example of cyber terrorism? **[8]**

b) Define Crime and Cybercrime. State Cybercrimes classification. **[9]**

OR

Q8) a) What Is Cyberstalking explain with an example. **[8]**

b) Explain the term Phishing & SQL Injection with a suitable example. **[9]**

x x x

Total No. of Questions : 8]

SEAT No. :

PB3866

[Total No. of Pages : 2

[6262]-130

T.E. (Information Technology)

DATA SCIENCE AND BIG DATA ANALYTICS

(2019 Pattern) (Semester - II) (314452)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain all the steps for writing a file in HDFS with neat diagram. **[8]**

b) Describe the various types of NoSQL Databases with example and also compare them. **[10]**

OR

Q2) a) Why map reduce is required in Hadoop? Explain the stages involved in map reduce task with a suitable example? **[9]**

b) What is Hadoop Distributed system? What is the advantage of heart bit message in Hadoop. **[9]**

Q3) a) Compare HBASE and HIVE with suitable parameters. **[8]**

b) How missing values are filled in Pandas Data Frame with zeros? Assume suitable data. **[3]**

c) Explain Min-max scaling. For the following dataset carry out min-max Scaling, X = 24,28,53,30,40,18,15,21. **[6]**

OR

Q4) a) What is categorical variable? Why do you need categorical variable encoding? With an example, explain one-hot encoding? **[8]**

b) What is data wrangling? Why do you need it? Explain data wrangling methods? **[9]**

P.T.O.

Q5) a) How Data Visualization is important in Big Data? Explain challenges to big data visualization? **[6]**

b) Explain various techniques for visual data representation. **[6]**

c) Explain the following data visualization techniques. **[6]**

i) Google Chart API

ii) D3.js

OR

Q6) a) Explain data visualization with respect to l-D, 2-D, 3-D data? **[6]**

b) Explain various analytical techniques and tools used in data visualization. **[6]**

c) Draw boxplot with a suitable example and explain its usage. **[6]**

Q7) a) What is text mining? Draw and explain text mining architecture and its use. **[8]**

b) Explain primary activities of Michal Porters value chain. **[5]**

c) How mobile analytic is different from social media analytic? **[4]**

OR

Q8) a) What is Porters valuation creation model? Explain porter's value chain analysis. **[9]**

b) What is social media analytic? Explain the process of social media data. analytic. **[8]**

x x x

Total No. of Questions : 8]

SEAT No. : ____

PB-3867

[Total No. of Pages : 2

[6262]-131
T.E. (Information Technology)
Web Application Development
(2019 Pattern) (Semester - II) (314453 (A))

Time : 2½ 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) Write a simple application in typescript to demonstrate the use of modules. **[9]**

b) What is pipe? Demonstrate the code for pipes in Angular. **[9]**

OR

Q2) a) Give the simple layout of the Angular application with multiple components. Explain how to create and use components in Angular? **[9]**

b) Explain the basic hooks in React JS. Explain any two hooks in brief. **[9]**

Q3) a) What is CRUD? Explain the CRUD using node. JS. **[9]**

b) What is node. JS? Explain file handling in node. js. **[8]**

OR

Q4) a) Write a code using Express. JS to illustrate the concept of roots. **[9]**

b) What is replication? Enlist the advantages of replication in database system. **[8]**

P.T.O.

Q5) a) What is navigation? Write a code to navigate from one page to another page in jQuery mobile. **[9]**

b) What is jQuery mobile? Explain layout in jQuery Mobile design with its types. **[9]**

OR

Q6) a) Why CSS is important in designing mobile websites? Give an example of CSS class used for mobile website design. **[9]**

b) List any five widgets in jQuery mobile and explain any two in brief. **[9]**

Q7) a) What is EC2 service? Explain steps to deploy website on EC2. **[9]**

b) What is AWS cloud? What are the services provided by AWS? Explain any two in brief. **[8]**

OR

Q8) a) What is ELB? What are the ELB types? List advantages of ELB **[9]**

b) What is VPC? What are the components of VPC? **[8]**

Total No. of Questions : 8]

SEAT No. :

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[6262]-132

T.E. (Information Technology)

ARTIFICIAL INTELLIGENCE

(2019 Pattern) (Semester- II) (Elective-II) (314454-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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What do you mean by rule-based systems? What are its characteristics? **[9]**

b) What is Knowledge Agent? What are various types in it Explain. **[9]**

OR

Q2) a) What is Bayesian networks? What are components involved in it? Explain. **[9]**

b) Explain Conflict resolution and methods to resolve those (Any 4). **[9]**

Q3) a) Explain two techniques of NLP that help to computers to understand and manage AI. **[8]**

b) What is text classification? What are its categories? Explain. **[9]**

OR

Q4) a) Explain unification grammar along with its various kinds. **[9]**

b) What do you mean by Pragmatic? Why it is important in NLP? Discuss. **[8]**

P.T.O.

Q5) a) What is Game theory? What are types in it? **[9]**

b) Elaborate properties of Min-Max Algorithm along with its limitations. **[9]**

OR

Q6) a) Alpha-beta algorithm is better than Min-Max algorithm. Justify. **[9]**

b) Elaborate components of planning system in AI. **[9]**

Q7) a) "Deep learning is subset of ML and hence AI". Comment on this. **[9]**

b) Write a brief note on "Artificial Intelligence Domains". **[8]**

OR

Q8) a) What is TensorFlow? Discuss. **[9]**

b) Write a brief note on "Boltzmann Machines". **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3869

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T.E. (Information Technology)

CYBER SECURITY

(2019 Pattern) (Semester- II) (Elective-II) (314454B)

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) What is Digital Forensics? Explain in details. **[6]**

b) What is mean by Digital Evidence? Explain its Characteristics. **[6]**

c) Explain with diagram-Digital Forensic Model. **[6]**

OR

Q2) a) Explain Social Engineering and its classification. **[6]**

b) Explain Security Audit. **[6]**

c) Explain Social Engineering Defense Strategies. **[6]**

Q3) a) What id Digital Signature and Indian IT Act? **[6]**

b) Explain Socio-technical Approach. **[6]**

c) What are Positive Aspects and weak areas of ITA 2000? **[5]**

OR

Q4) a) What is mean by Insider Attack? What are types of it? **[6]**

b) Explain the preservation of digital evidences. **[6]**

c) Explain Social Engineering Conceptual Evolution. **[5]**

P.T.O.

Q5) a) Explain in details Intellectual Property Rights in Cyberspace. **[6]**

b) What are the various social engineering attacks? Explain any one in detail. **[6]**

c) Explain Attack Spiral Model. **[6]**

OR

Q6) a) Explain Social Engineering Targets and Defense Strategies. **[6]**

b) What are the types of computer based on social engineering attacks? **[6]**

c) Explain about how to Prevent Insider Threats attacks? **[6]**

Q7) a) What is mean by Security Audit? Explain its steps. **[6]**

b) Explain what is mean by E-Commerce and E-Governance. **[6]**

c) Which acts have recognized digital signature in India? **[5]**

OR

Q8) a) Explain Intellectual Property Rights in cyberspace. **[6]**

b) What are various offenses in IT Act? Explain in short. **[6]**

c) Explain in details-Certifying Authority and Controller. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3870

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T.E. (Information Technology)

CLOUD COMPUTING

(2019 Pattern) (Semester- II) (314454C) (Elective-II)

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) Write a short note on **[6]**
   i) Amazon Elastic Block Store (EBS)
   ii) Amazon ElasticCache

b) Explain the Programming environment of Google App Engine. **[6]**

c) Write short note on following standards of application developer. **[6]**
   i) LAMP
   ii) LAPP

OR

Q2) a) Explain Windows Azure Platform Architecture with the help of a neat diagram. **[6]**

b) Write short note on **[6]**
   i) Amazon CloudFront
   ii) Amazon S3

c) Explain following Amazon Database Service **[6]**
   i) Amazon Relational Database Service (RDS)
   ii) Dynamo DB

Q3) a) List and explain the security issues in cloud. **[6]**

b) Draw & explain General Architecture Hadoop Distributed File System (HDFS). **[6]**

c) What is mean by Disaster Recovery? Discuss Threats in Disaster Recovery. **[5]**

OR

P.T.O.

Q4) a) Write a short note on **[6]**

i) How to Approach Business Continuity

ii) Architect for Failure

b) Draw & explain General Architecture Hadoop Distributed File System (HDFS). **[6]**

c) What is fault tolerance. Explain characteristics of fault tolerance. **[5]**

Q5) a) Explain Social Networking site Facebook. **[6]**

b) Explain in detail the Cyber-Physical System. **[6]**

c) Explain Benefits & Graph Properties of Social Network. **[6]**

OR

Q6) a) Explain cloudlet. Differentiate between cloud & cloudlet. **[6]**

b) Write a short note on RFID. **[6]**

c) Write a short note on ZigBee Technology. **[6]**

Q7) a) Write a short note on Location Aware Application. **[6]**

b) Explain architecture of mobile cloud computing with diagram. **[6]**

c) Explain following Concept with diagram: Automatic cloud engine. **[5]**

OR

Q8) a) Draw and Explain multimedia cloud. **[6]**

b) Explain key issues related to energy efficiency in cloud computing. **[6]**

c) Explain the Concept of jungle Computing with a diagram. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3871

[6262]-135

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T.E. (Information Technology Engineering)

SOFTWARE MODELING AND DESIGN

(2019 Pattern) (Semester- II) (Elective-II) (314454D)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Define event and explain in brief different types of events. **[6]**

b) In the context of a state diagram, what are concurrent sub states? Elaborate with an example. **[6]**

c) Write a short note on: Relation of class model and state model. **[6]**

OR

Q2) a) What is state? Explain the contents of a state in detail. **[6]**

b) Draw a sequence diagram for online shopping system. **[4]**

c) What do you mean by activity? Consider the ATM system scenario. Identify and explain at least five activities involved in the ATM system scenario. **[8]**

Q3) a) Describe the Macro level process of identification of view layer classes by analysing use case. **[6]**

b) Explain the difference between component and deployment diagram by using example. **[6]**

c) With the help of UML, how can we package the classes involved within a system scenario? **[5]**

OR

P.T.O.

Q4) a) What is OCL? Explain its applications. **[6]**

b) What is Object relational systems? How can you map relational data with application objects using mapping tool. (*Hint:mapping methods*)**[6]**

c) Draw a detailed Deployment diagram for ATM system scenario. **[5]**

Q5) a) List and explain three types of design pattern. **[6]**

b) Draw the Strategy pattern for Robotics application and explain in brief.**[6]**

c) Write a short note on Adaptor design pattern with example. **[6]**

OR

Q6) a) Draw the class diagram for mobile scenario using state design pattern.**[6]**

b) Draw a Singleton design pattern structure and explain in brief. **[6]**

c) What is GRASP? Explain Low Coupling and high Cohesion in detail.**[6]**

Q7) Write a short note on (any 3) **[17]**

a) Client-Server software Architecture

b) Service-Oriented software Architecture

c) Content-based software architecture

d) Software Architectural Transaction Patterns

OR

Q8) a) List and explain multiple views of a software architecture. **[8]**

b) Explain the entities involved in documenting a software architectural pattern. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3872

[Total No. of Pages : 2

[6262]-136
T.E. (Instru & Control)
EMBEDDED SYSTEMS
(2019 Pattern) (Semester - I) (306261)

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 labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the looping, counting and sorting operation in 8051 with any suitable example. **[9]**

b) Discuss the following assembler directives of 8051: ORG, DB, EQU, CODE, DATA and END. **[9]**

OR

Q2) a) Discuss various arithmetic and logical instructions of 8051 with examples. **[9]**

b) Discuss data transfer and branching instructions in 8051 with examples. **[9]**

Q3) a) Design the interface of the push buff on with 8051 (interface diagram, steps/flowchart/program). **[9]**

b) Design the interface of the stepper motor with 8051 (interface diagram, steps/flowchart/program). **[8]**

OR

Q4) a) Design the interface of LM35 with 8051 (interface diagram, steps/ flowchart/program). **[9]**

b) Design the interface of the LED/LED's with 8051 (interface diagram, steps/flowchart/program). **[8]**

P.T.O.

Q5) a) Block diagram, interface design, flowchart/steps: Interface temperature sensor to the microcontroller and display data on LCD and control heater using a relay. **[9]**

b) Block diagram, interface design, flowchart/steps: Interface the IR sensors to 8051 to control the DC motors for the line tracing robot. **[9]**

OR

Q6) a) Discuss a detailed flowchart or steps to control the washing machine for various modes interface to 8051. **[9]**

b) Block diagram, interface design, flowchart : Design application of washing machine control using the timer, motors and water level sensor. **[9]**

Q7) a) Differentiate between microprocessors and microcontrollers. **[9]**

b) Describe operating systems, its types, and Raspberry Pi boards. **[8]**

OR

Q8) a) Discuss about ASICs, PLDs, Arduino boards. **[9]**

b) Differentiate between RISC and CISC controllers. **[8]**

Total No. of Questions : 8] **SEAT No. :**

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[6262]-137
T.E (Instrumentation & Control Engg.)
INDUSTRIAL AUTOMATION-I
(2019 Pattern) (Semester-I) (306262)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain Comparison & math operations instruction in detail. **[8]**

b) With neat diagram explain analog input-output module. **[9]**

OR

Q2) a) Illustrate bit pattern in register, shift register & sequencer instruction. **[9]**

b) Describe the following instructions **[8]**

i) Move ii) Jump

Q3) a) Explain the SQO instruction of AB PLC with suitable example. **[9]**

b) List out the different manufacturer's of PLC and brief the technical specification of any two manufactures's PLC. **[9]**

OR

Q4) a) Write short note on : JSR, JMP, MCR. **[9]**

b) How analog inputs are handled in PLC? What are instruction's used to handle analog I/o's. **[9]**

Q5) a) Write short note on **[9]**

i) Need of HMI

ii) Application of VFD

b) Define SCADA system with its components. **[9]**

OR

P.T.O.

Q6) a) Compare PLC', Vs RTU's **[8]**

b) Describe selection criteria for drives & explain construction & working of VFD. **[9]**

Q7) a) Explain any one application of VFD with neat diagram. **[9]**

b) List out the advantages of HMI with PLC, give it's significance. **[9]**

OR

Q8) a) Describe any one application of SCADA system with neat diagram. **[9]**

b) Explain the role of RTU & MTU with block diagram. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3874

[Total No. of Pages : 3

[6262]-138

T.E. (Instrumentation & Control Engineering)

MODERN CONTROL THEORY

(2019 Pattern) (Semester - I) (306263)

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) ***Use of calculator is allowed.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) Apply the Kalman's Test to check the controllability and observability of the given system **[12]**

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix}=\begin{bmatrix}1 & 0 & 0\\ 0 & 2 & 0\\ 0 & 2 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}+\begin{bmatrix}0 & 1\\ 1 & 0\\ 0 & 1\end{bmatrix}u$$

$$\begin{bmatrix}y_1\\ y_2\end{bmatrix}=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$$

b) Apply the Liapunov direct method to examine the stability of the system given below **[6]**

$\dot{x}_1 = 2x_2$

$\dot{x}_2 = -2x_1 - x_1^2 x_2$

Use $V = x_1^2 + x_2^2$ as Liapunov function.

OR

P.T.O

Q2) a) Apply the Kalman's Test to check the controllability and observability of the given system **[12]**

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix}=\begin{bmatrix}-3 & 0 & 0\\ 0 & -2 & 0\\ 0 & 0 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}+\begin{bmatrix}1\\ 0\\ 1\end{bmatrix}u$$

$$[y]=\begin{bmatrix}1 & 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$$

b) Define the following with the help of suitable example **[6]**

i) Positive definite scalar function

ii) Negative definite scalar function

Q3) Apply Ackermann's formula to determine the state feedback gain matrix K such that desired closed loop poles of the plant are located at $s_1 = -1.5$, $s_2 = -2.5$ and $s_3 = -4$. Use the matrices of a system as given below: **[17]**

$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}\text{ and }B=\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}$$

OR

Q4) Apply Ackermann's formula to determine the observer gain matrix K_e such that desired closed loop poles of the plant are located $s_1 = -6$, $s_2 = -6$ and s3 = –6. Use the matrices of a system as given below: **[17]**

$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix},\ B=\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}\text{ and }C=\begin{bmatrix}1 & 0 & 0\end{bmatrix}$$

Q5) a) An analog signal $x(t) = 3\cos(50\pi t) - \cos(100\pi t)$ is passed through an impulse sampler. Determine the Nyquist Rate of sampling. **[9]**

b) Explain the sampled data control system. **[8]**

OR

Q6) a) Draw gain frequency plot of the zero-order hold circuit. **[9]**

b) Compare analog control system with discrete time control system. **[8]**

Q7) a) Find the step response of the system shown in the figure 1. **[12]**

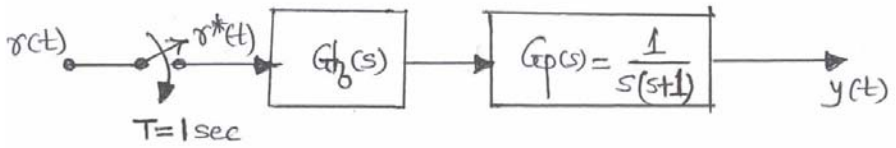

Figure 1

b) Apply the Jury's stability criterion to determine the stability of the system described by Characteristic polynomial $P(z) = z^3 - 1.1z^2 - 0.1z + 0.2 = 0$ **[6]**

OR

Q8) a) Determine the pulse transfer function of the sampled data system shown in the figure 2. **[12]**

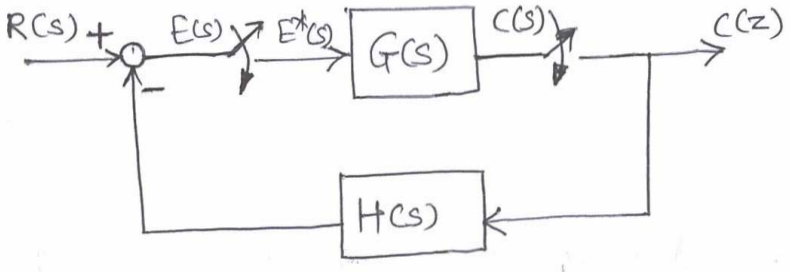

Figure 2.

b) Apply the z-transform approach for solving the following difference equation **[6]**

$x(k+2) + 4x(k+1) + 8x(k) = 0$, with $x(0) = 0$, $x(1) = 1$

Total No. of Questions : 8]

SEAT No. :

PB-3875

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[6262]-139

T.E. (Instrumentation and Control Engineering)

OPERATING SYSTEMS

(2019 Pattern) (Semester - I) (306264)

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) ***Neat circuit diagrams should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the concept of logical and physical memory. What is Contiguous Memory Allocation. **[8]**

b) With a neat diagram explain Paging. State the advantages and disadvantages of Paging. **[9]**

OR

Q2) a) What is Virtual Memory? Explain need of Dirty bit. **[8]**

b) Enlist various algorithms used for Page Replacement policies. Explain First In First Out Algorithm. **[9]**

Q3) a) Define a Deadlock. Explain the characteristics required for occurrence of deadlock. **[9]**

b) Explain various methods to get recovery from deadlock. **[9]**

OR

Q4) a) Explain the various deadlock prevention techniques with example. **[9]**

b) Describe the Banker's algorithm for deadlock avoidance. **[9]**

P.T.O.

Q5) a) Explain the various file allocation methods. **[8]**

b) Define a file. Briefly explain file attributes and file operations. **[9]**

OR

Q6) a) Explain the mechanism for ensuring protection and sharing in a file management system. **[8]**

b) State and explain different file system implementations. **[9]**

Q7) a) Explain how access is controlled using Access Matrix. **[10]**

b) Explain the statement, "Cryptography can be used as a security tool". **[8]**

OR

Q8) a) State different defence mechanism to ensure security. **[9]**

b) Write a note on Fire Walls. **[9]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3876

[Total No. of Pages : 2

[6262]-140

T.E. (Instrumentation and Control Engg.)

MECHATRONICS AND ROBOTICS

(2019 Pattern) (Semester - I) (306265A) (Elective-I)

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. 7or 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 the terms recognition of the need, Conceptual Design and Function Specification in mechatronic design process? **[6]**

b) Explain the terms prototyping and deployment with reference to mechatronic design process? Draw block diagram of mechatronic design process? **[6]**

c) Explain the terms sequential and concurrent engineering approach? Which concept is used in mechatronic design process? **[6]**

OR

Q2) a) Draw suitable block diagrams to represent the concept of normal engineering and concurrent engineering? Explain both concepts in brief? What are the merits and demerits of both methods? **[6]**

b) Why the hardware-in-the-loop technique is used in modeling and simulation environment? Explain in brief? **[6]**

c) Explain the concept of life cycle design? Which are important life cycle factors? **[6]**

Q3) a) Draw diagrams of four basic robot anatomies or configurations? Which one is the best in terms of pay load capacity and work volume? **[6]**

b) Compare between BLDC motor with stepper motor? Any six points **[6]**

c) What are the safety measures taken to avoid the Robot accidents in industry? List out? Elaborate presence sensing devices and emergency robot braking methods in brief? **[6]**

OR

P.T.O.

Q4) a) Draw a diagram for Jointed Arm Configuration robot? How many axes it have? Give advantages and disadvantages of this anatomy with respect to pay load capacity and Reach? **[6]**

b) Explain the working principle of Flex sensor and Acoustic sensor along with their diagrams? **[6]**

c) Give broad classifications of motors? Differentiate between brushed dc motor with brushless dc motor? Draw diagrams of it? **[6]**

Q5) a) What is mean by Direct Kinematics? Explain with examples and block diagram? **[6]**

b) Define the terms wrist roll, wrist pitch and wrist yaw? And also draw related diagrams? **[6]**

c) Explain the use of python Programming language in Robotics? Give suitable examples to support your answer? **[5]**

OR

Q6) a) What is the Inverse Kinematics? Explain with example and block diagram? **[6]**

b) What is mean by Expert Systems and Meta-knowledge used in Artificial Intelligence? Give applications of expert system? **[6]**

c) Enlist types of grippers available? Draw and describe function of finger type mechanical gripper? **[5]**

Q7) a) Line (black) following robot is to be developed as mini project. Give details to entire process starting from selection of components and microcontroller, development of algorithm and program? **[12]**

b) How kinematic calculations are used in development of Robotic arm-design and working? **[5]**

OR

Q8) a) The remote control car is to be implemented as a small project. Describe the selection criteria of components, microcontroller and development of the algorithm and program for it? **[12]**

b) The pick and place robot for material transportation applications is to be developed? Give selection criterion of components such as motor, microcontroller used in it with justification? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3877

[Total No. of Pages : 2

[6262]-141

T.E. (Instrumentation and Control Engineering)

DATA SCIENCE

(2019 Pattern) (Semester - I) (306265B) (Elective-I)

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 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) Differentiate between scatter plot, subplot, imshow. **[9]**

b) Give explanation of the various graphical data representation used in Seaborn. **[9]**

OR

Q2) a) Discuss on various matrix operations that can be performed on arrays using Numpy. **[9]**

b) Explain with applications the concepts of heat map and pair plot in Seaborn library. **[9]**

Q3) a) Evaluate the concept of Percentile and IQR in outlier treatment. **[8]**

b) Discuss on the usages of Boxplot and Z score of data. **[9]**

OR

Q4) a) Demonstrate the concept of data cleaning with examples. **[9]**

b) Discuss the various missing value treatments in a dataset. **[8]**

P.T.O.

Q5) a) With an example, explain the idea of 'dummies' in categorical to numerical data cleansing. **[9]**

b) Describe various feature transformation techniques. **[9]**

OR

Q6) a) Explain how to pick features in categorical to numerical data analysis. **[9]**

b) Discuss the notion of normalization and the reshaping of standardization features. **[9]**

Q7) a) Distinguish between Tableu public and Tableu Reader. **[8]**

b) Explain the various data types and databases available in Tableau. **[9]**

OR

Q8) a) Explain in detail the 'live' and 'extract' connections between Tableau and the database. **[9]**

b) Discuss the Tableau analysis of building views. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3878

[Total No. of Pages : 2

[6262]-143

T.E. (Instrumentation and Control Engg.)

BIO-MEDICAL INSTRUMENTATION

(2019 Pattern) (Semester - I) (306265D) (Elective-I)

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. 7or Q8.***
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) Define Cardiac Output. Draw and Discuss the working principle of Cardiac Output with neat diagram. **[10]**

b) Elaborate the Working of Indirect Blood Pressure Measurements with the help of neat diagram. **[7]**

OR

Q2) a) State the Causes, Occurrence, vibration, of Heart Sounds. Draw and Discuss the working principle of Phonocardiography with neat diagram. **[10]**

b) Describe the Working Principle of any one type of Ultrasonic type Blood Flow meter with neat diagram. **[7]**

Q3) a) State the function of Brainstem. With the help of neat diagram, elaborate the brain and its parts with its function. **[10]**

b) Explain the working the Electroencephalogy with neat diagram. **[8]**

OR

Q4) a) Define myoelectric voltages. Explain the working principle of Electromyography (EMG) with the help of neat diagram. **[10]**

b) With the help of neat diagram, Explain the Working Mechanism of EEG Amplifiers. **[8]**

P.T.O.

Q5) a) Elaborate the role of inner ear in the mechanism of hearing. Explain the working of Evoked Response Audiometer with the help of neat diagram. **[10]**

b) With the help of neat diagram, Explain the Sound Conduction system.**[7]**

OR

Q6) a) Define Audiometer. Elaborate on the working of Basic Audiometer with the help of neat diagram. **[10]**

b) Describe the Visual Acuity (Errors in Vision) and its remedy. **[7]**

Q7) a) With the help of neat diagram, explain the O_2 and CO_2 Transport. Explain the working of Spirometer with the help of neat diagram. **[10]**

b) With the help of neat diagram, Explain the working of Infrared Gas Analyzer. **[8]**

OR

Q8) a) State the function of Oxygenator. With the help of neat diagram, Explain the working of Bubble Type Oxygenators with the help of neat diagram **[10]**

b) With the help of neat diagram, Explain the working of Airflow measurement with the help of neat diagram. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3879

[Total No. of Pages : 2

[6262]-144

T.E. (Instrumentation & Control)

INTERNET OF THINGS

(2019 Pattern) (Semester - II) (306268)

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) Elaborate the network, device, application enablement & deployment, data and subscriber management IoT platform. **[8]**

b) How industry accepted protocols used for the development of IoT applications. **[9]**

OR

Q2) a) Classify the types of IoT platforms also explain them in detail. **[8]**

b) Sketch the GPIO of Arduino Uno. **[9]**

Q3) a) Elaborate in detail software as a service in service models. What is data Synchronization? **[8]**

b) How cloud of things acts as an enabler for new value added services and applications explain with a neat diagram. **[9]**

OR

Q4) a) Analyze the Infrastructure as a Service (IaaS) cloud model. **[8]**

b) Elaborate the service models of cloud computing and explain each model in detail. **[9]**

Q5) a) Illustrate the protocols used in Network and Transport Layer to provide security in IoT application. **[9]**

b) Analyze the application areas for deploying the IoT project architecture. **[9]**

OR

P.T.O.

Q6) a) How might wireless communications have an effect on the development and implementation of the internet of things (IoT)? **[9]**

b) Explain briefly the broad categories of threats? Which are the well-known active threats? **[9]**

Q7) a) Sketch the smart city frameworks and smart parking eco-system. **[9]**

b) What are the enabling technologies in Health Care IoT and challenges in it? **[9]**

OR

Q8) a) Draw a architecture of smart grid IoT system. What are the security aspects in smart grid system? **[9]**

b) Which are the different smart city frameworks? Write short note on Energy management in Smart Cities. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3880

[Total No. of Pages : 2

[6262]-145

T.E. (Instrumentation and Control)

INDUSTRIAL AUTOMATION - II

(2019 Pattern) (Semester - II) (306269)

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) Analyze the working of HART protocol with respect to following : **[10]**

i) HART Networks

ii) HART Configuration

b) Examine the master-slave communication in Modbus protocol. **[7]**

OR

Q2) a) Enlist and elaborate the different commands used in HART protocol. **[10]**

b) Describe the Serial communication protocol in industrial automation. **[7]**

Q3) a) Analyze the alarm and logging configuration in DCS. **[10]**

b) Summarize the different features of HMI. **[7]**

OR

Q4) a) What is mean by alarm management? Examine the different steps for alarm management system. **[10]**

b) Analyze the role of operator in DCS based process control. **[7]**

P.T.O.

Q5) a) Consider the following two fuzzy sets : **[10]**

$A = \{ (x_1, 0.1), (x_2, 0.2), (x_3, 0.3), (x_4, 0.4)\}$

$B = \{ (x_1, 0.5), (x_2, 0.7), (x_3, 0.8), (x_4, 0.9)\}$

Determine the following :

i) $A \cup B$

ii) $A(x) - B(x)$

iii) $A(x).B(x)$

iv) $A(x) + B(x)$

v) $A \cap B$

b) Enlist the different programming language as per IEC 61131-3. Elaborate Sequential Function Chart (SFC) programming with example. **[8]**

OR

Q6) a) Develop the Functional Block Diagram (FBD) for following logic implementation : **[10]**

- The signal state is 1 at output M3 when at least one AND logic operation is satisfied
- The signal state is 0 at output M3 when no AND logic operation is satisfied

b) Examine the role of DCS in process control. **[8]**

Q7) a) Analyze the role of Internet of Things and Mobile and remote devices in industrial process control. **[10]**

b) Elaborate the application of Industrial Internet in process control. **[8]**

OR

Q8) a) Describe the application of Distributed Control System in Pulp and paper environment. **[10]**

b) Justify, ERP helps organizations to automate and manage core business processes for optimal performance. **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-4489

[Total No. of Pages : 3

[6262]-146R
T.E. (Instrumentation and Control)
DIGITAL SIGNAL PROCESSING
(2019 Pattern) (Semester - II) (306270)

Time : 2½ Hours] ***[Max. Marks : 70***

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) ***Figures to the right indicate full marks.***
4) ***Use of Non-Programmable Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Sketch magnitude and phase plot of LTI system described by impulse response $h(n)=\frac{1}{2}[\delta(n)-\delta(n-1)]$ **[9]**

b) Determine the Fourier Series of discrete time signal **[8]**

$$x(n) = \cos\left(\frac{\pi n}{3}\right) + \sin\left(\frac{\pi n}{5}\right)$$

OR

Q2) a) Determine the DTFS for $x(n) = 2n - 1 \; ; \; 0 \leq n \leq 3$ **[9]**

b) Impulse response of the system is $h(n) = \{1, -1, 1, 1\}$. Find the response of the system for input $x(n) = \{2, 2, 4, 1\}$. **[8]**

Q3) a) Determine circular convolution between the following sequence **[12]**

$x_1(n) = \{4, 1, 0, 2)$ and $x_2(n) = \{4, 2, 3, 1\}$

Use DFT and IDFT Method.

b) Determine DFT of sequence, $x(n) = \{1, 1, 1, 1\}$. **[6]**

OR

Q4) a) Find X (k) using DIT FFT Algorithm if. **[12]**

$x(n) = \{1, 1, -1, -1, -1, -1, 1, 1\}$

b) Sketch the butterfly structure of DIT and DIF FFT Algorithm. Show all the details. **[6]**

P.T.O.

Q5) a) Design a digital Butterworth filter that satisfies following constraints using bilinear transformation. Assume T = 1 sec. **[12]**

$$0.85 \le \left|H(e^{j\omega})\right| \le 1; \quad 0 \le \omega \le \frac{\pi}{2}$$

$$\left|H(e^{j\omega})\right| \le 0.2; \quad \frac{3\pi}{2} \le \omega \le \pi$$

b) Sketch the response of Butterworth, Chebyshev-I and Chebyshev-II low pass filters show all details. **[6]**

OR

Q6) a) Design a digital low-pass Butterworth filter that satisfies the following. **[12]**

$$0.7 \le \left|H(e^{j\omega})\right| \le 1; \quad 0 \le \omega \le 0.3\pi$$

$$\left|H(e^{j\omega})\right| \le 0.3; \quad 0.6\pi \le \omega \le \pi$$

Use Impulse Invariance transformation. Assume T = 1 *Sec*.

b) Transform the analog filter transfer function **[6]**

$$H(s) = \frac{1}{(s+1)(s+2)}$$

into a digital filter H(z) using impulse invariance method.

Q7) a) Design a linear-phase FIR Low Pass filter with the following desired frequency response. **[12]**

$$H_d\left(e^{j\omega}\right) = 1; \; 0 \le \omega \le \frac{\pi}{2}$$

$$H_d\left(e^{j\omega}\right) = 0; \; \frac{\pi}{2} \le \omega \le \pi$$

Use Hanning Window with N = 9. Plot the Magnitude response also.

b) Discuss various properties of FIR filters. **[5]**

OR

Q8) a) Design an ideal high pass FIR filter with a frequency response. **[12]**

$$\left|H_d\left(e^{j\omega}\right)\right| = 1;\ \frac{\pi}{4} \le \omega \le \pi$$

$$\left|H_d\left(e^{j\omega}\right)\right| = 0;\quad \omega \le \frac{\pi}{4}$$

and $N = 11$. Plot the Magnitude response also.

b) What do you mean by symmetric and anti-symmetric response with respect to FIR filters? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB3882

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[6262]-147

T.E. (Instrumentation & Control Engineering)

BUILDING AUTOMATION

(2019 Pattern) (Semester- II) (Elective-II) (306271A)

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) Explain different components present in AHU. **[10]**

b) Describe Run Around Coil and Thermal wheel in AHU. **[8]**

OR

Q2) a) Explain different types of AHU. **[10]**

b) Compare VAV and CAV system. **[8]**

Q3) a) Explain with neat diagram, concept of refrigeration cylcle. **[10]**

b) Describe concept of heat pump with respect to geothermal energy. **[7]**

OR

Q4) a) Enlist the parts of water tube boiler and explain its working. **[10]**

b) Discuss geothermal heat transfer system. **[7]**

P.T.O.

Q5) a) Give classification of fire alarm system. **[8]**

b) Explain the conventional (non-addressable) and addressable Types of Fire Alarm Systems. **[10]**

OR

Q6) a) Give classification of SLC? **[8]**

b) What is fire triangle? What are different stages of fire? **[10]**

Q7) a) What is Access Control System? Describe its benefits. **[7]**

b) Explain architecture of CCTV system with components and imporatnce. **[10]**

OR

Q8) a) What are different types of cameras used in Access Control System? **[7]**

b) Discuss smartcard, proximity card, MI fare card technology. **[10]**

Total No. of Questions : 8]

SEAT No. :

PB3883

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[6262]-148

T.E. (Instrumentation & Control Engineering)

MACHINE LEARNING

(2019 Pattern) (Semester- II) (Elective-II) (306271B)

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.***
5) ***Use of Calculator is allowed.***

Q1) a) Explain the concept of logistic regression and its applications, also describe the sigmoid function and its role in logistic regression. **[10]**

b) Define probability and explain its importance in statistical analysis. Calculate the probability of getting a head when flipping a fair coin. **[8]**

OR

Q2) a) Discuss the advantages and limitations of using KNN for classification tasks. Calculate the accuracy, precision, and recall of a KNN classifier given the following confusion matrix: **[10]**

	Predicted Negative	Predicted Positive
Actual Negative	100	20
Actual Positive	30	50

b) Explain the concept of Naïve Bayes algorithm and its application in classification tasks. Discuss the strengths and weaknesses of the Naïve Bayes algorithm. **[8]**

Q3) a) Define Support Vector machine. Explain the significance of support vectors in determining the decision boundary of an SVM classifier. **[9]**

b) Elaborate margin in SVM and describe its importance in achieving a good classification model. Calculate the margin of an SVM classifier given the equation of the decision boundary. **[8]**

OR

P.T.O.

Q4) a) Define a hyperplane in the context of SVM and explain its role in separating classes. Discuss the concept of the maximum-margin hyperplane and its significance in SVM. **[9]**

b) Explain kernels in SVM and their role in handling nonlinear data. Write the advantages and disadvantages of using different types of kernels in SVM. **[8]**

Q5) a) Define Decision tree, root node, leaf node, edges. Discuss the tree split criteria used in decision trees, such as Gini index, entropy, and chi-square test. How these split criteria help in determining the best attribute to split the data at each node. **[10]**

b) Explain the concept of the chi-square test and its application in Decision Trees, also describe how the chi-square test is used to determine the significance of a split. **[8]**

OR

Q6) a) Define Random Forest and explain how it combines the concept of ensemble learning with Decision Trees. Write the advantages of using Random Forest over individual Decision Trees. **[10]**

b) Define overfitting and underfitting in the context of machine learning models. Explain how overfitting and underfitting can occur in Decision Trees and Random Forests. **[8]**

Q7) a) Define K-Means Clustering, Discuss the steps involved in the K-Means Clustering algorithm. **[9]**

b) Explain the concept of the Elbow Method and its application in determining the optimal number of clusters in K-Means Clustering. **[8]**

OR

Q8) a) Explain the Silhouette Method and its purpose in evaluating the quality of clustering results. **[9]**

b) Differentiate between internal evaluation metrics in clustering and external evaluation clustering. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB3884

[6262]-149

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T.E. (Instrumentation and Control)

ELECTRICAL DRIVES

(2019 Pattern) (Semester- II) (Elective-II) (306271C)

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.***
5) ***Use of Calculator is allowed.***

Q1) a) Discuss the separately excited DC motor control using semi converter. Draw a circuit diagram, waveforms with explanation for firing angles 45° and 90°. **[10]**

b) Draw and discuss Single quadrant variable speed chopper fed DC drives with waveforms. **[6]**

OR

Q2) a) Discuss universal dc motor with diagram and its characteristics. Write a method for speed control of universal dc motor. **[10]**

b) Draw and discuss DC servomotor drive. **[6]**

Q3) a) Draw and discuss the torque-slip characteristics of Induction motor. Explain the speed control methods for it. **[10]**

b) Draw and discuss the synchronous motor. Explain the speed control principle for it. **[8]**

OR

P.T.O.

Q4) a) Describe the AC motor with single phase and three phase cycloconverters Operations in different modes and configurations. **[10]**

b) Analyze different AC motor with single phase and three phase ac voltage controllers. **[8]**

Q5) a) Write the selection criterias of drives required for compressor. Which motor drive will you use for centrifugal compressor in gas pipeline application? **[10]**

b) Discuss the application of Motors and electric drives for Milling and Grinding Machines. **[8]**

OR

Q6) a) Write the selection criterias of drives required for Refrigeration and Air Conditioning. Discuss the application of Motors and electric drives for Refrigeration and Air Conditioning. **[10]**

b) Discuss the detail drives application for electric traction. **[8]**

Q7) a) Draw and discuss electric vehicle drive system. **[9]**

b) Discuss DC/DC converter in detail used for electrical vehicle. **[9]**

OR

Q8) a) Discuss use of brushed dc motor in electrical vehicle? Write detail DC drive control for it. **[10]**

b) Draw and discuss Torque-speed capabilities of PM BLDC motor. Discuss the Application of PM BLDC Motor in Electric Vehicle. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3885

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[6262]-150

T.E. (Instrumentation & Control Engineering)

ANALYTICAL INSTRUMENTATION

(2019 Pattern) (Semester- II) (Elective-II) (306271D)

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.***
5) ***Use of calculator is allowed.***

Q1) a) Define HPLC. Draw and explain the different types of column in HPLC. **[9]**

b) What are the types of Detectors and Recorders used in HPLC? Explain with sketch any one type of recorder in HPLC. **[9]**

OR

Q2) a) List the various detectors used in gas chromatography. Explain with neat sketch any one type of detector. **[9]**

b) What is chromatography? Explain the working principle of Gas chromatography with neat diagram. **[9]**

Q3) a) Draw and explain the Pollution Monitoring Instruments. **[9]**

b) Explain with sketch Turbidity Analyzer. **[8]**

OR

Q4) a) Explain with neat sketch H_2S analyzer system. **[9]**

b) Explain with sketch Oxygen analyzer using paramagnetic principle. **[8]**

P.T.O.

Q5) a) Define membrane separation process. What is the operating principles of membrane separation process and list the applications of same. **[9]**

b) Elaborate dialysis and electro dialysis membrane separation process. **[9]**

OR

Q6) a) List the different types of mass analyzers. Explain with neat sketch magnetic deflection type of mass analyzers. **[9]**

b) Define Mass Spectrometer (MS). What is working principle of mass spectrometer? What is ionization method in mass spectroscopy? **[9]**

Q7) a) Draw and explain GM counter. List the applications of GM counter. **[9]**

b) Draw and explain Gamma Spectrometry. **[8]**

OR

Q8) a) Explain Scintillation counter with respect to following points: **[9]**

i) Principle

ii) Construction

iii) Working

b) Explain Ionization chamber with respect to following points: **[8]**

i) Principle

ii) Construction

iii) Working

Total No. of Questions : 8] **SEAT No. :**

PB-3886

[Total No. of Pages : 2

[6262]-151
T.E.(Automobile Engineering)
Numerical & Optimization Method
(2019 Pattern)(Semester-I)(316481)

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) a) Use Taylor's series method solve equation $\frac{dy}{dx} = x^2 + y^2$. Given initial conditions are x = 0, y = 1. Estimate y (0.5) take h = 0.25. **[8]**

b) Use Runge-Kutta method of fourth order to obtain the numerical solution of $\frac{dy}{dx} = \sqrt{x^2 + y}$, Find y at x = 0.4 given y (0) = 1,take h= 0.2. **[9]**

OR

Q2) a) Initial, temperature within an insulated cylindrical metal rod of 4cm in length is given by, T = 50 (4 - x). $0 \le x \le 4$, where x is the distance from one end in cm. Both the ends are maintained at 0º C. Find the temperatures as a function of x and t ($0 \le t \le 1.5$) if the heat flow is governed by

$$\frac{\partial t}{\partial y} = 2.\frac{\partial^2 t}{\partial x^2}, \Delta x = 1, \Delta t = 0.25$$ **[8]**

b) Solve the boundary value problem $\frac{d^2y}{dx^2} - 64\,y + 10 = 0$ Initial condition, y (0) =1, y (1) =1 take step size, h=l/3 compute y (1/3) and y (2/3). **[9]**

Q3) a) Evaluate $\int_0^3 2x - x^2.dx,$ taking 6 intervals by using Trapezoidal rule. **[9]**

b) Find the Gaussian integration ofe^x. cos *x- 2x* in limits 0 to1 by using 3 Point Gauss Legendre formula. **[9]**

P.T.O.

OR

Q4) a) Evaluate $I = \int_0^1 \int_0^1 e^{x+y}$. dx .dy using trapezoidal rule. Take h = k =0.5 **[9]**

b) Find double integral of f(x, y) = x^2 +y^2+ 5 for x = 0 to 2 and y = 0 to 2 taking increment in both x and y as 0.5. Applying Simpson's 1/3rd rule.**[9]**

Q5) a) Solve the Transportation Problem by Vogel's approximation method.**[9]**

D / S	D1	D2	D3	Supply
S1	5	1	7	10
S2	6	4	6	80
S3	3	2	5	50
Demand	75	20	50	-

Fig. 2

b) Determine maximum value of roots of equation0.5 lx-sin *x* by Newton's method. Take initial guess as 2 and do the 4 iterations. **[8]**

OR

Q6) a) Maximize Z = 1600x+ l500y. Constraints are **[9]**

$5x + 4y \leq 500$

$15x + 16y \leq 1800$

$x \geq 0, y \geq 0$

Use simplex method to calculate x , y and maximize profit Z.

b) Minimize f (x) = $4x^3 + x^2 - 7x + 14$ within the interval (0, 1) using Golden-section search method. **[8]**

Q7) a) Explain Genetic algorithm. Write its advantages and applications. **[9]**

b) Explain Ant Colony optimization also write its advantages, disadvantages and applications. **[9]**

OR

Q8) a) Explain Particle swarm optimization in detail. **[9]**

b) Explain Simulated annealing with its advantages and applications. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3887

[Total No. of Pages : 3

[6262]-152
T.E. (Automobile)
HEAT TRANSFER
(2019 Pattern) (Semester - I) (316482)

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) Explain the significance of velocity boundary layer. **[6]**

b) Explain Local and Average heat transfer coefficient. **[6]**

c) Assuming man as a cylinder 350 mm diameter and 1.65m height with surface temperature of 28ºC, find the heat he would lose while standing in a 30 km/hr wind at 12ºC. **[5]**

Use: $Nu = 0.027 (Re)^{0.805} (Pr)^{1/3}$

Properties of air at 20ºC are k = 0.0259 W/mºC,

Kinematic viscosity = 15×10^{-6} m^2/s, Pr = 0.707.

OR

Q2) a) Explain the significance of following dimensionless numbers **[6]**

i) Prandtl Number

ii) Reynold Number

iii) Nusselt Number

b) Explain Laminar & Turbulent flow with example. **[5]**

c) Lubricating oil at a temperature of 60ºC enters 1 cm diameter tube with a velocity of 3m/s. The tube surface is maintained at 40ºC. Assuming that the oil has the following average properties. Calculate the tube length required to cool the oil to 45ºC. Density of oil = 865kg/m^3; k =0.14 W/mK; Cp = 1.78 kJ/kg K. Assume flow to be laminar (and fully developed). Nu = 3.657. **[6]**

P.T.O.

Q3) a) Why the heat transfer coefficient for natural convection is much less than that for convection? **[4]**

b) Define the Natural convection and give two practical examples of Natural convection. **[4]**

c) A circular disc of diameter 25cm is exposed to air at 293 K. If the disc is maintained at 393 K, estimate the heat transfer rate from it, when: **[10]**

i) Disc is kept horizontal (Take characteristic length Area/Perimeter)

ii) Disc is kept vertical.

For air at 70ºC, k = 0.03 W/m K; Pr 0.697; kinematic viscosity = 2.076×10^{-6} m^2/s

use the following correlations :

$Nu = 0.14 (Ra)^{0.334}$ for surface facing upward.

$Nu = 0.27 (Ra)^{0.25}$ for surface facing downward.

$Nu = 0.59 (Gr.Pr)^{0.25}$ for vertical surface.

OR

Q4) a) Explain Forced Convection Boiling (Flow boiling) with neat sketch. **[8]**

b) Estimate the heat loss from a vertical wall exposed to Nitrogen at 1 atm and 4ºC. The wall is 2 m high and 2.5 m wide and is maintained at 56ºC. The average Nusselt number over height of the wall for natural convection is given by: $Nu = 0.13 (Gr\ Pr)^{1/3}$ The properties for Nitrogen at a mean film temperature are given as density = 1.142 kg/m^3. k = 0.026 W/mk, kinematic viscosity = 15.63×10^{-6} m^2/s, Pr = 0.713. **[10]**

Q5) a) Draw labeled temperature profiles of the following types of heat exchangers. **[8]**

i) Parallel flow heat exchanger

ii) Counter flow heat exchanger

iii) Condenser

iv) Evaporator

b) Write a short note on : Electronic Cooling system. **[4]**

c) A counter flow double pipe heat exchanger is used to heat water from 20º C to 80ºC at a rate of 1.2 kg/s. The heating is to be accomplished by geothermal water available at 160ºC at a mass flow rate of 2kg/s. The inner tube is thin-walled and has a diameter of 1.5 cm. If the overall heat transfer coefficient of the heat exchanger is 640 W/m^2K, determine the length of the heat exchanger required to achieve the desired heating.**[5]**

OR

Q6) a) What is LMTD for a heat exchanger? Derive an expression for LMTD of counter flow heat exchanger. **[10]**

b) Define Heat Exchanger & write the classification of Heat Exchangers (Any three) **[7]**

Q7) a) Define following surface Emission Properties **[6]**

i) Emissive power (E)

ii) Emissivity (ε)

iii) Monochromatic emissive power (e_λ)

b) Write a note on : radiation shape factor. **[4]**

c) Three hollow thin-walled cylinders having diameters 10 cm, 20 cm, and 30 cm are arranged coaxially. The temperatures of the innermost and outermost cylinder surfaces are 100 K and 300 K respectively. Assuming vacuum between annular spaces, find steady state temperature attained by the cylinder having diameter of 20cm. Take emissivities of all cylinders as 0.05. **[8]**

OR

Q8) a) Explain **[6]**

i) Planck's Law

ii) Wien's Displacement law

iii) Kirchhoff's Law

b) Define Irradiation with their characteristics. **[4]**

c) Explain surface resistance and space resistance. **[8]**

❋ ❋ ❋

Total No. of Questions : 8]

SEAT No. : ____

PB-3888

[Total No. of Pages : 2

[6262]-153
T.E. (Automobile Engineering)
DESIGN OF MACHINE COMPONENTS
(2019 Pattern) (Semester - I) (316483)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Four questions from the following.***

2) ***Assume suitable data, if necessary.***

Q1) a) Describe the different types of welds. **[6]**

b) A machine slide weighing 3 KN is elevated by a double start acme threaded screw at the rate of 0.84 m/min. If the coefficient of friction is 0.12, calculate the power to drive the slide. The end of the screw carries a thrust collar of 32 mm inside diameter and 58 mm outside diameter. Pitch of the screw thread is 7 mm and outside diameter is 44 mm. Take coefficient of friction for collar as 0.09 and allowable shear stress as 44.125 Mpa. Is it strong enough to sustain the load? **[12]**

OR

Q2) a) Deduce an expression for torque required to raise the load in power screws. **[8]**

b) A triple riveted lap joint is to be made between 6 mm plates. If the safe working stresses are tensile stress 84 Mpa, shear stress 60 Mpa and crushing stress 120 Mpa, Design the joint. **[10]**

Q3) a) Deduce soderberg equation. **[10]**

b) The brasses of an automobile engine connecting rod have worn so as to allow play which gives shock loading equivalent to a weight 6000 N falling through a height 0.2 mm. The connecting rod is 250 mm long and has a cross-sectional area 300 mm^2 Determine the maximum stress induced in connecting rod, resilience in tension or compression. Take E=200000Mpa. **[7]**

P.T.O.

OR

Q4) a) A steel rod is subjected to torsional load varying from -110N-m to 440N-m and axial load varying from 4500N to 13500N. Assume factor of safety as 8. Take ultimate stress=550Mpa, yield shear stress=235Mpa, yield stress=470Mpa, fatigue stress concentration factor=1, load factor=0.7 for axial and 1 for torsion, surface finish factor=0.89, size factor=1. Calculate the diameter of rod. **[10]**

b) Explain about S-N diagram. **[7]**

Q5) a) Deduce an expression for formative number of teeth in helical gear. **[6]**

b) Design a pair of helical gears are to transmit 15KW at 10,000rpm of the pinion with PCD 80mm. The transmission ratio is 3:1. Assume α =20°FDI, β =45°. σ_d =193.2Mpa, BHN=250 for pinion and gear. Check only tangential tooth load. Y= π (0.154–0.912/Z_e), C_v=5.55/5.55+$V^{0.5}$ **[12]**

OR

Q6) a) Design spur gear set to transmit 20 KW at 900rpm of pinion. The transmission ratio is 3. Take 20º FDI, Z_1=18, σ_d =193.2Mpa, BHN=250 for pinion and σ_d =47.1Mpa, BHN=200 for gear. Check only tangential tooth load. Form factorY= π (0.154-0.912/Z), C_v=3.05/3.05+V **[12]**

b) Derive Lewis equation for beam strength. **[6]**

Q7) a) Explain the purpose of Worm & worm wheel. **[3]**

b) A worm gear drive is to connect two shafts to transmit 10 KW. The transmission ratio is 20:1 and worm shaft rotates at 1440 rpm. Design the gear set. Assume single start square thread. Take σ_d =207 Mpa, for worm and σ_d =82.4 Mpa, for worm wheel. Form factor Y= π (0.154-0.912/Z). **[14]**

OR

Q8) a) Describe miter gears. **[3]**

b) Two shafts are right angles to each other are connected by 20° full depth involute teeth bevel gears. The velocity ratio is 3:1. The pinion transmits 37.5 KW at 750 rpm. Assume number of teeth on pinion is 20. Design the gear set. Take σ_d =233.4 Mpa, BHN=200 for pinion and σ_d =l72.6 Mpa, BHN=150 for gear. Form factor Y= π (0.154-0.912/Z_e), C_v=6.1/6.1+V **[14]**

Total No. of Questions : 8]

SEAT No. :

PB-3889

[Total No. of Pages : 2

[6262]-154
T.E. (Automobile)
AUTOMOBILE ELECTRICAL AND ELECTRONICS
(2019 Pattern) (Semester - I) (316484)

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.***

Q1) a) Explain Distributor-less ignition systems. **[6]**

b) What is use of current regulator? Explain any one type of current regulator. **[6]**

c) Discuss the selection of cranking motor with the help of performance curve. **[6]**

OR

Q2) a) Explain principle and construction of Starter Motor. **[8]**

b) Explain working of Fuel gauge. **[10]**

Q3) a) Write construction and working of alternator. **[10]**

b) Explain working of Oil pressure gauge. **[7]**

OR

Q4) a) What are the different types of sensors? Explain any one. **[5]**

b) Explain with neat sketch Solenoid Actuators. **[5]**

c) Write short note on cold and warm start system. **[7]**

P.T.O

Q5) a) What are the different types of actuators? Explain any one. **[5]**

b) Explain with neat sketch MAP Sensor. **[5]**

c) Write down the difference between Group and sequential injection system. **[7]**

OR

Q6) a) Explain CRDI system with neat sketch. **[5]**

b) Explain Collision avoidance system with layout. **[5]**

c) Write short note on Smart Parking Assist System (SPAS). **[7]**

Q7) a) Explain Radar warning system. **[6]**

b) What is Driver State monitoring? Explain in brief. **[6]**

c) Explain MPFI system with neat sketch. **[6]**

OR

Q8) a) Explain ABS System with layout. **[6]**

b) Explain Global Positioning Systems (GPS). **[6]**

c) What is Adaptive Cruise Control? Explain in brief. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3890

[Total No. of Pages : 2

[6262]-155

T.E. (Automobile / Mechanical Engg.)

ADVANCED FORMING AND JOINING PROCESSES

(2019 Pattern) (Semester - I) (302045A) (Elective-I)

Time : 2½ 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, Que5 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) Explain in detail importance of effects of pre and post weld heat treatments processes? **[8]**

b) Explain in detail, the important factors considered in welding of dissimilar materials. **[9]**

OR

Q2) a) Explain the importance of weldability. Explain ASME and IS Welding Standards **[8]**

b) Explain in detail, Weld characterization, Weld decay and weld sensitization **[9]**

Q3) a) Explain with sketch, Friction stir welding process with advantages and limitations. **[9]**

b) Explain in detail with sketch, Roll welding process features and applications. **[9]**

OR

Q4) a) Explain in detail, Advances in adhesive bonding and cladding with features and advantages. **[9]**

b) Explain in detail with sketch, hot pressure welding process with advantages and limitations. **[9]**

P.T.O.

Q5) a) Analyze with the sketch, working of Cold Metal Transfer process and its applications. **[8]**

b) Explain with sketch, working principle of Underwater welding and its applications. **[9]**

OR

Q6) a) Analyze with the sketch, working of Atomic hydrogen welding process and its applications. **[8]**

b) Explain the Robotic welding, Plasma Arc welding and Plasma Transferred Arc welding. **[9]**

Q7) a) Explain in detail, concept of sustainability, Industry 4.0 and Green Manufacturing. **[9]**

b) Explain one case study on **[9]**

i) waste recycling and

ii) material recycling.

OR

Q8) a) Explain fundamentals of sustainable manufacturing, various tools of sustainable manufacturing, factors of sustainability **[9]**

b) Explain various Environment protection norms and Principles of Life Cycle Assessment. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3891

[Total No. of Pages : 2

[6262]-156

T.E. (Mechanical) (Automobile Engg.)

MACHINING SCIENCE & TECHNOLOGY

(2019 Pattern) (Semester - I) (302045 B) (Elective - I)

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) Explain and classify grinding wheels selection factors. **[10]**

b) Explain any one lapping process with neat sketch and state its applications. **[7]**

OR

Q2) a) Explain Ball burnishing process with neat sketch. State its advantage and applications. **[10]**

b) Explain grinding wheel designation: 35–A–46–M –3–S–33. **[7]**

Q3) a) Compare of jigs and fixtures with minimum five points. Write industry significance for jig and Fixture. (Minimum Five points). **[10]**

b) With neat sketch describe the concept of degree of freedom. Explain the six point location principle with neat sketch. **[8]**

OR

Q4) a) Write any six principles of clamping and draw labeled sketch of strap clamp. **[10]**

b) Explain with neat sketch inspection fixture. **[8]**

P.T.O.

Q5) a) Evaluate the phase of drawing interpretation in process planning activity. **[9]**

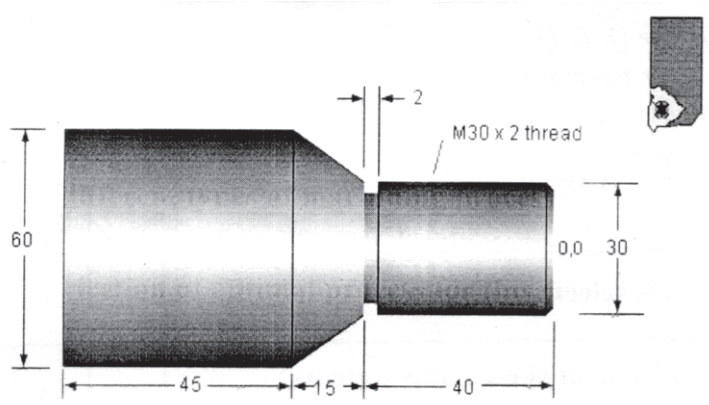
b) Explain production equipment & tooling selection in process planning. **[8]**

OR

Q6) a) Two different types of machining processes process-1 and process-2 can be used for the same job. Evaluate economics of process planning and selection of optimal process for this case. **[9]**

b) Explain with flowchart process selection. **[8]**

Q7) a) Generate CNC part programming for the below part which requires only threading operation as shown. **[10]**



b) Explain the steps involved in CNC part programming. **[8]**

OR

Q8) a) Explain with neat diagram Linear interpolation and Circular interpolation methods used for CNC part program. **[10]**

b) "Tool length Compensation in CNC part programming is necessary". Explain the statement with neat diagram. **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3892

[Total No. of Pages : 3

[6262]-157

T.E. (Automobile)

AUTOMOTIVE REFRIGERATION & AIR CONDITIONING

(2019 Pattern) (Semester - II) (316485)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of steam table & psychrometric chart is allowed.***

Q1) a) State function & types of fans. Explain axial flow Fans. **[6]**

b) Explain the air management & heater systems & importance in vehicle. **[6]**

c) Explain temperature control system of vehicle. **[6]**

OR

Q2) a) Define Human Comfort. What are the factors affecting human comfort & Explain it with comfort chart? **[6]**

b) State air distribution modes & explain any two modes. **[6]**

c) Explain cool down performance of vehicle. **[6]**

Q3) a) Define i) Bypass factor ii) Degree of saturation iii) Humidification & Dehumidification iv) DPT. **[8]**

b) A room 7m × 4m × 4m is occupied by an air water vapour mixture at 38 °C. The Atmospheric pressure is 1 bar & the relative humidity is 70%. Determine i) Humidity ratio ii) Dew point iii) Mass of dry air & water vapour. **[9]**

OR

P.T.O.

Q4) a) State Daltons law of partial pressure. Explain Adiabatic saturation temperature with neat sketch. **[7]**

b) The atmospheric air at 30 °C dry bulb temperature and 75% relative humidity enters a cooling coil at the rate of 200 m^3/ mm. The coil dew point temperature is 14 °C. Assuming by pass factor of heating coil as 0.1, Determine i) The temperature of air leaving the coil ii) The capacity of cooling coil in tonnes of refrigeration & in kilowatt. iii) The amount of water vapour remover per minute. iv) The sensible heat factor for the process. **[10]**

Q5) A restaurant with a capacity of 90 persons is to be air conditioned with the following conditions: **[18]**

Outside conditions = 30°C DBT and 70% RH
Desired inside conditions = 23°C DBT and 55% RH
Quantity of air supplied = 0.6 m^3/ min/ person

The desired conditions are achieved by cooling dehumidifying and then heating. Determine

a) Cooling of coil in tonnes of refrigeration
b) Capacity of heating coil
c) Amount of water removed by dehumidifier
d) Bypass factor of the heating coil if its surface temperature is 35 °C

OR

Q6) A hail is to be maintained at 24 °C dry bulb temperature and 60% relative humidity under the following conditions: **[18]**

Outdoor conditions = 38°C DBT and 28°C WBT
Sensible heat load in the room = 46.4 kW
Latent heat load in the room = 11.6 kW
Total Infiltration air = 1200 m^3/hr
Apparatus dew point temperature = 10°C
Quantity of recirculated air from the hall = 60%

If the quantity of recirculated air is mixed with the conditioned air after the cooling coil, Find the following :

a) The condition of air leaving the conditioner coil & before mixing with the recirculated air.
b) The condition of air before entering the hall.
c) The mass of air entering the cooler.
d) The mass of total air passing through the hall.
e) The bypass factor of the cooling coil.
f) The refrigeration load on the cooling coil in tonnes of refrigeration.

Q7) a) Explain temperature measurement in vehicle system. **[6]**

b) Write note on automotive AC components removing and replacing. **[6]**

c) Write short note on Initial vehicle inspection. **[5]**

OR

Q8) a) Explain leak detection methods and leak detectors in automotive AC. **[6]**

b) Explain sight glass & refrigerant safety and its handling in AC. **[6]**

c) Write short note on Compressor servicing. **[5]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3893

[Total No. of Pages : 2

[6262]-158
T.E. (Automobile Engineering)
AUTOMOTIVE CHASSIS AND TRANSMISSION
(2019 Pattern) (Semester - II) (316486)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer four questions from the following.***
2) ***Draw the neat sketches wherever required.***

Q1) a) Describe the wheel balancing procedure. **[10]**

b) What are the merits of Tubeless over Tubed Tyres? **[8]**

OR

Q2) a) Narrate the construction and working of Hydraulic brake system with neat sketch. **[10]**

b) Enumerate the functions and requirements of braking system. **[8]**

Q3) a) Explain the construction and working of Electromagnetic clutch with neat sketch. **[10]**

b) Discuss about the clutch plate lining materials. **[7]**

OR

Q4) a) With neat sketch explain the working of Synchromesh gearbox. **[10]**

b) Explain gear selector mechanism. **[7]**

Q5) a) Explain the real axle with types of load acting on rear axle. **[10]**

b) With neat sketch explain Torque tube Drive. **[8]**

OR

P.T.O

Q6) a) Explain the constructional details of differential with sketch. **[10]**

b) Narrate the features of Propeller shaft with types. **[8]**

Q7) a) Discuss the construction and working of Torque convertor with sketch. **[10]**

b) Briefly explain the construction & working of simple epicyclic gear train. **[7]**

OR

Q8) a) Explain Continuous Variable Transmission with advantages & disadvantages. **[10]**

b) Discuss about fully automatic transmission. **[7]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3894

[Total No. of Pages : 3

[6262]-159
T.E. (Automobile Engineering)
DESIGN OF ENGINE COMPONENTS
(2019 Pattern) (Semester - II) (316487)

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) ***Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What are the types of Engine cooling systems? Explain any one in detail. **[7]**

b) Calculate the volume of lubricating oil required in sump of a 5kW, Single cylinder diesel engine, with the lubricating oil cooling system based on natural convection. Fuel consumption of engine = 1.2 kg/hr. Calorific value of diesel = 42×10^6 J/kg, 0.007% of heat of combustion is absorbed by lubricating oil, convective heat transfer coefficient = 25 W/m^{2}K, Temperature difference between ambient temperature and temperature of lubricating oil as 45 K. Peripheral area of sump size = (35 × 20) cm. **[10]**

OR

Q2) a) Design an steel (constant, k 0.42 & bending stress= 50 N / mm^2) exhaust valve for a horizontal diesel engine using the following data: Cylinder bore = 160 mm Length of stroke = 270 mm, Engine speed = 600 rpm, Maximum gas pressure = 4 MPa, Seat angle = 45°, Assume allowable mean velocities of the gas through the port (V_p) = 50m/s. Calculate:**[10]**

i) Diameter of the valve port;

ii) Diameter of the valve head;

iii) Thickness of the valve head;

iv) Diameter of the valve stem; and

v) Maximum lift of the valve.

b) Draw and explain the valve assembly mechanism of a 4-stroke single cylinder diesel engine. **[7]**

P.T.O

Q3) a) Explain the basic difference between the functions of flywheel and governor. **[10]**

b) A machine is driven by a motor, which exerts a constant torque. The resisting torque of the machine increases uniformly from 400 N-m to 1400 N-m through a 360° rotation of the driving shaft and drops suddenly to 400N-m again at the beginning of next revolution. Calculate the maximum fluctuation of energy of flywheel disk. **[7]**

OR

Q4) a) Explain **[10]**

i) Mean speed of flywheel.

ii) Coefficient of fluctuation of speed of flywheel.

iii) Coefficient of steadiness of flywheel

iv) Maximum fluctuation of energy of flywheel

v) Coefficient of fluctuation of energy of flywheel

b) Explain the stresses in rimmed flywheel. **[7]**

Q5) a) Enlist the different types of roller contact bearings, which are frequently used. Explain in detail with neat diagram the characteristics of any one type of ball bearing. **[9]**

b) Explain the basic procedure for the selection of a roller bearing from the manufacturer's catalogue **[9]**

OR

Q6) a) Explain thin film lubrication. **[8]**

b) The following data is given for full hydrodynamic journal bearing for machine tool application: **[10]**

journal diameter = 75 mm

radial load = 10kN

journal speed = 1440 rpm

minimum oil film thickness = 22.5 microns

inlet temperature = 40°C

bearing material = Babbitt

Permissible bearing pressure for machine tool applications is 2 N/mm^2.

Calculate

i) The length of the bearing

ii) Clearance between shaft and bearing

iii) Viscosity of oil

iv) Temperature change

Note that (l/d) ratio should be rounded to match the below tabulated value.

$\left(\frac{l}{d}\right)$	ε	$\left(\frac{h_o}{c}\right)$	S	ϕ	$\left(\frac{r}{c}\right)f$	$\left(\frac{Q}{rcn_s l}\right)$	$\left(\frac{Q_s}{Q}\right)$	$\left(\frac{p}{p_{max.}}\right)$
∞	0	1.0	∞	(70.92)	∞	π	0	–
	0.1	0.9	0.240	69.10	4.80	3.03	0	0.826
	0.2	0.8	0.123	67.26	2.57	2.83	0	0.814
	0.4	0.6	0.0626	61.94	1.52	2.26	0	0.764
	0.6	0.4	0.0389	54.31	1.20	1.56	0	0.667
	0.8	0.2	0.021	42.22	0.961	0.760	0	0.495
	0.9	0.1	0.0115	31.62	0.756	0.411	0	0.358
	0.97	0.03	–	–	–	–	0	–
	1.0	0	0	0	0	0	0	0
1	0	1.0	∞	(85)	∞	π	0	–
	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0.280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152
	1.0	0	0	0	0	0	1.0	0

Q7) a) The mechanical efficiency of a single cylinder 4-stroke diesel engine is 80%. The frictional power is estimated to be 20kw. Calculate the indicated power and brake power developed by the engine. **[4]**

b) Write down the design considerations for combustion chamber. **[9]**

c) Enlist the different types of cylinder arrangements in I C Engines. Explain any one in detail. **[5]**

OR

Q8) Write note on: **[18]**

a) Exhaust gas CO and HC analyzer.

b) Cylinder power balance.

c) Distributor dwell angle.

Total No. of Questions : 8]

SEAT No. : ____

PB3895

[6262]-160

[Total No. of Pages :2

T.E. (Automobile Engineering)

AUTOMOTIVE AERODYNAMICS AND BODY ENGINEERING

(2019 Pattern) (Semester- II) (316488A) (Elective-II)

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.***

Q1) a) What are the characteristics of external flow on a body? **[9]**

b) Explain in details about **[9]**

i) Large full-scale wind tunnels

ii) Small full-scale wind tunnels

iii) Climatic tunnels

OR

Q2) a) Discuss the effect of aerodynamic noise on the motion of a road vehicle. **[9]**

b) Explain the features of aerodynamic stability of a vehicle and describe the effect of wind forces resulting from non-steady side winds on a vehicle. **[9]**

Q3) a) What are the methods of improving space in cars? Discuss. **[8]**

b) What is the importance of weight to power ratio of a car? **[9]**

OR

Q4) a) Explain the compactness of driver's cabin. **[8]**

b) List out the points to be considered while designing a driver's seat. **[9]**

P.T.O.

Q5) a) What are the possible locations of engine in a bus body layout? **[8]**

b) What is the influence of the floor height in the bus body layout? **[9]**

OR

Q6) a) How does the entrance and exit location influences the bus body layout? **[8]**

b) Explain the constructional details of s conventional bus body. **[9]**

Q7) a) List out the points to be considered for Impact protection from steering controls. **[9]**

b) Explain the longitudinal load and load distribution on vehicle structure. **[9]**

OR

Q8) a) Explain the types of seat used in automobiles. **[9]**

b) Write down the Importance of Bumper in automobile. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB3896

[6262]-161

[Total No. of Pages :2

T.E. (Automobile Engineering)

AUTOMOTIVE MATERIALS

(2019 Pattern) (Semester- II) (316488B) (Elective-II)

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) Explain the Resin transfer moulding. **[9]**

b) Compare Injection moulding with Compression moulding. **[8]**

OR

Q2) a) Explain the Reinforcement of fibres in composites. **[9]**

b) Describe the Hand lay-up process. **[8]**

Q3) a) Explain the properties and composition of glass. **[9]**

b) Describe the scratch resistant paints. **[9]**

OR

Q4) a) Explain the Various approaches in tempering of glass for improved toughness. **[9]**

b) Discuss the different methods of nano coatings for corrosion resistance. **[9]**

P.T.O.

Q5) a) Explain the new trends in engines. **[9]**

b) Discuss the use of MR fluids in automobiles. **[8]**

OR

Q6) a) Describe the smart materials used in the automobile industry. **[9]**

b) Explain the powder metallurgy process for making disc brake pads. **[8]**

Q7) a) Explain the criteria for selection of materials for different systems in automobiles. **[9]**

b) Describe the materials developments by Land Rover. **[9]**

OR

Q8) a) Explain the development in materials by Ferrari. **[9]**

b) Discuss the Ashby charts. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3897

[Total No. of Pages : 3

[6262]-162

T.E. (Mechanical/Mechanical Sandwich Engg.)

NUMERICAL AND STATISTICAL METHODS

(2019 Pattern) (Semester - I) (302041)

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 and 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 Scientific Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Evaluate $\int_0^1 \int_0^1 (x^2 y^2) dxdy$ by using suitable method. Take Step size in x & y as 0.25. **[9]**

b) Find the integration of $e^x \cos(x) - 2x$ in limits 0 to 1 by using 3-point Gauss Legendre formula. **[9]**

OR

Q2) a) Gas is expanded according to law $pV^{1.3} = C$ from the pressure of $10 N/m^2$. Assuming the initial volume of gas $1 m^3$ and final volume $7 m^3$. Calculate work done using Simpson's $\frac{1}{3}$ rule. Divide volume in 6 equal strips. **[8]**

b) Using Gauss-Legendre two point formula to find $\int_3^5 (x^2 - 5x + 2) dx$. **[5]**

c) Draw flowchart of Trapezoidal Method to evaluate Integration of a function. **[5]**

Q3) a) Draw flowchart for the equation $y = ab^x$. **[8]**

b) The population of a town is as follows : **[10]**

Year(x)	1941	1951	1961	1971	1981
Population in Lakhs (y)	20	24	29	36	46

Estimate the populatiqn increase during the period 1941 to 1946.

P.T.O.

OR

Q4) a) The variations of deformation of a metal rod can be modeled as $d = aT^2 + bT + c$, where T is the Operating Temperature. Calculate the values of a, b, and c from the following table : **[10]**

Temperature (K)	300	350	400	450	500
Deformation (mm)	0.913	0.929	0.922	0.918	0.909

b) The following data gives the values of y corresponding to certain values of X. Find the value of X when Y = 167.59789 by applying suitable method. **[8]**

X	1	2	5	6
Y	1	12	117	317

Q5) a) Compute Karl Pearson's coefficient of correlation between X and Y for the following data : **[8]**

X	100	98	78	85	110	93	80
Y	85	90	70	72	95	81	74

b) The competitors in a beauty contest are ranked by three judges in the following order. Use rank correlation coefficient to discuss which pair of judges has nearest approach to beauty. **[9]**

1st judge	1	5	4	8	9	6	10	7	3	2
2rd judge	4	8	7	6	5	9	10	3	2	1
3rd judge	6	7	8	1	5	10	9	2	3	4

OR

Q6) a) From the following data of marks obtained by 8 students in Numerical and Statistical methods (NSM) and Heat and mass transfer (HMT) papers, compute rank coefficient of correlation. **[9]**

NSM	15	20	28	12	40	60	20	80
HMT	40	30	50	30	20	10	30	60

b) Discuss the following terms : **[8]**

i) Coefficient of variation

ii) Central moments

iii) Standard deviation

iv) Grouped and Ungrouped Data

Q7) a) A can hit the target 1 out of 4 times, B can hit the target 2 out of 3 times and C can hit the target 3 out of 4 times. Find the probability of (i) at least two hit the target (ii) At most two hit the target (iii) No one hitting the target. **[9]**

b) In a distribution of 'NSM' marks exactly normal, 7% of students are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution. [$A_1 = 0.43$, $Z_1 = 1.48$, $A_2 = 0.39$, $Z_2 = 1.23$] **[8]**

OR

Q8) a) Among 64 offsprings of a certain cross between guinea pigs 34 were red, 10 were black and 20 were black and 20 were white. According to a genetic model, these numbers should be in the ratio 9:3:4. Are the data consistent with the model at 5% level? **[9]**

Given $(\chi^2_{2,0.05} = 5.99)$.

b) A can hit the target 1 out of 4 times, B can hit the target 2 out of 3 times and C can hit the target 3 out of 4 times. Find the probability of **[8]**

i) At least two hit the target

ii) At most two hit the target

iii) No one hitting the target

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. : ____

PB3898

[Total No. of Pages : 3

[6262]-163

T.E. (Mechanical Engineering)/(Mechanical Sandwich Engineering)

HEAT AND MASS TRANSFER

(2019 Pattern) (Semester - I) (302042)

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 wherever necessary.***

Q1) a) Explain the following Non dimensional numbers **[9]**

i) Reynold Number,

ii) Grashoff Number

iii) Nusselt Number

b) Estimate heat loss from a vertical wall exposed to nitrogen at 1 atm and 4 °C. The wall is 2 m high and 2.5 m wide and is maintained at 56 °C. The average Nusselt number over height of the wall for natural convection is given by

$Nu_H = 0.13(Gr\ Pr)^{1/3}$

The properties for nitrogen at a mean film temp are given as $\rho = 1.142\ kg/m^3$, $K = 0.026\ W/mK$, $\nu = 15.63 \times 10^{-6}\ m^2/s$, $Pr = 0.713$. **[9]**

OR

Q2) a) Explain in short Critical Heat Flux. **[4]**

b) Differentiate between filmwise and dropwise condensation. **[4]**

c) Air at atmospheric pressure and 30 °C flows over a flat plate at 3m/s. Plate is 50cm × 100 cm. Find heat loss in Watt if air flow is parallel to 100 cm side of plate. Consider both sides of plate.

If 50cm side is kept parallel to air flows. What will percentage increase in heat transfer rate? Plate temperature is 110°C. Given that for forced convection, use following relation $Nu = 0.664\ Re^{0.5}\ Pr^{0.33}$

Air properties at 70°C: Kinematic Viscosity = $20.02 \times 10^{-6}\ m^2/s$, $K = 2.964 \times 10^{-2}\ W/mK$, $C_p = 1.009\ KJ/Kg.K$, $\mu = 20.6 \times 10^{-6}\ Ns/m^2$. **[10]**

P.T.O.

Q3) a) Write Note on radiation shield. **[5]**

b) Calculate the net radiant heat exchange per m^2 area for two large parallel plates at temperatures 427°C and 27°C respectively ε (hot plate) = 0.9 and ε (cold plate) = 0.6.

If a polished aluminium shield is placed between them, find the percentage reduction in the heat transfer, ε (shield) = 0.4. **[12]**

OR

Q4) a) Explain the following **[8]**

i) Black Body

ii) Wien's displacement law

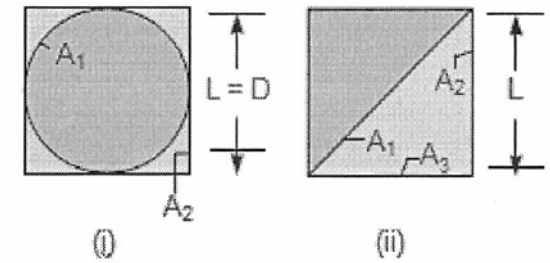
iii) Kirchhoff 's law

iv) Solid angle

b) Calculate the shape factor F12 and F21 for the following geometries **[9]**

i) Sphere of diameter D inside a cubical box of length D

ii) Diagonal partition within a long square duct



Q5) a) Enumerate applications of mass transfer. **[4]**

b) Explain the mode of mass transfer. **[4]**

c) A well is 40 m deep and 9 m diameter and the atmospheric temperature is 20°C. The air at the top is having a relative humidity of 50%. Determine the rate of diffusion of water vapour through the well. $D = 0.58 \times 10^{-5}$ m^2/s. The partial pressure is equal to saturation pressure at 25°C = 0.03169 bar. At RH = 50% the partial pressure can be taken as 0.5 × 0.03169 bar. **[10]**

OR

Q6) a) State and explain Fick's law for mass diffusion. **[8]**

b) Write the Mass Diffusion Equations in Cartesian, Cylindrical and Spherical Coordinate system. **[6]**

c) Explain the following term **[4]**

i) mass concentration

ii) molar concentration

Q7) a) Derive an expression for LMTD of a counter flow heat exchanger. **[8]**

b) Determine the area required in parallel flow heat exchanger to cool oil from 60°C to 30°C using water available at 20°C. The outlet temperature of the water is 26°C. The rate of flow of oil is 10 kg/s. The specific heat of the oil is 2200 J/kg K. The overall heat transfer coefficient U = 300 W/m^2 K. **[9]**

OR

Q8) a) Derive Expression for effectiveness of parallel flow heat exchanger in terms of NTU and capacity ratio. **[8]**

b) Consider the following parallel flow heat exchanger specification cold flow enters at 40°C : C_c = 20,000 W/K

hot flow enters at 150°C : C_h = 10,000 W/K

A = 30m^2 U = 500W/m^2.K

Determine the heat transfer rate and the exit temperatures **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3899

[Total No. of Pages : 4

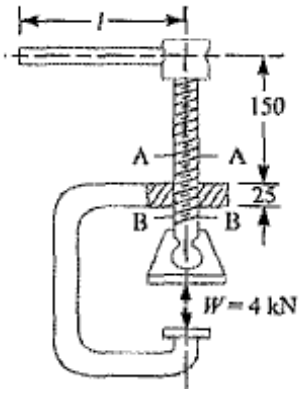
[6262]-164
T.E. (Mechanical Sandwich) (Mechanical)
DESIGN OF MACHINE ELEMENTS
(2019 Pattern) (Semester - I) (302043)

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 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, if necessary.***

Q1) a) A C-clamp, as shown in Figure, has trapezoidal threads of 12 mm outside diameter and 2mm pitch. The coefficient of friction for screw threads is 0.12 and for the collar is 0.25. The mean radius of the collar is 6 mm. If the force exerted by the operator at the end of the handle is 80N, find: 1) The length of handle; 2) The maximum shear stress in the body of the screw and where does this exist; and 3) The bearing pressure on the threads. **[8]**



b) Derive expression for torque required to raise the loads in case of square threads. **[5]**

c) Prove that efficiency of self-locking square threads is less than 50%. **[4]**

OR

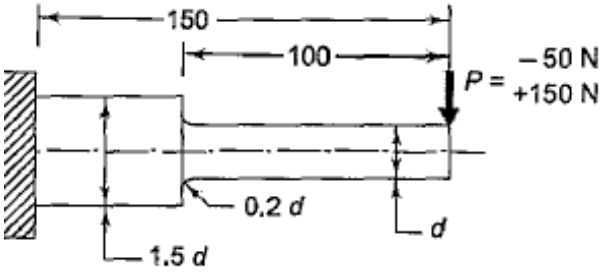
P.T.O.

Q2) a) A power screw having double start square threads of 25 mm nominal diameter and 5 mm pitch is acted upon by an axial load of 10 kN. The outer and inner diameters of screw collar are 50 mm and 20 mm respectively. The coefficient of thread friction and collar friction may be assumed as 0.2 and 0.15 respectively. The screw rotates at 12 r.p.m. Assuming uniform wear condition at the collar and allowable thread bearing pressure of 5.8 N/mm^2, find: 1. the torque required to rotate the screw; 2. the stress in the screw; and 3. the number of threads of nut in engagement with screw. Also state the condition of screw. **[8]**

b) Explain with neat sketch, differential screw and Compound screw. **[4]**

c) Explain with neat sketch, re-circulating ball screw. State its application. **[5]**

Q3) a) A cantilever beam made of cold drawn steel 40C8 (S_{ut} = 600 N/mm^2 and S_{yt} = 380N/mm^2) is shown in Figure. The force P acting at the free end varies from –50 N to +150 N. The expected reliability is 90% and the factor of safety is 2. The notch sensitivity factor at the fillet is 0.9. Determine the diameter of the beam at the fillet cross-section. Take surface finish factor 0.77, Size factor 0.85, Reliability factor 0.897 and theoretical stress concentration factor 1.44. **[8]**



b) What is stress concentration? What are the causes of stress concentration? **[6]**

c) Define and Explain 1) Notch Sensitivity 2) Endurance limit. **[4]**

OR

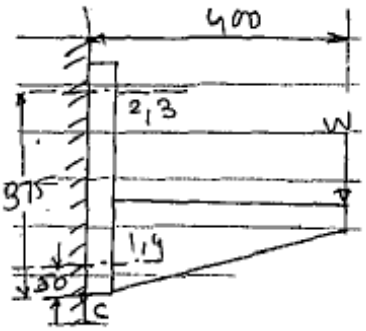
Q4) a) A cantilever beam of circular cross section made of steel Fe 550 (S_{ut} =550 N/mm^2 is fixed at one end and subjected to a completely reversed load (P) of 15 kN is at the free end. He force P is perpendicular to the axis of beam. The distance between forces to fixed end is 200 mm. Take Kt = 1.35, q = 0.85, Ka = 0.8, Kc = 0.897 and the values of K_b is taken from table. The factor of safety is 2 Calculate the diameter of the beam for infinite life. **[8]**

d (mm)	Kb
d ≤ 7.5	1.0
7.5 < d ≤50	0.85
d > 50	0.75

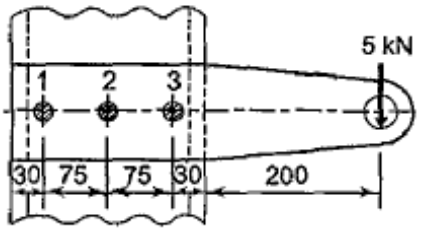
b) Explain modified Goodman diagram. Draw neat labeled sketches of modified Goodman diagram for axial & Bending stresses. **[5]**

c) Write a short note on Cumulative damage. **[5]**

Q5) a) A bracket shown in figure is fixed to steel column by means of four bolts of size M14. A load of W acts on the bracket. Take σ_t = 84 MPa. If ratio B/t for cross section of the arm bracket is 45. Determine 1) Maximum load on bracket, 2) Cross section of bolts. **[8]**



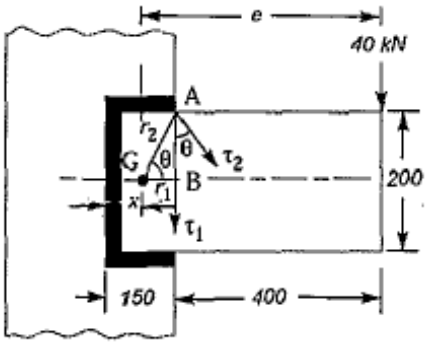
b) A steel plate subjected to a force of *5 kN* and fixed to a channel by means of three identical bolts is shown in Figure. The bolts are made from plain carbon steel *45C8 (S_{yt} = 380 N/mm^2)* and the factor of safety is 3. Specify the size of bolts. **[5]**



c) Write a note on: Bolts of uniform strength. **[5]**

OR

Q6) a) A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load *40 kN*, as shown in Figure. Determine the Maximum shear stress if size of weld is 11.62mm. **[8]**



b) Discuss in brief strength of parallel fillet welds. **[5]**

c) Prove that stress on the throat is equal to the ratio of force on weld to $0.707 \times s \times l$ **[5]**

Q7) a) A mechanism used in printing machinery consists of a tension spring assembled with a preload of 30 N. The wire diameter of spring is 2 mm with a spring index of 6. The spring has 18 active coils. The spring wire is hard drawn and oil tempered having following material properties: Design shear stress = 680 MPa; Modulus of rigidity = 80 kN/mm^2 Determine: 1) the initial torsional shear stress in the wire; 2) Spring rate; and 3) The force to cause the body of the spring to its yield strength. **[8]**

b) Draw a neat sketch of a multi-leaf spring and show its essential parts. State functions of any two components. **[4]**

c) What is mean by spring surge and what is its effect? **[5]**

OR

Q8) a) A safety valve of 60 mm diameter is to blow off at a pressure of 1.2 N/mm^2. It is held on its seat by a close coiled helical spring. The maximum lift of the valve is 10 mm. Design a suitable compression spring of spring index 5 and providing an initial compression of 35 mm. The maximum shear stress in the material of the wire is limited to 500 MPa. The modulus of rigidity for the spring material is 80 kN/mm^2. Calculate: 1) Diameter of the spring wire, 2) Mean coil diameter, 3) Number of active turns, and 4) Pitch of the coil. **[8]**

b) Explain with the neat sketch, nipping of leaf spring. **[5]**

c) Explain A.M. Wahl's factor and state its importance in the design of helical springs. **[4]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3900

[Total No. of Pages : 3

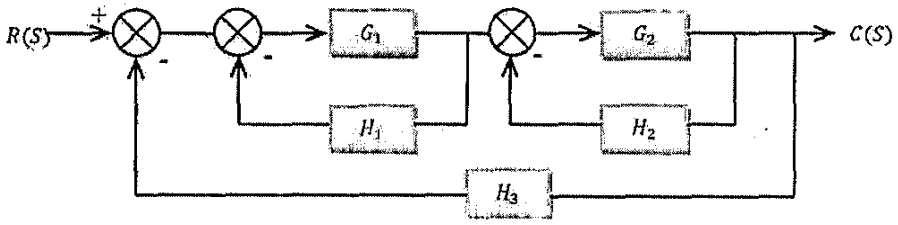
[6262]-165
T.E. (Mechanical/Mechanical Sandwich)
MECHATRONICS
(2019 Pattern) (Semester - I) (302044)

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 wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***

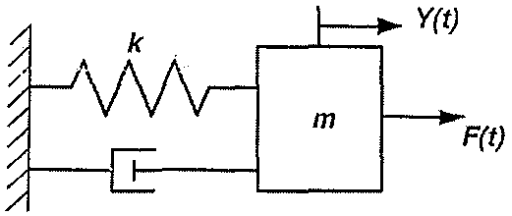
Q1) a) Find overall transfer function for following block diagram representation using block diagram reduction technique. **[10]**



b) Differentiate between open loop and closed loop control system. **[7]**

OR

Q2) a) For the System Shown in Fig. Assume m = mass =1 kg, k = stiffness = 2N/m, and d = damping = 0.5 Ns/m - Also, F- Force input in N and Y = Displacement output in m. For this system **[10]**



i) Derive transfer function Y(s)/ F(s)

ii) Identify the location of poles and zeros

iii) Comment on stability of the system.

b) Using a suitable block diagram explain the application of a closed loop control system in temperature control in household refrigerator **[7]**

P.T.O.

Q3) a) For The Transfer Function $G(s) = \dfrac{200}{s^2 + 2s + 200}$ Find Peak Time, Rise Time, Delay time, Settling Time **[10]**

b) Define the following terms and draw transient response mentioning following terms for second order mechanical system **[8]**

i) Delay Time

ii) Rise Time

iii) Peak Time

iv) Peak Overshoot

v) Settling Time

OR

Q4) a) The transfer function of a system is $\dfrac{C(s)}{R(s)} = \dfrac{1}{(s + 3 + 7j)\,(s + 3 - 7j)}$

Draw the pole zero plot and Find Following for Unit Step input **[10]**

i) Damping Ratio

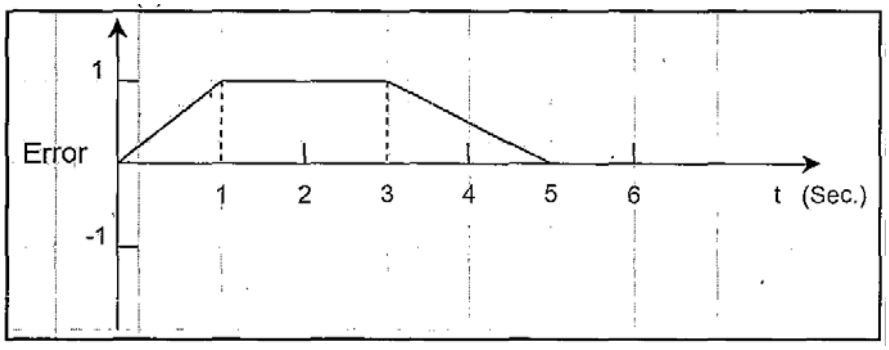
ii) Damped Natural Frequency

iii) Settling Time

iv) Peak Time

b) Differentiate time response analysis and frequency response analysis.**[8]**

Q5) a) Fig. shows an error time graph sketch PD Controller Output w.r.t. time Kp=5, Kd=0.5 %/sec. and P(0)30 %. **[10]**



b) Draw a suitable diagram and derive equation of PID(Proportional, Integral and Derivative) Controller Output in parallel form **[7]**

OR

Q6) a) The equation of error is $e = 0.5\ t+0.03t^2$. With $K_p = 5$, $K_D = 0.5$ and P(0)=50 %. Sketch the graph of the controller output Vs time for proportional derivative controller (Parallel Form) From t = 0 to t=2 sec. **[10]**

b) Using Suitable block diagram, Explain the working of PI Controller with its advantages. **[7]**

Q7) a) Develop ladder diagram to meet Following Objectives **[10]**

Given 2 push to ON buttons(PB1, PB2) Red and green lamps,

i) When PB1 is pushed, RED lamp should be ON and it will continue to be ON till PB2 is pushed.

ii) When PB2 is pushed GREEN lamp should be ON and it will continue to be ON till PB1 is pushed.

iii) if PB1 and PB2 both are pushed simultaneously both light should be OFF

b) Draw a suitable block diagram and explain architecture of a PLC. **[8]**

OR

Q8) a) Given four normally open switches (P1, P2, S1 & S2), with DC motor (M) write a PLC Program to satisfy following objectives. **[10]**

i) When P1(Start Button) is pushed the Cycle Shall Start. The Cycle Shall continue to remain ON until P2(Stop Button) is pushed.

ii) When S1 is pushed and S2 is not pushed then Motor is ON clockwise direction.

iii) When S2 is pushed and S1 is not pushed then Motor is ON in counter clockwise direction.

iv) When P2 is pushed the program stops.

b) Write a short note on following in context with PLC : **[8]**

i) Counters

ii) Latching

Total No. of Questions : 8]

SEAT No. :

PB-3901

[Total No. of Pages : 3

[6262]-166
T.E. (Mechanical)
ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
(2019 Pattern) (Semester - II) (302049)

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.***
4) ***Use of Non-Programmable Scientific Calculator is allowed.***

Q1) a) Is Naive Bayes supervised or unsupervised algorithm? Why? **[2]**

b) Differentiate between clustering and classification. **[6]**

c) Explain how Support Vector Machine works ? Explain with neat sketch Hard Margin and Soft Margin. **[9]**

OR

Q2) a) Define following terms of Decision tree. **[2]**

i) Leaf node

ii) Pruning

b) How does K-means work? **[6]**

c) Use Naive Bayes algorithm to determine whether a red domestic SUV car is a stolen car or not using the following data : **[9]**

Example no.	Colour	Type	Origin	Whether stolen
1	red	sports	domestic	yes
2	red	sports	domestic	no
3	red	sports	domestic	yes
4	yellow	sports	domestic	no
5	yellow	sports	imported	yes
6	yellow	SUV	imported	no
7	yellow	SUV	imported	yes
8	yellow	SUV	domestic	no
9	red	SUV	imported	no
10	red	sports	imported	yes

P.T.O.

Q3) a) What are four typical problems to be solved using machine learning approach? **[6]**

b) Enlist and explain steps involved in development of classification model. **[6]**

c) Explain use of Confusion matrix in Machine Learning Model with suitable example. **[6]**

OR

Q4) a) What is hyper parameter tuning? Explain any three hyper parameters tuned in SVM? **[6]**

b) What is training data, labeled data and unlabeled data? What are key steps involved in developing training data? **[6]**

c) Explain with neat sketch K-fold cross-validation mode. **[6]**

Q5) a) Explain the concept of Reinforcement learning with an example. Also define key terms used in Reinforcement learning. **[8]**

b) Explain Q-learning algorithm with flow diagram. **[6]**

c) The transfer function of neuron on one layer of a neural network is assumed to be of sigmoid form. Evaluate the output of neuron corresponding to input x = 0.62. How is the nature of sigmoid function? (Justify the answer with plot). **[4]**

OR

Q6) a) Explain Convolution Neural Network (CNN) using neat flow diagram. Explain padding and striding in CNN. **[8]**

b) Explain SARSA algorithm for reinforcement learning. **[6]**

c) A neuron with 4 inputs has the weights 1,2,3,4 and bias 0. The activation function is linear, say the function f(x) = 2x. If the inputs are 4, 8,5,6 compute the output. Draw a diagram representing the neuron. **[4]**

Q7) a) Explain human and machine interaction? Explain with any example. **[5]**

b) What is predictive maintenance? Explain different steps in predictive maintenance. **[6]**

c) Explain with suitable example how fault detection is done. **[6]**

OR

Q8) a) Explain different steps in Dynamic system reduction. **[5]**

b) Explain any one mechanical engineering application where image-based classification can be adopted. **[6]**

c) Explain the steps involved in material inspection? How machine learning can be implemented in material inspection. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

[Total No. of Pages : 4

PB-3902

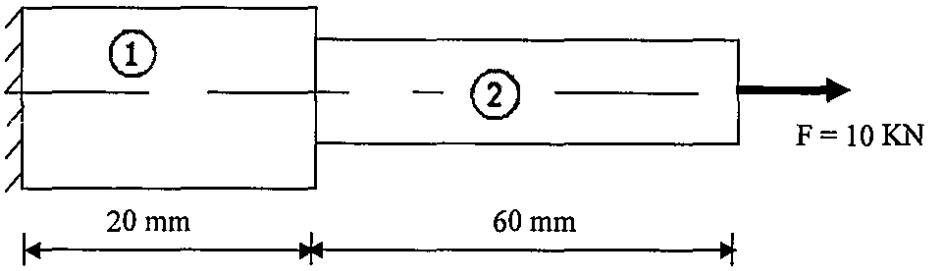
[6262]-167
T.E. (Mechanical Engineering)
COMPUTER AIDED ENGINEERING
(2019 Pattern) (Semester - II) (302050)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

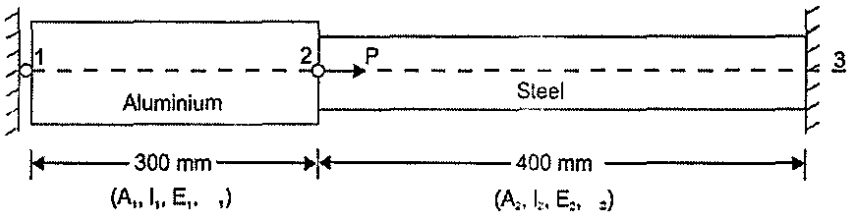
1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) A stepped bar is made of two materials joined together as shown in fig. The bar is subjected to an axial pull of 10kN. Determine the displacements, stress and reaction of each of the section using lD element A_1 = 200 mm^2, A_2 = 180 mm^2; $E_1 = 200 \times 10^3$ N/mm^2; $E_2 = 120 \times 10^3$ N/mm^2. **[8]**



b) Determine the nodal displacements at node 2, stresses in each material and support reactions in the bar shown in Figure, due to applied force $P = 400 \times 10^3$N and temperature rise of 30°C. Given: **[9]**

$A_1 = 2400mm^2$ $A_2 = 1200mm^2$
$l_1 = 300mm$ $l_2 = 400mm$
$E_1 = 0.7 \times 10^5 N/mm^2$ $E_2 = 2 \times 10^5 N/mm^2$
and $\alpha_1 = 22 \times 10^{-6}/°C$ $\alpha_2 = 12 \times 10^{-6}/°C$



OR

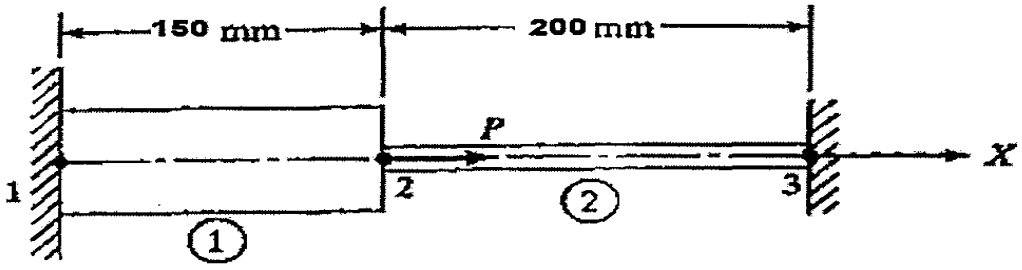
P.T.O

Q2) a) Consider the bar element shown in figure. An axial load $P = 200 \times 10^3$ N is applied as shown. $A_1 = 2000\ mm^2$; $A_2 = 800\ mm^2$; $E_1 = 70 \times 10^3 N/mm^2$ $E_2 = 200 \times 10^3\ N/mm^2$. **[7]**

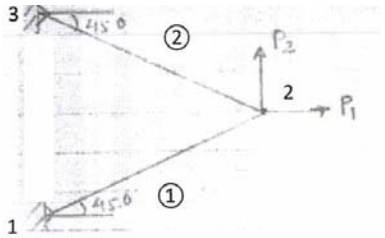
i) Determine the nodal displacement

ii) Determine the stress in each material

iii) Determine the reaction forces



b) Determine the nodal displacements and stresses in each element in the following truss problem. **[10]**



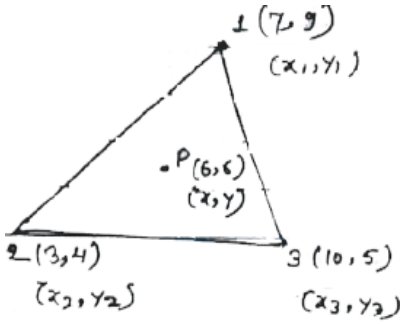
Data

P1 = 5000N P2 = 7000N

L = 500 mm A = 50 mm^2

E = 200 kN/mm^2

Q3) a) A constant strain triangular element is defined by three nodes as shown in figure. Evaluate the shape functions N_1, N_2 and N_3 at the interior point P(6,6). **[6]**

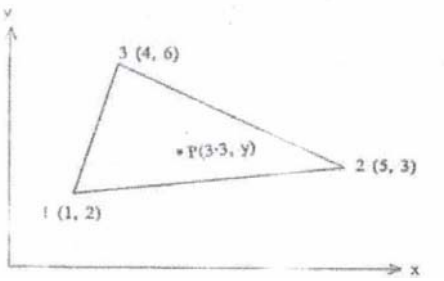


b) How to verify and validate results in CAF post-processing? **[6]**

c) What are the steps for interpretation of results during postprocessing in Finite element analysis? **[5]**

OR

Q4) a) The nodal coordinate of triangular element are shown in the figure. At the interior point 'P' the x-coordinate is 3.3. Nl = 0.3. Determine N2, N3 and the y-coordinate of point P. **[6]**



b) What are the modifications are suggested based on the interpretation of results during postprocessing in CEA? **[6]**

c) Explain the tricks for postprocessing in computer aided Engineering. **[5]**

Q5) a) Explain difference between static analysis and dynamic analysis. **[6]**

b) Explain free and forced vibration. **[6]**

c) Explain modal analysis, harmonic analysis and transient analysis to study the dynamic properties of the structures. **[6]**

OR

Q6) a) Give comparison of Linear and Nonlinear Analysis CAE Problems with respect to its characteristics features – load – displacement relation, stress - strain relation, scalability, stress - strain measures, superposition, reversibility, solution scheme, computational time and user interaction with software. **[6]**

b) What are the different kinds of geometric non-linearities in CAE Project? Explain with figures. **[6]**

c) Write a general procedure for Non-linear static analysis project. **[6]**

Q7) a) What is durability, reliability and fatigue? Explain S-N Curve with low cycle, high cycle and infinite fatigue life. **[6]**

b) Write typical application of computation fluid dynamics in various industries for the following domains: **[6]**

i) Aerospace Engineering

ii) Automobile Engineering

iii) Civil Engineering

c) Explain use of FEA to optimize plastic injection mold materials. **[6]**

OR

Q8) a) What is Computational Fluid Dynamics (CFD)? Explain the three dimension of fluid dynamics. **[6]**

b) Discuss the concept of FEA for structural dynamics and acoustics used in NVH analysis. **[6]**

c) Enlist the CAE software used for different application of CAE. Write at least 16 software with their applications. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3903

[Total No. of Pages : 3

[6262]-168
T.E. (Mechanical)
DESIGN OF TRANSMISSION SYSTEMS
(2019 Pattern) (Semester - II) (302051)

Time : 3 Hours] ***[Max. Marks : 70***

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) Classify the bearings as per direction of force and type of friction? **[4]**

b) State the assumptions and write the Reynold's equation for 2-D flow and explain the significance of each term in it? **[6]**

c) A ball bearing is subjected to F_r = 3 kN, N = 720 rpm having expected life 10000 hrs. at 95% reliability. Calculate the dynamic load carrying capacity of the bearing at 90% of reliability. Also find System reliability for such 4 bearings. **[7]**

OR

Q2) a) A single row deep groove ball bearing subjected to following work cycle. If L_{10h} = 8000 hrs. Select bearing from the following table. What is average speed of bearing? **[6]**

F_r (kN)	F_a (kN)	X	Y	Race Rotating	C_s	Speed rpm	Fraction of cycle
1.5	0.25	1.0	0	Inner	1.2	400	1/10
1.0	0.75	0.56	2	outer	1.8	500	1/4
5.0	1.1	0.56	2	Inner	1.5	600	1/2
1.0	--	1.0	0	outer	2.0	800	Remaining

C (kN)	29.6	46.2	74.1	99.5
Bearing No	6011	6211	6311	6411

P.T.O.

b) Derive the Petroff's equation for hydrodynamic bearing. Also state its limitation? **[7]**

c) Two identical ball bearings A and B are used in two different applications. The load on the bearing B is half of that bearing A. The remaining conditions are identical. What will be the expected life of bearing B as compared to bearing A. **[4]**

Q3) a) What are the characteristics for material used for brake lining? Name the materials used? **[4]**

b) Explain Disc brakes and mention advantages and disadvantages of disc brake. **[6]**

c) Draw a figure for is Internal expanding shoe brake and write the assumptions on which its analysis depends? State the observations made when the vehicle will be travelling in 'reverse' for anti-clockwise rotation of brake drum? **[7]**

OR

Q4) a) What are the two theories applied to friction plates? Why clutches are usually designed on the basis of uniform wear? **[4]**

b) What are the desirable properties for good friction material? Name the friction materials used in clutches. **[6]**

c) Draw neat sketch diagram of Cone clutch and explain construction and working. State the advantages, disadvantages and practical applications of Cone clutch? **[7]**

Q5) a) What is structural formula? Write any three structural formulae for twelve speed gear box. **[6]**

b) Differentiate between arithmetic, geometric and Harmonic progressions in case of design of gear box. **[6]**

c) Draw the structure diagrams and gear box arrangements for the following equations, **[6]**

i) 2 (1) 3 (2); ii) 2 (3) 3 (1); iii) 3 (1) 2 (3); d) 3(2) 2 (1)

OR

Q6) a) Explain the significance of geometric progression ratio. **[6]**

b) Explain the term: Transmission range with reference to machine tool gear box. **[6]**

c) Draw speed diagram and layout for a six speed gear box having the following structural formula: i) 2 (3) 3 (1); ii) 2 (1) 3 (2). The output speeds are 160 rpm minimum and 1000 rpm maximum. The motor shaft speed is 1440 rpm. **[6]**

Q7) a) Define Degree of Hybridization. Explain in details Micro Hybrid and Mild Hybrid. **[6]**

b) Explain how the performance analysis carried in Series and parallel of Hybrid Electric Vehicles? **[6]**

c) Explain the Sizing performance for Hybrid Electric Vehicle Components? Explain the optimal sizing in HEV components? **[6]**

OR

Q8) a) Explain Hybrid Electric Vehicle with the help of block diagram? What are the advantages and disadvantages of Hybrid Electric Vehicles? **[6]**

b) Explain The basic modes of operations used Hybrid Electric Vehicle? **[6]**

c) Explain how the performance analysis carried in Series and parallel of Hybrid Electric Vehicles? **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. : ____

PB3904

[Total No. of Pages :3

[6262]-169

T.E. (Mechanical Engineering)

COMPOSITE MATERIALS

(2019 Pattern) (Semester- II) (Elective-II) (302052A)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain the Squeeze casting process of fabrication of a metal matrix composite in detail. **[6]**

b) Give the advantages and drawbacks of metal matrix composites over polymer matrix composites. **[6]**

c) Describe liquid infiltration process with a neat sketch. **[6]**

OR

Q2) a) Explain interface and wettability of metal matrix composites. **[6]**

b) List three kinds of metal matrix composites and write typical reinforcements used in particle type metal matrix composites. **[6]**

c) Describe with neat sketch the In-situ process of fabrication of a metal matrix composite with its advantages. **[6]**

Q3) a) A glass/epoxy lamina consists of 70% fiber volume fraction. Determine, **[6]**

i) Density of lamina

ii) Mass fractions of the glass and epoxy

iii) The volume of composite lamina if the mass of the lamina is 4 kg.

iv) Volume and mass of glass and epoxy

Take, Density of fiber(ρ_f) is 2500 kg/(m^3,) and density of matrix(ρ_m) is 1200 kg/m^3.

P.T.O.

b) Find the major and minor Poisson's ratio of a glass/epoxy lamina with 70% fiber volume fraction. Take Poisson's ratio of fiber(ϑ_f) is 0.2, Poisson's ratio of matrix(ϑ_m) is 0.3, Young's modulus of fiber(E_f) is 85 GPa and Young's modulus of matrix(E_m) is 3.4 GPa. **[6]**

c) Explain the fatigue property of composite materials. **[5]**

OR

Q4) a) What is a void fraction? What are the properties it governs? **[6]**

b) Derive the rule of mixture equation. **[6]**

c) What do you mean by micro-mechanics and macro-mechanics of lamina? **[5]**

Q5) a) Describe with the help of a neat sketch the fatigue testing of polymer matrix composite. **[6]**

b) Discuss common mechanical tests for composites mentioning the purpose of each test. **[6]**

c) Explain any two non-destructive testing for polymer matrix composites. **[6]**

OR

Q6) a) List the various international and national test standards developed to test mechanical properties of a lamina. **[6]**

b) What is R-curve in fracture toughness test? Interpret its significance in double cantilever beam specimen with the help of load-displacement diagram. **[6]**

c) Sketch the schematic representation of V-Notched beam shear test composite and describe the test with regard to ASTM D5379. **[6]**

Q7) a) State any three advatages and three disadvantages of using glass-Epoxy Composite in Aircraft. **[6]**

b) Write any three reasons why Composites are preferred in sports equipment which composites will be preferred for helmets used in hockey? **[6]**

c) Write any three advantages of Composite material over wood in building a boat? What will be preferred as a resin for building boat? **[5]**

OR

Q8) a) Sate any six properties of Composites that makes it a better material than steel for building application. **[6]**

b) Name the composite that can make the automobile lightweight? State any four advantages of the vehicle being light weight? **[6]**

c) Why is glass/carbon fiber preferred in blade aerofoil of a Light Combat Aircraft? State the significance of Orientation of fiber in the blade aerofoil of a Light Combat Aircraft? **[5]**

Total No. of Questions : 8]

SEAT No. : ____

PB3905

[Total No. of Pages :2

[6262]-170

T.E. (Mechanical)

SURFACE ENGINEERING

(2019 Pattern) (Semester- II) (Elective-II) (302052B)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) What are the fundamental principles governing the process of diffusion in materials? **[6]**

b) Compare and contrast induction hardening, flame hardening, and laser hardening. **[6]**

c) Explain the carburizing process and how it enhances the properties of steel surfaces? **[6]**

OR

Q2) a) Contrast the processes of nitriding and carbonitriding. **[6]**

b) What information do ASTM standards G105 and G95 provide in the context of surface hardening? **[6]**

c) Provide examples fo specific industies where surface hardening treatments are commonly applied and the corresponding steel selections. **[6]**

Q3) a) With neat sketch explain Ion beam surface treatment, and how does it alter the properties of a material? **[6]**

b) What are the environmental considerations when choosing a coating for corrosion resistance? **[6]**

c) What is sol-gel coating technology, and in what industrial applications is it commonly used? **[5]**

OR

P.T.O.

Q4) a) What role do nitrides, silicides, and carbides play in compound coatings for corrosion protection? **[6]**

b) Explain the key advantages and limitations of ion beam surface treatment compared to other modification techniques? **[6]**

c) What is electroless coating, and how does it differ from electroplating in terms of application and mechanism? **[5]**

Q5) a) Explore the hot-dipping process for metal coatings and its applications. **[6]**

b) Discuss the advantages and limitations of the electrodeposition process? **[6]**

c) Highlight need of coatings for aerospace and aircrafts. List applications of it? **[6]**

OR

Q6) a) Describe the flame spraying process for metal coatings and its applications. **[6]**

b) What is cladding, and how does it differ from other metal coating processes? **[6]**

c) How do coatings contribute to the protection and longevity of different surfaces? **[6]**

Q7) a) Explain how atomic force microscopy contributes to the measurement and analysis of surface roughness. **[6]**

b) Define Over Spary, Flooding, wrinkling, Bubbling, Pin-holing, Blushing. **[6]**

c) Define crawling and cratering in the context of coating defects and discuss potential causes? **[5]**

OR

Q8) a) How is surface roughness quantified, and why is it an essential parameter in coating applications? **[6]**

b) What is Blushing, foaming? How this defect arises, mention steps to remove these defects? **[6]**

c) How does residual stress affect the stability and performance of coated materials? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3906

[Total No. of Pages : 3

[6262]-171

T.E. (Mechanical Sandwich)

FUNDAMENTALS OF COMPUTER-AIDED ENGINEERING

(2019 Pattern) (Semester - I) (302061)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

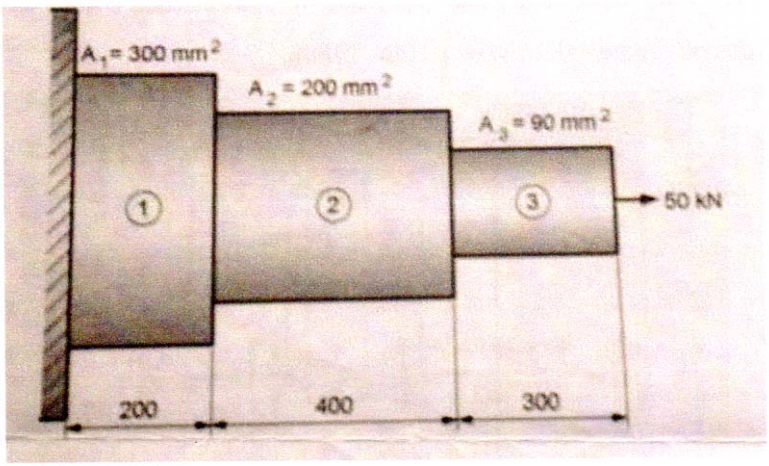
1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 & Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data, if required.***
5) ***Use of a non-programmable scientific calculator is allowed.***

Q1) a) An axial stepped bar shown in below figure is subjected to an axial pull of 50 kN. If the material of the bar is uniform and has a modulus of elasticity as 200 GPa, determine: **[12]**

i) Nodal displacements

ii) Stress in each element

iii) Reaction force at the support.



b) Explain temperature effect in 1 -dimensional element. Deduce the equation for thermal stress in two-node beam element **[5]**

OR

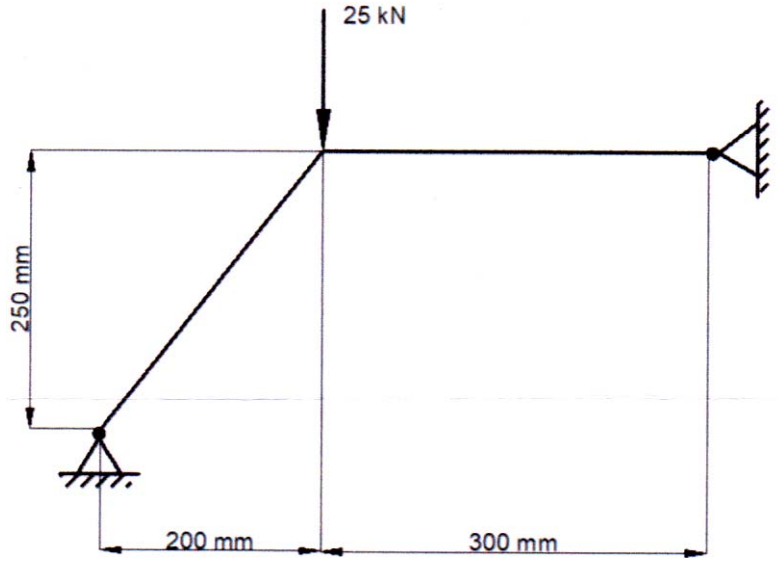
P.T.O

Q2) a) Truss element is shown in below figure. If the cross-sectional area of both the elements is 200 mm^2 and E = 2×10^5 N/mm^2 determine: **[12]**

i) Nodal displacements

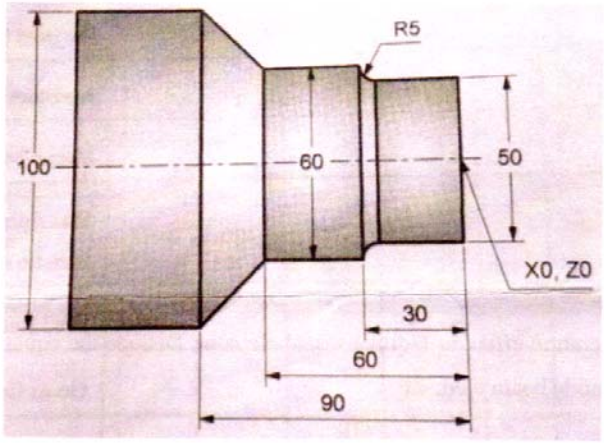
ii) Stress in each element

iii) Reaction force at the support.



b) Explain the Galerkin approach of weighted residuals used in CAE. **[5]**

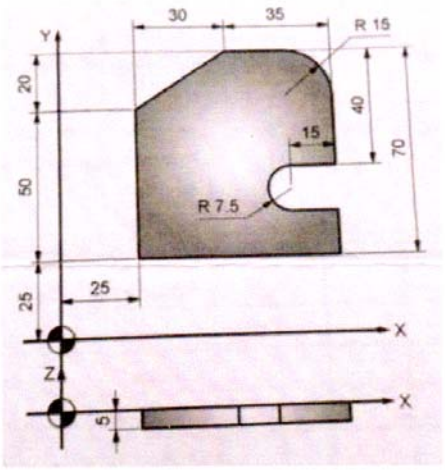
Q3) a) Develop a part program using G and M code to turn mild steel job as shown in the below figure. Assume suitable cutting parameters and various canned cycles to turn the final shape from the raw material of size ϕ100×80mm. **[12]**



b) Compare NC,CNC and DNC machine tools. (minimum five points of comparison are expected). **[5]**

OR

Q4) a) Write a NC part using G and M code to cut a slot for the component shown in the below figure by using an end mill of 10mm. Assume suitable data for machining parameters. **[12]**



b) Explain the linear, circular CW and circular CCW interpolation with G code word address format. **[5]**

Q5) a) Define Robots according to Robotics Industry Association. Explain various generations of the Robots with suitable examples. **[9]**

b) List various actuators used for the robot. Explain the stepper motor in detail. **[9]**

OR

Q6) a) Explain various elements of a flexible manufacturing system with the help of a neat block diagram. **[9]**

b) What is Computer Integrated Manufacturing (CIM)? Explain four islands of CIM. **[9]**

Q7) a) How the CAE results are validated and checked for accuracy? Explain in brief. **[7]**

b) Explain the integral form of the conservation laws. **[7]**

c) Explain in brief, how the durability is checked using CAE softwares? **[4]**

OR

Q8) a) What are the common mistakes made by CAE Engineers? **[7]**

b) Explain various steps involved in the crash analysis. **[7]**

c) Write a short note on CAE Reports **[4]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3907

[Total No. of Pages : 2

[6262]-172

T.E. (Mechanical - Sandwich)

PROCESS PLANNING & TOOL SELECTION (Self-Study-I)

(2019 Pattern) (Semester - II) (302066)

Time : 2½ Hours] ***[Max. Marks : 70***

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) ***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.***

Q1) a) Classify various manufacturing processes, considering their underlying principles, technological applications and strategic implications within the broader industrial context. **[8]**

b) What do you mean by major operations, critical operations, qualifying and re-qualifying operations and how to identify them? **[9]**

OR

Q2) a) Evaluate the multifaceted factors contributing to work-piece variations and elucidate their intricate interplay within manufacturing processes.**[8]**

b) How locators are arranged in 3-2-1 pattern? Provide a pertinent example to illustrate the application of this configuration for a cube and a cylinder. **[9]**

Q3) a) Categorize a diverse array of cutting tools. Discriminate between these tools based on material, geometric configurations, and specialized applications, demonstrating a comprehensive understanding of their classifications within the realm of machining. **[9]**

b) What is the material of drill bush? Explain any two types of drill bushes. **[9]**

OR

P.T.O.

Q4) a) Explain the steps involved in machine selection method with a neat flow chart. **[9]**

b) Discuss various types of locating devices with neat sketch. Analyze the material, distinctive features and applications of each type. **[9]**

Q5) a) What are the process parameters for Drilling operation? How do you select Process parameters? 'What is its impact on drilling efficiency and precision? **[8]**

b) How to estimate machining cost and labor cost? **[9]**

OR

Q6) a) What are the different variable costs and fixed costs involved in producing a product. **[8]**

b) What are the process variables considered in calculation of machining time? How do you calculate machining time for lathe operations? How do you estimate cost per piece for mass production? **[9]**

Q7) a) What information does the process picture provide? Discuss various steps involved in manual process planning. **[9]**

b) Draw a format for operation route sheet. Analyze and synthesize the key elements within this format. **[9]**

OR

Q8) a) Explain the benefits of Computer Aided Process Planning (CAPP). Evaluate the multifaceted impact of CAPP on manufacturing efficiency, precision, and adaptability. **[9]**

b) Draw following process symbols used while making process pictures? **[9]**

i) View of locator showing point of contact with workpiece.

ii) Alternate locator

iii) View of a locator that is hidden

iv) View of a locator in front of work-piece with contact point hidden

v) Material added or removed

vi) Clamp and locator

vii) Fixed support

viii) Adjustable support

ix) Clamp all over

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. :

PB-3908

[Total No. of Pages : 2

[6262]-173
T.E. (Mechanical Sandwich)
ADVANCED MATERIALS AND MANUFACTURING
(Self Study - II)
(2019 Pattern) (Semester - II) (302067)

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) ***Use of electronic pocket calculator is allowed.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) With neat sketch explain stir casting of MMC along with advantages & disadvantages. **[9]**

b) Briefly explain spray process of MMC. (Construction & working). State the advantages & limitations. **[9]**

OR

Q2) a) Classify the metal matrix composites each with suitable examples and properties. **[9]**

b) Write a short note on Rule of mixtures in regards with composites. Elaborate with suitable examples. **[9]**

Q3) a) With neat sketch explain high energy rate forming process along with its advantages and limitations. **[9]**

b) Elaborate with the applications, advantages and limitations laser beam foming process. **[8]**

OR

Q4) a) Explain the process of isostatic pressing. Discriminate between hot and cold isostatic pressing. **[9]**

b) Elaborate the process with the applications, advantages and limitations Magnetic pulse forming process. **[8]**

P.T.O

Q5) a) With neat sketch explain working of atomic hydrogen welding process, advantages and limitations. **[10]**

b) Differentiate between electron beam and laser beam welding. **[8]**

OR

Q6) a) State the principle of friction stir welding process and explain the construction and working. **[10]**

b) Write a short note on welding automation in aerospace, nuclear and transport vehicle area with examples. **[8]**

Q7) a) Briefly explain the principle and working of ultrasonic machining process. State it's advantages and limitations. **[9]**

b) State and explain the advantages of non-conventional machining processes over conventional machining processes. **[8]**

OR

Q8) a) Comment on Material removal rate of various non-conventional machining processes. Explain the influence of tool material, geometry, di-electric fluid and process parameters on machining characteristics. **[9]**

b) Explain the construction and working of Electrochemical machining process. **[8]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB-3909

[Total No. of Pages : 4

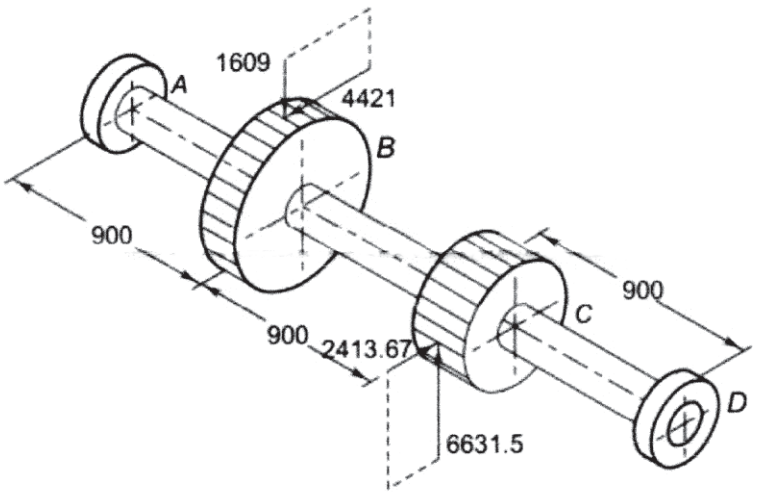
[6262]-174
T.E. (Automation and Robotics)
DESIGN OF ROBOT ELEMENTS
(2019 Pattern) (Semester - I) (302521)

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 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) The layout of an intermediate shaft of a gear box supporting two spur gears B and C is shown in Figure. The shaft is mounted on two bearings A and D. The pitch circle diameters of gears B and C are 900 and 600 mm respectively. The material of the shaft is steel FeE 580 (S_{ut} = 770 and S_{yt} = 580 N/mm^2). The factors k_b and k_t of ASME code are 1.5 and 2.0 respectively. Determine the shaft diameter using the ASME code. Assume that the gears are connected to the shaft by means of keys. **[13]**



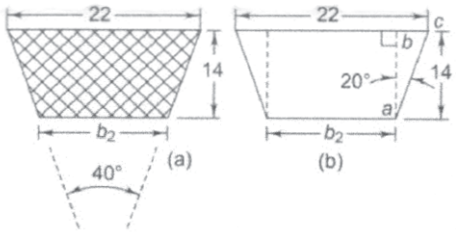
b) Explain design of shaft design using ASME code. **[5]**

OR

P.T.O.

Q2) a) The following data is given for a V-belt drive connecting a 20 kW motor to a compressor. The centre distance between pulleys is 1 m and the dimensions of the cross-section of the belt are given in Figure. The density of the composite belt is 0.97 g/cc and the allowable tension per belt is 850 N. How many belts are required for this application? **[11]**

	Motor-pulley	*Compressor-pulley*
Pitch diameter (mm)	*300*	*900*
Speed (rpm)	*1440*	*480*
Coefficient of friction	*0.2*	*0.2*



b) Derive equations of V-belt for analysis of tensions in the belt. **[7]**

Q3) a) Write a note on remote compliance center design with neat labelled diagram. **[8]**

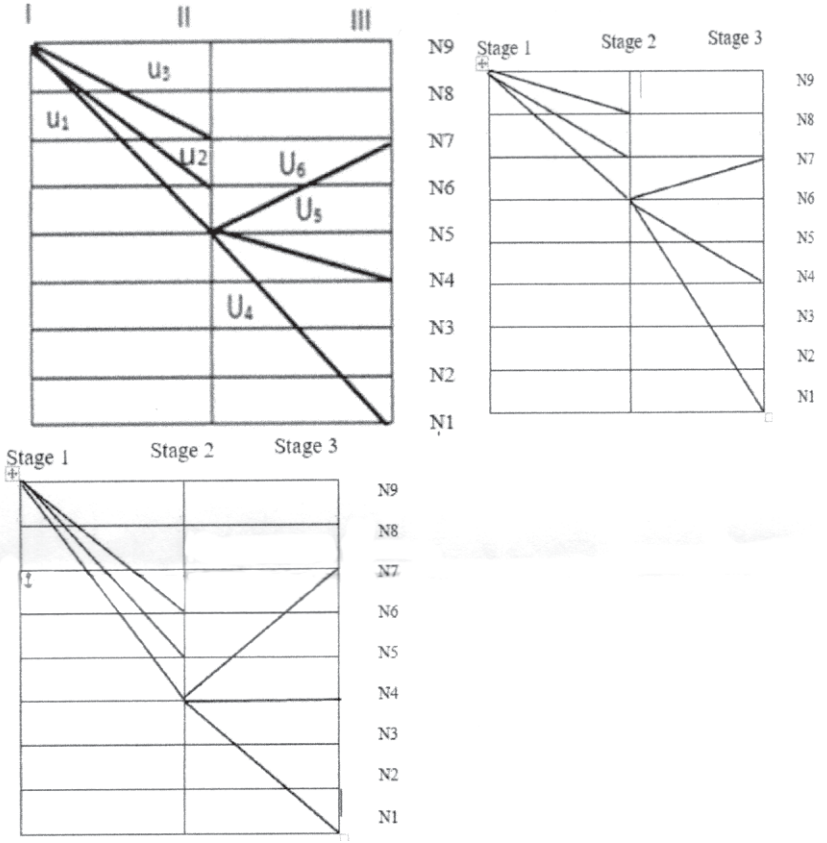
b) Write basic design process of gripper. **[9]**

OR

Q4) a) Write a note on using tools as end effectors. **[9]**

b) What do you mean by payload in the design of robots. Explain payload force analysis with neat diagram and mathematical equations. **[8]**

Q5) a) A 3 × 3 Gear box is transmitting a power of 10 KW. Choose the best ray diagram based on minimum summation of shaft diameters made of same material with permissible shear stress of 36 N/mm^2. Use GP ratio of 1.26 and Lowest speed N_1 = 100 RPM. **[10]**



b) Write a note on general recommendation for developing the gearing diagram. Explain with suitable example. **[8]**

OR

Q6) Design a nine-speed gear box having N_{min} 100 rpm and N_{max} = 630 rpm. Assume motor speed 1400 rpm. The design should include structural diagram, ray diagram, speed chart, gearing diagram and number of teeth of the gear. (Gearing diagram is not essential) **[18]**

Q7) a) In a particular application, the radial load acting on a ball bearing is 5 kN and the expected life for 90% of the bearings is 8000 h. Calculate the dynamic load carrying capacity of the bearing, when the shaft rotates at 1450 rpm. **[5]**

b) Explain in details equivalent bearing load in rolling contact bearing. **[5]**

c) A single-row deep groove ball bearing is subjected to a 30 second work cycle that consists of the following two parts: The static and dynamic load capacities of the ball bearing are 50 and 68 kN respectively. Calculate the expected life of the bearing in hours. **[7]**

	Part I	*Part II*
duration (s)	*10*	*20*
radial load (kN)	*45*	*15*
axial load (kN)	*12.5*	*6.25*
speed (rpm)	*720*	*1440*

Refer table for values of X and Y factors as follows :

$\left(\frac{F_a}{C_0}\right)$	$\left(\frac{F_a}{F_r}\right) \le e$		$\left(\frac{F_a}{F_r}\right) > e$		e
	X	Y	X	Y	
0.025	1	0	0.56	2.0	0.22
0.040	1	0	0.56	1.8	0.24
0.070	1	0	0.56	1.6	0.27
0.130	1	0	0.56	1.4	0.31
0.250	1	0	0.56	1.2	0.37
0.500	1	0	0.56	1.0	0.44

OR

Q8) a) Derive Petroff's Equation for sliding contact bearing. **[7]**

b) The following data is given for a 360° hydrodynamic bearing: radial load = 3.2 kN journal speed = 1490 rpm journal diameter = 50 mm bearing length = 50 mm radial clearance = 0.05 mm viscosity of lubricant = 25 cP Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate (i) coefficient of friction (ii) power lost in friction, (iii) minimum oil film thickness (iv) flow requirement in litres/min; and (v) temperature rise. **[10]**

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Total No. of Questions : 8]

SEAT No. :

PB3910

[Total No. of Pages : 3

[6262]-175

T.E.(Automation and Robotics Engineering)

ROBOT KINEMATICS AND DYNAMICS

(2019 Pattern)(Semester - I)(302522)

Time : 2½Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer four question from the following(Q1or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8)***
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 Sutiable/Standard data if necessary.***

Q1) a) Explain the concept of tool configuration of five axis articulated robot in details. **[9]**

b) What is the fundamental difference between forward kinematics and inverse kinematics in the context of robotic motion? **[9]**

OR

Q2) a) Explain the concept for inverse kinematics and why it is essential for controlling the end- effector of a robot in various applicastions? **[9]**

b) Derive the equation for three link robot (3DOF) considering inverse kinematics with geometrical method. **[9]**

Q3) a) What are the benefits of using the Cartesian space approach in scenarios where task-related positions and orientations are critical? **[9]**

b) What is the joint space technique in trajectory planning, and how does it differ from other approaches like Cartesian space? **[8]**

OR

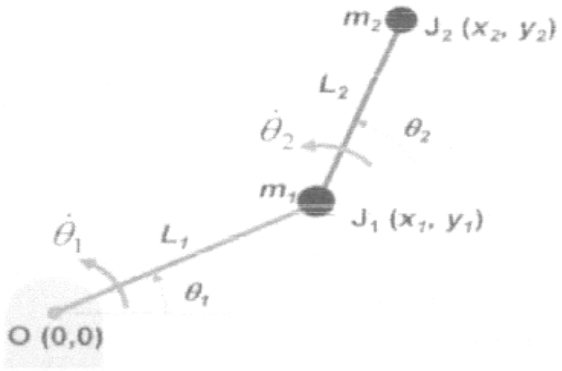
P.T.O.

Q4) a) What is a "pick and place " operation in robotics, and how is it typically used in various industries and applications? **[9]**

b) What is workspace analysis in the context of robotics, and why is it important for designing and operating robots? **[8]**

Q5) a) Find the equation of motion for following configuration by using lagrangian formulation method. **[9]**

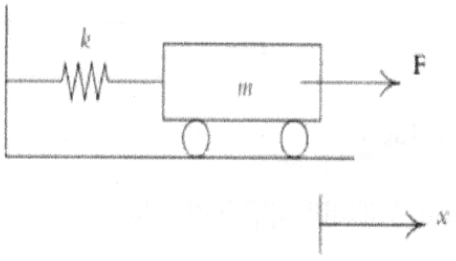
A planar 2R serial manipulator



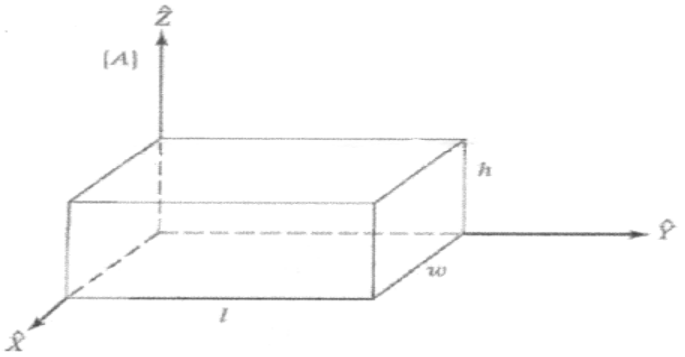
b) What are manipulator dynamics in the context of robotics, and why is understanding them important for robot control and performance? **[9]**

OR

Q6) a) Derive the force-acceleration relationship for the 1-DOF system shown in Figure using both the Lagrangian mechanics as well as the Newtonian mechanics. Assume the wheels have negligible inertia. **[9]**



b) Find the intertia tensor for the rectangular body of uniform density p with respect to the coordinate system shown in Figure **[9]**



Q7) a) What are the key considerations when selecting motors and actuators for a joint controller, and how do these choices impact the overall system's performance? **[9]**

b) What are the key components and subsystems in the hardware architecture of a robotic system, and how do they work together to enable robot functionality? **[8]**

OR

Q8) a) What hardware components are essential for a joint controller system in industrial automation? **[9]**

b) How do you define computational speed? What are the primary factors that influence the computational speed of a computer or processing system? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3911

[Total No. of Pages : 3

[6262]-176

T.E. (Automation and Robotics)

COMPUTER AIDED ENGINEERING AND MANUFACTURING

(2019 Pattern) (Semester - I) (302523)

Time : 2½ Hours] ***[Max. Marks : 70***

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) Evaluate the stiffness matrix for the CST element shown in fig. 1a. Coordinates are in mm. Assume Plain stress conditions. Take E = 200 GPa, γ = 0.3, Thickness = 1 cm **[15]**

Nodal displacements are given as:

u_1 = 1 mm; u_2 = 0.5 mm; u_3 = 2 mm; v_1 = 1 mm; v_2 = 0; v_3 = 1mm

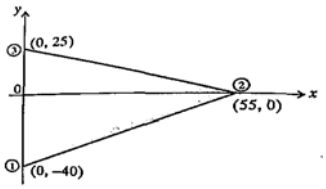


fig. 1a

b) Distinguish between plain stress and plain strain condition. **[3]**

OR

Q2) a) For the triangular element fig. 2a defined by nodes 1 : (5, 5), 2 : (20, 6), 3 : (6, 30), obtain the strain displacement relation matrix B and determine the strains ε_x, ε_y, γ_{xy}. **[15]**

The displacements at the nodes are:

U_1 = 0.2, U_2 = 0.4, U_3 = 0.3, and V_1 = –0.1, V_2 = –0.5, V_3 = –0.3.

Assume the units to displacements and the coordinates are the same, also determine the displacement at point P(12, 10).

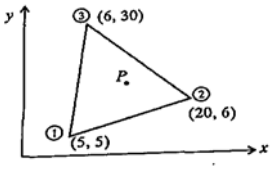


fig. 2a

b) Explain Post Processing techniques in FEA. **[3]**

P.T.O

Q3) a) Write a manual part program for the component shown in fig. 3a. Assume the raw product as cast iron and the machining is to achieve the various dimensions. **[12]**

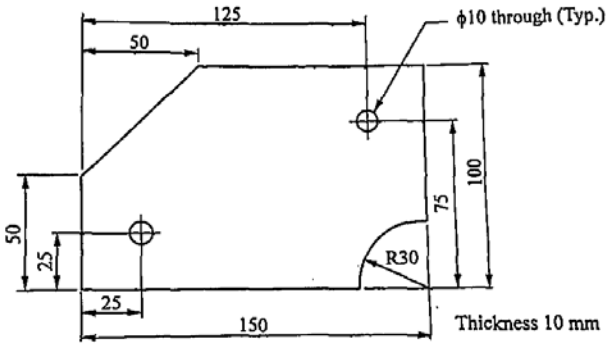


fig. 3a

b) Explain different CNC machine control systems. **[5]**

OR

Q4) a) Write a manual part program to machine the contour for the component shown in fig. 4a. and drill a hole. The thickness of component is 18mm. Assume suitable data. **[12]**

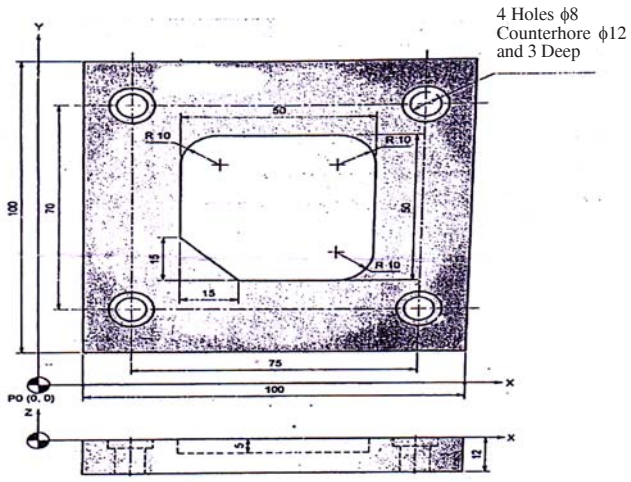


fig. 4a

b) Write short notes on Industry 4.0. **[5]**

Q5) a) What are the types of manufacturing layout in cellular manufacturing and explain them briefly. **[10]**

b) Explain the five phases of six sigma in details. **[8]**

OR

Q6) a) Briefly explain the different types of lean manufacturing tool with their significance in industry. **[10]**

b) What is meant by Total Productive Maintenance? Where is it implemented? **[8]**

Q7) a) A T-slot is to be cut in C.I. slab as shown in fig.7a. Estimate the machining time. Take cutting speed 25 m/min, feed is 0.25 mm/rev. Diameter of cutter for channel milling is 80 mm. Assume suitable data if required with justification. **[10]**

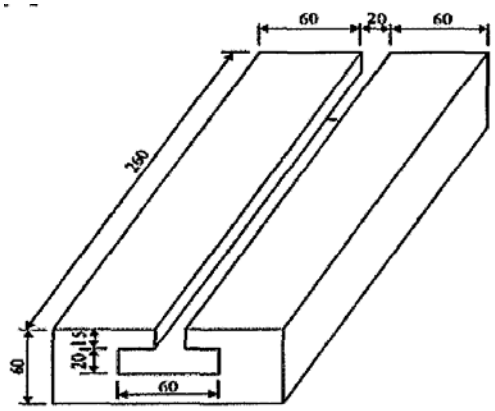


fig. 7a

b) Give a procedure for planning for the manufacturing of a component in machine shop. **[7]**

OR

Q8) a) The following information is obtained from ABC co. Ltd. in a certain year: **[10]**

Sales = Rs 2,00,000/-

Variable cost = Rs 1,20,000/-

Fixed cost = Rs 60,000/-

i) Find
   a) P/V ratio
   b) Breakeven point
   c) Margin of safety at this level.

ii) Calculate the effect of
   a) 20% increase in selling price
   b) 10% decrease in selling price
   c) 5% decrease in sales volume

b) What are the factors influencing process selection and write down the process selection parameters. **[7]**

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Total No. of Questions : 8]

SEAT No. :

PB-3912

[Total No. of Pages : 2

[6262]-177

T.E. (Automation and Robotics)

SIGNAL PROCESSING AND CONDITIONING

(2019 Pattern) (Semester - I) (302524)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer four questions from the following.***
2) ***Neat diagrams must be drawn 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) With the help of neat diagrams explain interfacing of any one Sensor to Data Acquisition system. **[8]**

b) Explain signal communication and the types of data transmission. **[9]**

OR

Q2) a) Draw a suitable block diagram and explain the working of a DAQ system with its components. **[8]**

b) A 4-bit SAR type ADC has reference voltage of 16 volts. If the ADC is supplied with an analog input of 11.2 volts, determine the equivalent digital output with the help of neat circuit diagram. Also draw a graph of output waveform. **[9]**

Q3) a) Draw and explain Ladder Logic programming for any three logic gates. **[9]**

b) Write at least 9 aspects to be considered while selection of a PLC. **[9]**

OR

Q4) a) Draw and explain Architecture of PLC. **[9]**

b) Draw and explain a PLC ladder diagram for control of two pneumatic pistons. **[9]**

P.T.O.

Q5) a) Sketch pole- zero plot of the system. **[8]**

$$G(s) = \frac{S+1}{S^2(S^2+5S+6)}$$

b) Write a short note on Bode Plot, Gain margin and Phase margin with the help of neat diagram. **[9]**

OR

Q6) a) Using Suitable diagram explain Unit step response analysis via transient response specifications. **[8]**

b) A unit step response test conducted on a second order system yielded peak overshoot Mp = 0.12 and peak time tp 0.2s. Obtain the corresponding frequency response indices (Mr, ωr, ωb) for the system. **[9]**

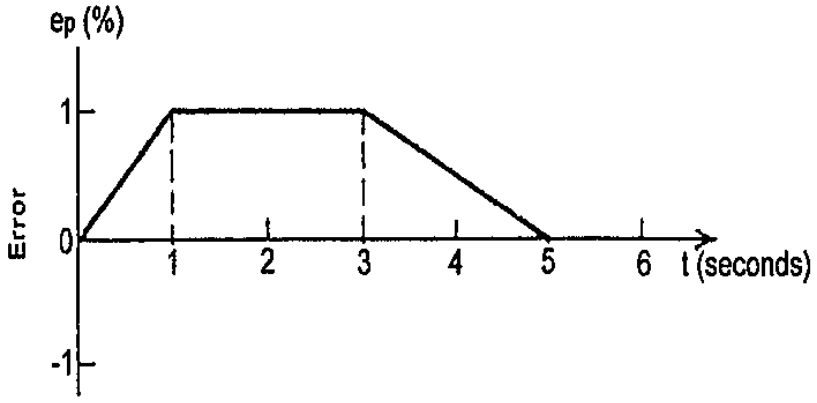
Q7) a) Explain Manual tuning of PID control with variation in different values of control parameters and plot the respective graphs. **[9]**

b) Explain Proportional (P), Integral (I) and Derivative (D) control actions. **[9]**

OR

Q8) a) Draw and explain PD and PID control systems in parallel form. **[9]**

b) Following figure shows an error time graph, sketch the PID controller (parallel form) output w.r.t. time. Assume Kp = 10, K_I = 2, K_D = 0.5 and P_0 = 0 i.e. the controller output is zero when the error is zero. **[9]**



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Total No. of Questions : 8]

SEAT No. :

PB-3913

[Total No. of Pages : 3

[6262]-179
T.E. (Automation and Robotics)
OPTIMIZATION TECHNIQUES
(2019 Pattern) (Semester - I) (302525B) (Elective - I)

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 side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Define simulation. Explain Monte Carlo Techniques of Simulation. **[5]**

b) The owner of a readymade garment store sells two types of T shirts-Zee shirts and button down shirts. He makes a profit of Rs. 3 and Rs.12 per shirt on Zee shirt and button own shirt resp. He has two tailors A and B, at his disposal for stitching the shirts. Tailor A and B can devote at the most 7 hrs and 15 hrs per day, resp. Both these shirts are to be stitched by both the tailors. Tailor A & B spend 2 hrs and 5 hrs resp. in stitching one Zee shirt and 4 hrs and 3 hrs resp. in stitching button down shirt. How many shirts of both the types should be stitched in order to maximize the daily profit? **[12]**

i) Formulate and solve the problem as an LP.

ii) If the optimal solution is not integer valued use Gomory's Technique to derive the optimal integer solution.

OR

Q2) a) Explain the classification of Integer Programming Problems **[5]**

b) Solve the following all integer programming problems using the branch and bound method. **[12]**

Maximize Z = 2 *x* 1 + 3 *x* 2

Subject to constraints 6 *x* 1 + 5 *x* 2 $\leq$ 25

*x*1 + 3 *x* 2 $\leq$ 0

*x*l, *x*2 $\geq$ 0 and integers.

P.T.O

Q3) a) Explain the concept of Genetic Algorithm. State its applications. **[8]**

b) Alpha company produces two kinds of fancy products, pen holder and paper tray. Production of either of them requires 1 hr production capacity in the plant. The plant has a maximum production capacity of 12 hrs per week. The maximum numbers of pen holders and paper trays that can be sold are 7 and 10 respectively. The gross margin from the sales of pen holder is Rs 90 and Rs 45 for a paper tray. The overtime hours should not exceed 3 hrs per week if required. The plant manager has set the following goals in order of importance: **[10]**

i) P1 : He wants to avoid any under-utilization of production capacity

ii) P2 : He wants to limit the overtime hours to 3 hrs

iii) P3 : He wants to sell as many pen holders and paper trays as possible. Since the gross margin from the sale of a pen holder is set at twice the amount of the profit from a paper tray, the manager has twice as much desire to achieve the sales goal for pen holders as for paper trays.

iv) P4 : The manager wishes to minimize the overtime operation of the plant as much as possible

OR

Q4) a) Write a short note on Artificial Neural Network. **[8]**

b) In 18th century when transportation systems were not developed a family wanted to travel from their home to reach a friend's house in other part of the country. But they has a choice of various routes and haltages in between from their home to final destination. Cost of travel from each point to the other points on route, based on relevant factors such as distance, difficulties, mode of transportation etc are given: **[10]**

	2	3	4
1	7	5	4

	5	6	7
2	8	3	9
3	10	7	6
4	4	5	6

	8	9
5	6	8
6	7	4
7	3	6

	10
8	5
9	4

Q5) a) What are the different steps involved in SAW Method? **[8]**

b) What is the concept of analytical network process? **[5]**

c) Discuss the Weighted Product method. **[4]**

OR

Q6) a) Explain Analytic Hierarchy Process (AHP)? **[6]**

b) What do you mean by TOPSIS and PROMETHEE? **[8]**

c) Define the term MCDM. Also name its methods. **[3]**

Q7) a) List and elaborate the modern optimization techniques? **[6]**

b) State any two optimization techniques and explain its applications. **[6]**

c) How the Fuzzy Optimization technique is applied on any engineering system? **[6]**

OR

Q8) a) Explain the concept of Ant Colony Optimization. **[6]**

b) State the importance of modern optimization Techniques. **[6]**

c) Explain the mutation in Genetic Algorithm. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3914

[Total No. of Pages : 2

[6262]-180

T.E. (Automation and Robotics)

SENSORS AND VISION SYSTEMS IN ROBOTS

(2019 Pattern) (Semester - II) (302527)

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 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) Explain Vision and Tracking: following the road concept with neat diagram. **[8]**

b) Draw and Explain components of a general-purpose image processing system. **[9]**

OR

Q2) a) Explain EM Algorithm in detail. **[8]**

b) Draw and Explain Stereo Imaging Model and calculate equation of disparity. **[9]**

Q3) a) Explain 3 types of low pass filters used for image smoothing in frequency domain. **[9]**

b) Explain Mechanics of Linear Spatial filtering with neat diagram of kernel. **[9]**

OR

Q4) a) Explain smoothing (low pass) spatial filter and its two types of kernels. **[9]**

b) Sketch Laplacian kernels used for image sharpening using second order derivative equations. **[9]**

P.T.O.

Q5) a) Explain Edge Linking using Hough Transform. **[8]**

b) Explain the basics of Intensity Thresholding using intensity Histogram. **[9]**

OR

Q6) a) Explain Region segmentation using K-means Clustering and its algorithm. **[8]**

b) Explain Topological Descriptor using suitable examples. **[9]**

Q7) a) Write Installation and testing of ROS camera Drivers. **[9]**

b) Explain ROS to Open CV - The CV bridge Package. **[9]**

OR

Q8) a) Explain Open CV image processing library. **[9]**

b) Explain image processing using MATLAB programming. **[9]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3915

[Total No. of Pages : 3

[6262]-181

T.E. (Automation and Robotics)

ARTIFICIAL INTELLIGENCE IN ROBOTICS

(2019 Pattern) (Semester - II) (302528)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw neat labeled diagrams wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of non-programmable electronic calculator is permitted.***
4) ***Assume Suitable/Standard data f necessary.***

Q1) a) Explain following feature engineering techniques with suitable example **[8]**

i) Imputation
ii) Scaling

b) Write a note on different data wrangling techniques employed in the data pre - processing. **[9]**

OR

Q2) a) What do you mean by feature scaling? Why is need of scaling in data pre - processing? When scaling is essential? **[7]**

b) Refer the following datasheet and write the python code for the followings: **[10]**

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...	...
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

P.T.O

i) Write a python code for the encoding of the feature 'Species'.

ii) Write a python code for the scaling of data set using normalization and standardization scaling techniques.

Q3) a) Write a note on following algorithms **[8]**

i) Random Forest

ii) Logistic Regression

b) How to choose right value of K in KNN using elbow method. **[5]**

c) Explain terminology in the decision tree with neat labeled diagram. **[5]**

OR

Q4) a) Distinguished between bagging and boosting algorithms. **[8]**

b) Calculate information gain for the features 'outlook', 'temperature', 'humidity' and 'windy'. Refer following datasheet. **[10]**

	outlook	temperature	humidity	windy	play
0	overcast	hot	high	False	yes
1	overcast	cool	normal	True	yes
2	overcast	mild	high	True	yes
3	overcast	hot	normal	False	yes
4	rainy	mild	high	False	yes
5	rainy	cool	normal	False	yes
6	rainy	cool	normal	True	no
7	rainy	mild	normal	False	yes
8	rainy	mild	high	True	no
9	sunny	hot	high	False	no
10	sunny	hot	high	True	no
11	sunny	mild	high	False	no
12	sunny	cool	normal	False	yes
13	sunny	mild	normal	True	yes

Q5) a) Explain Markov decision process and Q-learning. **[8]**

b) Draw fully connected deep learning network and explain elements of the deep learning. **[5]**

c) Explain in detail any two activation functions used in the neural networks. **[4]**

OR

Q6) a) Write applications of reinforcement learning with suitable examples. **[5]**

b) Explain key constituents of reinforcement learning with neat labelled sketch. **[7]**

c) Distinguish between machine learning and deep learning. **[5]**

Q7) a) How does the K-means clustering works? **[8]**

b) Describe in details steps involved in the development of classification problems. **[10]**

OR

Q8) a) Explain in details linear SVM and non-linear SVM. **[9]**

b) Write a note on human machine interaction. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3916

[Total No. of Pages : 2

[6262]-182
T.E. (Automation and Robotics)
MODELLING AND SIMULATION
(2019 Pattern) (Semester - II) (302529)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer two 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) Use the linear congruential method to generate a sequence of random numbers with X_0 = 27, a = 17, c = 43, and m = 100. Here, the integer values generated will all be between zero and 99 because of the value of the modulus. These random integers should appear to be uniformly distributed the integers zero to 99. Random numbers between zero and 1 can be generated by $R_i = X_i / m$, i = 1,2,.... **[10]**

b) List out techniques for identifying data distribution. Explain any one of them. **[7]**

OR

Q2) a) Explain timing and relationship of validation, verification and estàblishing credibility. **[9]**

b) Define random number and list the properties of it. Explain any one technique for generating random numbers. **[8]**

Q3) a) What are the different techniques for generating random variates? Explain any one of them. **[9]**

b) List out the potential issues to overcome in output data analysis. **[9]**

OR

P.T.O.

Q4) a) Explain terminating simulation with any two examples in detail. **[8]**

b) Explain inverse transform technique for uniform and Weibull distribution with detailed procedure. **[10]**

Q5) a) Explain vehicle system with regard to material handling system and also list its input parameters that should be considered when designing and implementing them. **[9]**

b) Explain the components of manufacturing system. **[8]**

OR

Q6) a) What are the different performance measures used in manufacturing systems. **[10]**

b) Write a short note on- Flexible Manufacturing System. **[7]**

Q7) a) Define simulation software and list out its key features. Also mention few popular simulation software used in different domains. **[6]**

b) Compare simulation software with the programming languages. **[6]**

c) Explain object oriented simulation package. **[6]**

OR

Q8) a) Explain the features needed in programming the discrete-event type simulation model. **[6]**

b) Explain the classification of simulation software with example. **[6]**

c) What is general purpose software package? Explain any one example of it. **[6]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3917

[Total No. of Pages : 2

[6262]-183

T.E. (Automation & Robotics)

MACHINING SCIENCE & TECHNOLOGY

(2019 Pattern) (Semester - II) (302530A) (Elective - II)

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) Explain in details effect of process parameters on tool life. **[9]**

b) A tool life 80 minutes is obtained at a speed of 30 m/min and 8 minutes in 60 m/min. **[9]**

Determine the following:

i) Tool life Equation

ii) Cutting speed for 4 minutes of tool life.

OR

Q2) a) Explain in details tool wear mechanism in details with neat sketch. **[9]**

b) A tool life 70 minutes is obtained at a speed of 15 m/min and 7 minutes in 50 m/min. Determine the following: **[9]**

i) Tool life Equation.

ii) Calculate percentage of increase of tool life when cutting speed reduced by 50%.

Q3) a) Explain in details requirements of dynamometer. **[9]**

b) What is the need of measurement of cutting forces? **[8]**

OR

Q4) a) What is lathe tool dynamometer, explain its construction and working with neat sketch. Write its applications. **[8]**

b) Write a classification of cutting force dynamometers. Explain any two of them. **[9]**

P.T.O.

Q5) a) What are the elements of total production cost? Explain in details. **[9]**

b) Suppose a turning operation is to be performed with HSS tooling on mild steel, with Taylor tool life parameters n = 0.125, C70 m/min. Work part length 500mm and diameter 100 mm. Feed 0.25 mm/rev. Handling time per piece = 5.0 min, and tool change time = 2.0 min. Cost of machine and operator = 30 rupees /hr, and tooling cost 3rupees per cutting edge.Find:**[9]**

i) cutting speed for maximum production rate, and

ii) cutting speed for minimum cost

iii) the hourly production rate and cost per piece for the two cutting speeds computed.

OR

Q6) a) Explain in details economics of machining. **[9]**

b) A high-speed steel tool is used to turn a steel work part that is 300 mm long and 80 mm in diameter. The parameters in the Taylor equation are: n = 0. 13 and C = 75 (m/min) for a feed of 0.4 mm/rev. The operator and machine tool rate = 30 rupees/hr, and the tooling cost per cutting edge = 4 rupees. It takes 2 min to load and unload the work part and 3.5 min to change tools. Determine **[9]**

i) cutting speed for maximum production rate,

ii) cutting speed for minimum cost,

iii) tool life of cutting in (i) and (ii),

iv) cycle time and cost per unit of product in (i).

Q7) a) Write short note on modern machining techniques. **[9]**

b) Describe in detail Laser Beam Machining (LBM) with working principle, diagram, construction, working, and application. **[8]**

OR

Q8) a) Differentiate between conventional and non-conventional machining process. **[9]**

b) Describe in detail Abrasive Water Jet Machining (AWJM) with working principle, diagram, construction, working, and application. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PB3918

[Total No. of Pages : 2

[6262]-184

T.E. (ESE) (Automation and Robotics)

MAINTENANCE AND SAFETY ENGINEERING

(2019 Pattern) (Semester - II) (302530-B) (Elective - II)

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 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 is the primary goal of planned maintenance, and how does it differ from unplanned maintenance? **[9]**

b) Explain Condition Base Maintenance System. **[9]**

OR

Q2) a) How does preventive maintenance contribute to increasing the reliability of machinery and equipment? **[9]**

b) How do unplanned maintenance events affect production, operations, and the bottom line of an organization? **[9]**

Q3) a) What is maintenance planning, and why is it a critical aspect of effective maintenance management? **[9]**

b) What is maintenance scheduling, and how does it complement maintenance planning in asset management? **[8]**

OR

Q4) a) Explain the Short term and Long Term Maintenance Plans. **[9]**

b) Write a short note on **[8]**

i) Annual Overhauls

ii) Renovation

iii) Revamping and

iv) Modernization

P.T.O.

Q5) a) What is the primary objective of industrial safety, and why is it a critical concern in industrial settings? **[9]**

b) What is a Hazard and Operability Study (HAZOP), and how does it help identify potential hazards in industrial processes? **[9]**

OR

Q6) a) What are the fundamental principles of industrial safety management, and how do they guide safety practices in an organization? **[9]**

b) What are the common types of accidents that can occur in industrial environments, and how are they categorized? **[9]**

Q7) a) What are the key considerations when ensuring safety in the planning, construction, and commissioning of industrial plants? **[9]**

b) What are alarm and hazard defense plans, and how do they help in managing and mitigating safety risks in industrial plants? **[8]**

OR

Q8) a) Why is it important to communicate safety information to the public in the vicinity of industrial plants, and what are the key elements of such communication? **[9]**

b) What are inherent safety measures, and how do they aim to reduce risks at the source in industrial processes? **[8]**

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Total No. of Questions : 8]

SEAT No. :

PB-3919

[Total No. of Pages : 2

[6262]-185
T.E. (Biotechnology)
ANALYTICAL TECHNIQUES
(2019 Pattern) (Semester - I) (315461)

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) ***Use of a calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) **Answer the following questions:**

a) What factors influence gel electrophoresis? **[6]**

b) Explain briefly the steps involved in electrophoresis? **[6]**

c) List applications of horizontal gel electrophoresis? **[6]**

OR

Q2) a) Draw a schematic diagram of the SDS-PAGE apparatus and describe the two types of gels used. **[10]**

b) Differentiate between Stacking gel and Running gel. **[8]**

Q3) **Answer the following questions:**

a) Define filtration and discuss the factors that affect it. What are the characteristics of an ideal filter medium? Explain. **[10]**

b) Write a note on the theory of centrifugation? **[7]**

OR

Q4) a) Provide a brief overview of the operation of a plate and frame filter press. List the advantages and disadvantages of the press and its applications. **[9]**

b) Define the following terms: **[8]**

i) Slurry

ii) Filter medium

iii) Filter cake

iv) Filtrate

P.T.O

Q5) **Answer the following questions:**

a) Discuss Beer-Lambert's law. **[5]**

b) What is a Monochromator? What are the different types of monochromators? **[5]**

c) Explain the concept of preparative centrifugation? **[8]**

OR

Q6) a) What are the functions of a colorimeter? Describe the components and working principle of a colorimeter in detail? **[10]**

b) Compare and contrast Fluorescence and Phosphorescence. Differentiate between Spectrophotometry and Spectro fluorometry. Draw an energy diagram and explain the concept of Fluorescence. **[8]**

Q7) **Answer the following questions:**

a) What is NMR? Explain the instrumentation used in NMR spectroscopy. **[10]**

b) Differentiate between Spectrophotometry and Spectro fluorometry. Draw an energy diagram and explain the concept of Fluorescence. **[7]**

OR

Q8) a) What do you mean by a nuclear spin. How and why does it occur. Explain using suitable examples. **[10]**

b) What is magnetic shielding? How does shielding effect the spin of a proton inside a nucleus? **[7]**

Total No. of Questions : 8]

SEAT No. :

PB3920

[Total No. of Pages : 3

[6262]-186
T.E. (Biotechnology)
MATERIAL BALANCES AND STOICHIOMETRY
(2019 Pattern) (Semester - I) (315462)

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 Q6, 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) Heat capacity of SO_2 is given by the following equation : **[8]**

$$C_p^o = 43.458 + 10.634 \times 10^{-3}\,T - 5.945\times10^2/T^2$$

Calculate the heat required to raise the temperature of 1 kmol pure sulphur dioxide (SO_2) from 300k to 1000k.

b) Define the following term: **[10]**

i) Latent heat of fusion

ii) Latent heat of sublimation

iii) Sensible heat

iv) Latent heat

v) Heat Capacity

OR

Q2) a) State and explain in details different forms of energy. **[6]**

b) A stream flowing at a rate of 14999 mol/h containing 25 mole% N_2 and 75 mole % H_2 is to be heated from 25ºC to 200ºC. Calculate the heat that must be transferred using C_p^0 data given below: **[12]**

$$C_p^0 = a + bT + cT^2 + dT^3,\ kJ/(kmol.k)$$

Gas	a	$b\times10^3$	$C\times10^6$	$d\times10^9$
N_2	29.5909	–5.41	13.1829	–4.968
H_2	28.6105	1.0194	–0.1476	0.769

P.T.O.

Q3) a) Write a detail note on Limiting Reactant/Component and excess reactant. **[6]**

b) In the synthesis of ammonia, fresh feed containing 25.7% nitrogen and 1% inerts is mixed with recycle feed. Mixed feed entering into reactor resulted in 25% conversion of ammonia. **[11]**
Calculate:
i) The recycle ratio
ii) The purge ratio and
iii) The combined feed ratio

OR

Q4) a) For carrying nitration reaction, it is desired to have a mixed acid containing 39% HNO_3 and 42% H_2SO_4 (by mass). Nitric acid of 68.3% (mass) is readily available. **[6]**
Calculate:
i) The required strength of sulphuric acid to obtain the above mixture.
ii) The weight ratio of nitric acid to sulphuric acid to be mixed.

b) Define : **[4]**
i) Mole
ii) Molar mass
iii) Gram mole
iv) Atomic mass

c) A feed containing 60 mole% A, 30 mole % B and 10 mole % inerts enters a reactor. 80% of original A reacts according to the following reaction. **[7]**
$2A + B \rightarrow C$
Find the composition of product stream on mole basis

Q5) a) For a given reaction the gross heating value (GHV) of gaseous propane at 298 K (25ºC) is 2219.71 KJ/mol. Calculate the net heating value (NHV) of propane. **[9]**
$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

b) Calculate heat of formation of liquid 1-3 butadiene at 298.15 K (25ºC) using the following data: **[9]**
Data : Standard heat of formation of CO_2 (g) = – 393.51 KJ/mol
Standard heat of formation of H_2O (l) = – 285.83 KJ/mol
Standard heat of combustion of C_4H_6 (l) at 298.15 K (25ºC) = –2520.11 kJ/mol

OR

Q6) a) Calculate heat of formation of gaseous ethyl alcohol at 298.15 K (25ºC) using the following data: **[9]**

Data : Standard heat of formation of CO_2 (g) = – 393.51 KJ/mol

Standard heat of formation of H_2O (l) = – 285.83 KJ/mol

Standard heat of combustion of gaseous ethyl alcohol at 298.15 K (25ºC) = –1410.19 kJ/mol.

b) Calculate the enthalpy change between reactants and products if both are at 298.15 K (25ºC) if 60 mol CO_2 is produced according to the following reaction: **[9]**

$$2C_4H_{10}\ (g) + 13O_2\ (g) \rightarrow 8CO_2\ (g) + 10H_2O\ (1)$$

Data:

Component	ΔH_r^o kJ/mol at 298.15 K (25ºC)
C_4H_{10} (g)	- 125.79
CO_2 (g)	- 393.51
H_2O (l)	- 285.83

Q7) a) What is ultimate analysis of coal explain in details. **[5]**

b) Write a short note on Orsat analysis. **[5]**

c) The Gross calorific value of gaseous propane is 2219 kJ/mole at 293.15K. Calculate the Net calorific value. Latent heat of H_2O vapour = 2442.5kJ/kg water. **[7]**

OR

Q8) a) How is the coal classified? Write in details about classification of coal. **[5]**

b) Define along with formulate **[6]**

i) Calorific value

ii) Gross calorific value

iii) Net calorific value

c) Write formulae for theoretical air required in moles and percent excess air. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PB-3921

[Total No. of Pages : 2

[6262]-187
T.E. (Biotechnology)
GENETIC ENGINEERING
(2019 Pattern) (Semester - I) (315463)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q 7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) How is the blue white selection of libraries carried out? **[9]**

b) Discuss the construction of cDNA libraries and their role in gene expression studies. Explain how PCR is used to amplify cDNA sequences from these libraries. What are the advantages and limitations of cDNA libraries in comparison to genomic libraries? **[9]**

OR

Q2) a) Describe various screening methods, such as, colony PCR, immunological screening, and selection based on nutrient deficiency. **[9]**

b) PCR plays a pivotal role in cloning. Describe how PCR is used to amplify DNA fragments for cloning purposes. **[9]**

Q3) a) Cloning in bacteria is a fundamental technique in genetic engineering. Explain the concept of competency in bacteria and how it is crucial for successfiul cloning. Discuss the methods to induce competency and how it enhances the efficiency of gene insertion in bacterial hosts. **[9]**

b) Describe a typical cloning vector with diagram. What is broad host range in plasmid? **[8]**

OR

P.T.O.

Q4) a) Broad host range plasmids are versatile tools in genetic engineering. Describe the significance of copy numbers in plasmids and how broad host range plasmids facilitate gene expression in different bacterial hosts. **[9]**

b) Cloning in yeast and fungi offers valuable insights into eukaryotic biology. Focus on cloning in Saccharomyces cerevisiae (S. cerevisiae), addressing the problems that can be encountered during the process. Describe the vectors and promoters used in S. cerevisiae cloning and explain the significance of using yeast as a cloning host. **[8]**

Q5) a) What are the different strategies for transformation of animal cell? Give brief account of them. **[9]**

b) What is Electroporation? Give its procedure, diagram, significance. **[9]**

OR

Q6) a) Discuss the transformative role of microinjection in advancing genetic engineering techniques for human cells. Describe the essential steps involved in the microinjection process and the instruments required for its successful implementation. **[9]**

b) Provide an overview of the particle bombardment technique and its significance in transforming plant cells. Describe the key principles and steps involved in this method for introducing foreign DNA into plant cells. **[9]**

Q7) What are the different types of vaccines give a detailed account of each of the four types. **[17]**

OR

Q8) a) What is Bt cotton? How is it produced? What is the principle? How is genetic engineering applied in its production? **[9]**

b) What is gene therapy? Has it been used successfully? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3922

[Total No. of Pages : 2

[6262]-188
T.E. B.Tech.
BIOTECHNOLOGY
Introduction to Immunology
(2019 Pattern) (Semester - I) (315464)

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) ***Figures to right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) What are the main attributes that make a substance a good antigen? **[12]**

b) Write a short note on Monoclonal antibodies. **[6]**

OR

Q2) a) I have isolated two proteins. First protein is 3000 KD M.W and no aromatic amino acid, Second protein is 12000 KD M.W and with one tyrosine. Justify which one of the two is good antigen and why? **[12]**

b) Write a short note on secretary antibody. **[6]**

Q3) a) Discuss the CMI. **[10]**

b) Write a note on Class I MHC. **[7]**

OR

Q4) a) Write short notes on **[15]**

i) T Helper cells

ii) CTLs

iii) Graft rejection

b) Cells presenting antigen to T helper cells are called as _____. **[2]**

P.T.O

Q5) a) Briefly describe Type I hypersensitivities and explain the events taking place after binding of reaginic antibodies to mast cells. **[12]**

b) Write a short note on Autoimmunity. **[6]**

OR

Q6) a) A person has difficulty in breathing after penicillin injection. What type of hypersensitivity could it be and why? **[12]**

b) Write a note on Organ specific autoimmune disease. **[6]**

Q7) a) With the help of labeled diagrams discuss any three types of antigen-antibody reactions along with their applications. **[12]**

b) Giving examples enlist different types of vaccines. **[5]**

OR

Q8) a) Giving example discuss the following : whole-cell vaccine, sub-unit vaccine, recombinant vaccine. **[12]**

b) Define Agglutination. Give two examples. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3923

[Total No. of Pages : 2

[6262]-189

Third Year B.Tech. (Biotechnology Engg.)

ENZYME TECHNOLOGY

(2019 Pattern) (Semester - I) (315465A) (Elective-I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer 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.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) Answer the following: **[18]**

a) Detail the role of flavins (e.g., FAD and FMN) as coenzymes in various enzymatic reactions

b) Describe the functions of biotin as a coenzyme in carboxylation reactions. How does biotin facilitate the transfer of carbon dioxide in these reactions?

OR

Q2) Answer the following: **[18]**

a) Explain the role of Pyridoxal phosphate (PLP) in a range of enzymatic reactions, particularly in amino acid metabolism

b) Differentiate between Biotin and TPP

Q3) Answer the following: **[17]**

a) How do allosteric effectors regulate enzyme activity and how does this contribute to cellular homeostasis?

b) Discuss competitive inhibition, non-competitive inhibition and uncompetitive inhibition

OR

P.T.O.

Q4) Answer the following: **[17]**

a) Differentiate between feedback inhibition and allosteric inhibition.

b) How do competitive inhibition and non-competitive inhibition alter the Michaelis-Menten equation?

Q5) Answer the following: **[18]**

a) Explain the process of cross-linking enzymes within a matrix. What are the mechanisms of cross-linking?

b) Compare the kinetic properties of free (soluble) enzymes with immobilized enzymes.

OR

Q6) Answer the following: **[18]**

a) How does immobilization affect parameters such as Michaelis-Menten constants (Km and Vmax) and catalytic efficiency (kcat/Km)?

b) Provide two examples of how immobilized enzymes are utilized in food industry applications.

Q7) Answer the following: **[17]**

a) What are examples of immobilized enzymes used in clinical diagnostics? Explain enzyme action of any TWO

b) Define biosensors. State its working principle and its main components.

OR

Q8) Answer the following: **[17]**

a) What are the applications of immobilized enzymes in food industry? Explain any one with suitable example

b) Discuss the advantages of using immobilized bio component in construction of biosensor.

Total No. of Questions : 8]

SEAT No. :

PB-3924

[Total No. of Pages : 2

[6262]-191

T.E. (Biotechnology Engg.)

AGRICULTURAL BIOTECHNOLOGY

(2019 Pattern) (Semester - I) (315465C) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

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) ***Assume Suitable data if necessary.***

Q1) a) Write an essay on applications of Plant Tissue Culture. **[9]**

b) Explain the concept of **[9]**

i) Protoplast culture and

ii) Secondary Metabolite Production

OR

Q2) a) Differentiate between somoclonal and gametoclonal variations. **[9]**

b) Write short notes on **[9]**

i) Micro propagation

ii) In Vitro mutagenesis

Q3) a) Describe Randomly Amplified Polymorphic DNA sequences (RAPD) technology for crop improvement. **[9]**

b) Explain methodology of molecular marker assisted selection (MAS) for crop improvement with example. **[8]**

OR

Q4) a) Define molecular marker. Enlist different types of molecular markers. **[9]**

b) Give applications of structural and functional genomics in agriculture. **[8]**

P.T.O.

Q5) a) Give methodology used for large scale production of microbial biofertilizers. **[10]**

b) Explain Biological Nitrogen fixation with examples. **[8]**

OR

Q6) a) What are biopesticides? Explain its importance in sustainable agriculture. **[10]**

b) Explain use of biostimulants in agriculture. **[8]**

Q7) a) Describe the functional role of Recombinant DNA advisory committee (RCGM). **[9]**

b) Write short note on **[8]**

i) GMO Act 2004

ii) Cartagena Protocol

OR

Q8) a) Describe regulatory framework of GM crops and products in India. **[9]**

b) Write short note on **[8]**

i) Patents and

ii) Biosafety committees in India

Total No. of Questions : 8]

SEAT No. :

PB-3925

[Total No. of Pages : 2

[6262]-192
T.E.
BIOTECHNOLOGY
Fermentation Technology
(2019 Pattern) (Semester - II) (315471)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Write note on bakers yeast production. **[6]**

b) What is vitamin? Explain the production of vitamins B2 & B12 through fermentation. **[6]**

c) What are antibiotics? Describe the process of fermentative production of penicillin. **[6]**

OR

Q2) a) Describe the process of recovery of citric acid in detail. **[6]**

b) Illustrate the process of production and recovery of streptomycin with neat sketch. **[6]**

c) Write note on ethanol production through fermentation and discuss its applications. **[6]**

Q3) a) What is immobilization? Describe the various techniques of immobilization for cells and enzymes. **[9]**

b) Considering the enzyme amylase, describe its detail production, recovery process and applications. **[8]**

OR

Q4) a) Describe the fungal protein production through solid state fermentation. **[9]**

b) Write note on single Cell protein Production through fermentation. **[8]**

Q5) a) What is batch reactor? Discuss its components along with functions with neat sketch. **[8]**

b) What are types of bioreactors? Describe them in detail with neat sketch. **[10]**

OR

Q6) a) What is Solid State Fermentation (SSF)? Explain its working and design with neat labeled diagram. **[10]**

b) Write about advantages, disadvantages and applications of solid liquid fermentation and solid state fermentation. **[8]**

Q7) a) Write note on enhancement of fermentation efficiency by taking the case study of ethanol economics. **[8]**

b) What is down stream processing? Discuss various techniques involved in down stream processing. **[9]**

OR

Q8) a) Write note on Good Manufacturing Practices (GMP). **[8]**

b) Discuss the phenomenon of Inoculum development and sterilization in detail. **[9]**

Total No. of Questions : 8] **SEAT No. :**

PB-3926

[Total No. of Pages : 2

[6262]-193
T.Y.B.Tech.
BIOTECHNOLOGY
Mass Transfer
(2019 Pattern) (Semester - II) (315472) (End Semester)

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) a) Write a short Note on: **[10]**

i) Oslo crystallizer ii) Vacuum crystallizer

b) A crystallizer is charged with 7500 kg of an aqueous solution at 377K 29.6% by weight of which is anhydrous sodium sulphate. The solution is cooled. During the cooling operation, 5% of the initial water is lost by evaporation. As a result, crystals of Na_2SO_4. 10 H_2O crystallize out. If the mother liquor is found to contain 18.3% by weight anhydrous Na_2SO_4, Calculate the yield of crystals and quantity of mother liquor. At. Wt.: Na=23, S=32, O=16,H=1 **[8]**

OR

Q2) a) What are solubility curves? Explain solubility curves for any salt and water solution. **[9]**

b) Write mass balance equation for batch crystallizer. **[9]**

Q3) a) Draw a neat diagram and write a short note on vapour-liquid equilibria.**[8]**

b) What is relative volatility? Explain it using an example of binary distillation. **[9]**

OR

P.T.O.

Q4) a) Explain in detail with one example molecular and extractive distillation. **[8]**

b) What are types of efficiencies? How overall plate efficiency is calculated? **[9]**

Q5) a) Write a short note on Flash distillation. **[6]**

b) A liquid mixture of benzene-toluene is to be distilled in a tower at 101.3 kPa pressure. The feed of 100 kmol/h is liquid and it contains 45 mole % benzene and 55 mole % toluene and enters at 327.6 K. A distillate containing 95 mole % benzene and 5 mole % toluene and bottoms containing 10 mole % benzene and 90 mole % toluene are to be obtained. The reflux ratio is 4:1. The average heat capacity of the feed is 159 kJ/kmol. K and the average latent heat is 32099 kJ/kmol. Calculate the kmol/h of distillate and bottom product and the number of plates required.

B.P. of benzene =353 K and B.P of Toluene =383.8 K **[12]**

x	1	0.78	0.581	0.411	0.258	0.130	0
y	1	0.90	0.777	0.632	0.450	0.261	0

OR

Q6) a) Write a short note on flooding and entrainment in distillation column. **[6]**

b) Explain Mc Cabe -Thiele Method using any one case study. **[12]**

Q7) a) Draw a schematic sketch for co-current and countercurrent operation and show in graphs how height of column varies with slope of operating line? **[9]**

b) Define and explain - 1) Rault's Law

2) Henry's Law When these laws can be used? **[8]**

OR

Q8) a) Draw various types of packing materials and give its design importance when used in an absorption column **[5]**

b) Write a material balance equation for countercurrent absorption column and derive equation in terms of L/G ratio. **[12]**

Total No. of Questions : 8]

SEAT No. :

PB-3927

[Total No. of Pages : 2

[6262]-194
T.Y. B.Tech.
Biotechnology
Bioseparation Engineering
(2019 Pattern) (Semester - II) (315473)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or 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***

Q1) a) Give few applications of adsorption in biotechnology. **[9]**

b) Write a short note on temperature swing adsorption with one case study. **[9]**

OR

Q2) a) Write difference between physical and chemical adsorption. **[9]**

b) Explain in detail principle and continuous operation of adsorption process. **[9]**

Q3) a) What are the types of columns present in gas chromatography? **[9]**

b) What are the different types of detectors? Explain FID in detail. **[8]**

OR

Q4) a) Explain different peak broadening effects. How Van Deemter plot co-relates peak broadening effect? **[8]**

b) A chromatographic separation of a two component samples on a 50cm column gave the retention times for the solutes A and B as 2.5 and 3.1 min with base widths of the two chromatographic peaks being 0.24 and 0.3 min respectively. Calculate the parameters: (i). number of theoretical plates, (ii). Plate height (iii).Resolution of the two peaks. **[9]**

P.T.O.

Q5) a) What is membrane fouling? How to avoid it? **[9]**

b) Write short note on: **[9]**

a) Osmosis and Reverse Osmosis

b) Ultrafiltration

OR

Q6) a) Enlist the factors affecting the performance of membranes? How are they minimized? **[9]**

b) Draw the diagram of membrane separation process and explain all components in the diagram. **[9]**

Q7) a) What is isoelectric point? How isoelectric precipitation is performed in dairy industries? Why is it important? **[9]**

b) What are the different types of molecular sieves? Give one recent application from literature where is it applied. **[8]**

OR

Q8) a) How supercritical extraction is used in extraction of caffeine? Write principle and process of supercritical extraction. **[9]**

b) What is the purpose of using mass spectrometry in combination with GC and LC? Explain it with one case study of GC-MS and LC.-MS. **[8]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3928

[Total No. of Pages : 2

[6262]-196

T.E. (Biotechnology)

FOOD BIOTECHNOLOGY

(2019 Pattern) (Semester - II) (315474B) (Elective - II)

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.***

Q1) a) How do engineering principles contribute to the design and operation of refrigerators, freezers, and dryers in the context of preserving biological materials? **[9]**

b) What are the different Low temperature techniques of food preservation? **[9]**

OR

Q2) a) What are the primary technological methods employed in the microbial production of food ingredients, and how do these methods contribute to enhancing food quality and nutritional value? **[9]**

b) Enlist the advantages and disadvantages of food processing. **[9]**

Q3) a) Which microorganisms are commonly used in the food industry? Give examples and the food in which they are used. **[7]**

b) Give the detailed steps in cheese making. What are the different types of cheese made give a brief description. **[10]**

OR

Q4) a) Discuss the biotechnological processes involved in the production of microbial polysaccharides for food applications, emphasizing their functional roles and benefits in food products. **[7]**

b) Explain the sequential process involved in bread making, providing a comprehensive breakdown of each stage and its significance in the final product's formation. **[10]**

P.T.O.

Q5) a) Could you elaborate on the different classes of enzymes crucial for various food industry processes, emphasizing their specific functions and applications? **[9]**

b) How do enzymes significantly contribute to the baking process in the bakery industry, and what specific roles do they play in improving dough characteristics and final bread quality? **[9]**

OR

Q6) a) What roles do enzymes serve in meat processing, and how do they contribute to tenderization, preservation or flavor enhancement in meat products? **[9]**

b) Describe and discuss any four microbial enzymes other than amylase used in the food processing industry with their applications. **[9]**

Q7) a) How are food industrial wastes categorized into solid, liquid, and hazardous types, and what distinguishes one type from another in terms of their composition and potential impact on the environment? **[9]**

b) Explain the different methods used for disposing of food industrial waste, highlighting the distinctive characteristics and advantages of physical, chemical, and biological disposal approaches. **[8]**

OR

Q8) Write notes on

a) Compare and contrast the activated sludge and anaerobic processes in treading food processing wastes, highlighting their mechanisms, efficiency, and applicability in waste treatment. **[9]**

b) Discuss recent advancements in sustainable waste management practices within the food industry, focusing on innovative methods that minimize environmental impact. **[8]**

Total No. of Questions : 8] **SEAT No. :**

PB-3929

[Total No. of Pages : 3

[6262]-198
T.E.(Printing Engineering)
PRINT STATISTICS
(2019 Pattern)(Semester-I) (308281)

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) ***Black 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) From the given data, arrange the data, prepare frequency distribution table and draw the Histogram only and comment on the same. **[17]**

0.912	0.910	0.904	0.905	0.910	0.911
0.914	0.912	0.910	0.913	0.908	0.914
0.907	0.909	0.913	0.912	0.909	0.913
0.902	0.906	0.909	0.907	0.906	0.908
0.915	0.909	0.910	0.911	0.912	0.909
0.910	0.909	0.908	0.910	0.909	0.907

Note 1: From G Chart, the recommended number of groups should be 7 for Number of measurements between 30 to 40.

And divide the range of the data by number of groups (7), to find out the class interval, and round it off to 3rd decimal value to form the groups.

OR

Q2) Explain the following : **[17]**

a) Measures of Accuracy or Centering

b) Measures of Precision or Spread

c) Normal Distribution

P.T.O.

Q3) Prepare X bar S chart from the given data on graph paper **[18]**

Sample No.	1	2	3	4	5	6	7	8	9	10
Measurements	933	911	889	882	903	890	892	908	895	916
	897	898	915	913	930	940	912	920	920	890
	885	900	905	930	890	895	895	896	922	891
	900	905	902	900	890	909	896	894	928	920
	879	862	873	871	900	915	902	906	926	915

Note: Round off all the values as per standard rule

Shewhart's Constants: A3 = 1.427, B3 = 0, B4 = 2.089

OR

Q4) Make two Pareto Charts for the data given in the following table, one for the number of defectives and one for dollar loss. In each case, include a cumulative percentage graph as well. **[18]**

Department	Defectives	Dollar Loss
A	20	100
B	120	60
C	80	800
D	100	500
E	50	200
F	30	90

Q5) Describe in detail the Normal Distribution and 3SD and its role in monitoring and controlling the process with suitable diagrams. **[17]**

OR

Q6) From the following data, draw appropriate diagrams and also comment on the same (any two) **[17]**

a) Target 22 mm, Tolerance +/- 2 mm, process mean 23 mm, LCL 20 mm, UCL 26 mm

b) Target 530, process mu 532, standard deviation 8, LSL 505, USL 560

c) Design specification 5.5, s= 1.5, mu 6, specification width 8

Q7) Calculate the Process Capability Index for Density on an Offset Press. USL: 1.55 and LSL: 1.35, d2 = 2.326 **[18]**

Sample No.	**Shift 1**	**Shift 2**	**Shift 3**
1	1.5	1.4	1.5
2	1.32	1.42	1.44
3	1.3	1.2	1.55
4	1.6	1.39	1.54
5	1.41	1.51	1.62

OR

Q8) Explain in detail the DMAIC and where it is used? And how? With suitable example. **[18]**

Total No. of Questions :8]

SEAT No. :

PB3930

[Total No. of Pages : 2

[6262]-199
T.E.(Printing Engineering)
OFFSET PRINTING TECHNIQUES
(2019 Pattern)(Semester -I)(308282)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.No.1or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Describe the difference between mechanical shaft and shaft less drives system. **[6]**

b) Explain the solid and skeleton transfer cylinders. **[6]**

c) Explain feeder grippers and delivery gripper system. **[6]**

OR

Q2) a) Explain types of reel stands. **[6]**

b) Explain dancer roller and braking mechanism in infeed in web offset **[6]**

c) Explain the drive concepts in web offset. **[6]**

Q3) Write a short note on:

a) Hydrodynamic thrust **[5]**

b) Ink Splitting **[6]**

c) Integrated Color Measurement **[6]**

OR

Q4) a) Explain ink metering in ink duct. **[5]**

b) Define inking unit temperature control system. **[6]**

c) Explain fountain solution & it's characteristics. **[6]**

P.T.O.

Q5) a) Define dryer and chiller temperature setting according to ink and substrate. **[8]**

b) Explain different type of folders used for commercial publication. **[9]**

OR

Q6) a) Describe different folding techniques. **[6]**

b) Explain folder maintenance on web offset. **[5]**

c) Explain ink behavior in coldest presses. **[6]**

Q7) a) Define Web tension control in web offset presses. **[9]**

b) Explain different factor which affect web tension. **[9]**

OR

Q8) a) Explain Closed loop systems for register control. **[6]**

b) Explain any 2 auxiliary equipment used on web offset press. **[12]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3931

[Total No. of Pages : 3

[6262]-200
T.E. (Printing)
ENGINEERING
Color Science and Measurement
(2019 Pattern) (Semester - I) (308283)

Time : 2½ Hours] ***[Max. Marks : 70***

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 3 basic perceptual attributes of color. **[6]**

b) Explain which attributes can be derived from tri-stimulus values and how? **[6]**

c) Describe the CIE 1931 *Yxy* System **[5]**

OR

Q2) a) Describe the Munsell Color model system. **[6]**

b) Define saturation and explain out of 2 same samples, which attribute will visually show higher degree of difference. **[6]**

c) Explain the L*a*b color system. **[5]**

Q3) a) Explain difference between tint, shade and tone. **[12]**

b) Justify effect of light source on the color of an object **[6]**

OR

P.T.O

Q4) a) State different parts of a Spectrophotometer. Distinguish between a colorimeter and spectrophotometer. **[12]**

b) Draw a neat diagram only (with proper labels) of spectrum indicating with optical brightening agents and without optical brightening agents. **[6]**

Q5) a) Solve following using delta Eab equation between Sample 1& 2 And Sample 3&4 **[6]**

Sample 1

L1 * 56.2

a1* –32.5

b1 * 4.9

&

Sample 2

L2 * 56.0

a2 * –45.7

b2 * 5.7

Sample 3

L3 * 60.3

a3 * 33.0

b3 * 64.3

&

Sample 4

L4 * 41.0

a4 * 33.2

b4 * 25.5

b) State role of spectrophotometer in measurement of color difference. Why is it important to measure color difference with a device and not visually. **[12]**

OR

Q6) a) State the significance of measuring color difference with help of instrument. **[5]**

b) Solve following using delta Eab equation between Sample 1 & 2 and Sample 3 & 4 **[6]**

Sample 1

L1 *56.2

a1 * –32.5

b1 * 4.9

&

Sample 2

L2 * 56.0

a2 * –45.7

b2 * 57

Sample 3

L3 * 60.3

a3 * 33.0

b3 * 64.3

&

Sample 4

L4 * 41.0

a4 * 33.2

b4 * 25.5

c) Explain standard viewing conditions. **[6]**

Q7) a) Compare difference between a colorant and dye. Give any 3 applications of each. **[12]**

b) What is particle size of a pigment or dye. Why particle size is important. **[6]**

OR

Q8) a) Explain the term Colour Index™ Generic Name (CIGN). Give any 3 examples, how pigments are dscribed using this term. **[12]**

b) Why are the spectral curves twisted of a metameric pair. **[6]**

☺☺☺

Total No. of Questions : 8]

SEAT No. :

PB-3932

[Total No. of Pages : 2

[6262]-201

T.E. (Printing)

INK TECHNOLOGY

(2019 Pattern) (Semester - I) (308284)

Time : 2½ 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) ***Figures to the right indicate full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write review on Behavior of Inks on machines. **[6]**

b) Write review on Viscometer. **[6]**

c) Write review on Rheology. **[6]**

OR

Q2) a) Draw a stress and strain curve diagram and explain printing ink on the diagram. **[6]**

b) Compare Shear thinning and shear thickening liquids. **[6]**

c) Identify the factors which affects the rheological behavior of printing inks. **[6]**

Q3) a) Classify the Ink drying with suitable diagram. **[5]**

b) Explain in brief the penetration drying method. **[6]**

c) Compare Micro wave and radio frequency drying. **[6]**

OR

Q4) a) Write review on Electron beam curing. **[5]**

b) Describe the evaporation drying process. **[6]**

c) Identify the drying method for different inks. Which would you prefer for drying UV inks. **[6]**

P.T.O.

Q5) a) List down the printing substrates and their ink requirements in terms of adhesion and gloss and drying methods. **[6]**

b) Explain in brief the ink ingredients for ink manufacturing for various printing process inks. **[6]**

c) Write review on milling process of ink manufacturing. **[6]**

OR

Q6) a) Write short note on pigment dispersion. **[6]**

b) Explain in brief the printing process and their ink ingredients and ink formulation. **[6]**

c) What is the purpose of Breakdown of the Pigment Particles. **[6]**

Q7) a) What is the purpose of checking the ink adhesion? Explain the ink adhesion test. **[5]**

b) What is the purpose of checking the solid content of the ink? Explain the solid content measurement process. **[6]**

c) What is the purpose to measure the ink viscosity? What are the different methods of are used to check the viscosity of ink. **[6]**

OR

Q8) a) Explain in brief the purpose to check the gloss of ink. **[5]**

b) Explain in brief health hazards, safety and environmental effect of ink ingredients on human health. **[6]**

c) Write review on ink migration. **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3933

[Total No. of Pages : 2

[6262]-203

T.E. (Printing Engineering)

CYBER SECURITY

(2019 Pattern) (Semester - I) (308286A) (Elective-I)

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 not allowed.***

Q1) a) Explain in detail about Logic Bombs and working of logic bombs? **[6]**

b) Describe virus and How Virus can damage the corporate world? **[12]**

OR

Q2) a) Define the terms - Malware, Trojan and Ransomware. **[6]**

b) How to avoid getting breached with a virus attack. **[6]**

c) Explain how an android device was hacked using the Metasploit framework? **[6]**

Q3) a) Explain hacking phases and Name a few tools used for each of these phases. **[10]**

b) Describe Steganography and its advantages and disadvantages of Steganography. **[7]**

OR

Q4) a) What security measures can be taken by an individual to stay safe from android hacking? **[8]**

b) Do hackers need physical access to a computer in order to infect it with malware? If not, explain the other options available to them. **[9]**

P.T.O.

Q5) a) Define Social Engineering. How can you identify such attacks? **[10]**

b) Describe SEToolkit? How can you use this tool to simulate a phishing attack? **[8]**

OR

Q6) a) How is "The Harvester" tool used for reconnaissance? Explain the modus operandi of a social engineering attack. **[8]**

b) How can you detect and prevent falling prey to phishing, vishing and smishing Attacks? **[10]**

Q7) a) Explain the historical background, Object, Extent, Scope and Commencement of the Information Technology Act. **[10]**

b) What is stalking? What are the legal actions which can be taken against stalking as per the IT Act in India? **[7]**

OR

Q8) a) Define and discuss various IT Act clauses related to cyber crimes. **[12]**

b) Explain the liability aspect of the Internet Service Provider as per the Information Technology Act 2000. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3934

[Total No. of Pages : 2

[6262]-204

T.E. (Printing Engineering)

WOOD, GLASS AND METAL BASED PACKAGING

(2019 Pattern) (Semester - I) (308286 B) (Elective-I)

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 not allowed.***

Q1) a) Explain manufacturing of glass. **[9]**

b) Give brief introduction of glass Packaging. **[9]**

OR

Q2) a) Write down about modern trends in glass packaging. **[9]**

b) Explain standards of glass packaging. **[9]**

Q3) a) Explain about USP glass types and testing procedures. **[9]**

b) Write down the concept of gauging. **[8]**

OR

Q4) a) What is requirement of testing in glass packaging. **[8]**

b) Explain 2 physical test of glass packaging. **[9]**

Q5) a) Explain manufacturing of aluminium foil. **[9]**

b) Write down properties of aluminium foil. **[9]**

OR

P.T.O.

Q6) a) Explain Tin Plate Characteristics. **[9]**

b) Explain Manufacturing of Black Plate. **[9]**

Q7) a) Explain about Drums. **[8]**

b) Explain about closures. **[9]**

OR

Q8) a) Write down types of drums. **[8]**

b) Explain Manufacturing of Drums. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3935

[Total No. of Pages : 2

[6262]-206
T.E. (Printing Engineering)
Flexo Printing Techniques
(Semester - II) (2019 Pattern) (308289)

Time : 2½ Hours] *[Max. Marks : 70*

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 purpose and effects of Back-exposure and how to test. **[6]**

b) Explain the purpose and effects of Main-exposure. **[6]**

c) Discuss Environmental concerns in flexo industry. **[5]**

OR

Q2) a) Why we use developing solution and explain different type of washout solution. **[6]**

b) Explain in purpose and effects of Drying mechanism of plate. **[5]**

c) What is Post-exposure and Light Finishing? Why we required these. **[6]**

Q3 a) How to prepare Digital Flexo Plates. **[8]**

b) Explain the working principle of He -Ne laser with neat and clean diagram. **[10]**

OR

Q4) a) Discuss difference between digital plate and conventional plate. **[8]**

b) Explain the working principle of Argon laser with neat and clean diagram. **[10]**

P.T.O.

Q5) a) Explain flexography process with diagram. **[6]**

b) Explain UVdryer in detail with diagram. **[6]**

c) Define Central impression narrow web press and its advantages. **[5]**

OR

Q6) a) Discuss on flexography product and application. **[6]**

b) Define stack narrow web press and its advantages. **[5]**

c) Explain EB dryer in detail with diagram. **[6]**

Q7) a) How to select anilox roller in flexography? **[6]**

b) Explain different method of Anilox cleaning. **[6]**

c) Explain doctor blade in detail with diagram. **[6]**

OR

Q8) a) "Anilax is heart of flexography", If you agree then explain it in detail. **[6]**

b) Explain anilox cell and Explain different type of anilox cell with diagram? **[6]**

c) Explain fountain roller and its specification. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3936

[Total No. of Pages : 2

[6262]-207
T.E. (Printing)
Color Management
(2019 Pattern) (Semester - II) (308290)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What are different display technologies? **[6]**

b) Why display profiling is important? **[6]**

c) How to select display system? **[5]**

OR

Q2) a) Explain CRT display technology. **[6]**

b) Comment on color correction environment for monitor display. **[5]**

c) Discuss setting of display prior to monitor profiling. **[6]**

Q3) a) What is printer calibration setting? **[6]**

b) What is profile conversion? **[6]**

c) What are parameters to be considered for flexographic printer profiling? **[6]**

OR

Q4) a) How to ensure consistency of printing output? **[6]**

b) Can you apply your knowledge to construct profile for given printing device? **[6]**

c) Comment on Rendering Intent. **[6]**

P.T.O.

Q5) a) Comment on Device Link. **[6]**

b) How to do proofer profiling? **[6]**

c) Discuss importance of soft proofing. **[5]**

OR

Q6) a) What is proof to press color management? **[6]**

b) State importance of Hard Proofing. **[5]**

c) Compare proofing methods in color management. **[6]**

Q7) a) Importance of grey background for visual color evaluation. **[6]**

b) Comment on illumination condition required for visual color evaluation. **[6]**

c) State importance of Gray balance. **[6]**

OR

Q8) a) How do you set conditions for visual evaluation of print? **[6]**

b) Explain TRC. **[6]**

c) Comment on Gray balance and color management. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3937

[Total No. of Pages : 4

[6262]-208
T.E. (Printing Technology)
DESIGN OF EXPERIMENTS
(2019 Pattern) (Semester - II) (308291)

Time : 2½ Hours] *[Max. Marks : 70*

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) A pollution control officer has reported average fine of 500 printing presses that he has to deal with during a month amount to Rs. 36,000/- with a standard deviation of Rs. 10,000/-. Assuming that the fine in these businesses are normally distributed, find : **[6]**

b) The number of businesses the fine is over Rs. 40,000. **[6]**

c) Describe t-test. **[5]**

OR

Q2) a) Hourly output of 1000 workmen sticking the labels on the bottles are normally distributed around a mean of 70 and with a standard deviation of 5. Estimate the number of labels whose hourly sticking/pasting of labels will be :

Between 70 and 72 **[6]**

b) Between 69 and 72. **[5]**

c) Define following terms : independent variable and dependent variables. **[6]**

Q3) a) To adjust the contact pressure between plate cylinder and blanket cylinder, which move towards each other at a fixed axial clearance, the plate or the blankets are underlaid, a process which results in a 0.05-0.15 mm radial deformation of the blanket. The changes in the underlay resulted in variations in tone value increase in the highlight areas and print contrast. The operator collected data for 6 of its treatments of underlay.

P.T.O.

Treatment in micron thickness of packing					
0.01	0.05	0.075	0.08	0.1	0.2
27	29.3	29.3	29.45	30.11	34.7
26.7	27	28.99	30.33	33.47	31.77
28	28.01	29.02	31.1	31.55	32.98
27.3	25.9	29.1	31	34	33.0

Using the data given below for TVI, test whether the mean tone value increase due underlay is same for all thicknesses at 0.05 level of significance. **[12]**

b) Explain background variables and primary variables. **[6]**

OR

Q4) a) A CTP unit manufacturer is experimenting on time required for imaging in CTP plates. It is of interest for the researcher to study the effects of following factors: types of laser diodes and the coating type. Each factor is run at 3 levels. The setup is that of a completely randomized design. The data are given in table. The time measured is in microseconds. **[12]**

Factors	Coating Type	
Laser Power in Watt	A	B
60	39.5 45.7 49.8 50.2 63.8	47.4 43.5 39.8 36.1 41.2
80	33.5 36.7 42 38.1 31.2	44 41.2 47.3 45.3 42.7

Prepare ANNOVA Table

b) i) What effect does coating type have on the time to image?

ii) What effect does power have on the time to image?

iii) Do both coating types behave in the same manner in the two different power types?

[6]

Q5) a) Consider a 2^2 factorial with factors A and B and n experimental observations per factor combination. Prepare a geometric view and in tabular form of the 2^2. Define Contrast A, B and AB among treatment totals. **[6]**

b) Offset Industries statistics report states information of 276 packaging presses and 24 publication presses facing strong environmental issues due to air pollutants released from the presses. Explain with the help of a cause-and-effect diagram his problem in order to reduce emissions. **[6]**

c) Explain general full factorial in DOE. **[5]**

OR

Q6) a) In 2^k series consider following factors polymer 1 and polymer 2. Each run at 2 levels low and high indicating concentration of the polymers. These experiments are conducted to test additives to inks. Data given is change in plastic viscosity which is a rheological measure reflecting the change in thickness of the ink. Various polymers are added to the ink to increase the viscosity.

Prepare and display treatment combinations in graphical form. **[11]**

	Polymer 1			
Polymer 2	Low		High	
Low	3	3.5	11.3	12.0
High	11.7	12.0	21.7	22.4

Calculate main effect and interaction effect.

b) Write a short note on factorial design. **[6]**

Q7) A book making machine is set to deliver packets of a given weight, 10 samples of size 5 each were recorded. Below given are relevant data : **[18]**

Sample no	1	2	3	4	5	6	7	8	9	10
Mean xbar	15	17	15	18	17	14	18	15	17	16
Range	7	7	4	9	8	7	12	4	11	5

Calculate the values for the central line and control limits for mean chart and range chart and then comment on the state of control.

OR

Q8) a)

345	530	556	354	590
395	515	479	494	420
563	444	629	440	485
505	604	490	445	605
402	406	730	506	516
472	475	610	586	523
691	520	465	468	545
523	582	570	578	505
461	575	420	605	527
624	440	585	420	384

Construct a frequency distribution table with appropriate class limits and class boundaries. With reference to G chart divide the measurement scale into 8 groups. **[6]**

b) Draw histogram to represent the above frequency distribution. **[6]**

c) Comment on the results. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB3938

[Total No. of Pages : 2

[6262]-209

T.E. (Printing Engg.)

MAINTENANCE MANAGEMENT OF PRINTING MACHINES

(2019 Pattern) (Semester - II) (308293A) (Elective - II)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Prepare a Annual Preventive Maintenance check sheet for Offset Printing Press? **[6]**

b) What are is the need of Preventive Maintenance? **[6]**

c) Important Steps for Establishing a CM Program. **[5]**

OR

Q2) a) Write a Brief Note on Corrective Maintenance with Suitable Example. **[6]**

b) What are the Elements of Preventive Maintenance? **[6]**

c) Write a brief note on Types Lubricants and Lubrication. **[5]**

Q3) a) What is Condition Based Monitoring. **[6]**

b) Explain in detail about Air Leakage testing for Offset Press. **[6]**

c) How Condition Based Monitoring helps to build data mine. **[6]**

OR

Q4) a) How Vibration Tester & Ultrasonic Digital Cameras are used in Condition Based Monitoring. **[6]**

b) Describe in Detail the Predictive Maintenance with respect to Diesel Generator used for Offset Printing Press. **[6]**

c) Explain any 3 Instruments used for Different Condition Monitoring. **[6]**

P.T.O.

Q5) a) What is OEE, Explain with respect to Quality. **[6]**

b) What is the Need for Effectiveness Maintenance. **[6]**

c) What are the Key Performance Indicators for Offset Maintenance. **[5]**

OR

Q6) a) What are the Safety Measures taken during Offset Maintenance. **[6]**

b) What is significance of 5s in Maintenance Management. **[6]**

c) What is MTTR and MTBF. **[5]**

Q7) a) Describe the Replacement or Repair Decision Making Policy with respect to LCC Model Technique. **[6]**

b) What is Kaizen. Explain with suitable example from maintenance management. **[6]**

c) Explain 7 Elements of Repair/Replacement Model. **[6]**

OR

Q8) a) What is TPM. Explain with respect to Single color Offset Press. **[6]**

b) What are the Pillars of TPM. Explain with suitable example. **[6]**

c) What is Critical Spares. **[6]**

x x x

Total No. of Questions : 8]

SEAT No. :

PB3939

[Total No. of Pages : 2

[6262]-210

T.E. (Printing Engineering)

BASIC COMMUNICATION SYSTEMS AND ELECTRONIC INSTRUMENTATION

(2019 Pattern) (Semester - II) (308293B) (Elective - II)

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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Differentiate between the Active Tags and Passive Tags used in RFID. **[9]**

b) Mention the frequency bands in which RFID operates and explain the advantages and limitations of each frequency band in different applications. **[9]**

OR

Q2) a) Explain the basic principles behind Wi-Fi communication and how it enables wireless connectivity. **[9]**

b) State the applications of RFID in detail. **[9]**

Q3) a) Describe Fundamentals of measurements and Need of Instrumentation. **[8]**

b) Describe the classifications of transducers. **[9]**

OR

Q4) a) Explain the Types of errors in measurement system. **[9]**

b) Define **[8]**

i) Resolutions

ii) Drift

iii) Hystersis

iv) Speed of response

P.T.O.

Q5) Explain the working of ultrasonic transducer and its application in printing and packaging industry. **[18]**

OR

Q6) a) Describe working of thermocouple and its applications in printing. **[9]**

b) Describe the working principle of strain gauge sensor used in printing industry. **[9]**

Q7) Mention the application of sensors and Transducer in printing industry. **[17]**

OR

Q8) Describe the working of RTD and its applications in printing industry. **[17]**

x x x

Total No. of Questions : 8]

SEAT No. :

PB3940

[Total No. of Pages :2

[6262]-211

T.E. (Printing Engineering)

E PUBLISHING

(2019 Pattern) (Semester- II) (308293-C) (Elective-II)

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) Explain all the image file formats for Web. **[18]**

OR

Q2) What is Image optimization and its importance? **[18]**

Q3) Explain Roles and responsibilities of Content Generators, Content Writers and Content Managers. **[17]**

OR

Q4) Explain various types of Online Media and differentiate between Online media and Print Media. **[17]**

Q5) a) What is Computing and Computing Environment? **[9]**

b) Explain any 4 types of Computing. **[9]**

OR

P.T.O.

Q6) a) Draw with the diagram and explain practical history of internet. **[9]**

b) Explain classification of Web Technology. **[9]**

Q7) Explain with workflow diagram of how Online Payment System works. **[17]**

OR

Q8) Explain Web to Print Workflow with diagram. **[17]**

Total No. of Questions : 8]

SEAT No. :

PB-3941

[Total No. of Pages : 2

[6262]-212
T.E. (Production)
ENGINEERING METROLOGY & INSTRUMENTATION
(2019 Pattern) (Semester - I) (311081A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Use of electronic pocket calculator is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain in detail ISO 9001-2000 & ISO 9000-1998 Series standards.**[8]**

b) In automobile filling process 550 gms. of certain liquid was to be filled in plastic bags. The permissible variation is ±4 gms. For investigating the process capability, 5 bags were taken at random from each batch for 10 successive batches and results were plotted as follows. **[10]**

Batch	1	2	3	4	5	6	7	8	9	10
Mean, gms.	551	552	549	543	551	552	552	549	548	552
Range	3	2	1	3	1	2	2	3	4	5

Find out control limits for x-bar chart.

Take A_2=0.577, D3=0, D4=2.115, d_2=2.326. Will the process be able to meet the specifications?

OR

Q2) a) Define Quality of conformance and explain in detail cost of Quality. **[8]**

b) A subgroup of 5 items is taken from the manufactured items. After 21 subgroups the values of $\bar{x}$ and R were found to be $\sum \bar{x} = 254$ and ΣR=5.6.The specification limits for the part are 16.5±0.25. Assuming the process is in control, what conclusion would you draw about the ability of the process to produce the items within the specified limits? Take A_2=0.483,D3=0,D4=2.004, d_2 =2.534 for subgroup size of 6.**[10]**

P.T.O.

Q3) a) Explain in detail 5S in KAIZEN practice. **[9]**

b) Draw Cause and effect diagram and explain in detail. **[9]**

OR

Q4) a) Write a short note on Pareto Chart. **[9]**

b) Describe the contributions of Deming in the area of total quality management. **[9]**

Q5) a) Define Force. Explain in detail Direct and Indirect methods of force measurement. **[7]**

b) Explain in detail Readout-Recording stage in generalized measuring system. **[10]**

OR

Q6) a) Explain the following features of measuring instrument **[10]**

i) Precision

ii) Accuracy

b) Explain the stages in generalized measuring system. **[7]**

Q7) a) Explain with neat sketch LVDT type of transducer for force measurement. **[8]**

b) Explain in detail active and passive sensors with example. **[9]**

OR

Q8) a) What are the different types of dynamometers? Explain with neat sketch Prony Brake type dynamometer in Torque measurement. **[8]**

b) What is vibration and explain with neat sketch any one vibration measuring instrument. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3942

[Total No. of Pages : 2

[6262]-213
T.E.(Production Engg)
MATERIAL FORMING TECHNOLOGY
(2019 Pattern)(Semester -I)(311082A)

Time : 2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Solve Q.1or 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 electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain with sketch different types of wire drawing machine with their relative merits and demerits. **[12]**

b) How stock is prepared for drawing operation? **[5]**

OR

Q2) a) Describe various type of tube drawing operation with sketch **[12]**

b) Write short note on drawing die. **[5]**

Q3) a) Write short note on (any two) **[10]**

i) Four high rolling mill
ii) Sendzimir Cluster Rolling Mill
iii) Planetary Rolling Mill

b) For cold rolling;Show that **[8]**

$$R.L. = \sigma_0 \times W_m \times \sqrt{R\Delta h}$$

Where,

R.L. = Rolling load

σ_o *= yield stress*

Wm = mean width if sheet

R = Roll radius

Δh *= change in thickness*

Also mention the assumption made.

OR

P.T.O.

Q4) a) A steel strip of size,thickness 110mm×width 150mm×length 1000 mm is rolled in rolls of diameter 700mm with reduction of 25%. The coefficient of friction is 0.4. The roll rotates at speed 160 rpm. **[12]**

Determine:

i) Arc contact length
ii) Angle of bite
iii) Angle of contacts
iv) Neutral section thickness
v) Neutral angle
vi) Forward slip and Backward slip

b) State true or false with justification: **[6]**

i) Friction is essential during rolling process.
ii) Rolling load can be decreased by increasing roll diameter

Q5) a) Explain how seamless tubes are produced by extrusion process. **[9]**

b) Explain various differences between forward and backward extrusion with ram travel vs extrusion pressure diagram. **[8]**

OR

Q6) a) Explain various extrusion defects with their causes and remedies. **[9]**

b) Describe impact extrusion and hydrostatic extrusion. **[8]**

Q7) a) Explain With Sketch Magnetic pulse forming. **[6]**

b) Discuss various methods of flow forming. **[6]**

c) Write short note on Stretch forming. **[6]**

OR

Q8) a) Compare high velocity forming with conventional forming. **[6]**

b) Explain confined explosive forming. **[6]**

c) Discuss tribiological aspects in micro-forming. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3943

[Total No. of Pages : 2

[6262]-214
T.E. (Production Engineering)
MACHINING SCIENCE AND TECHNOLOGY
(2019 Pattern) (Semester - I) (311083 (A))

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. 7or 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) Which factors are affecting the tool life? Discuss in detail. **[9]**

b) Discuss indirect tool failure criterias in metal cutting. **[9]**

OR

Q2) a) How cutting fluids are classified? State properties of cutting fluids in metal cutting. **[9]**

b) Using the Taylor equation and assuming n=0.4, C=390. Calculate the percentage increase in tool life when cutting speed is reduced by 40%. **[9]**

Q3) a) What are the types of tool damages? Describe any two type of tool damage with suitable sketch. **[9]**

b) Describe attrition and abrasive wear mechanisms with suitable sketches. **[8]**

OR

P.T.O.

Q4) a) Explain wear by plastic shear and diffusion wear mechanisms with suitable sketches. **[9]**

b) For a metal machining , the following information is available: Tool change time, =12 min. Tool re-grind time, = 8 min. Machine running cost, = Rs. 6 per hour, Tool depreciation per re grind,= 30 paise, n= 0.25, C=150. Calculate the optimum cutting speed. **[8]**

Q5) a) Explain ten digit ANSI method of insert specification. **[9]**

b) What is the use of chip breaker? Discuss various types of chip breakers with suitable sketches. **[9]**

OR

Q6) a) What are the shapes of inserts? Draw any two shapes and comment on strength, power requirement and vibration tendency. **[9]**

b) Design a single point cutting tool to turn a M S bar with a linear cutting speed of 30 m/min on a lathe equipped with a 12KW motor. Safe stress for tool material is 300 MPa and efficiency of machine tool is 82%. **[9]**

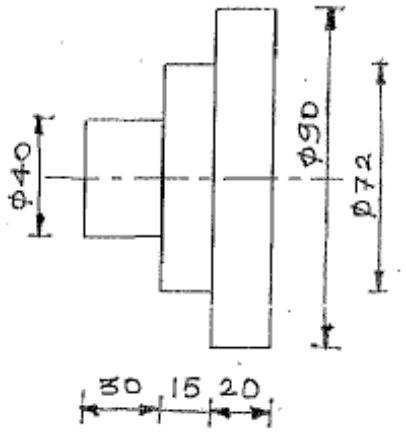
Q7) a) Explain guidelines for designing length of body and number of teeth for reamer with suitable sketch. **[9]**

b) State various guidelines to be used in design of broach. **[8]**

OR

Q8) a) With suitable example, explain the procedure to be followed in designing of flat form tool by graphical method. **[8]**

b) Design a circular form tool for a given job by graphical method when, rake angle = 20° and relief angle = 10º, a = 12 mm, b = 10 mm. Raw material – mild steel. **[9]**



Total No. of Questions : 8]

SEAT No. :

PB-3944

[Total No. of Pages : 3

[6262]-215

T.E. (Production Engineering)

KINEMATICS AND DESIGN OF MACHINES

(2019 Pattern) (Semester - I) (311084(A))

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) ***Figure to the right indicates 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) a) Explain following with suitable sketches : **[7]**

i) Wedge cam

ii) Cylindrical cam

iii) End cam

b) Following data relate to a cam profile, in which the follower moves with Simple Harmonic Motion during the out stroke and return stroke. **[10]**

The minimum cam radius = 45 mm.

The diameter of a roller = 18 mm

Lift of roller follower = 40 mm

Offset of follower axis = 10 mm towards right

Angle of ascent = 110°

Angle of dwell between ascent and descent = 50°

Angle of descent = 120°

Angle of remaining dwell = 80°

Cam speed = 200 rpm. Draw cam profile.

OR

P.T.O.

Q2) a) Explain turning moment diagram for single cylinder 4 stroke IC engine. **[7]**

b) A 5 kW motor running at 900 rpm operates a riveting machine. It has flywheel fitted to it of mass 100 kg and radius of gyration 0.4 m. Each riveting takes 1 seconds and required 10 kW. Determine **[10]**

i) Number of rivets closed per hour

ii) Fall in the speed of flywheel after riveting operation.

Q3) a) Discuss the significance of fatigue stress concentration factor and notch sensitivity. **[8]**

b) A cantilever beam of circular cross section, made of alloy steel with ultimate tensile strength of 1500 N/mm^2, is fixed at one end and subjected to a completely reversed force of 1000 N at free ends. The force is perpendicular to beam axis. The distance between free and fixed end of beam is 400 mm. Corrected endurance limit is 310.64 N/mm^2. The desired life of beam is 50000 cycles. If the required factor of safety is 1.5, determine diameter of beam. **[10]**

OR

Q4) a) What are the various causes of stress concentration? **[6]**

b) Explain following : **[12]**

i) Modified Goodman diagram for fluctuating torsional shear stress.

ii) Methods of reducing effect of stress concentration

Q5) a) Discuss the causes of variations in dimensions of component. **[7]**

b) The deflections tested of 100 springs under axial load are normally distributed with mean of 31 .48 mm and standard deviation of 1.586 mm. If the permissible deflection for the spring is between 29 mm and 33 mm, determine the percentage of the springs likely to be rejected. **[10]**

The areas below standard normal distribution curve from zero to z are as follows.

Z	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Areas	0.3159	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452

OR

Q6) a) Give comparison between normal distribution and standard distribution curves. **[5]**

b) A shaft and hole assembly of nominal diameter 40 mm have the following dimension

Shaft diameter = 40 ± 0.18 mm Hole diameter = 40 ± 0.24 mm

Assuming shaft and hole diameters are normally distributed, determine the probability of interference fit between shaft and hole.

The areas below standard normal distribution curve from zero to z are as follows. **[12]**

Z	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1
Areas	0.4192	0.4332	0.4452	0.4554	0.4641	0.4713	0.4772	0.4821

Q7) a) Explain with example, what are functional requirements and undesirable effects in design of mechanical system. **[6]**

b) A tensile bar of length 200 mm is subjected to constant tensile force of 5000 N. If the factor of safety is 3, design the bar with objective of minimizing the material cost out of following material. What will be the cost of bar. **[12]**

Material	Mass density kg/m^3	Material cost per unit mass, Rs/kg	Yield strength N/mm^2
Steel	7800	14	400
Aluminum alloy	2800	66	150
Magnesium alloy	1800	75	100

OR

Q8) a) Explain the guidelines to be followed in the design of machining parts. **[8]**

b) Explain the concepts of design for assembly and design for manufacture. **[10]**

⌘⌘⌘

Total No. of Questions : 8]

SEAT No. :

PB-3945

[Total No. of Pages : 3

[6262]-216

T.E. (Production Engineering)

FINITE ELEMENT ANALYSIS - I

(2019 Pattern) (Semester - I) (311085(A)) (Elective - I)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Determine the stresses and strains for the 2D CST element using Galerkin approach. **[8]**

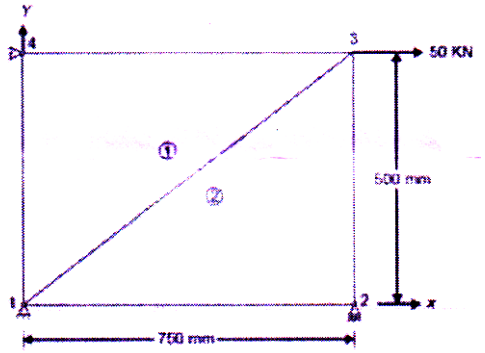
b) A triangular membrane element of thickness t = 0.2 cm, with the (x, y) coordinates of nodes indicated beside the node numbers, is shown in Fig. Take E = 270 GPa and μ = 0.3, determine the following : **[9]**

i) Shape functions of the element, N_i (x, y), N_j (x, y). and N_k (x, y).
ii) Matrix [B] that relates the strains to the nodal displacements.
iii) Elasticity matrix [D].
iv) Element stiffness matrix.

OR

Q2) a) Discuss examples of the plane stress, plane strain, and axisymmetric problems. **[9]**

b) Determine the nodal displacements and element stresses in the propped beam shown in Fig. Idealize the beam into two CST elements as shown in the figure. Assume plane stress condition. **[8]**
Take μ = 0.3, E =2 × 10^5 N/mm^2, Thickness = 25 mm.



P.T.O.

Q3) a) Determine the structural stresses and strains for 1 D bar element using a direct and energy approach? Also, apply a direct approach to determine the thermal stresses and strains for the 1 D bar element. **[9]**

b) Outline the procedure to determine the stresses and strains for the bar element. **[8]**

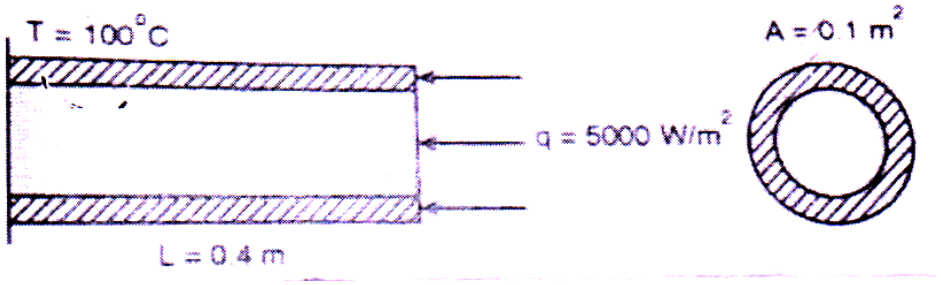
OR

Q4) a) Derive the ESM formulation for 1 D steady state heat conduction problems. **[9]**

b) What are the boundary conditions that prevail in 1 D steady state heat conduction. **[8]**

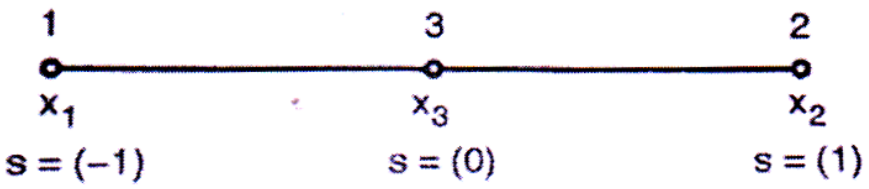
Q5) a) Discuss the steps involved in processing step, to solve 1 D heat transfer problem using FE Problem. **[8]**

b) The fin shown in fig. is insulated on the perimeter. The left end has a constant temperature of 100°C. A positive heat flux of q = 5000 W/m^2 acts on the right end. Let Kxx = 7 W/m°C and cross sectional area A = 0.1 m^2. Determine Global stiffness matrix. **[10]**



OR

Q6) a) For the three-noded iso-parametric bar element shown, show that the Jacobean determinate is |J| = L/2. Also determine the shape function N_1, N_2 and N_3 and the strain displacement matrix [B]. Assume displacement field as $u = a_1 + a_2 s + a_3 s^2$. **[10]**



b) Explain significance of Warp angle and skewness in FEM. **[8]**

Q7) a) A three stepped rod of dia 85mm, 120mm with length 1000mm and 210mm is fixed at one end. Let density=0.00075kg/m^3, E = 200 × 100000 N/sq.mm, calculate Global Matrix and the eigen values. **[10]**

b) Give the various approaches used in fatigue analysis. **[8]**

OR

Q8) a) A three stepped rod of dia 65mm, 110mm with length 150mm and 310mm is fixed at one end. Let density=0.00073kg/m^3, E=250 × 100000N/sq.mm, calculate Global Matrix and the eigen values. **[10]**

b) Differentiate clearly between the static and dynamic analysis. **[8]**

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Total No. of Questions : 8]

SEAT No. : [ ]

PB-3946

[Total No. of Pages : 2

[6262]-217

T.E. (Production Engineering)

ADVANCES IN MANUFACTURING PROCESSES

(2019 Pattern) (Semester - I) (311085A(II)) (Elective-I)

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. 7or 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) Describe the differences between expendable and permanent molds. **[6]**

b) Outline of production steps in a typical sand-casting operation **[6]**

c) Explain with neat sketch the principle of working, advantages and applications of vacuum-mold casting **[6]**

OR

Q2) a) Explain with neat sketch the principle of working, advantages and applications of evaporative-pattern casting **[6]**

b) Explain with neat sketch the principle of working, advantages and applications of ceramic-mold casting **[6]**

c) Explain why squeeze casting produces parts with better mechanical properties, dimensional accuracy, and surface finish than do expendable-mold processes. **[6]**

Q3) a) Find the best welding speed to be used for the welding of 6 mm steel plates with an ambient temperature of 30°C with the welding transformer set at 25 V and the current passing is 300 A. The arc efficiency is 0.9 and possible travel speeds are 6 to 9 mm/s. The limiting cooling rate for satisfactory performance is 6°C/s at a temperature of 550°C. **[9]**

b) Explain in brief the main causes for the development of residual stresses in welded structures. **[8]**

OR

P.T.O.

Q4) a) A single full penetration weld pass is made on steel using the following parameters E = 20 V, I = 200 A, v = 5 mm/s, T_0 = 25°C, T_m = 1510°C, ρ_c = 0.0044 J/mm^3°C, t = 5mm, f_1 = 0.9, H_{net} = 720 J/mm. Calculate the peak temperatures at distances of 1.5 and 3.0 mm from the weld fusion boundary. **[9]**

b) Determine the expression for cooling rate at the weld centerline by considering relative plate thickness factor. **[8]**

Q5) a) Explain the constituents of magnetorheological fluids. Explain with cause-and-effect diagram of process parameters of magnetorheological abrasive flow finishing process **[9]**

b) Explain with neat sketch the principle of working, equipment, mechanism of material removal, process parameters, performance characterization, applications of magnetic abrasive finishing process. **[8]**

OR

Q6) a) Explain with neat sketch the principle of working, equipment, mechanism of material removal, process parameters, performance characterization, applications of magnetorheological abrasive flow finishing process. **[9]**

b) Explain with neat sketch the effect of duty cycle on percentage decrease in surface roughness **[8]**

Q7) a) Explain principle of Gear hobbing. List advantages & disadvantages of gear hobbing. **[6]**

b) Explain the principle of gear shaping. List advantages and limitations of gear shaping. **[6]**

c) Explain continuous horizontal broaching machine with neat sketch. **[6]**

OR

Q8) a) What are the different methods of thread manufacturing? Explain anyone with a neat sketch. **[6]**

b) List the various gear grinding methods. Explain in brief the gear grinding process with neat sketch. **[6]**

c) Explain any two types of broaching machines with neat sketches. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3947

[Total No. of Pages : 2

[6262]-218

T.E. (Production Engineering)

MECHATRONICS

(2019 Pattern) (Semester - I) (311085A(III)) (Elective-I)

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. 7or Q8.***
2) ***Figures to the right indicates full marks.***

Q1) a) What is basic logic gates? **[6]**

b) State the rules of Boolean algebra. **[6]**

c) Describe binary octal and hexadecimal numbering systems? **[6]**

OR

Q2) a) Explain the working of Analog-to-digital convertor. **[6]**

b) Explain Digital to analog convertor in brief. **[6]**

c) What is the largest value of output voltage from an 8-bit DAC that produces 1.0V for a digital input of 00110010? **[6]**

Q3) a) Which are the five basic elements of a process control system? **[6]**

b) What are Dead Time Responses in Laplace form? **[6]**

c) Write note on Laplace transform **[6]**

OR

Q4) a) Describe Process Dynamics Laplace. **[6]**

b) Which are the types of Second-Order Response in Laplace transform? **[6]**

c) Explain Lag Responses in Laplace Form. **[6]**

P.T.O.

Q5) a) What is a Controller? **[6]**

b) Which are the different types of Controllers? **[6]**

c) Describe Proportional Controllers. **[5]**

OR

Q6) a) Describe Proportional plus Integral plus Derivative Controller (PID Controller). **[6]**

b) State general guidelines for designing a PID Controller. **[6]**

c) Which are the advantages and disadvantages of Proportional Controller? **[5]**

Q7) a) Explain the Ladder language of PLC programming. **[6]**

b) State ladder relay instructions of PLC programming. **[6]**

c) Explain Timer Instructions with example in PLC. **[5]**

OR

Q8) a) Describe programmable logic controller with sample ladder logic program. **[6]**

b) Describe five basic programming models of PLC. **[6]**

c) Explain an SFC program for tank level control using PLC. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3948

[Total No. of Pages : 2

[6262]-219

T.E. (Production Engineering)

SUPPLY CHAIN MANAGEMENT

(2019 Pattern) (Semester - I) (311085A(IV)) (Elective-I)

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***
4) ***Use of Non-programmable scientific calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain Incoming Material Management. **[5]**

b) Explain principles of transport management. **[6]**

c) Write short note on Automated Storage/Retrieval. **[6]**

OR

Q2) a) Explain the principles of material handling. **[5]**

b) Explain Obsolete, Surplus and Scrap Management. **[6]**

c) Explain Value Analysis in detail. **[6]**

Q3) a) Explain the factors influencing distribution network design. **[7]**

b) How to selecta distribution network design? **[5]**

c) What are the role of distribution network. **[6]**

OR

Q4) a) Explain distribution network design in the supply chain. **[5]**

b) Explain types of distribution strategies with examples. **[6]**

c) Explain network design decisions using decision trees. **[7]**

P.T.O.

Q5) a) Discuss the role of cycle inventory in the supply chain. **[5]**

b) Explain Revenue Management for Multiple Customer Segments. **[6]**

c) Describe Selective Inventory Control Techniques. **[6]**

OR

Q6) a) Explain Managing Inventory for Short Life Cycle Products. **[6]**

b) What is Risk Pooling in Supply Chain Management? **[5]**

c) Explain Multiple-item, Multiple-location Inventory Management. **[6]**

Q7) a) What are the causes of Bullwhip effect? **[6]**

b) Explain Effective Forecasting in details. **[6]**

c) Write a short note on Information Technology in the Supply Chain. **[6]**

OR

Q8) a) Explain Lack of Supply Chain Coordination in detail **[6]**

b) Explain Supply chain Restructuring. **[6]**

c) Explain the Bullwhip Effect. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3949

[Total No. of Pages : 2

[6262]-220
T.E. (Production Engineering)
PRODUCTION TOOLING
(2019 Pattern) (Semester - II) (311088(A))

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) ***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) To design a drawing die for a component as shown in figure no.1, calculate following values for a sheet of thickness 5 mm and yield strength 360 MPa. i) Blank size, ii) Percentage reduction, iii) Number of draws required, iv) Cup diameter and height in each draw, v) Die and punch dimensions in each draw, vi) Press capacity required in each draw **[12]**

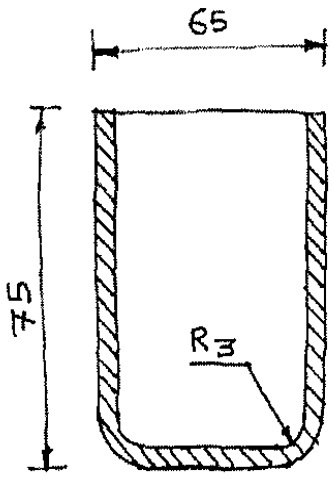

Figure No. 1 All dimensions in mm.

b) Calculate bending force required for steel sheet 4mm thick and width 3 meter to be bent in a wiping die. The upper and lower die radius is 8 mm and UTS is equal to 570 MPa **[6]**

OR

P.T.O.

Q2) a) With suitable example, explain use of Area Method in calculation of blank size. **[9]**

b) Which methods are available to overcome the spring back in bending? Explain any two methods to overcome the spring back with suitable sketches. **[9]**

Q3) a) How inserts are useful in forging die. Explain types of die inserts used in forging with suitable sketches. **[9]**

b) Explain design of trimming die in forging die design with suitable sketch. **[8]**

OR

Q4) a) Discuss various guidelines to be used for selection corner radius, fillet radius and drafis in forging die design. **[9]**

b) What is the purpose of edging operation in forging? With suitable example explain design of edging impression in forging die design. **[8]**

Q5) a) Which metals and alloys are used for submerged plunger type hot chamber die casting machines? Explain working of submerged plunger type hot chamber die casting machine with suitable sketches. **[9]**

b) Why lubrication is required in die casting? State various rules of die lubrication. **[9]**

OR

Q6) a) Describe working of gooseneck type die casting machine with suitable sketch. **[9]**

b) Explain working of cold chamber die casting machine with suitable sketches. **[9]**

Q7) a) Explain working of screw type injection moulding with suitable sketch. **[9]**

b) Discuss compression moulding with suitable sketches. **[8]**

OR

Q8) a) Determine, i) Shot capacity with acrylic. ii) Number of cavities for a mould by shot capacity method for a given data. Material = acrylic, Mass of the component = 36 g., Swept volume = 100 cm^3, Density = 1.18 g/cm^3, Constant = 0.92. **[9]**

b) Explain direct sprue gate, side gate and ring gate with suitable sketches. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3950

[Total No. of Pages : 3

[6262]-221
T.E. (PRODUCTION)
Production & Operations Management
(2019 Pattern) (Semester - II) (311089 (A))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 orQ4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) How does the role of PPC differ in Job Production and Mass Production? **[6]**

b) What are the challenges for PPC in typical batch manufacturing unit? **[6]**

c) What are the principles of PPC? **[6]**

OR

Q2) a) What will be the consequences if a manufacturing company doesn't have effective system? **[6]**

b) What are the objectives of PPC system? **[6]**

c) What is an integrated PPC system? **[6]**

Q3) a) Explain with Flow chart Systematic Layout Planning Procedure. **[8]**

b) Explain different types of material handling equipment with its applications in manufacturing industries. **[9]**

OR

Q4) a) List and explain various principles of material handling. **[10]**

b) Explain different types of plant layouts used in manufacturing industries. **[7]**

P.T.O.

Q5) a) What is EOQ? Derive an expression for the Economic Order Quantity when the stock replenishment is instantaneous (give assumptions). **[8]**

b) An automobile factory manufacturer manufactures Engine within the factoy. **[9]**

The particulars of this engine are given below.

Demand rate = 16,000 units/ year

production rate = 38000 units/ year

set-up cost = Rs. 550 / set-up

carrying cost = Rs, 17 /unit/ year

Find EBQ. Total cost and Cycle time.

OR

Q6) a) Define following terms related to inventory and also show graphically.**[8]**

i) Lead Time

ii) Recorder Level

iii) Safety stock

iv) Average inventor level

b) XYZ Industries needs 18,000 units/year of a bought out component which will he used in its main product. The ordering cost is Rs. 135 per order and the carrying cost per unit per year is 20% of the purchase price per unit which is Rs.75. **[9]**

Find i) Economic order quantity.

ii) Number of orders per year.

iii) Time between successive orders.

Q7) a) Explain the role of master production schedule, bill of material and inventory status file in developing output of material requirement planning. **[8]**

b) What is block chain technology? How it can be used in Supply Chain Management? **[5]**

c) What are the benefits of Asset Tracking? **[5]**

OR

Q8) a) What is the difference between Quality Assurance and Quality Control? **[5]**

b) What is material provenance and why it is important? **[5]**

c) Consider a following assembly network relationship of a product. The number of shift per day is one and the number of working hours per shift is 8 hours. M/s. craft company aims to produce 40 units of product per shift. **[8]**

Operation No.	Immediate Preceding Task	Duration
1	----	8
2	1	3
3	1	2
4	1	4
5	1	7
6	3,7	4
7	2	5
8	4,5	6
9	6	10
10	7,8,9	11

i) Draw precedence diagram.

ii) What is the desired cycle time?

iii) What is the number of stations of the solution obtained?

Total No. of Questions : 8]

SEAT No. :

PB-3951

[Total No. of Pages : 2

[6262]-222

T.E. (Production Engg.)

PROCESS ENGINEERING AND RESOURCE PLANNING

(2019 Pattern) (Semester - II) (311090A)

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 and Q.7 OR Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain Importance of work piece control? **[8]**

b) What are causes of work piece Variation? **[9]**

OR

Q2) a) Write short notes on — (Any Two): **[8]**

i) Equilibrium theory.

ii) Principal process operations .

iii) Geometrical Control.

b) What are variables influencing work piece Control. **[9]**

Q3) a) What are factors to be considered while selecting the tooling? **[9]**

b) What is operation rout sheet? **[8]**

OR

Q4) a) What are factors to be considered while selecting the Machine or equipment? **[9]**

b) What is mean by process sheet design, **[8]**

P.T.O.

Q5) a) What are factors affecting process selection. **[9]**

b) Explain capacity planning? **[9]**

OR

Q6) a) What are factors for effective capacity **[9]**

b) Explain OEE **[9]**

Q7) a) How the CAPP (Computer Aided Process planning) is useful in Industry. **[9]**

b) What is Generative process planning? **[9]**

OR

Q8) a) What are advantages of CAPP over manual process planning? **[9]**

b) Explain Knowledge based process planning **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4533

[Total No. of Pages :2

[6262]-223
T.E. (Production Engineering)
PRODUCT DESIGN AND DEVELOPMENT
(2019 Pattern) (Semester-II) (Elective II) (311091-(A)-I)

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) Elaborate on market and marketing. **[9]**

b) Explore stage gate system of product development. **[8]**

OR

Q2) a) Classify types of products with its configuration. **[9]**

b) Which are different elements in marketing plan. **[8]**

Q3) a) How to identify customers need? Suggest various methods. **[9]**

b) Brief on kano model. **[8]**

OR

Q4) a) Distinguish engineering characteristics in identifying customer's needs. **[9]**

b) How to implement quality function deployment. **[8]**

Q5) a) Explain various requirements of design for assembly in detail. **[9]**

b) Suggest methods for the estimation of manufacturing cost. **[9]**

OR

P.T.O.

Q6) a) Write consideration for design of forging in detail. **[9]**

b) Compare deep drawing process to sheet bending process for DFM. **[9]**

Q7) a) Explore structure of PLM Vision. **[9]**

b) Enumerate different PLM strategies in brief. **[9]**

OR

Q8) a) Explain application of PLM in home applicances. **[9]**

b) How to implement PLM in auto industry. Describe various stages. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3952

[Total No. of Pages :2

[6262]-224

T.E. (Production Engineering)

NANO-MANUFACTURING

(2019 Pattern) (Semester- II) (Elective-II) (311091-A-II)

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) What are the different energy sources used in nonconventional machining processes? **[10]**

b) What are the needs of unconventional manufacturing process? **[6]**

OR

Q2) a) What is the reason for using unconventional or advanced machining? **[10]**

b) Which non-conventional machining process has highest material removal rate? **[6]**

Q3) a) What are the different types of nano finishing process? **[10]**

b) Why finishing is necessary on metal surface? **[8]**

OR

Q4) a) What is the purpose of nano finishing process? **[10]**

b) What is the need for nano finishing process? **[8]**

P.T.O.

Q5) a) What are the difference between bottom-up fabrication and top-down fabrication? **[12]**

b) What are the approaches used in nano fabrication? **[6]**

OR

Q6) a) What are the two fundamental approaches to nanomanufacturing? **[6]**

b) What are the key issues in the synthesis of nanomaterials? **[12]**

Q7) a) Which device can be used for nano measurement? **[12]**

b) What is the role of size in nanomaterials? **[6]**

OR

Q8) a) What are the different methods of measurement of nano materials? **[12]**

b) What is importance of Nanometrology? **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB3953

[6262]-225

[Total No. of Pages :2

T.E. (Production Engineering)

STATISTICS AND NUMERICAL METHODS

(2019 Pattern) (Semester- II) (Elective-II) (311091A-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) What are types of error? Discuss in detail. **[9]**

b) If $u = 4x^2y^3/z^4$ and errors in x, y, z be 0.00, compute the relative maximum error in u, when $x = y = z = 1$. **[9]**

OR

Q2) a) What are algebraic and transcendental equations? **[9]**

b) Find the root of equation $x^3 – 20x + 20 = 0$, by Newton Raphson method. Take initial guess as 1, up to accuracy 0.001. **[9]**

Q3) a) Discuss various methods of least square criteria's. **[9]**

b) Following is the data given for the values of x & y. Fit a second degree polynomial of type $ax^2 + bx + c$, where a, b, c are constants. **[8]**

x	–3	–2	–1	0	1	2	3
y	12	4	1	2	7	15	30

OR

Q4) a) What is quadric equation? And explain how it is fitted? **[9]**

P.T.O.

b) In some determinations of the values v of CO_2 dissolved in a given volume of water at different temp θ, the following pairs were obtained.

θ	0	5	10	15
v	1.80	1.45	1.18	1.00

Obtain by method of least square, a relation of the form $v = b + a\theta$ which best fits to these observations. Also find the value CO_2 dissolved in volume of water at temp. 25°C. **[8]**

Q5) a) The following are co-ordinates of a set of point. Find x at $y = 2$. **[9]**

x	0	1	2	3
y	0	1	7	25

b) Use Simpson's 3/8 rule to evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\sin x + \cos x}\, dx =$

$\int_0^{\frac{\pi}{2}} (\sin x + \cos x)^{1/2}\, dx$ (Consider only one strip i.e. 3 sub strips). **[9]**

OR

Q6) a) $\int_0^1 \frac{\sin x}{2 + 3\sin x}.dx$ find the integration using Simpson's 3/8 rule (6 strips). **[9]**

b) A set of values x and $f(x)$ are given below. Using Lagrange's interpolation formula, find $f(g)$ when $x_g = 9$. **[9]**

x	5	7	11	13	17
$y = f(x)$	150	392	1452	2866	5202

Q7) a) What is significance of optimization in manufacturing? **[9]**

b) Discuss Genetic Algorithm (GA) with any one case study. **[8]**

OR

Q8) a) Explain Lagrange multipliers and Steepest descent method? **[9]**

b) What is optimization? Explain classical and multiple optimization. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB3954

[Total No. of Pages :5

[6262]-226

T.E. (Production Engineering)

FINANCIAL MANAGEMENT AND COSTING

(2019 Pattern) (Semester- II) (Elective-II) (311091A-IV)

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) What is the effect of credit policy and price level changes on working capital? **[6]**

b) Hi-tech Ltd. plans to sell 30,000 units next yaer. The expected cost of goods sold is as follows: **[6]**

₹.(Per Unit)	
Raw material	100
Manufacturing expenses	30
Selling, administration and financial expenses	20
Selling price	200

The duration at various stages of the operating cycle is expected to be as follows:

Raw material stage	2 months
Work-in-progress stage	1 month
Finished stage	1/2 month
Debtors stage	1 month

Assuming the monthly sales level of 2,500 units, estimate the gross working capital requirement. Desired cash balance is 5% of the gross working capital requirement, and working progress in 25% complete with respect to manufacturing expenses.

c) Is there a difference between the project's and the firm's cost of capital? Explain. **[5]**

OR

P.T.O.

Q2) a) Find out the effective rate of interest, if nominal rate of interest is 12% and is quartely compounded. **[6]**

b) What are the dangers of excessive and inadequate working capital? **[6]**

c) What is the opportunity cost of capital? Is it same as the required rate of return? **[5]**

Q3) a) What are the important methods of Costing? Describe each of them briefly. **[6]**

b) From the records of an oil distribution company, the following summarized information is available for the month of March 1996: **[6]**

Sales of month:	Rs. 19,25,000
Opening Stock as on 1.3.1996:	1,25,000 litre @ 6.50 per litre

Purchases (including freight and Insurance):

March 5	150,000 litre @ Rs. 7.10 per litre
March 27	100,000 litre @ Rs. 7.00 per litre
Closing stock as on 31.3.96:	1,30,000 litres.

General administrative expenses for the month:Rs. 45,000

On the basis of the above information, work out the following using:

FIFO methods of inventory valuation assuming that pricing of issues is being done at the end of the month after all receipts during the month:

i) Value of closing stock as on 31.3.96

ii) Cost of goods sold during March 1996

iii) Profit or loss for March 1996

c) Ramesh Ltd. has three production departments A, Band C and six service departments. The following figures are extracted from the records of the company: **[5]**

Production Departments		Service Departments	
A	₹16,000	Stores	₹2,000
B	₹10,000	Timekeeping	₹3,000
C	₹12,000	Maintenance	₹1,000
	₹38,000	Power	₹2,000
		Walfare	₹1,000
		Supervision	₹2,000
		Total	₹49,000

The other information available in respect of the production departments:

	Production Departments		
Particulars	A	B	C
No. of Employees	40	30	20
No. of Stores Requisition	30	20	10
Horse Power of Machines	500	500	600
Machine Hours	2500	1500	1000

You are required to apportion the costs of various service departments to production departments.

OR

Q4) a) What are the important techniques of costing? Explain each one. **[6]**

b) Calculate the earnings of workers A and B under Straight Piece Rate System and Taylor's Differential Piece Rate System from the following particulars: **[6]**

Standard time allowed 50 units per hour.

Normal time rate per hour ₹100.

Differentials to be applied.

80% of Piece rate below standard.

120% of Piece rate at or above standard.

In a day of 8 hours A produced 300 units and B produced 450 units.

c) Following information is made available from the costing records of a factory: **[5]**

i) The original cost of the machine : ₹1,00,000

Estimated life : 10 years

Residual value : ₹5,000

Factory operates for 48 hours per week: 52 weeks in a year.

Allow 15% towards machine maintenance down time 5% (of productive time assuming unproductive) may be allowed as setting up time.

ii) Electricity used by the machine is 10 units per hour at a cost of 50 paise per unit.

iii) Repair and maintenance cost is ₹500 per month.

iv) Two operators attend the machine during operations along with two other mahcines. Their total wages including fringe benefits, amounting to ₹5,000 per month is paid.

v) Other overheads attributable to the machine are ₹10,431 per year. Using above data, calculate machine hour rate.

Q5) a) Define Standard Costing. What do you understand by Standard Cost and Standard Costing? **[6]**

b) Discuss the preliminary steps for determination of Standard Cost. **[6]**

c) Calculate Material Cost Variance from the following information:

Standard Price of material per kg = ₹4

Standard Usage of materials = 800 kgs

Actual Usage of materials = 920 kgs

Actual Price of materials per kg = ₹3

Actual Cost of materials ₹2,760

Standard cost of material for actual production ₹3,200 **[6]**

OR

Q6) a) What are the differences between Standard Costing and Estimated Costing? **[6]**

b) Explain the different types of Material Cost Variance. **[6]**

c) From the following particulars, calculate Labour Variance:

Standard hours = 200

Standard rate for actual production = ₹1 per hour

Actual hour = 190

Actual Rate = ₹1.25 per hour **[6]**

Q7) a) What do you understand by Marginal Costing? Define Marginal Costing. Briefly explain the features of marginal costing. **[6]**

b) What are the merits and demerits of process costing? **[6]**

c) From the following information, calculate the amount of profit using marginal cost technique:

Fixed cost ₹3,00,000

Variable cost per unit ₹5

Selling price per unit ₹10

Output level 1,00,000 units **[6]**

OR

Q8) a) What is meant by Cost Driver? Explain role of Cost Driver in tracing costs to products. **[6]**

b) Write short notes on: **[6]**

i) Normal Process Loss

ii) Abnormal Process Loss

iii) Abnormal Gain

c) In Process A, 1,000 units were introduced at a cost of ₹20,000, the other expenditure incurred in the process were materials ₹10,000 and wages ₹5,000. 10% is the normal loss during production andpossess a scrap value of ₹3 each. The output of process A was only 800 units. Find out the value of Abnormal Loss. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3955

[Total No. of Pages : 2

[6262]-227

T.E. (Production Engineering - Sandwich)

MANUFACTURING TECHNOLOGY (Self Study)

(2019 Pattern) (Semester - I) (311122(A))

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) ***Figure to the right indicates full marks.***
3) ***Neat Diagram must be drawn wherever necessary.***
4) ***Use of Logarithmic Table, Slide rule and pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Brief the types of Maintenance with suitable example. **[10]**

b) Explain Ferrography with neat sketch. **[7]**

OR

Q2) a) Explain the function of reliability and state the difference between Reliability and Quality. **[8]**

b) What is availability and how can it be increased? **[9]**

Q3) a) Brief Deming's Approach and Juran's Approach. **[8]**

b) Write Short Notes (Any two) : **[9]**

i) TPM

ii) Kaizen

iii) Quality Circle

OR

Q4) a) Describe House of Quality with suitable example. **[10]**

b) Explain in Brief about 7 QC Tools. **[7]**

P.T.O.

Q5) a) Explain MRP 1 and MRP 2. **[10]**

b) Write Short Notes (Any Two) : **[8]**

i) Law of Demand and Supply

ii) Law of diminishing marginal utility

iii) Capital Market

OR

Q6) a) Explain with suitable example Selection of 4 M's. **[10]**

b) Enlist types of charts and forms used in production planning And explain any two charts with neat sketch. **[8]**

Q7) a) Explain the Organization of Estimating Department with suitable example. **[9]**

b) Write Short Notes : **[9]**

i) Need of Scrap.

ii) Replacement Techniques

iii) Time value of Money

OR

Q8) a) Brief the objectives and functions of cost estimation. **[9]**

b) Write the types of Depreciation and Explain any two. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PB-3956

[Total No. of Pages : 4

[6262]-228

T.E. (Production Sandwich)

KINEMATICS AND DESIGN OF MACHINES

(2019 Pattern) (Semester - II) (311084(A))

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) ***Neat Diagram must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary***
4) ***Use of Logarithmic Table, Slide rule and pocket calculator is allowed.***
5) ***Figure to the right indicates full marks.***

Q1) a) Define the following terms as applied to cam with neat sketch : **[8]**

i) Base Circle ii) Pitch Circle

iii) Pressure angle iv) Stroke of the follower

b) The turning moment diagram for a petrol engine is drawn to the following scales turning moment 1 mm = 5 N-m; crank angle 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order, are 295, 685, 40, 340, 960, 270 mm^2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m. **[10]**

OR

Q2) a) Sketch different types of cams and follower and name it. **[6]**

b) A riveting machine is driven by a constant torque 3 kW motor. The moving parts including the flywheel are equivalent to 150 kg at 0.6 m radius. One riveting operation takes 1 second and absorbs 10000 N-m of energy. The speed of the flywheel is 300 r.p.m. before riveting. Find the speed immediately after riveting. How many rivets can be closed per minute? **[12]**

P.T.O.

Q3) a) Explain the Modified Goodman Diagram for fluctuating axial/bending stresses with neat sketches. **[8]**

b) A plate made of plain carbon steel 40C8(Sut = 580 N/mm^2), shown in Fig. (A), is subjected to a completely reversed axial force of 40 kN. The theoretical stress concentration factor at the change in the cross-section is 2.27 and the notch sensitivity is 0.8. The surface finish factor and the size factor are 0.75 and 0.85 respectively. The load factor is 0.923. The expected reliability is 90%, for which the reliability factor is 0.897. If the required factor of safety is 2, determine the plate thickness for infinite life. **[9]**

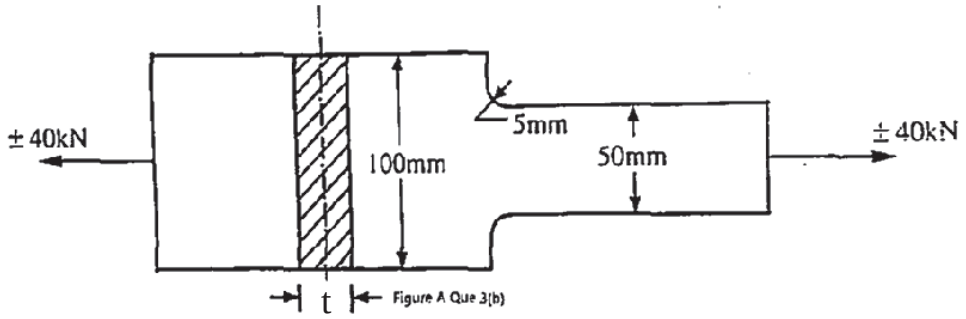

Figure A Que 3(b)

OR

Q4) a) Define the following terms : **[8]**

i) Notch sensitivity

ii) Endurance Limit

iii) Stress Concentration

b) A steel bar of 50mm diameter is subjected to a completely reversed bending stress of 250 N/mm^2. The ultimate tensile strength of steel is 600 N/mm^2. The surface finish factor and size factor are 0.43 and 0.85 respectively. The reliability factor is 0.897. Assuming there is no stress concentration, determine the life of the bar. **[9]**

Q5) a) Explain the following terms used in the statistical analysis of the engineering problems : **[6]**

i) Arithmetic Mean

ii) Median

iii) Standard deviation

b) A batch of 100 helical compression springs are tested for the deflection under the axial load. The results are tabulated as follows : **[12]**

Deflection of springs in mm	Number of springs
26-28	2
28-30	12
30-32	50
32-34	32
34-36	4

If the permissible deflection for the springs is between 29mm and 33mm, determine the % of the springs likely to be rejected

Z	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Area	0.3159	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452

[Use linear interpolation for values in between.]

OR

Q6) a) Explain the difference between 'design tolerance' and 'natural tolerance'. **[6]**

b) The recommended class of fit for the journal and the bearing of a hydrodynamic bearing is 20 H_7-e_8. The diameters of the journal and bearing are normally distributed. From the considerations of hydrodynamic action and bearing stability, the maximum and minimum clearances are limited to 0.08 and 0.05 mm respectively. Determine the percentage of rejected assemblies.
The tolerances in micron are as follows: **[12]**

Diameter, mm	H_7		e_8	
	es	ei	es	ei
20	+21	0	–40	–73

[Use linear interpolation for values in between.]

Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
Area	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554
Z	1.8	1.9	2.0	2.1	2.0	2.1	2.2	2.3
Area	0.4641	0.4713	0.4772	0.4821	0.4772	0.4821	·0.4861	0.4893
Z	2.4	2.5	2.6	2.7				
Area	0.4918	0.4938	0.4953	0.4965				

Q7) a) What is design for manufacture (DFM)? Explain the general principles to be followed while designing the parts for manufacture. **[8]**

b) Explain desirable, undesirable effects and functional requirement parameter in optimum design. State various step involved in optimum design for normal specification. **[9]**

OR

Q8) a) Define adequate design & optimum design. **[3]**

b) A tensile bar of length 200 mm is subjected to the constant tensile force of 5000 N If the factor of safety is 3, design the bar with the objective of minimizing the material cost, out of the following materials : **[14]**

Material	Mass density ρ kg/m^3	Material cost per unit Mass c, Rs/kg	Yield strength Syt, N/mm^2
Steel	7800	14	400
Aluminium Alloy	2800	66	150
Titanium Alloy	4500	1100	800
Magnesium Alloy	1800	75	100

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Total No. of Questions : 8] **SEAT No. :**

PB-3957

[Total No. of Pages : 3

[6262]-229
T. E. (Production/Sandwich Engineering)
Material Forming and Mould Design
(2019 Pattern) (Semester - II) (311124 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) ***Neat diagrams must be drawn whenever 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) A 0.1% carbon steel strip is 50 mm wide and 5 mm thick was rolled in one pass to 3.5 mm at 1060 °C. When the homogeneous yield stress was 1.05 KN/mm^2. The roll diameter was 340 mm. find magnitude of rolling load, taking into account roll flattening, if rolls were made up of CI. Assume young's modulus (E) = 1.005 MN/mm^2 and Poissons ratio (r) = 0.35. **[8]**

b) Explain briefly Electromagnetic forming with neat sketch. **[5]**

c) Explain briefly with neat sketch Electro-Hydraulic forming. **[5]**

OR

Q2) a) Explain neat sketch Automatic gauge control in Rolling (AGC). **[5]**

b) Explain with neat sketch Electro-Hydraulic forming. **[5]**

c) Determine maximum possible reduction for cold rolling a 300 mm thick slab when coefficient of friction is 0.08 and roll diameter is 600 mm. What is maximum reduction on same mill when coefficient of friction is 0.5 for hot rolling processes. **[8]**

Q3) a) Explain Pouring basin, Sprue, Sprue base well, Runner and Gate in sand casting with neat sketch. **[6]**

P.T.O.

b) Explain following in case of Die casting **[6]**

i) Draft

ii) Parting line shape & location

iii) Die wear

Die lubricants

c) Explain about the various methods available for trapping slag in pouring basin. **[6]**

OR

Q4) a) For a slab casting 500 × 250 × 50 mm which to be made in cast iron calculate the choke area. Take density of material as 7.86 gms/cm^3, fluidity of iron as 22 inches, mass density of molten metal (d) as 6.09 gms/cm^3, efficiency factor (c) as 0.85. Assume top gating system with 100 mm cope height. **[8]**

b) Explain following in case of sand casting with sketch **[10]**

i) Pouring time

ii) Choke area

iii) Chovornov's rule

iv) Gating ratio

Q5) a) Define formability and explain various forgability tests. **[6]**

b) Explain various forging design factors in detail. **[6]**

c) Explain various forging operations to be carried out in multi-impression die with neat sketch. **[5]**

OR

Q6) a) Explain following for forging operations with neat sketch **[8]**

i) Fullering

ii) Edging

iii) Blocking

iv) Finishing

b) Explain following **[9]**

i) Liquid metal forging

ii) Isothermal forging

Q7) a) Explain stripper plate ejection technique for injection moulding with suitable sketch. **[8]**

b) Explain following in case of injection mould with sketch **[9]**

i) Core & Cavity

ii) Sprue bush

OR

Q8) a) Explain in detail any two types of gates used in injection moulding. **[8]**

b) Explain following in case of injection mould **[9]**

i) Guide pillar & guide bush

ii) Register ring

Total No. of Questions : 8]

SEAT No. :

PB-4471

[Total No. of Pages : 2

[6262]-300RA

T.E. (Production Sandwich Engg.)

METROLOGY AND QUALITY CONTROL

(2019 Pattern) (Semester - II) (311125A)

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) ***Figure to the right indicates full marks***
3) ***Neat diagrams 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) Elaborate machine vision in brief. **[9]**

b) Classify types of probes with neat sketches. **[8]**

OR

Q2) a) Enlist applications of CMM. Explain any two applications in detail. **[9]**

b) Write short notes on the following. (any two) **[8]**

i) Straightness measuring method

ii) DC and AC Interferometer

iii) Concept of straightness

Q3) a) Why flatness measurement is essential? Explain various methods of measuring flatness. **[9]**

b) Draw the bevel gear showing its terminology. **[8]**

OR

Q4) a) Explain how the alignment of lathe bed may be checked by using various instruments. **[9]**

b) Enlist different methods to measure threads. Explain any one in detail. **[8]**

P.T.O.

Q5) a) Mention few methods for flow measurement. **[9]**

b) Draw neat diagram of Venturimeter. Explain its construction and working. **[9]**

OR

Q6) a) Discuss various methods for measurement of temperature. **[9]**

b) Differentiate between readability and reliability with desired examples. **[9]**

Q7) a) Describe various capability variables. **[9]**

b) Elaborate p and np charts in detail. **[9]**

OR

Q8) a) Explain briefly X and R chart. **[9]**

b) Why study of statistical quality control is important? Elaborate it. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3959

[Total No. of Pages : 3

[6262]-301

T.E. (Production Engineering) (Sandwich)

STATISTICS AND NUMERICAL OPTIMIZATION METHODS

(2019 Pattern) (Semester - II) (311088(A))

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) ***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.***

Q1) a) Determine the root of the given equation sin X = 0 for X = [3, 4] within the accuracy of 0.05, using bisection Method and correct through three decimal places. **[9]**

b) Find a root of an equation $F(x) = \sin x - \frac{(x+1)}{(x-1)}$ using Newton Raphson method. With $X_0 = -0.2$ for two interactive steps. **[8]**

OR

Q2) a) Solve following equation using gauss elimination method. **[8]**

$3x_1 - x_2 + x_3 = -2$

$-x_1 + x_2 + x_3 = 4$

$5x_1 + 2x_2 + 9x_3 = 15$

b) Solve following equation using gauss Seidal method upto three approximations. **[9]**

$5x_1 - x_2 + x_3 = 10$

$2x_1 + 8x_2 - x_3 = 11$

$-x_1 + x_2 + 4x_3 = 3$

P.T.O.

Q3) a) Number of man-hours and the corresponding productivity (in units) are furnished below. Fit a simple linear regression equation $y = a + bx$ applying the method of least squares. **[8]**

Man-hours	3.6	4.8	7.2	6.9	10.7	6.1	7.9	9.5	5.4
Productivity (in units)	9.3	10.2	11.5	12	18.6	13.2	10.8	22.7	12.7

b) Find In 9.2 with $n = 3$, using Lagrange's interpolation formula with the given table **[9]**

x	9	9.5	10	11
In x	2.197	2.251	2.302	2.397

OR

Q4) a) Evaluate e^{2x} for $x = 0.05$ using Newton Forward Difference Method. **[9]**

x	0.00	0.10	0.20	0.30	0.40
$y = e^{2x}$	1.000	1.2214	1.4918	1.8221	2.255

b) Fit a straight line to the data given below. Also estimate the value of y at $x = 2.5$. **[8]**

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

Q5) a) State the order of the polynomial which might be suitable for the following function. Calculate $f(45)$ using Newton Backward Difference Method.**[9]**

x	40	50	60	70	80
$f(x)$	31	73	124	159	190

b) Find the value of y at $x = 1.1$ by Using Newton Divided Difference Method formula from the following data. **[9]**

x	0.0	0.1	0.3	0.6	1.0
y	–6.0	–5.89483	–5.65014	–5.17788	–4.28172

OR

Q6) a) Evaluate $f(x) = 0.2 + 25x$ from $x = 0$ to $x = 2$ by using Trapezoidal Method by taking 3 divisions. **[9]**

b) Use Simpsons 1/3rd rule to evaluate $\int_0^1 e^x dx$. **[9]**

Q7) a) Describe in brief Method of Lagrange's Multipliers. **[9]**

b) Explain the Steepest Decent Method used in manufacturing. **[9]**

OR

Q8) a) Write in brief implantation of Simulating annealing with suitable example. **[9]**

b) Brief on: Generalized reduced gradient Method. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3960

[Total No. of Pages : 2

[6262]-302

T.E. (Production Sandwish Enggineering)

ADVANCED MATERIALS

(2019 Pattern) (Semester - II) (311126 A(I)) (Elective - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. No. 1 or Q. No. 2, Q.No. 3 or Q.4, Q. No. 5 or Q.No. 6, Q.No. 7 or Q.No.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) How does filament winding contribute to the manufacturing of advanced materials? **[8]**

b) What is the role of the laminate-laminate code in the macromechanical analysis of laminates? **[9]**

OR

Q2) a) Explain the process of RTM and its role in manufacturing advanced materials? **[8]**

b) Explain generalized Hooke's law? Explain the reduction of Hooke's law from three dimensions to two dimensions in the context of a lamina?**[9]**

Q3) a) What are different systems used in the preparation of Functionally Graded Materials? Explain some notable properties? **[8]**

b) Explain the Shape Memory Alloys (SMAs) with its Classifications, Composition and Applications? **[9]**

OR

Q4) a) Explain the classifications of Functionally Graded Materials with its Applications? **[8]**

b) How are Shape Memory Alloys classified based on their composition? **[9]**

P.T.O.

Q5) a) What are the unique properties exhibited by materials at the nano scale? State their advantages and disadvantages? **[9]**

b) Highlight important bio metallic alloys, such as Ni-Ti alloy and Co-Cr-Mo alloys with their properties and Applications? **[9]**

OR

Q6) a) Explain Nano materials with their significance in various fields? State the Advantages, Disadvantages and Applications? **[9]**

b) What is the importance of biocompatibility in biomaterials and its impact on medical applications? **[9]**

Q7) a) What are the significant properties of Aluminum alloys? State their important metallurgical aspects and Applications? **[9]**

b) Explain the composition of Cobalt base super alloys and their role in enhancing properties and State their Applications? **[9]**

OR

Q8) a) What are the strengthening mechanisms employed in Nickel base super alloys? State their properties and Applications? **[9]**

b) What are the important metallurgical aspects of Magnesium alloys with their properties and Applications? **[9]**

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 3

PB-3961

[6262]-303

T.E. (Production (Sandwich) Engineering)

COSTING AND COST CONTROL

(2019 Pattern) (Semester - II) (Elective - II) (311126(A) - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
4) ***Use of electronic pocket Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What is Machine Hour Rate? What are its advantages and disadvantages? **[8]**

b) Calculate the machine hour rate from the following: **[10]**

	Rs.
Cost of machine	18,000
Cost of installation	2,000
Scrap value after 10 years	2,000
Rates and rent for a quarter for the shop	600
General lighting	200p.m.
Shop supervisor's salary	Rs. 6,000 per quarter
Insurance premium for a machine	120 p.a.
Estimated repair	200 p.a.

Power 2 units per hour @ Rs.l50 per 100 units

Estimated working hours p.a. 2,000

The machine occupies 1/4th of the total area of the shop. The supervisor is expected to devote 1/6th of his time for supervising the machine. General lighting expenses are to be apportioned on the basis of floor area.

OR

Q2) a) What are the principal factors to be considered when fixing a machine hour rate? Give a specimen computation. **[8]**

P.T.O

b) The following particulars relate to a processing machine treating a typical material. You are required to calculate the machine hour rate. **[10]**

The cost of the machine Rs. 10,000

Estimated life 10 years

Scrap value Rs. 1,000

Working time (50 weeks of 44 hrs. each) 2,200 hrs.

Machine maintenance per annum 200 hrs.

Setting up time estimated @ 5% of total productive time

Electricity is 16 units per hour @ 10 paise per unit.

Chemicals required weekly Rs. 20

Maintenance cost per year Rs. 1,200

Two attendants control the operations of the machine together with 6 other machines, their combined weekly wages are Rs. 140. Departmental overhead allocated to this machine per annum Rs. 2,000.

Q3) a) Discuss the reasons for overheads being analyzed into fixed and variable components. **[8]**

b) The production department of factory furnishes the following information for the month of March 2015 : **[9]**

Materials used	Rs. 2,50,020
Direct wages	Rs.2,08,350
Overheads	Rs. 1,66,680
Labour hours worked	1,66,680
Hours of machine operation	1,38,900
For an order executed by the department during a particular period, the relevant information was as under :	
Materials used	Rs.27,78,000
Direct Wages	Rs.14,8 1,600
Labour hours worked	14,816
Machine hours worked	11,112

Calculate the overhead charges chargeable to the job by the following methods:

i) Direct materials cost percentage rate

ii) Labour hour rate; and

iii) Machine hour rate

OR

Q4) a) Distinguish clearly between direct and indirect materials. Under what circumstances may direct materials be charged indirectly to the product? **[9]**

b) Explain any two methods of secondary distribution of Overheads. **[8]**

Q5) a) Distinguish between traditional costing system and activity based costing. **[8]**

b) The under given data is supplied by Fair deal travel services, From the following information calculate fare for passenger Km. **[9]**

The cost of the Bus	Rs. 4,50,000
Insurance charges	3 % p.a.
Annual tax	Rs. 4500
Garage rent	Rs. 500 p.m.
Annual repairs	Rs. 4800
Expected life of the bus	5 yrs
Value of scrap at the end of 5 years	Rs. 30,000
Route distance	20 km long
Driver's salary	Rs. 550 p.m.
Conductor's Salary	Rs. 500 p.m.
Commission to Driver & conductor (shared equally)	10 % of the takings
Stationary	Rs. 250 p.m.
Manager-cum-accountant's Salary	Rs. 1750 p.m.
Diesel and Oil (for 100 kms)	125

The bus will make 3 rounds trips for carrying on the average 40 passenger's in each trip. Assume 15 % profit on takings. The bus will work on the average 25 days in a month.

OR

Q6) a) Draw up a job cost-sheet for a simple product, to find out the cost of a product. **[8]**

b) What are the benefits of activity based costing? Distinguish between traditional costing system and activity based costing. **[9]**

Q7) Write Short note on: **[18]**

a) Value analysis and Value engineering

b) Zero Base Budgeting

OR

Q8) Write Short note on: **[18]**

a) Cost Volume Profit Analysis

b) Profit volume ratio

☺☺☺

Total No. of Questions : 8]

SEAT No. :

PB-3962

[Total No. of Pages : 2

[6262]-304

T.E. (Production Sandwish Enggineering)

ADVANCED JOINING TECHNOLOGY

(2019 Pattern) (Semester - II) (311126(A)-III) (Elective - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Attempt 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 if necessary.***

Q1) a) Explain diffusion bonding process stating its advantages, disadvantages and applications of the process. **[10]**

b) Explain Brazing and soldering process stating its advantages, disadvantages and applications. **[8]**

OR

Q2) a) Explain Ultrasonic Welding stating its advantages, disadvantages and applications of the process. **[9]**

b) Explain Friction Welding stating its advantages, disadvantages, and applications of the process. **[9]**

Q3) a) Explain Thermit welding stating its advantages, disadvantages and applications of the process. **[9]**

b) Explain Electron beam welding stating its advantages, disadvantages and applications of the process. **[8]**

OR

Q4) a) Explain Friction stir welding stating its advantages, disadvantages and applications of the process. **[9]**

b) Write short notes on: **[8]**

P.T.O.

i) Cold Metal Transfer Joining

ii) Welding automation in aerospace

Q5) a) Describe various types of joints used in welding with sketch in short. **[9]**

b) Describe in short, the Magnetic Particle Testing of weldments. **[9]**

OR

Q6) a) Write short notes on: **[9]**

i) Radio graphs of weldments

ii) Life assessment of weldments

b) Describe in short, the liquid penetration test of weldments. **[9]**

Q7) a) Write Short notes on: **[8]**

i) Weld thermal cycles and their effects

ii) concept of HAZ

b) What do you understand by weldability? Explain how weldability is assessed in short. **[9]**

OR

Q8) a) Explain the following weld defects, their causes and remedies. **[9]**

i) Lack of penetration

ii) Cracks

iii) Lack of fusion

b) What are different weldability test? Describe any one in short. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3963

[Total No. of Pages : 2

[6262]-305

T.E. (Production Sandwish Enggineering)

WORLD CLASS MANUFACTURING

(2019 Pattern) (Semester - II) (311126(A)-IV) (Elective - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 o.r 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) ***Assume Suitable data if necessary.***
4) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.***
5) ***Figure to the right indicates full marks.***

Q1) a) State and explain Cellular Manufacturing. Explain work cell concepts and applications. **[9]**

b) What are the various types of coding systems widely used? Explain in brief. **[8]**

OR

Q2) a) Explain the concept of part family in detail **[9]**

b) What is Production Flow Analysis? List the steps involved in carrying out PFA. **[8]**

Q3) a) State & explain the concept of Total Productive Maintenance with the help of pillars. **[9]**

b) What is Overall Equipment Effectiveness (OEE). State and explain it. **[8]**

OR

Q4) a) What is Resource Levelling? State and explain its importance with suitable example. **[9]**

b) State and explain the concept of Autonomous Maintenance **[8]**

P.T.O.

Q5) a) What is Theory of Constraints? What are the Steps of Theory of Constraints? **[9]**

b) What are 5S techniques? Explain with suitable example. **[9]**

OR

Q6) a) What is Drum-Buffer-Rope Approach? Explain it in detail. **[9]**

b) What is throughput accounting in Theory of Constraints? What are the limitations of throughput accounting? How do you calculate throughput in accounting? **[9]**

Q7) a) Explain enablers of Industry 4.0 and barriers of Industry 4.0 **[9]**

b) What is Lean Thinking and how can it be applied to Service Sector? **[9]**

OR

Q8) a) Define IOT. Explain the applications of IOT in manufacturing **[9]**

b) With suitable examples, explain the effect of the lean approach in healthcare **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3964

[Total No. of Pages : 4

[6262]-306

T.E. (Mechatronics Engineering)

MACHINE DESIGN

(2019 Pattern) (Semester - I) (317541)

Time : 2½ 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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***
5) ***Use of non programmable calculator & drawing instruments is allowed.***

Q1) a) Define Power Screw. Why are square threads preferable to V threads for power transmission? **[6]**

b) The nominal diameter of a triple threaded square screw is 50 mm, while the pitch is 8 mm. It is used with a collar having an outer diameter of 100 mm and inner diameter as 65 mm. The coefficient of friction at the thread surface as well as at the collar surface can be taken as 0.15. The screw is used to raise a load of 15 kN. Using the uniform wear theory for collar friction, calculate: (i) torque required to raise the load; (ii) torque required to lower the load; and (iii) the force required to raise the load, if applied at a radius of 500mm. **[12]**

OR

Q2) a) Write a short note on the self-locking and over-hauling screw. **[6]**

b) The lead screw of a lathe has single-start ISO metric trapezoidal threads of 52 mm nominal diameter and 8 mm pitch. The screw is required to exert an axial force of 2 kN in order to drive the tool carriage during turning operation. The thrust is carried on a collar of 100 mm outer diameter and 60 mm inner diameter. The values of coefficient of friction at the screw threads and the collar are 0.15 and 0.12 respectively. The lead screw rotates at 30 rpm. Calculate (i) the power required to drive the lead screw; and (ii) the efficiency of the screw. **[12]**

P.T.O.

Q3) a) Define Stress Concentration and explain the causes of stress concentration. **[6]**

b) Determine the thickness of a 120 mm wide uniform plate for safe continuous operation if the plate is to be subjected to a tensile load that has a maximum value of 250 kN and a minimum value of 100 kN. The properties of the plate material are as follows: Endurance limit stress = 225 MPa and Yield point stress = 300 MPa. The factor of safety based on yield point may be taken as 1.5. **[12]**

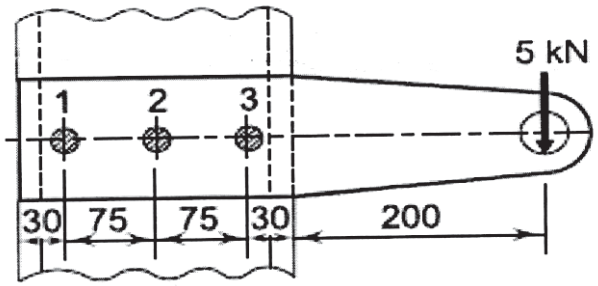
OR

Q4) a) Explain the Soderberg and Goodman's diagram for fluctuating stresses. **[6]**

b) A machine component is subjected to fluctuating stress that varies from 40 to 100 N/mm^2. The corrected endurance limit stress for the machine component is 270 N/mm^2. The ultimate tensile strength and yield strength of the material are 600 and 450 N/mm^2 respectively. Find the factor of safety using (i) Gerber theory (ii) Soderberg line (iii) Goodman line Also, find the factor of safety against static failure. **[12]**

Q5) a) Define Threaded Joint with its advantages and disadvantages. **[7]**

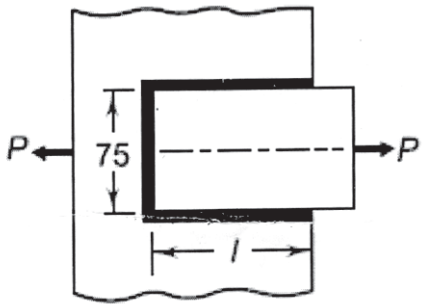
b) A steel plate subjected to a force of 5 kN and fixed to a channel by means of three identical bolts is shown in Fig. The bolts are made from plain carbon steel 45C8 (Syt = 380 N/mm^2) and the factor of safety is 3. Specify the size of bolts. **[10]**



OR

Q6) a) What is the cause of residual stresses in welded joints? How are they relieved? **[5]**

b) A plate, 75 mm wide and 10 mm thick, is joined with another steel plate by means of single transverse and double parallel fillet welds, as shown in Fig. The joint is subjected to a maximum tensile force of 55 kN. The permissible tensile and shear stresses in the weld material are 70 and 50 N/mm^2 respectively. Determine the required length of each parallel fillet weld. **[12]**



Q7) a) Define : **[5]**

i) Spring

ii) Spring Index

iii) Solid length of spring

iv) Compressed length of spring

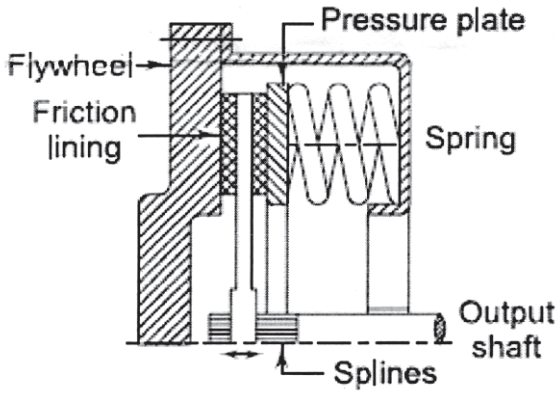
v) Free length of spring

b) It is required to design a helical compression spring subjected to a maximum force of 1250 N. The deflection of the spring corresponding to the maximum force should be approximately 30 mm. The spring index can be taken as 6. The spring is made of patented and cold-drawn steel wire. The ultimate tensile strength and modulus of rigidity of the spring material are 1090 and 81 370 N/mm^2 respectively. The permissible shear stress for the spring wire should be taken as 50% of the ultimate tensile strength. Calculate: (i) wire diameter; (ii) mean coil diameter; (iii) number of active coils; (iv) total number of coils; (v) free length of the spring; and (vi) pitch of the coil. **[12]**

OR

Q8) a) Write a short note on Nipping of Leaf Spring. **[5]**

b) An automotive single plate clutch consists of two pairs of friction surfaces, one between the friction lining and the pressure plate and the other between the friction lining and the flywheel as shown in Fig. Eight identical helical compression springs, arranged in parallel, provide the required axial thrust on the friction surface. The total spring force exerted by all springs is 2400 N and the corresponding deflection of each spring is approximately 15 mm. The spring index can be taken as 8. The springs are made of patented and cold-drawn steel wire with ultimate tensile strength of 1390 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the spring wire can be taken as 30% of the ultimate tensile strength. Design the springs and calculate: (i) wire diameter; (ii) mean coil diameter; (iii) number of active coils; (iv) total number of coils; (v) solid length; (vi) free length. **[12]**



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Total No. of Questions :8]

SEAT No. :

PB3965

[Total No. of Pages : 2

[6262]-307
T.E.(Mechatronics Engineering)
MANUFACTURING PROCESSES
(2019 Pattern)(Semester -I)(317542)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.No.1or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of drawing instruments, electronic pocket calculators are allowed.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define Machining & differentiate between orthogonal & oblique cutting. **[8]**

b) Describe the tool geomerty of single point cutting tool with neat sketch. **[9]**

OR

Q2) a) Classify the Milling Machine. Compare shaping and Plaining Machine. **[8]**

b) What are the various type of chips? Explain with neat sketch. **[9]**

Q3) a) Write short note on: **[8]**

i) Soldering method

ii) Brazing method

b) Draw neat sketch of Oxy Acetylene gas welding and explain important points regarding Oxy Acetylene welding. **[9]**

OR

Q4) a) Write short note on: **[8]**

i) Forge welding

ii) Ultrasonic welding

b) What are the type of brazed joint? Compare Soldering and Brazing processes. **[9]**

P.T.O.

Q5) a) Explain with neat sketch electrical discharge machining(EDM) **[6]**

b) Write short note on Fundamental of Rapid prototyping. **[6]**

c) Explain with neat sketch laser beam machining. **[6]**

OR

Q6) a) Explain with neat sketch Electron Beam Machining(EBM). **[6]**

b) Classify the unconventional machining processes. **[6]**

c) Write short notes on Stereo lithography. **[6]**

Q7) a) Explain silicon processing with neat sketch.(circuit) **[6]**

b) Explain photolithography and layer processes used in IC fabrication. **[6]**

c) State the proceduce for PCB fabrication. **[6]**

OR

Q8) a) Explain IC packaging. **[6]**

b) Explain PCB assembly with neat sketch. **[6]**

c) What do you mean by PCB structure. What are the types and materials required? **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3966

[Total No. of Pages : 2

[6262]-308

T.E. (Mechatronics Engg.)

CONTROL SYSTEM

(2019 Pattern) (Semester - I) (317543)

Time : 2½ Hours] ***[Max. Marks : 70***

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. 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) State the Properties of root locus. **[8]**

b) Sketch the root locus of unity feedback system with open loop Transfer function **[9]**

G(S)=K/S((S+1) (S+4)

OR

Q2) a) What is Root Locus? Give advantages and applications of Root Locus **[8]**

b) Sketch the Root Locus Of System with open loop transfer function **[9]**

G(S) H(S)=K(S+4) (S+6)/S(S+2)

Q3) a) Sketch the Polar Plot of system **[8]**

i) G(S)H(S)=10/S(S+1)(S+5)

ii) G(S)H(S)=50/(S+1)(S+2)(S+5)

b) Explain the Correlation between frequency and time domain specifications. **[9]**

OR

Q4) a) Derive the expression for Resonant Frequency and Resonant Peak. **[8]**

b) Sketch the Nyquist Plot of System with open loop Transfer Function G(S) H(S)=50/(S+1)(S+2)(S+5) and comment on stability. **[9]**

P.T.O.

Q5) a) What is Bode Plot? State the applications of Bode Plot, Explain the procedure to sketch actual Bode Plot. **[8]**

b) Draw the Bode Plot of System with open loop Transfer Function **[10]**

$G(S)=40(S+1)/S^2(S+4)(S+10)$

Also determine Gain Crossover Frequency, Phase Crossover Frequency, Gain Margin and Phase Margin and Comment on stability

OR

Q6) a) Draw the Bode Plot of System with open loop Transfer Function **[10]**

$G(S)=K/S(S+1)(S+5)$

Also determine Gain Crossover Frequency, Phase Crossover Frequency, Gain Margin and Phase Margin and Comment on stability

b) Write a Short note on Asymptotic Bode Plot **[8]**

Q7) a) Explain following actions with their transfer function and features **[9]**

i) P-Action

ii) I.Action

iii) D-Action

b) Explain Ziegler and Nichols open loop Step response method of PID tuning. **[9]**

OR

Q8) a) Explain Ziegler and Nichols closed loop Step response method of PID tuning. **[9]**

b) Explain Industrial Automation with their different types also state the necessity of IOT based Industrial Automation. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3967

[Total No. of Pages : 2

[6262]-309

T.E. (Mechatronics Engineering)

DIGITAL SIGNAL PROCESSING

(2019 Pattern) (Semester - I) (317544)

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) ***Neat diagram must be drawn wherever necessary.***
3) ***Use of Non-programmable Calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Find DTFS for the following : **[9]**

$$x(n) = \sin\left(\frac{\pi}{3}n\right)$$

b) Distinguish between DTFS and DTFT. **[4]**

c) Enlist the properties of DTFS. **[4]**

OR

Q2) a) Find the DTFT of the sequence, $x(n) = \{1, 0, 1, 0\}$. **[10]**

b) State and explain the properties of DTFT. **[7]**

Q3) a) Perform the circular convolution of given sequences **[12]**

$x(n) = \{1, 3, 5, 7\}$

$h(n) = \{2, 4, 6, 8\}$

b) Discuss in brief Butterfly operations and Bit reversal form in FFT. **[6]**

OR

Q4) a) State various properties of DFT. **[6]**

b) Compute the 8-point DFT of the sequence **[12]**

$x(n) = \{2, 0, 2, 0, 2, 0, 2, 0\}$

using radix-2 decimation-in-time (DIT) FFT algorithm.

P.T.O.

Q5) a) Draw analog filter frequency response show all details. Also sketch and brief the response of Butterworth filter responses. **[9]**

b) Apply bilinear transformation to the following to find H(*z*), **[9]**

$$H(s) = \frac{1}{(s+2)(s+3)}$$

with T = 1 sec.

OR

Q6) Design a Butterworth digital low pass filter with following specification, **[18]**

$0.8 \le |H(e^{jw})| \le 1$; for $0 \le \omega \le 0.2\pi$

$|H(e^{jw})| \le 0.2$; for $0.6\pi \le \omega \le \pi$

using bilinear transformation method. Assume T = 1 sec.

Q7) a) List various types of window function used in FIR filter Design, state the mathematical function. Explain Gibbs phenomenon in brief. **[11]**

b) Compare FIR and IIR filters. **[6]**

OR

Q8) Design a linear-phase FIR Low Pass Filter with the following desired frequency response. Sketch magnitude response. **[17]**

$$H_d(e^{jw}) = 1; -\frac{\pi}{2} \le \omega \le \frac{\pi}{2}$$

$$H_d(e^{jw}) = 0; \frac{\pi}{2} \le \omega \le \pi$$

Using hanning window with N = 9.

▽▽▽▽

Total No. of Questions : 8] **SEAT No. :**

PB-3968 **[Total No. of Pages : 2**

[6262]-310

T.E. (Mechatronics Engineering)

MICROCONTROLLERS

(2019 Pattern) (Semester - I) (317545)

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) ***Use of calculators is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) List different timer modes of 8051 microcontroller and describe mode 2 with a neat sketch. **[6]**

b) Write in brief about C data types used in 8051 Programming **[6]**

c) Generate square waves of 2 kHz on port pin P2.1 generate delay using timer 0 in mode 1. Assume a crystal frequency of 11.0592 MHz. Also write the program **[6]**

OR

Q2) a) Explain the timer structures of 8051 with TMOD register **[6]**

b) Write an 8051 C program to toggle all the bits of port P1 continuously with some delay in between. Use Timer 0, 16-bit mode to generate the delay. **[6]**

c) Find the value of TH l if the timer l is used in timer mode2 to generate a baud rate of 4800. Assume appropriate oscillator frequency. **[6]**

Q3) a) Give different steps followed by 8051 in response to interrupt. Explain with an example. **[5]**

b) Name the five interrupt sources of 8051? **[5]**

c) Write an 8051 C program to switch “ON” OR “OFF” A LED connected on P 1.3 Complement the LED whenever the switch is connected on P 3.2 is pressed. **[8]**

OR

P.T.O.

Q4) a) Write a note on Programming of External hardware interrupts in C. **[5]**

b) With neat diagram explain the ADC interface to 8051. **[5]**

c) Explain IE and IP register **[8]**

Q5) a) Explain SBUF register of 8051 **[5]**

b) Draw & explain PCON register format of 8051. **[5]**

c) Explain the function of RS232C pins of DB-9 connector **[7]**

OR

Q6) a) Describe the baud rate in UART 8051. On which factors it depends. **[5]**

b) List the advantages of serial communication over parallel communication. **[5]**

c) Draw the format of SCON register & explain the function of each bit. **[7]**

Q7) a) Draw the interfacing of stepper motor and write a program to rotate in anticlockwise direction **[10]**

b) Draw and explain temperature measurement using 8051 **[7]**

OR

Q8) a) Draw and explain interfacing of LED in different configurations. Use a suitable delay to blink LED connected at port P2.1 and write a program in C **[10]**

b) Draw interfacing of 16 × 2 LCD with 8051 and state the function of EN and RS of LCD **[7]**

Total No. of Questions : 8]

SEAT No. :

PB-3969

[Total No. of Pages : 2

[6262]-311

T.E. (Mechatronics Engineering)

INDUSTRIAL AUTOMATION

(2019 Pattern) (Semester - II) (317547)

Time : 2½ 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) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) a) Draw a ladder diagram for following comparison operations : **[8]**

i) less than

ii) greater than

b) Draw a ladder diagram for MUL, DIV and SQR math operations. **[9]**

OR

Q2) a) Draw a ladder diagram for following math operations : **[8]**

i) ADD

ii) SUB

b) Draw a ladder diagram for following comparison operations : **[9]**

i) equal

ii) not equal to

iii) greater than or equal to

Q3) a) Explain analog signal processing for analog input signal with example. **[8]**

b) What is PID tuning and state various tuning methods for it. Explain loop control PID function with inputs and outputs. **[9]**

OR

P.T.O.

Q4) a) Explain multi-bit data processing with suitable diagram. **[8]**

b) Explain analog output application for Analog In / Analog or BCD Out with neat sketch. **[9]**

Q5) a) Explain working of HMI with suitable example. **[6]**

b) State the need of HMI with its advantages. **[6]**

c) State the need of drives and explain Variable Frequency Drive (VFD) in detail. **[6]**

OR

Q6) a) Compare PLC and SCADA on any six points. **[6]**

b) Draw a block diagram for motion control and state its different elements. **[6]**

c) Explain Selection criterion for drives and also enlist various methods of speed control for PLC. **[6]**

Q7) a) Explain SCADA system with its benefits. **[6]**

b) Explain Internet based SCADA system and also list down its advantages. **[6]**

c) State the applications of SCADA and explain any one application related to our day today life. **[6]**

OR

Q8) a) State different SCADA packages and compare among each other's. **[6]**

b) Differentiate between PLCs and RTUs. **[6]**

c) Write a short note on : Master Terminal Units (MTU). **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3970

[Total No. of Pages : 2

[6262]-312
T.E. (Mechatronics Engineering)
ELECTRO-MECHANICAL SYSTEMS
(2019 Pattern) (Semester - II) (317548)

Time : 2½ 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) ***Figure to the right indicates full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Use of drawing instruments, electronic pocket calculators are allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explanation neat sketch the any two types of Pressure Intensifiers. **[6]**

b) Explanation of Meter in and Meter out circuits. **[6]**

c) Explain the accumulators. State its types. Explain any one. **[6]**

OR

Q2) a) Difference between Meter in and Meter out circuits. **[6]**

b) Explain with neat sketches spring loaded and gas charged accumulators. Explain their advantages and disadvantages. **[6]**

c) Difference between Meter in and Meter out circuits. **[6]**

Q3) a) Sketch and explain the general layout of Pneumatic Systems. **[6]**

b) Explain construction and working of pneumatic (air) filter and lubricator. **[6]**

c) What is an air compressor? Explain its classification. **[5]**

OR

Q4) a) Write a short note on : **[6]**

i) Directional control valves.

ii) Non-return valves

b) What are the advantages and disadvantages of Pneumatic Systems? **[5]**

c) Compare Hydraulic & Pneumatic systems. **[6]**

P.T.O.

Q5) a) Draw Pneumatic circuits using quick exhaust valve. **[6]**

b) Draw the Circuit for - Speed Control explanation. **[6]**

c) Draw the Circuit for - Operating SAC using 3/2 DCV, explanation. **[6]**

OR

Q6) a) Draw the Circuit for - Operating DAC using 4/2 DCV, explanation. **[6]**

b) Draw the Circuit for - Operating Two SAC in Sequence, explanation. **[6]**

c) Draw the Circuit for - Operating SAC and DAC in Sequence, explanation. **[6]**

Q7) a) Explain Electro-pneumatic systems. **[5]**

b) What is ladder logic diagram in PLC. Explain its functions. **[6]**

c) Explain Electro-hydraulic system. **[6]**

OR

Q8) a) Explain the use of PLC for industrial process control. **[6]**

b) Explain hydro-pneumatic system. **[6]**

c) Explain the function of Relays in electro pneumatic systems **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3971

[Total No. of Pages : 4

[6262]-313

T.E. (Mechatronics)

FINITE ELEMENT ANALYSIS

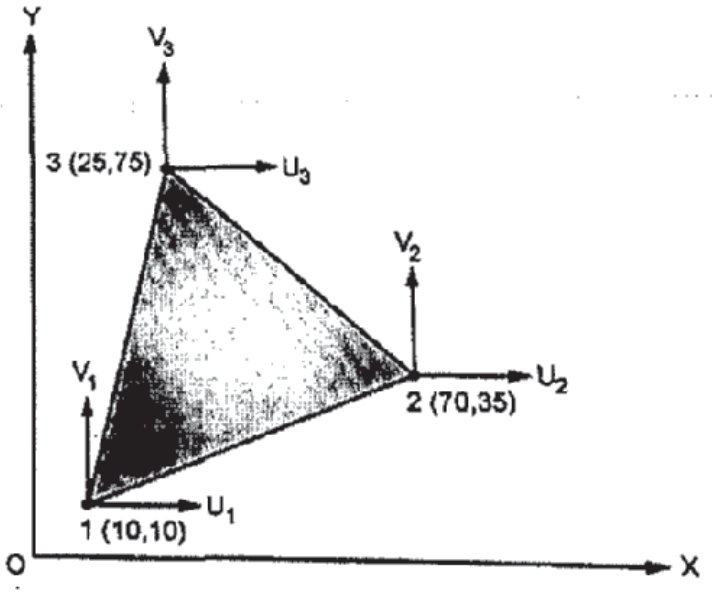
(2019 Pattern) (Semester - II) (317549)

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) A triangular metallic plate ($E = 210*10^3$ N/mm^2, poison ratio = 0.25) of thickness 10 mm is used in machine assembly. The coordinates of the three vertices of the plate are shown in fig. The deflections observed at three nodes are $U_1 = 0.01$ mm, $V_1 = -0.04$ mm, $U_2 = 0.03$ mm, $V_2 = 0.02$ mm, U_3 -0.02 mm, $V_3 = 0.05$ mm. Assuming the plate as CST element, determine the strains and stresses. **[10]**



b) Explain verification and validation of results in FEA post-processing? **[8]**

P.T.O.

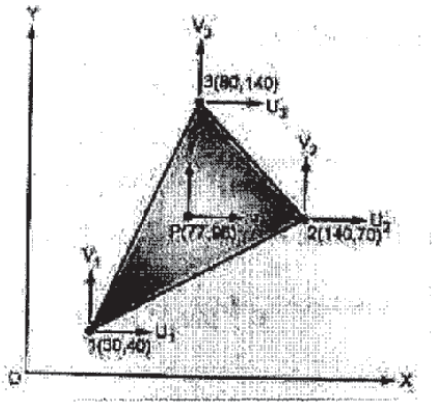
OR

Q2) a) In a triangular element, the nodes 1, 2 and 3 have cartesian coordinates : (30, 40), (14, 70) and (80, 140) respectively. The displacement in mm at nodes 1, 2 and 3 are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3) respectively. The point P within the element has cartesian coordinates (77, 96). For point P, determine: **[10]**

i) The natural coordinates

ii) The shape functions

iii) The displacement of point P



b) Explain the tricks for post processing in computer aided Engineering. **[8]**

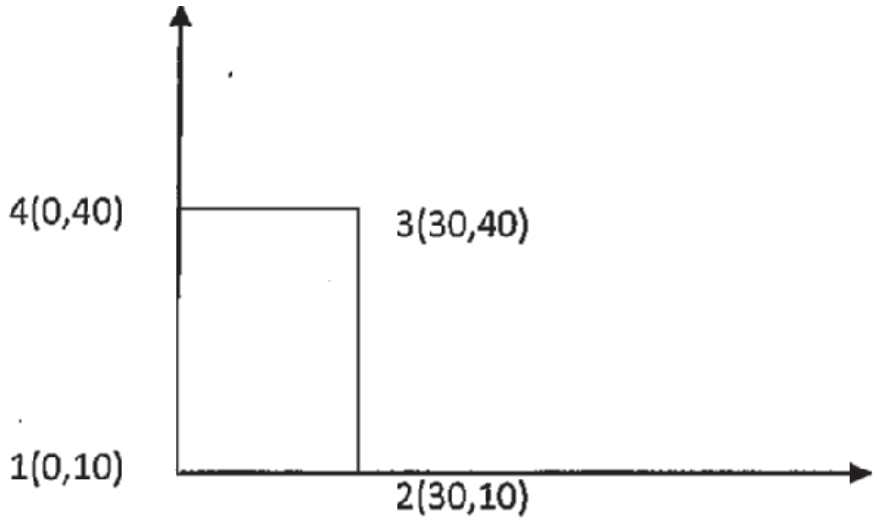
Q3) a) Evaluate the following integrals using 2-point or 3-point Gaussian quadrature method. Also compare with the exact solution. **[10]**

$$\int_5^{10} (1 + x + x^2) dx$$

b) Explain the terms isoparametric, subparametric and superparametric elements. **[7]**

OR

Q4) a) For the element shown in fig., assemble Jacobian Matrix and strain displacement matrix for the Gaussian point (0.7,0.5). **[10]**



b) Differentiate between p-refinement and h-refinement. **[7]**

Q5) a) A brick wall has a thickness of 0.6m and thermal conductivity of 0.8 W/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^2. Using two elements for finite element formulation, determine the steady state temperature distribution within the wall and heat flux through the wall. **[10]**

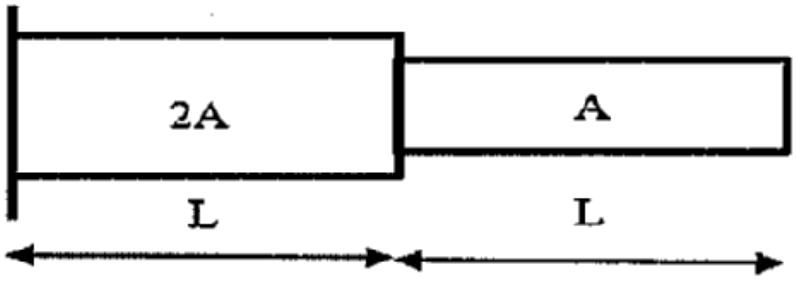
b) Explain essential and natural boundary conditions and solving for temperature distribution. **[7]**

OR

Q6) a) A brick wall has a thickness of 0.6m and thermal conductivity of 0.75 W/m° K. The inner surface of wall is at 15°C and outer surface is exposed to cold air at –15°C. The heat transfer coefficient at outer surface is 40 W/m^2. Using two elements for finite element formulation, determine the steady state temperature distribution within the wall and heat flux through the wall. **[10]**

b) Define Fin. Explain with appropriate governing equations. **[7]**

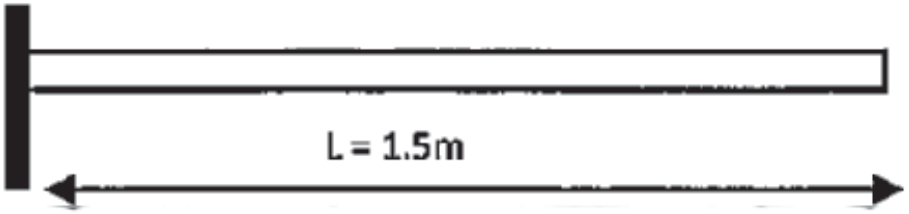
Q7) a) Find the natural frequencies of longitudinal vibrations of the same stepped shaft of areas A = 1000mm^2 and 2A = 2000mm^2 and of equal lengths (L), when it is constrained at one end, as shown in fig. **[10]**



b) Differentiate between Lumped mass system and Consistent mass system. **[8]**

OR

Q8) a) Estimate the natural frequencies of axial vibrations of bar shown in fig. using consistent mass matrices. The bar is having uniform cross-section as A = 50* $10^6 m^2$. Length = 1.5m, modulus of elasticity = 2* 10^{11} N/m^2 and density = 7800 kg/m^3. Model the bar using two elements. **[10]**



b) Enlist and explain different types of Dynamic Analysis. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

PB3972

[Total No. of Pages : 2

[6262]-314

T.E. (Mechatronics Engineering)

EMBEDDED SYSTEM DESIGN

(2019 Pattern) (Semester - II) (317550)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Write a program in embedded C to generate a square wave of 1Hz to blink LED for PIC18FXX. **[6]**

b) Explain compare mode of operation of PIC 18XX in details with proper neat diagram. **[6]**

c) Design a DC Motor control using PWM of CCP mode in PIC18FXX. **[6]**

OR

Q2) a) Draw and Explain the capture mode of CCP module in PIC18FXX. **[9]**

b) Draw an interfacing diagram and write an algorithm for DC Motor speed control using PIC18XXX. **[9]**

Q3) a) Explain Interrupt Structure of PIC 18FXXX. **[5]**

b) Explain external hardware interrupts in PIC 18FXX. **[5]**

c) Explain in detail the steps in executing an interrupt for PIC 18FXX. **[8]**

OR

P.T.O.

Q4) a) Write a short note on sources of interrupts in PIC18FXX. **[5]**

b) Explain PORTB Change on interrupt of PIC18FXX. **[5]**

c) Write a program using Timer 0 and Timer 1 interrupts to generate square wave on PINS RB1 and RB7 , while data is been transferred from PORT C to PORT D. Draw a neat interfacing diagram of PIC 18FXX. **[8]**

Q5) a) Design a PIC 18 based data acquisition system for Temperature Measurement using LM35. **[5]**

b) Draw and Explain interfacing of ADC for analog input 0 to 5v with PIC. **[5]**

c) Draw a neat interfacing diagram of 16 × 2 LCD with PIC 18FXX to display "SPPU" on first line and "UNIVERSITY" on second line, write an embedded C Program. **[7]**

OR

Q6) a) Draw and explain the interfacing of LCD to port D and port E of PIC 18FXX. nicrocontroller. **[5]**

b) Draw and explain an interfacing of Temperature sensors to PIC using Serial ADC. **[5]**

c) Design a PIC18 based data Acquisition system for Temperature measurement using LM35. Write the corresponding embedded C program to display the temperature on LCD. **[7]**

Q7) a) Explain RS-232 and RS-485 communication protocol in detail. **[8]**

b) Draw and explain MSSP structure of PIC 18FXX. **[9]**

OR

Q8) a) Explain the SPI mode of MSSP structure used for serial communication with a proper neat diagram. **[10]**

b) Explain in detail MODBUS with its types and physical media. **[7]**

Total No. of Questions : 8]

SEAT No. :

PB-3973

[Total No. of Pages : 2

[6262]-315

T.E. (Mechatronics Enggineering)

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

(2019 Pattern) (Semester - II) (317551)

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.7or 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) Why use the Naive Baye algorithm? **[5]**

b) List down advantages and limitations of the Logistic Regression. **[5]**

c) Explain cost function in linear and logistic Regression. **[8]**

OR

Q2) a) Explain entropy reduction, information gain and Gini index in the decision tree. **[10]**

b) Explain the concept of Naïve Bayes algorithm and its application in classification tasks. Discuss the strengths and weaknesses of the Naïve Bayes algorithm. **[8]**

Q3) a) Differentiate between clustering and classification. **[5]**

b) Describe different evaluation metrics used in machine learning, such as accuracy, precision, recall, Fl score **[5]**

c) Explain the importance of data quality in machine learning. How can you ensure the data collected is of high quality? **[7]**

OR

Q4) a) Why is data pre-processing a critical step in the machine learning pipeline? Provide examples of common data preprocessing tasks. **[9]**

b) Explain hyper parameter tuning for SVM, Also identify methodology to attempt following problems and enlist general steps involved in it. **[8]**

P.T.O.

Q5) a) Compare and contrast value-based and policy-based reinforcement learning algorithms. **[5]**

b) Explain the concept of exploration vs. exploitation in reinforcement learning. **[5]**

c) Define Markov Decision Process (MDP) and explain its key components. How does it serve as a framework for solving reinforcement learning problems? **[8]**

OR

Q6) a) Explain the architecture and functioning of an artificial neural network. How do neural networks simulate the workings of the human brain? **[5]**

b) Differentiate between positive and negative reinforcement in the context of reinforcement learning. **[5]**

c) Provide examples of how reinforcement learning can be applied in mechanical engineering to optimize processes or control systems. **[8]**

Q7) a) What is predictive maintenance and how does it differ from traditional, reactive maintenance strategies? Provide an example of a real-world application. **[8]**

b) Explain fault diagnosis (of any suitable machine element) using ML. **[9]**

OR

Q8) a) Give examples of industries where process optimization has led to significant improvements in efficiency, cost reduction, or product quality. **[7]**

b) What is control algorithm tuning and why is it necessary in the operation of control systems? **[5]**

c) How is Machine Learning used for Manufacturing Process Optimization? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3974

[Total No. of Pages : 2

[6262]-316

T.E. (Robotics & Automation Engineering)

EMBEDDED SYSTEM IN ROBOTICS

(2019 Pattern) (Semester - I) (311501(A))

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) Explain Zig-Bee in detail. State its advantages, disadvantages and applications. **[9]**

b) Write short note on: **[9]**

i) Bluetooth

ii) USB

OR

Q2) a) Write a short note on: **[9]**

i) SPI

ii) RS232

b) Explain Field-bus (Profibus) in detail. State its advantages, disadvantages and applications. **[9]**

Q3) a) Write a short note on: **[9]**

i) Embedded networking

ii) Operators

b) Explain the terms: **[9]**

i) Constants

ii) Data types

iii) Variables

iv) Function

OR

P.T.O

Q4) a) What is LED? Explain interfacing of LED with any embedded C controller. **[9]**

b) Explain SFR in detail. **[9]**

Q5) a) Explain shared memory techniques in detail. **[8]**

b) Consider we have 3 tasks T1, T2, T3 in the foreground and T4 task in the background. **[9]**

Task Number	ei (in ms)	pi (in ms)
t1	5	20
t2	10	25
t3	15	50

Compute the completion time for the T4 when its processing time requirement is 200 ms to complete.

OR

Q6) a) Explain the terms: **[8]**

i) ISR

ii) Semaphores

iii) Task scheduler

iv) Message queues

b) Explain RTOS Foreground/Background SCHEDULING systems in detail. **[9]**

Q7) a) What is linux explain architecture of linux in detail. **[8]**

b) Write short note on: **[9]**

i) System call

ii) Network device driver

OR

Q8) a) Explain Linux kernel module in detail. **[8]**

b) Write short note on: **[9]**

i) Character device driver

ii) The Role of Device Driver

Total No. of Questions : 8]

SEAT No. :

PB3975

[Total No. of Pages : 2

[6262]-317
T.E. (Robotics & Automation)
HYDRAULICS AND PNEUMATICS
(2019 Pattern) (Semester - I) (311502 A)

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 and 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) With neat sketch, Explain Operation of Poppet check valve and state its advantages & Disadvantages. **[8]**

b) With neat sketch, Explain Operation of pressure and temperature of compensated FCV. **[9]**

OR

Q2) a) With Neat Sketch, explain construction and working of pilot operated pressure valve. **[8]**

b) Draw neat sketch and explain the following with their applications in circuit. **[9]**

i) Three Way, Two Position Direction Control Valve.

ii) Four Way, Three Position Direction Control Valve (Closed Centre)

Q3) a) Explain counter balance valve circuit with neat sketch. **[9]**

b) Explain speed control of a hydraulic motor circuit. **[9]**

OR

P.T.O.

Q4) a) Explain the pump unloading Circuit. **[9]**

b) With neat sketch explain the spring loaded accumulator. **[9]**

Q5) a) Write the advantages, disadvantages and applications of pneumatic system. **[9]**

b) With neat sketch explain the working of FRL unit. **[9]**

OR

Q6) a) Draw a typical circuit showing control of a double acting cylinder operated through use of an air pilot actuated direction control valve and explain working of the circuit. **[9]**

b) Explain with neat sketch working of AND valve and with the help of circuit diagram explain any one typical application. **[9]**

Q7) a) Explain one application each of Automation and Robotics using PLC. **[8]**

b) With neat sketch explain 5/2 - way single solenoid valve, spring return. **[9]**

OR

Q8) a) Draw and explain the direct control of single cylinders using electro pneumatics. **[8]**

b) What is a programmable logic controller? State the main function of each of the following elements of a PLC: **[9]**

i) CPU

ii) Programmer/monitor

iii) I/O module

❋ ❋ ❋

Total No. of Questions : 8]

SEAT No. :

PB-3976

[Total No. of Pages : 3

[6262]-318
T.E. (Robotics and Automation)
ROBOT KINEMATICS AND DYNAMICS
(2019 Pattern) (Semester - I) (311503 A)

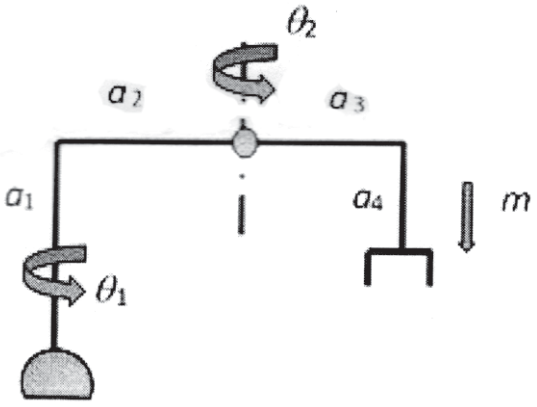
Time : 2½ Hours] *[Max. Marks : 70*

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) ***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 steps of pattern search algorithm to solve inverse kinematics problems. **[6]**

b) For the kinematic diagram of a robot shown in Fig.. obtain the inverse kinematic equations for joint parameters θ_1, θ_2. and m to bring the end effector to position (1.70, 1.87, 1.70). The link lengths are: $a_1 = 2$, $a_2 = 1.5$, $a_3 = 1.2$, $a_4 = 0.1$. **[12]**



OR

Q2) a) Perform one iteration of a steepest descent algorithm to minimize function $f = 2x_1^2.x_2 - 6x_1$. Consider initial solution as: $x_1 = 1$, $x_2 = 1$. **[10]**

b) Explain Roulette wheel selection as a reproduction operator in genetic algorithm. **[8]**

P.T.O.

Q3) a) Obtain the gripper force to hold a part weighing 50 N using friction against two opposing fingers. The coefficient of friction between the fingers and the part surface is 0.2. **[8]**

b) A pneumatic gripper has a cylinder of piston diameter 15 mm and required stroke length is 540 mm. The gripper force is 200 N, Detemine the motor power required in HP if it runs with 40 rpm. **[6]**

c) What are the advantages and limitations of mechanical grippers? **[4]**

OR

Q4) a) Explain the design aspects of Electromagnetic grippers. **[6]**

b) What are various criteria for selection of grippers in robotics applications? **[6]**

c) Determine the number of suction cups required for a vacuum gripper shown in Figure, to hold a mass of 20 Kg. Consider diameter of cup to be 50 mm, applied pressure is of 0.7 bar and coefficient of friction between cup and work surface is 0.2. **[6]**

Q5) a) What is robot inverse dynamics? How it is useful in robot design? **[8]**

b) A robot arm with revolute joint is stationary at $\theta = 20°$. It is required to move it to $\theta = 50°$ in 6 seconds. Find the coefficients of cubic polynomial that accomplishes this motion and brings the manipulator to rest at goal point. Hence determine the angular position, angular velocity and angular acceleration at $t = 2$ seconds. **[9]**

OR

Q6) a) Explain by means of an example the concept of dynamic equation of motion for a robot. **[5]**

b) For a planer robot having two prismatic joints as shown in figure, determine the force on each link at time $t = 3$ sec. considering the mass of the link 1 as 4 kg and mass of link 2 as 3 kg. The equation of Joint angle for link 1 is $q_1 = 0.3t^3 - 0.2t + 16$ and equation of Joint angle for link 2 is $q_2 = 0.1t^3 - 0.3t + 10$. **[12]**

Q7) a) Explain clearly the terms 'static balancing' and 'dynamic balancing'. State the necessary conditions to achieve them. **[9]**

b) Explain the method of balancing of different masses revolving in the same plane. **[8]**

OR

Q8) a) Write note on : Balancing machines. **[5]**

b) A shaft carries four masses in parallel planes A, B, C and D in this order along its length. The masses at B and C are 18 kg and 12.5 kg respectively, and each has an eccentricity of 60 mm. The masses at A and D have an eccentricity of 80 mm. The angle between the masses at B and C is 100° and that between the masses at B and A is 190°, both being measured in the same direction. The axial distance between the planes A and B is 100 mm and that between B and C is 200 mm. If the shaft is in complete dynamic balance, determine: **[12]**

i) The magnitude of the masses at A and D;

ii) The distance between planes A and D ; and

iii) The angular position of the mass at D.

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3977

[Total No. of Pages : 2

[6262]-319
T.E. (Robotics & Automation Engineering)
SENSORS TECHNOLOGY
(2019 Pattern) (Semester - I) (311504A)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***All questions are compulsory i.e. Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Assume suitable data if necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain working principle of Resistance Temperature Detector (RTD). Also list the several applications of RTD **[8]**

b) Explain different "Governing Laws used in Thermocouple" also explain in detail Freiheit, Celsius and Kelvin scale of temperature with suitable examples. **[9]**

OR

Q2) a) Write a short note on thermistor. **[8]**

b) Explain the following term **[9]**

i) Thermal Energy

ii) Absolute Temperature

iii) Relative Temperature

Q3) a) What is Position Sensor? Explain in details about LVDT. **[8]**

b) Distinguish between "Point Type Level Sensor" and "Continuous Type Level Sensor" **[9]**

OR

Q4) a) Write a short note on Continuous Type Level Sensor **[8]**

b) Compare Piezoelectric Accelerometer and Piezoresistive Accelerometer. **[9]**

P.T.O

Q5) a) Explain the working of Load Cell with suitable circuit diagram also state the advantages and application of the same. **[9]**

b) What is Gauge Factor? Derive and expression for Gauge Factor in terms of poisons ratio. **[9]**

OR

Q6) a) Explain Bounded type Strain Gauge also state the advantages and application of the same. **[9]**

b) Explain the role of Wheatstone Meter Bridge in Strain Gauge Circuit also state the advantages and application of the same. **[9]**

Q7) a) Explain in details Nanotechnology-Enabled Sensors. **[9]**

b) Write a short note on Thermal Detectors and explain its any two types. **[9]**

OR

Q8) a) Write a short note on Nanotechnology. **[9]**

b) Write a short note on position and motion sensors. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4534

[Total No. of Pages : 2

[6262]-320

T.E. (Robotics and Automation)

STATISTICS AND NUMERICAL METHODS

(2019 Pattern) (Semester - I) (311505 (A)-(I)) (Elective - I)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed***
5) ***Assume suitable data if necessary.***

Q1) a) Solve the following system of linear equations using the Gauss elimination method **[9]**

$$2x + 3y - z = 7$$

$$3x + 2y + 4z = 9$$

$$x - y + 2z = 6$$

b) Use the bisection method to find the root function $f(x) = x^3 - 2x - 5$ within the interval [1,3] with a tolerance of 0.01. **[9]**

OR

Q2) a) Solve following equation using gauss elimination method **[9]**

$$4x + 2y - z = 8$$

$$2x - 3y + 2z = 0$$

$$-3x + y + 3z = 3$$

b) Use the Newton-Raphson method to find the root of the equation $f(x) = e^x - 2x$ with initial guess of $x_0 = 1$. Perform two iterations. **[9]**

P.T.O.

Q3) a) Given the following set of data points for x and y, use Newton's forward difference method to find the value of y at $x = 3.5$. **[9]**

x	1	2	4	5
y	1	8	64	125

b) Given the following set of data points for x and y, use Lagrange interpolation polynomial to find the value of y at $x = 2.5$. **[9]**

x	1	2	4	5
y	2	3	5	6

OR

Q4) a) Given the following set of data points for x and y, use Lagrange interpolation polynomial to find the value of y at $x = 2.3$. **[9]**

x	1	2	4	5
y	3	5	11	15

b) Given the following set of data points for x and y, use Newton's forward difference method to find the value of y at $x = 2.2$. **[9]**

x	1	2	3	4
y	1	4	9	16

Q5) a) Use the Trapezoidal rule to approximate the integral of $(x) = x^2 + 2x$ from $x = 0$ to $x = 2$. **[8]**

b) Use Simpson's 1/3 rule to approximate the integral of $(x) = x^3 + 4x^2$ from $x = 0$ to $x = 2$. **[9]**

OR

Q6) a) Use the fourth-order Runge-Kutta method to approximate the solution of the differential equation $dy/dx = x + y$ with the initial condition $y(0) = 1$ at $x = 0$. **[8]**

b) Use Simpsons 1/3rd rule to evaluate e^{-x^2}. **[9]**

Q7) a) Explain the concept of optimization and its significance in various fields such as engineering, economics and operations research. **[9]**

b) Describe the role of objective functions in optimization problems. How are they formulated and evaluated? **[8]**

OR

Q8) a) Write in brief implantation of Genetic Algorithm with suitable example. **[9]**

b) Brief on: Generalized reduced gradient Method. **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. : ____

PB-3978

[Total No. of Pages : 3

[6262]-321
T.E. (Robotics & Automation)
FINITE ELEMENT ANALYSIS
(2019 Pattern) (Semester - I) (311505 (A) II) (Elective - I)

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 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 calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What do you mean by displacement function? Write down convergence criteria for finite element analysis'? **[6]**

b) Write a note on Pascal's Triangle for identification of 2D element interpolation function. **[4]**

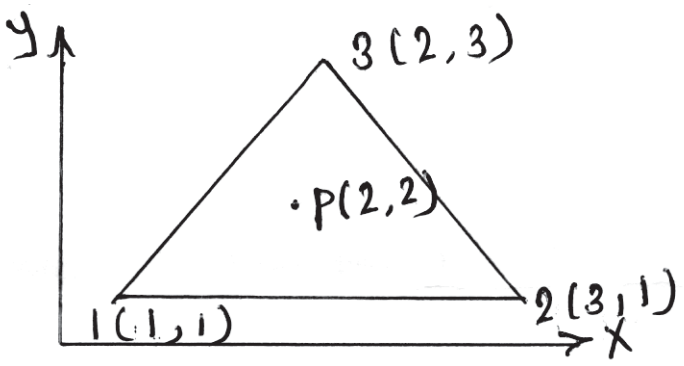
c) The triangular element has nodal coordinates (10, 10) (40, 20) and (30, 50) for nodes 1, 2 and 3 respectively for a point 'p' inside triangle. Determine the *x* and *y* coordinates if shape functions N_1 and N_2 are 0.15 and 0.25 respectively. **[8]**

OR

Q2) a) What are the characteristics of shape function? **[4]**

b) Write a Note on CST element and write a equation of stiffness matrix. **[4]**

c) For the triangular element shown in fig, the nodal values of displacement in *x* and *y* directions respectively are $u_1 = 2.0$, $u_2 = 3.0$, $u_3 = 5.0$ and $v_1 = 1.0$, $v_2 = 2.0$, $v_3 = 3.0$. Find out for plane stress conditions (i) Displacement of point P, (ii) Strain-displacement relationship (iii) Element stress (iv) Strains **[10]**



P.T.O.

Q3) a) Write short notes on : **[9]**

i) Uniqueness of mapping of isoparametric elements.

ii) Jacobian matrix

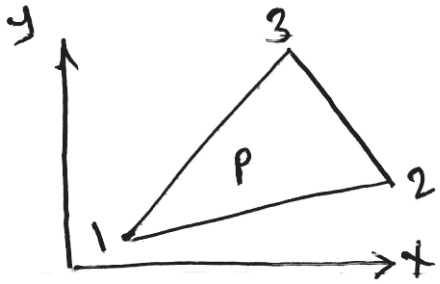
iii) Gaussian quadrature integration technique.

b) The coordinates and function values at the three nodes of a triangular linear element are given below. Calculate the function value at (20,6). **[8]**

Node I Coordinates (13,1) Function value 190

Node 2 Coordinates (25,6) Function value 160

Node 3 Coordinates (13,13) Function value 185.



OR

Q4) a) What are the Condition For Axisymmetric Problem? **[4]**

b) Explain the conergence criteria for isoparametric elements. **[5]**

c) Triangular elements are used for stress analysis of a plate subjected to in plane load. The components of displacement along x and y axes at the nodes i, j and k of an element are found to the (–0.001, 0.01), (–0.002, 0.01) and (–0.002, 0.02) cm respectively. If the (x, y) coordinates of the nodes i, j and k are (20, 20), (40, 20) and (40, 40) in cm respectively, find **[8]**

i) the distribution of the two displacement components inside the element and

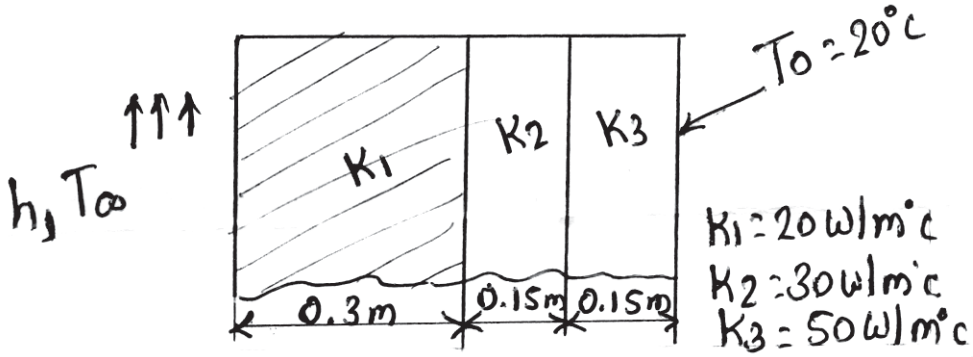
ii) components of displacement of the point (x_p, y_p) = (30, 25) cm.

Q5) a) Derive elemental stiffness matrix (conduction + convection) formulations for 1 D steady state heat transfer problems. **[7]**

b) Consider a brick wall of thickness = 0.3 m, k = 0.7 W/m°K. The inner surface is at 28°C and the outer surface is exposed to cold air at –15°C. The heat transfer coefficient associated with the outside surface is 40 W/m^2°K. Determine the steady state temperature distribution within the wall and also the heat flux through the wall. Use two elements and obtain the solution. **[10]**

OR

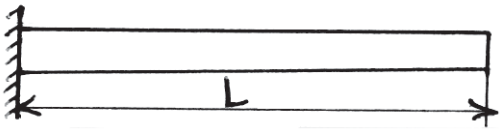
Q6) a) A composite wall consists of three materials a shown in fig. the outer temperature is T_0 = 20°C. Convection heat transfer takes place on the inner surface of the wall with $T_\infty = 800\,°C$ and $h = 25 W/m^2\,°C$. Determine the temperature distribution in the wall. **[10]**



b) Derive FEA stiffness matrix for Pin Fin Heat Transfer Problem. **[7]**

Q7) a) Write down Consistent Mass and Lumped Mass Matrix for **[8]**
i) Bar Element
ii) Plane Stress Element

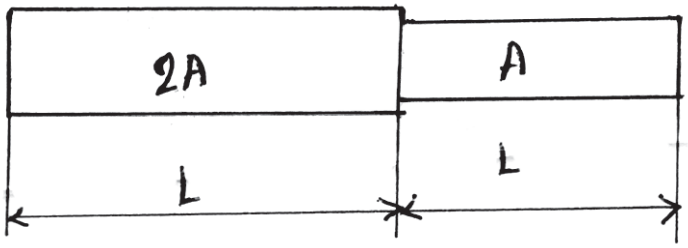
b) Find the natural frequency of longitudinal vibration using consistent and lumped mass matrix method with one element of bar as shown in fig. Take E = 2 × 1011 N/m², p = 7800kg/m³, L = 1m. **[10]**



OR

Q8) a) List difference between consistent and lumped mass matrix technique for modal analysis of structure. **[8]**

b) Find the natural frequencies of longitudinal vibrations of the same steppe shaft of areas A = 12000 mm² and 2A = 2500 mm² and of equal length (L = 1m), when it is constrained at one end, as shown below : **[10]**



▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-3979

[Total No. of Pages : 2

[6262]-322

T.E. (Robotics and Automation Engg.)

INDUSTRIAL ROBOTICS & MATERIAL HANDLING SYSTEMS

(2019 Pattern) (Semester - I) (311505A(III)) (Elective-I)

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 side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Describe briefly the various types of motion controls possible in robots. **[9]**

b) Explain in brief Robot centered cell used in manufacturing industries. **[9]**

OR

Q2) a) List and explain the general considerations in Robotic material handling. **[9]**

b) Explain in detail CNC machine tool loading. **[9]**

Q3) a) Show the following grippers with the help of a diagram: **[8]**

i) Two finger gripper

ii) Internal and external gripper

iii) Angular and parallel gripper

b) Write a short note on active and passive grippers. **[9]**

OR

Q4) a) List and Explain different types of end effectors used in robots and their applications. **[9]**

b) Discuss different factors influencing the choice of a robot. **[8]**

P.T.O.

Q5) a) Explain Material handling Robots used in warehouse. **[8]**

b) Explain in detail Robotic vision systems. **[9]**

OR

Q6) a) Explain continuous arc welding Robots used in Automobile industry. **[8]**

b) Define Die Casting. Explain Robots used in Die Casting, **[9]**

Q7) Write a short note on: **[18]**

a) Lee's Algorithm for obstacle avoidance.

b) Underwater applications Robots.

OR

Q8) Write a short note on: **[18]**

a) Medical applications.

b) Interfacing Robots with computers.

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 3

PB-3980

[6262]-323

T.E. (Robotics & Automation Engineering)

INTELLIGENT MANUFACTURING SYSTEM-IV

(2019 Pattern) (Semester - I) (311505(A)) (Elective - I)

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.***
5) ***Use of calculator is allowed.***

Q1) a) Using simulated annealing technique, update the solution (2, 3) to minimize the function x^2_1-6.x_1.x_2 with $1 \leq x_1.x_2 \leq 4$. **[12]**

b) Explain application of artificial neural network in manufacturing. **[5]**

OR

Q2) a) The spring back (S) in bending operations is mathematically expressed as: $S = -24.7 + 13.3t + 9.19r - 4.06t.r + 0.0073\ r.\theta + 0.941t^2 - 0.607r^2$. Where, t = sheet thickness (mm), θ = sheet orientation (degrees) and r = punch tip radius, Perform two iterations of genetic algorithm to minimize S considering bounds of variables as: $1 \leq t \leq 2$ mm, $0 \leq \theta \leq 90$ degrees and $1 \leq r \leq 4$ mm **[9]**

b) What is learning rate in artificial neural network? What is its significance? **[8]**

Q3) a) Apply the rank order clustering technique to the part machine incidence matrix in the following table to identify most logical part families and their machine groups. **[10]**

	Parts					
Machines	A	B	C	D	E	F
1	1				1	
2				1		1
3	1	1				
4			1	1		
5		1			1	
6			1	1		1

b) Explain the 'Weighted Minkowski metric' method of group technology. **[8]**

P.T.O

OR

Q4) a) Explain various coding and classification schemes in group technology. **[10]**

b) Apply row and column masking algorithm for grouping of the parts (P) and machines (M) from the following part machine incidence matrix.**[8]**

	Parts								
Machines	A	B	C	D	E	F	G	H	I
1	1								1
2		1					1		
3			1		1			1	
4		1				1	1		
5			1					1	
6						1	1		
7	1			1					
8			1		1				

Q5) a) Explain the applications of intelligent systems for mobile Robot Motion Planning. **[9]**

b) Explain Rapidly-exploring random trees (RRT) algorithm for robot path planning. **[8]**

OR

Q6) a) Explain the following terms related to Dijkstra's Algorithm used in path planning **[10]**

i) Graph

ii) Source and Destination vertex

iii) Non negative edges

iv) Time complexity

v) Space complexity

b) Use A* algorithm for AGV to determine the shortest path while moving from cell (4, 6) to target cell (1, 1). Consider obstacles are at cells (3, 3) and (2, 5). **[7]**

(1,1)	(2,1)	(3,1)	(4,1)
(1,2)	(2,2)	(3,2)	(4,2)
(1,3)	(2,3)	(3,3)	(4,3)
(1,4)	(2,4)	(3,4)	(4,4)
(1,5)	(2,5)	(3,5)	(4,5)
(1,6)	(2,6)	(3,6)	(4,6)

Q7) a) What is difference between robot path planning and robot trajectory planning? Explain with suitable example. **[9]**

b) How does flexible manufacturing system works? What are components of flexible manufacturing system? **[9]**

OR

Q8) Write short notes on: **[18]**

a) Real time scheduling in FMS

b) Autonomous mobile robots

c) Challenges in implementation of FMS

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 3

PB-3981

[6262]-324
T.E. (Robotics & Automation Engineering)
ROBOT PROGRAMMING
(2019 Pattern) (Semester - II) (311508(A))

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 labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of logarithmic table, slide rule is electronic pocket calculator is allower.***

Q1) a) Differentiate between the command structure of VAL-I and VAL-II language in Robot Programming. **[8]**

b) Explain various monitor command instructions used in VAL-Il. **[9]**

OR

Q2) a) Develop a program using VAL II robot programming language for a PUMA 560 robot when setting input signal at 25^{th} port of controller it unloads a cylindrical part of 10mm diameter, from Machine l positioned at point P1 with coordinates (150,250,0) mm and orientation (0,90,0)° and load the part on Machin2 positioned at P2 with coordinates(150,250,50)mm and orientation (0,90,0)°. The speed of robot motion is 20 in./s. However, because of safety precautions, the speed is reduced to 10 in./s while moving to a machine for an unloading or loading operation. **[9]**

b) Explain the following instruction in VAL-II with example: **[8]**

i) ABORT

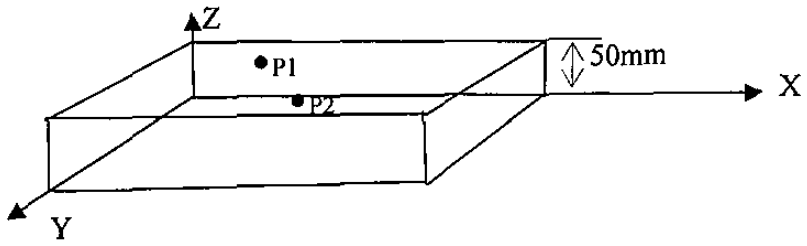
ii) EXECUTE

iii) DO

iv) RETRY

P.T.O

Q3) a) Develop a program using RAPID robot programming language using RAPID procedure for drilling operation from point P1(200,200,50) to P2(400,350,50) such that both the holes are of 5mm diameter and with depth of 50mm. While executing the program the orientation of end effector remains same as (0,90,0)°. **[9]**



b) Explain the following instruction in RAPID with example: **[9]**

i) GripLoad

ii) SetAO

iii) MoveC

iv) ISignalDO

v) WaitDO

vi) CONNECT

OR

Q4) a) Explain the Position Instructions and Input/Signal Instructions in RAPID with the help of examples of programs. **[9]**

b) Define Data types. Explain any four data type used in RAPID with the help of examples of programs. **[9]**

Q5) a) Explain the following instruction in AML with example: **[9]**

i) AMOVE

ii) DMOVE

iii) EOD

iv) QMONITOR

v) ERASE

vi) PRINT

b) Explain the following code & output when executed in AML: **[9]**

i) MONITOR (LED, 2, 0, 0, 1.5, 'passed');
MOVE (ARM, fgoal, LED);

ii) ATTN: SUBR;
MOTPARMS: NEW STOPMOVE;
WAITMOVE;
BREAK (EOL, 'ATTENTION REQUESTED');
APPLY ('AMOVE', MOTPARMS);
END;

iii) DMOVE(<4, 5, 6>, <30, –60, 90>);

iv) SPEED (0.8)

OR

Q6) a) Explain sensor instructions in detail with examples used in AML. **[9]**

b) Explain motion controls used in AML. **[9]**

Q7) a) Explain the methods of detecting possible collision of robots and what are the features added to avoid it. **[9]**

b) Write a short note on "Robot Economics". **[8]**

OR

Q8) a) Explain the process of repeatability measurement of robot. **[9]**

b) Write a short note on "Multiple robot and machine Interferences". **[8]**

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Total No. of Questions : 8]

SEAT No. :

PB-3982

[Total No. of Pages : 2

[6262]-325
T.E. (Robotics and Automation)
ARTIFICIAL INTELLIGENCE FOR ROBOTICS
(2019 Pattern) (Semester - II) (311509-A)

Time : 2½ 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 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 necessary.***

Q1) a) Explain with suitable example hidden Markov model in machine learning. **[9]**

b) In genetic algorithm, a certain variable is coded in binary form as 1101. What will be its actual value if lower bound and upper bound of the variable are 4 and 10 respectively? **[8]**

OR

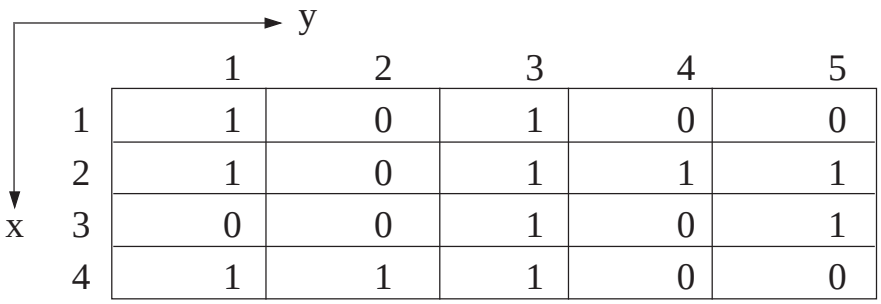
Q2) a) Ant colony optimization is used to solve a travelling salesmen problem with 5 stations. The distance matrix is given below. Considering starting station as A, what is the % probability that an ant will choose the path A to D? Assume initial pheromone deposition level as 1. **[10]**

	A	B	C	D	E
A	0	14	16	19	12
B	14	0	15	13	10
C	16	15	0	11	17
D	19	13	11	0	21
E	12	10	17	21	0

b) Write note on : Support vector machine. **[7]**

P.T.O.

Q3) a) Determine the centroid of the image given below. **[10]**



x \ y	1	2	3	4	5
1	1	0	1	0	0
2	1	0	1	1	1
3	0	0	1	0	1
4	1	1	1	0	0

b) Explain the application of machine vision system in robotics. **[7]**

OR

Q4) a) Determine the gradient of intensity of a pixel having intensity 4 in the image given below. Use Prewitt operator. **[10]**

3	5	7
5	4	3
2	8	5

b) Explain region growing method for image segmentation. **[7]**

Q5) a) Explain the applications of intelligent systems for mobile Robot Motion Planning. **[10]**

b) Write note on : Path Planning Robot Control in Dynamic Environmenls. **[8]**

OR

Q6) a) What are the different algorithms for localisation and obstacle avoidance? **[8]**

b) Explain application of artificial neural network in robot path planning. **[10]**

Q7) a) Explain with suitable example techniques for automatic tool path generation. **[9]**

b) Write note on: Flexible manufacturing system. **[9]**

OR

Q8) a) Explain with suitable example techniques for automatic tool path generation. **[9]**

b) What is real time scheduling in flexible manufacturing system? Explain with suitable example. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB-4490

[Total No. of Pages : 2

[6262]-326R
T.E. (Robotics & Automation)
FLEXIBLE MANUFACTURING SYSTEMS
(2019 Pattern) (Semester - II) (311510(A))

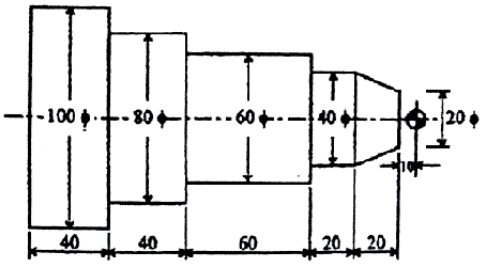
Time : 2½ Hours] ***[Max. Marks : 70***

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) ***Neat Diagram 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) ***Figure to the right indicates full marks.***

Q1) a) Define NC machine and write the advantages of NC machine system over manual methods. **[8]**

b) Prepare part programming of following component. **[9]**

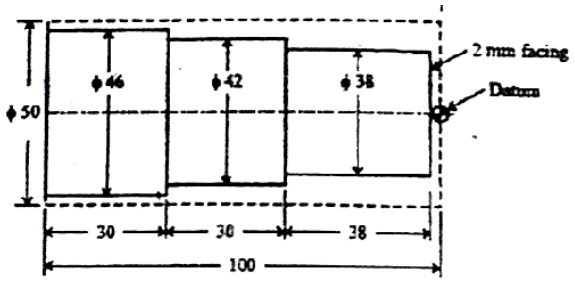


All dimensions in mm.

OR

Q2) a) Discuss the several word functions in Numerical Control systems. Discuss the advantages of DNC over NC/CNC. **[8]**

b) Prepare part programming of following component. **[9]**



Raw workpiece = ϕ 50 × 100 mm

_____ (Dotted line) = Raw workpiece

_____ (Continuous line) = Final part (Finished part)

All the Dimentions are in mm.

P.T.O.

Q3) a) What is a material requirement planning? Explain the various inputs to the MRP system? **[9]**

b) Explain the concept of ERP. **[9]**

OR

Q4) a) What is computer aided inspection (CAI) and how can we control quality with the help of CAI? **[9]**

b) Explain the term Rapid Product Development and Manufacture. **[9]**

Q5) a) Explain the basic components of a robotic system. **[9]**

b) What is robot? explain the benefits of using industrial robots. **[9]**

OR

Q6) a) Explain types of AGV and their principal of working. **[9]**

b) Explain the following terms : **[9]**

i) Unit load AS/RS

ii) Mini load AS/RS

iii) Carousel AS/RS

Q7) a) Give the concept of Tool Management. **[8]**

b) Describe Tool Preset Identification and Data Transfer. **[9]**

OR

Q8) a) What art the different types of tool strategies? Explain Each. **[8]**

b) Draw and explain block diagram offered detection in vibration. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

PB3984

[Total No. of Pages : 2

[6262]-327

T.E. (Robotics & Automation)

MICRO - ELECTRO - MECHANICAL SYSTEMS-I

(2019 Pattern) (Semester - II) (311511A) (Elective-II)

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) ***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.***

Q1) a) Explain in brief with a neat sketch of parallel plate capacitors and comb drive devices along with their application. **[9]**

b) Explain with a neat sketch of thermal resistors and thermal bimorph. Also, Explain the applications for each. **[8]**

OR

Q2) a) What are piezo-resistive sensors? Explain the different piezo- resistive sensor materials. **[9]**

b) Briefly explain the applications of comb drive devices with respect to: **[8]**

i) Inertia Sensors

ii) Actuators

Q3) a) Explain with a neat sketch of magnetic actuators and micro- magnetic components. **[9]**

b) Briefly explain the applications of parallel plate capacitors with respect to: **[9]**

i) Pressure Sensors

ii) Tactile Sensors

OR

P.T.O.

Q4) a) Write in brief one case study of MEMS in magnetic actuators. **[9]**

b) Write in brief one case study in piezoelectric sensors and actuators from a fabrication point of view. **[9]**

Q5) a) What are polymers? Explain in brief LCP and PDMS with their applications. **[8]**

b) Briefly explain polyimide and the application of polymers related to tactile sensors. **[9]**

OR

Q6) a) Briefly explain SU-8 and the application of polymers related to pressure sensors. **[8]**

b) Briefly explain PMMA and applications related to flow sensors. **[9]**

Q7) a) Briefly explain the overview, history, and application of Zigbee and Gyros. **[9]**

b) Briefly explain the Blood pressure sensor and an Acceleration sensor with respect to overview, history and applications. **[9]**

OR

Q8) a) With a neat sketch explain Wireless cameras and Voice transmissions. **[9]**

b) Briefly explain the overview, history and application of Ultrasonic Distance ranging sensors. **[9]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB3985

[Total No. of Pages : 2

[6262]-328

T.E. (Robotics and Automation Engineering)

HUMANOID ROBOTS

(2019 Pattern) (Semester - II) (Elective-II) (311511A-II)

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) ***Figure to the right indicates thu marks.***
3) ***Neat Diagram must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is dynamic simulation in the context of humanoid robots, and how does it contribute to their development and analysis? **[8]**

b) How can the dynamic equations of motion be derived for a humanoid robot in 3D analysis? Explain the steps involved in the derivation process. A humanoid robot has two feet with contact points at (0, 0) and (0.4, 0) in a 2D plane. The robot's center of mass is located at (0.2, 0.2). Calculate the net torque around the center of mass and determine if the robot is in balance. **[10]**

OR

Q2) a) Explain the concept of ZMP (Zero Moment Point) and its role in ZMP based walking pattern generation for humanoid robots. **[8]**

b) Perform the kinematic and dynamic analysis of 2 DOF serial planar robot arm. **[10]**

Q3) a) Explain the neuroscience and its relevance in robotics. **[8]**

b) Discuss cognitive robotics and its applications. **[9]**

OR

Q4) a) How does cognitive human robotics contribute to the development of more intelligent and interactive robots? **[8]**

b) How does humanoid locomotion relate to the brain, and its role in movement control? **[9]**

P.T.O.

Q5) a) Discuss Humanoid-assisted Healthcare. **[8]**

b) What are the challenges in controlling multiple robot arms for object manipulation? Explain the significance of cooperation between multiple humanoids in robotics. **[9]**

OR

Q6) a) What are the challenges in achieving effective multi-fingered grasping in robotics? **[8]**

b) What is multi-arm object manipulation control? state the advantages of using multiple robot arms for object manipulation. **[9]**

Q7) Write short note on : **[18]**

a) Cognitive robotics

b) ANN

c) Concept of AI

OR

Q8) Write short note on : **[18]**

a) A.I. in Robotics

b) Medical Robots

c) Behavioral Robotics

Total No. of Questions : 8]

SEAT No. :

PB3986

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[6262]-329

T.E. (Robotics and Automation Engineering)

MODELING AND SIMULATION

(2019 Pattern) (Semester - II) (311511A-III) (Elective - II)

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, and Q.7 or Q.8.***
2) ***Figuress to the right indicates full marks.***
3) ***Neat Diagram must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is the nature of simulation models? **[6]**

b) Which are the inputs of simulation model? **[6]**

c) When to use simulations? **[5]**

OR

Q2) a) What is input modeling in simulation? **[6]**

b) Which are the four phases of input modeling for simulation? **[6]**

c) What is a Histogram? **[5]**

Q3) a) What is random variate generation? **[6]**

b) Which are the factors to be considered in selecting generator? **[6]**

c) Explain generating continuous random variates like Uniform. **[5]**

OR

Q4) a) Explain generating continuous random variates like Exponential. **[6]**

b) Which are types of simulations with regard to output analysis? **[6]**

c) Explain generating continuous random variates like Weibull. **[5]**

P.T.O.

Q5) a) Discuss "simulation ismore widely applied to manufacturing systems than to any other application area". **[6]**

b) Describe types of manufacturing issues typically addressed by simulation.**[6]**

c) Which are the common measures of performance obtained from a simulationstudy of a manufacturing system? **[6]**

OR

Q6) a) Discuss the need for and the quantity of equipment and personnel in manufacturing system design. **[6]**

b) Describe Evaluation of operational proceduresin simulation in manufacturing system design. **[6]**

c) What is a Manufacturing System? Which are the basic components of manufacturing system? **[6]**

Q7) a) Which features needed in programming most discrete-event simulation models? **[6]**

b) What are the advantages of using asimulation package rather than a general-purpose programming language? **[6]**

c) Describe classification of simulation software. **[6]**

OR

Q8) a) Which are the features to be considered while selecting simulation software?**[6]**

b) What is SLAM? Which are applications of it? **[6]**

c) Describe ARENA simulation software package. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3987

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[6262]-331

T.E. (Artificial Intelligence and Machine Learning)

DESIGN & ANALYSIS OF ALGORITHMS

(2019 Pattern) (Semester - I) (318541)

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.***

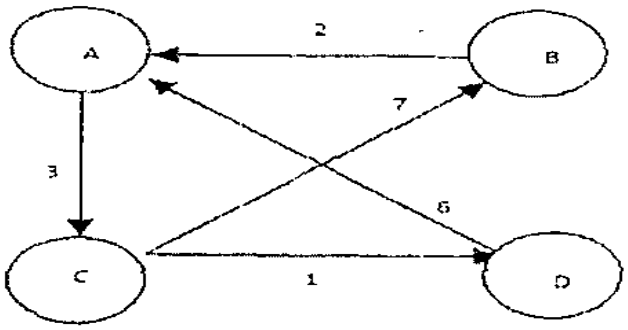
Q1) a) Let N = 4, and {al, a2, a3, a4} = {DAA, ITPM, OS, SP}. Let (1:3) = {3, 3, 1, 1} and Q(0:3) = {2, 3, 1, 1, 1} Compute and construct OBST tbr above values using Dynamic Programming. **[8]**

b) State and explain the principle of dynamic programming. Name the elements of dynamic programming. **[6]**

c) Compare Dynamic Programming with Greedy Approach. **[4]**

OR

Q2) a) Solve using Floyd's algorithm for all pair's shortest paths. **[8]**



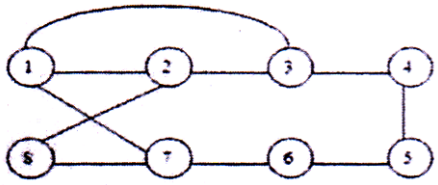
b) Solve the following instance of the 0/1 knapsack problem by Dynamic programming, Capacity W = 8. **[10]**

Item	1	2	3	4
Weight	12	10	20	15
Profit	2	1	3	2

P.T.O

Q3) a) Differentiate between backtracking and branch and bound. Draw state space tree for given sum of subset problem : Set of elements = {3, 5, 6, 7} and d=15. **[7]**

b) Find out Hamiltonian cycle for following graph. **[6]**



c) Compare Backtracking and Recursion? **[4]**

OR

Q4) a) Find all possible solution for 5-queens problem using backtracking method. **[7]**

b) Write an algorithm for 0/1 Knapsack problem using backtracking method. **[6]**

c) Write a recursive algorithm of backtracking method. **[4]**

Q5) a) Explain following term: **[10]**

Branch and Bound

LC search.

FIFO branch & bound.

Bounding function

Difference in LIFOBB and LCBB.

b) What is travelling salesman problem? Find the solution of following travelling salesman problem using branch and bound method. **[8]**

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

OR

Q6) a) 0/l Knapsack instance n = 4 with capacity 10kg. Such that find maximum profit using Least Cost branch and bound (LCBB) method. Use fixed size formation for state space tree. **[10]**

Item	1	2	3	4
Profit	40	42	20	12
Weight	4	7	5	3

b) Describe in brief the general strategy used in branch and bound method. Write general algorithm for Branch and Bound Method. **[8]**

Q7) a) Explain complexity classes P and NP and differentiate between NP complete and NP Hard. **[10]**

b) Differentiate between different models of parallel computations. **[7]**

OR

Q8) a) Specify one example of NP-HARD problem. Also mention that why it is NP hard. **[10]**

b) Write and algorithm for pointer doubling problem. What is time complexity of this algorithm? **[7]**

Total No. of Questions : 8]

SEAT No. :

PB3988

[Total No. of Pages : 2

[6262]-332

T.E.(Artificial Intelligence and Machine Learning)

IOT WITH ARTIFICIAL INTELLIGENCE

(2019 Pattern)(Semester -I)(318542)

Time : 2½ 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.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 the application layer protocols CoAP and MQTT in the IoT context.Write the advantages of CoAP. **[8]**

b) Explain Supervisory Control and Data Acquisition systems. **[6]**

c) Write a note on Security of IEEE 802.15.4. **[4]**

OR

Q2) a) Explain in detail Constrained Nodes and Constrained Networks. **[8]**

b) Describe 6LoWPAN protocol in brief . **[6]**

c) Differentiate between IEEE 802.15.4 and 802.11ah protocol. **[4]**

Q3) a) List and explain any three IoT frameworks. **[7]**

b) Explain the challaenges and solutions associated with device integration in IoT frameworks. **[6]**

c) Write a note a Unstructured data storage on cloud. **[4]**

OR

Q4) a) Describe Authentication and Authorization in detail. **[7]**

b) Explain the key components and processes involved in data acquisition and integration in IoT solutions. **[6]**

c) State and describe unstructured data storage challenges. **[4]**

P.T.O.

Q5) a) Explain Everything as a Service cloud service model(XAAS). **[8]**

b) Write a short note on data in motion and data at rest in IoT analytics. **[6]**

c) Discuss the role of cloud platforms in supporting computing for IoT/M2M applications. **[4]**

OR

Q6) a) How is data acquired and organized in IoT/M2M systems? **[8]**

b) Explain Data Categorization for storage. **[6]**

c) Differentiate between structured and Unstructured data analytics approaches in IoT. **[4]**

Q7) a) Discuss Amazon "Web Services" in the context of IoT. **[7]**

b) Explain Software & Management Tools for IoT Cloud Storage Models. **[6]**

c) How does IoT contribute to the development of smart cities, particularly in participatory sensing? **[4]**

OR

Q8) a) Analyze design constraints in industrial automation and how IoT addresses them. **[7]**

b) What is the Smart grids? Discuss how Smart cities are adopting Smart grid technology. **[6]**

c) How do communication APIs facilitate efficient data transfer in IoT systems. **[4]**

Total No. of Questions : 8]

SEAT No. :

PB-3989

[Total No. of Pages : 2

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T.E. (Artificial Intelligence and Machine Learning)

WEB TECHNOLOGY

(2019 Pattern) (Semester - I) (318543)

Time : 2½ 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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is architecture of MVC? Explain in detail with neat diagram. **[9]**

b) Describe various Typescript variables and constants, data types. **[9]**

OR

Q2) a) Explain web framework and its types with example. **[9]**

b) What is ReactJs? Explain its functions briefly. **[9]**

Q3) a) Brief file system and related operations on files in Node JS. **[9]**

b) What are the different features of Node JS? **[8]**

OR

Q4) a) Explain Mongo DB and NoSQL in detail. **[8]**

b) Write down CRUD operations using Node JS. **[9]**

Q5) a) Create a simple mobile website using JQuery Mobile. **[9]**

b) What is layout in jQuery Mobile design? Explain its types. **[9]**

OR

Q6) a) Explain the importance of CSS in mobile designing. Write down the example of CSS class used for mobile website design. **[9]**

b) Explain different CSS classes and Events use for jQuery web development. **[9]**

P.T.O.

Q7) a) What is cloud? Write down the different types of cloud in detail. **[9]**

b) Explain different components of AWS VPC in brief. **[8]**

OR

Q8) a) Explain Elastic Load Balancer and its types. **[9]**

b) What are AWS web services? Explain in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

PB-3990

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T.E. (Artificial Intelligence and Machine Learning)

MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY

(2019 Pattern) (Semester - I) (318544)

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) ***Figures to the right indicate full marks.***
3) ***Neat labelled diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the characteristics of entrepreneurs and their role in society in detail. **[9]**

b) Describe the classification and types of entrepreneurs in detail. **[9]**

OR

Q2) a) Explain the entrepreneurship in India and barriers to entrepreneurship. **[9]**

b) Define and explain financial feasibility study and social feasibility study in India. **[9]**

Q3) a) Define the process for project selection, project report, need and significance of project report. **[8]**

b) Explain the meaning and importance of ERP and Functional areas of Management. **[9]**

OR

Q4) a) Explain the guidelines by planning commission for project report in detail. **[8]**

b) Explain the Finance and Accounting related to Human Resources. Also explain the Types of reports and methods of report generation. **[9]**

P.T.O

Q5) a) Define the characteristics and advantages of micro and small enterprises. **[9]**

b) Explain the Government of India industrial policy 2007 on micro and small enterprises. **[9]**

OR

Q6) a) Define the steps in establishing micro and small enterprises in detail. **[9]**

b) Define the micro and small enterprises and Institutional support for MSME-DI. **[9]**

Q7) a) Write short note on Concept and Theories and Kinds of Intellectual Property Rights. **[8]**

b) Write short note on International Regime Relating to IPR TRIPS and other Treaties (WIPO, WTO, GATTS). **[9]**

OR

Q8) a) Explain the Advantages and Disadvantages of IPR in detail. **[8]**

b) Write short note on Criticisms of Intellectual Property Rights Politics of Intellectual Property Rights Third World Criticisms Marxist Criticisms. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-3991

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T.E. (Artificial Intelligence and Machine Learning)

ROBOTICS

(2019 Pattern) (Semester - I) (318545A) (Elective-I)

Time : 2½ 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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain homogenous coordinate system in detail **[6]**

b) When encountering a DH matrix for a robotic system, how do you approach interpreting its parameters and understanding their implications for the robot's kinematics? **[6]**

c) How to form forward solution in robotic kinematic. **[6]**

OR

Q2) a) Explain inverse or back solution with any suitable example **[9]**

b) Draw and explain below controller architectures **[9]**

i) Joint position control (JPC)

ii) Resolved motion position control (RMPC)

iii) Resolved motion rate control (RMRC)

Q3) a) Explain design aspects for gripper with different types of gripper **[9]**

b) Enlist what are the various process tools which can be used as end effectors. Explain any one in detail **[9]**

OR

Q4) a) Write a note on uses of sensors in robotics. **[9]**

b) What are different types of Safety sensor used in Robotics? Explain any one of them with the help of neat sketch **[9]**

P.T.O.

Q5) a) Explain robot control sequencing in detail **[8]**

b) Explain following robot computational elements in detail **[9]**

i) Application Control

ii) Communication

iii) Coordination

OR

Q6) a) Write short note on robot programming Languages **[9]**

i) RAIL

ii) RPL

iii) Val

b) Write short note on Artificial Intelligence and Robot programming in detail **[8]**

Q7) a) Write a short note on Robotic technology. **[8]**

b) Explain how to use robot for defence & surveillance industry application. **[9]**

OR

Q8) a) Explain the terms **[9]**

i) Social Issues

ii) Labor issues

iii) Capital formation

b) Write a short note on robotics applications like arc welding, spot welding, spray painting, assembly operation **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3992

[Total No. of Pages : 2

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T.E. (Artificial Intelligence and Machine Learning)

PATTERN RECOGNITION

(2019 Pattern) (Semester - I) (318545B) (Elective-I)

Time : 2½ 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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Mixture Models in detail. **[6]**

b) Explain Naive-Bayes Classifier. What are the advantages and disadvantages of this algorithm. **[6]**

c) Write short notes on: **[6]**

i) Maximun Entropy Estimation

ii) Maximum Likelihood parameter Estimation

OR

Q2) a) Explain why the maximum likelihood estimation is not working with uniformly distributed training sets. **[6]**

b) Explain nearest neighbour algorithm.What are the difficulties with this algorithm. **[6]**

c) What is Bayesian interference. State applications of the same **[6]**

Q3) a) What are different types of Linear classifier? Which linear classifiers support multi-class classification **[8]**

b) Explain perceptron learning algorithm in detail **[5]**

c) What is Mean Square Error? How it is evaluated? **[4]**

OR

P.T.O.

Q4) a) Define a Decision Hyperplane in the context of pattern recognition. Explain its role in separating classes in a feature space. **[8]**

b) State and explain Stochastic Approximation of LMS Algorithm **[5]**

c) Write short note on :Sum of Error Estimate **[4]**

Q5) a) What is The XOR Problem? Explain in detail. **[6]**

b) Why Two Layer Perceptron model is used? Explain with diagram **[6]**

c) Explain Backpropagation Algorithm along with limitations of the same. **[6]**

OR

Q6) a) Given 7 two dimensional patterns A=(1,1), B=(1,2),C=(2,2), D=(6,2), E=(7,2), F(6,6), G=(7,6). Using k-means algorithm obtain 3 clusters. **[6]**

b) Explain difference between divise and agglomerative clustering with suitable example. **[6]**

c) Give criterion function of clustering. **[6]**

Q7) a) How Fisher Linear discriminant analysis can be used for dimensionality reduction? **[6]**

b) Explain Hidden Markov model. Why Hidden Markov model is different from traditional markov model? **[6]**

c) Briefly describe Maximum-likelihood estimation. **[5]**

OR

Q8) a) What is Bayesian decision theory? Explain 2 category classification. **[6]**

b) What are dimension reduction methods? Explain Principle Component Analysis algorithm for dimension reduction. Also write its limitations. **[6]**

c) How can we utilize prior information with data in parameter estimation? **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3993

[Total No. of Pages : 2

[6262]-337

T.E. (Artificial Intelligence and Machine Learning)

INFORMATION SECURITY

(2019 Pattern) (Semester - I) (318545C) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. No.1 or 2, Q. No. 3 or 4, Q.No. 5 or 6, Q. No. 7 or 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) Explain Chinese reminder theorem with an example. **[9]**

b) Use Diffie Hellman Key exchange algorithm with common prime q=71 and primitive root, a=7 **[9]**

If User A has private Key xA=7, what is A's public key YA?

If User B has private Key xB=l4, what is B's public key YB?

What is the shared secret key?

OR

Q2) a) Explain Elliptic Curve Cryptography with its advantages. **[9]**

b) Use RSA algorithm to perform encryption and decryption. Find d and C. P=5, q=11, e=3, M=9. **[9]**

Q3) a) Calculate the number of padding bits, if the length of the original message is 260 bits in SHA algorithm. **[8]**

b) Elaborate IPsec. What is its purpose in network security? **[9]**

OR

Q4) a) Calculate the number of padding bits, if the length of the original message is 1002 bits in MD5 algorithm. **[8]**

b) Elaborate Two Simple Hash Functions used in cryptography. List any two applications of Cryptographic Hash Functions. **[9]**

P.T.O.

Q5) a) Elaborate OSI Security Architecture in detail. **[9]**

b) Explain application security in detail. **[9]**

OR

Q6) a) What is Security attack? Differentiate between active and passive attacks. **[9]**

b) Explain the need and characteristics of Firewall. **[9]**

Q7) a) Elaborate Section 66: Computer-related offence law against cybercrime along with the punishment. **[9]**

b) What are key-loggers? How key-loggers are used to perform cyber-crime? Justify your answer. **[8]**

OR

Q8) a) What is Cyber stalking? Elaborate types of stalkers. **[9]**

b) What is Password cracking? Elaborate different guidelines to avoid being victim of Password cracking. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-3994

[Total No. of Pages : 2

[6262]-338

T.E. (Artificial Intelligence and Machine Learning)

BUSINESS INTELLIGENCE

(2019 Pattern) (Semester - I) (318545D) (Elective-I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q. No.1 or 2, Q. No. 3 or 4, Q.No. 5 or 6, Q. No. 7 or 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 Roll of performance measurement dashboard in BI **[4]**

b) Explain the 4 Perspectives of BSC in detail. **[6]**

c) Define following term with report to BI **[8]**

i) Key performance indicator

ii) Balanced scored cards

OR

Q2) a) What is a Business Report and also explain the components of Business Reporting Systems in detail **[6]**

b) Write a note on Business Performance Management. **[6]**

c) Explain in detail Closed Loop BPM Cycle. **[6]**

Q3) a) Explain Multiple Goals & Goal Seeking in detail. **[6]**

b) Differentiate in-between descriptive analytics vs. predictive analytics vs. prescriptive analytics. **[6]**

c) Explain what is certainty & uncertainty related to Decision Making in detail. **[5]**

OR

P.T.O.

Q4) a) How mathematical programming optimization obtain in BI. **[6]**

b) Write a note on Decision Support Systems Modeling. **[6]**

c) Write a note on decision tree related to decision analysis. **[5]**

Q5) a) Explain the concepts of Business Intelligence in Production. **[6]**

b) Explain the concepts of Business Intelligence in Telecommunications. **[6]**

c) Describe how different forms of Business Analytics are supported in practice **[6]**

OR

Q6) a) State and explain business intelligence applications in fraud detection and retail industry **[8]**

b) Write a note on role of visual and business analytics (BA) in BI **[6]**

c) State any four application of BI in banking. **[4]**

Q7) a) Describe different types of advanced visualization reports. **[6]**

b) Explain emerging technologies in BI. **[5]**

c) Explain in detail BI Search & Text Analytics. **[6]**

OR

Q8) a) Explain Advanced Visualization in detail **[5]**

b) Write a note on Location-Based Analytics for Organizations. **[6]**

c) Write a note on Impact of Analytics in Organizations. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-3995

[Total No. of Pages : 2

[6262]-339

T.E. (Artificial Intelligence and Machine Learning)

MACHINE INTELLIGENCE FOR DATA SCIENCE

(Semester - II) (2019 Pattern) (318552)

Time : 2½ Hours] *[Max. Marks : 70*

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) ***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 statistical linear model, and how is it used to model relationships between variables? **[6]**

b) How can we tell if a regression model fits the data well, and what are residuals? **[6]**

c) How do we perform inference in regression analysis? **[6]**

OR

Q2) a) Explain generalized linear models. **[6]**

b) What is logistic regression, and how does it work? **[6]**

c) What is maximum likelihood estimation, and how is it used in logistic and Poisson regression? **[6]**

Q3 a) What is a support vector machine, and how does it classify data points? **[6]**

b) What are kernel functions, and how are they used in SVMs? **[6]**

c) How do bagging and bootstrap ensemble methods work? **[5]**

P.T.O.

OR

Q4) a) What is random forest, and how does it differ from other ensemble methods? **[6]**

b) What are some applications of SVMs and random forests? **[5]**

c) How do you choose the appropriate kernel function and other parameters for an SVM or random forest model? **[6]**

Q5) a) What is a decision tree, and how does it use entropy to make splits in the data? **[6]**

b) What are random forests, and how do they differ from other decision tree-based ensemble methods? **[6]**

c) What algorithms are used to create decision trees, and how do they differ from each other? **[6]**

OR

Q6) a) How do bagging and boosting impact bias and variance in decision tree-based models? **[6]**

b) What is C5.0 boosting, and how does it differ from other boosting methods? **[6]**

c) What is gradient boosting, and what is XGBoost? **[6]**

Q7) a) What is unsupervised learning, and how does it differ from supervised learning? **[6]**

b) What are partitioning methods in clustering, and how do they assign data points to clusters? **[6]**

c) How does density-based spatial clustering work, and what are some applications of this method? **[5]**

OR

Q8) a) What are hierarchical clustering methods, and how do they create a tree-like structure of clusters? **[6]**

b) How are dendrograms used to visualize hierarchical clustering results, and how do you choose the appropriate number of clusters? **[5]**

c) What are divisive clustering techniques, and how do they differ from agglomerative clustering methods? **[6]**

Total No. of Questions : 8]

SEAT No. : ____

PB-3996

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[6262]-340

T.E. (Artificial Intelligence and Machine Learning)

DATA MINING AND WAREHOUSING

(2019 Pattern) (Semester - II) (318553)

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, 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***

Q1) a) Explain the k-means and DBSCAN clustering techniques with examples. **[8]**

b) Explain the concept of data, information, and knowledge in the context of BI. **[6]**

c) Explain the role of a data warehouse in BI systems. **[4]**

OR

Q2) a) Compare K-Means with K-Medoids techniques for clustering. **[6]**

b) Explain various components of business intelligence. **[6]**

c) Explain the state the categories of clustering methods. **[6]**

Q3) a) Explain the need for data warehousing in decision support systems. Discuss the characteristics of a data warehouse. **[8]**

b) Explain the three-tier data warehouse architecture. **[6]**

c) What are the trends in data warehousing? **[5]**

OR

Q4) a) Compare and contrast operational database and data warehouses. Describe the components of a data warehouse. **[8]**

b) What are steps in designing the data warehouse? Explain. **[6]**

c) Differences between operational database and data warehouse. **[5]**

P.T.O.

Q5) a) Explain the ETL process in data warehousing and its significance. **[8]**

b) Write short note on data reduction strategies. **[6]**

c) Describe applications of Data warehouse. **[4]**

OR

Q6) a) What are the techniques for discretization and concept hierarchy generation for numerical and categorical data in data warehousing? **[8]**

b) Describe the role of metadata in data warehousing. **[6]**

c) Give an overview of the data life cycle and its stages. **[4]**

Q7) a) Suppose that a data warehouse consists of the three dimensions time, doctor, and patient, and the two measures count and charge, where charge is the fee that a doctor charges a patient for a visit. Draw a Stars, Snowflakes, and Fact Constellations Measures schema diagram for the above data warehouse. **[9]**

b) Differentiate between ROLAP, MOLAP and HOLAP. **[6]**

OR

Q8) a) Explain following OLAP operation in multi-dimensional data with example. **[10]**

i) Roll Up

ii) Drill Down

iii) Slice

iv) Dice

v) Pivot

b) Discuss the need for OLAP. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-3997

[Total No. of Pages : 2

[6262]-341

T.E. (Artificial Intelligence and Machine Learning)

ARTIFICIAL NEURAL NETWORKS

(2019 Pattern) (Semester - II) (318554)

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 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 if necessary.***

Q1) a) Explain Feed Forward Neural Network. **[6]**

b) Explain in detail Error Back Propagation Algorithm. **[6]**

c) Explain Gradient Descent with example. **[6]**

OR

Q2) a) Write Applications of Feed Forward Neural Networks with examples. **[6]**

b) Explain Sigmoid Neurons with example. **[8]**

c) Explain in detail Multilayer Perceptrons (MLPs). **[4]**

Q3) a) Explain Auto associative Feed back Neural Networks. **[7]**

b) Explain different types of Boltzman Machines. **[10]**

OR

Q4) a) What is the Simulated Annealing. Write an algorithm for it.State it's Advantages. **[7]**

b) What are the different types of Hopfield Networks. **[10]**

P.T.O.

Q5) a) What are different Components of competitive Learning. **[8]**

b) Explain Semantic Networks in competitive Learning with examples. **[6]**

c) Write an Advantage and Disadvantage of Self-Organizing Map. **[4]**

OR

Q6) a) Explain Adaptive Resonance Theory and it's significant in pattern recognition. **[10]**

b) Explain Pattern Clustering Networks. **[8]**

Q7) a) Write architectures of Deep Learning Networks. **[7]**

b) Explain with diagram Long short-term memory (LSTM) Networks and Deep Recurrent Neural Networks (RNN) with examples. **[10]**

OR

Q8) a) Explain Convolutional Neural Networks (CNN). **[8]**

b) Write difference between Traditional Machine Learning and Learning in Deep Neural Networks. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

PB3998

[Total No. of Pages : 2

[6262]-342

T.E. (Artificial Intelligence and Machine Learning)

INDUSTRIAL INTERNET OF THINGS

(2019 Pattern) (Semester - II) (318555(A)) (Elective - II)

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) Explain in detail CPS-based manufacturing and Industries. **[6]**

b) Describe knowledge Mining in Databases. **[6]**

c) Explain Networking of IIoT in detail. **[6]**

OR

Q2) a) Explain work piece's memory Contents with the help of neat diagram. **[8]**

b) How Integration of Knowledge is done in CMS? **[6]**

c) Explain Interoperability in Smart Automation. **[4]**

Q3) a) What is Cyber Physical System Intelligence? **[6]**

b) Explain the working of digital technology in manufacturing industry. **[6]**

c) How is CPS used in machine tools? **[5]**

OR

Q4) a) How can Machine Learning be applied in condition monitoring? **[6]**

b) Explain exemplary plant setup of two drives with the help of a diagram. **[6]**

c) What is Big Data, and how is it used in IIoT? **[5]**

P.T.O.

Q5) a) Explain skills and tools of open manufacturing with the help of neat diagram. **[6]**

b) Write short note on : **[6]**

i) Product Innovation.

ii) Service Innovation.

c) Write a note on Advance Manufacturing. **[6]**

OR

Q6) a) Explain the role of innovation ecosystems in Industry 4.0 adoption. **[6]**

b) How does Innovation Ecosystems support Human-Machine Interaction? **[6]**

c) Explain Centralized user intervention in detail. **[6]**

Q7) a) Explain examples of Industrial IOT using real time. **[6]**

b) How does Smart Metering work, and what are its benefits? **[6]**

c) Explain **[5]**

i) Application of IOT in healthcare.

ii) Application of IOT in City Automation.

OR

Q8) a) What are the real-life examples of IIoT in the Manufacturing sector, and how have they benefited the industry? **[6]**

b) Explain the architecture of an IOT system in Smart Card. **[6]**

c) Explain Home Automation in detail. **[5]**

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Total No. of Questions : 8]

SEAT No. :

PB-4748

[Total No. of Pages : 2

[6262]-343R

T.E. (Artificial Intelligence and Machine Learning)

BRAIN COMPUTER INTERFACE

(2019 Pattern) (Semester - II) (318555 B) (Elective - II)

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 diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is the Independent Component Analysis? **[6]**

b) What is an Application in storm wave? **[6]**

c) explain Properties Time domain analysis. **[6]**

OR

Q2) a) Which uses the principles of Fourier optics in detail. **[6]**

b) What is Frequency domain analysis? **[6]**

c) Draw and explain Phase synchronization and coherence. **[6]**

Q3) a) Explain Binary classification of MACHINE LEARNING. **[6]**

b) Explain reconstruct the phase of light intensity. **[6]**

c) Which is the Multiclass Classification? **[5]**

OR

Q4) a) Explain Evaluation of classification performance of BCI. **[6]**

b) Why we use RBF's? **[5]**

c) Explain Multilayer neural networks. **[6]**

P.T.O.

Q5) a) Which Generalized Support Vector Machine for Brain-Computer Interface? **[6]**

b) Explain Visual evoked potentials in BCI. **[6]**

c) Explain Flash visual evoked potentials. **[6]**

OR

Q6) a) How we can use visual evoked potentials in various stimulation conditions? **[6]**

b) What is the onset Flash visual evoked potentials? **[6]**

c) Explain offset Peak-to-valley amplitudes. **[6]**

Q7) a) Which are Determination Invasive BCIs. **[6]**

b) What is Decoding and Tracking Arm in Human Anatomy? **[6]**

c) What is Psychological and Social Implications in BCI? **[5]**

OR

Q8) a) Explain the task Dual-Use and Militarization. **[6]**

b) Why we use Multi-electrode array implants involve the collection? **[5]**

c) Explain functional Dual-Use and Misuse. **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

PB-4752

[Total No. of Pages : 2

[6262]-344

T.E. (A.I.&M.L.)

AI FOR CYBER SECURITY

(2019 Pattern) (Semester - VI) (318534) (Elective - 2(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) ***Assume Suitable data if necessary.***

Q1) a) Explain different machine learning (ML) algorithms for botnet detection. **[8]**

b) Explain network and transport layer attacks. **[6]**

c) Explain different approaches used to identify botnet topology. **[4]**

OR

Q2) a) Explain different types of botnet topologies. **[8]**

b) Explain statistical and machine learning based anomaly detection techniques. **[6]**

c) Explain Naïve Bias and KNN algorithm. **[4]**

Q3) a) Explain leverage machine learning (ML) algorithms for fraud detection. **[7]**

b) Explain different techniques for securing user authentication. **[6]**

c) Explain how to protect sensitive information and assets. **[4]**

OR

Q4) a) Explain authentication abuse prevention techniques. **[7]**

b) Explain user authentication with keystroke recognition. **[6]**

c) Explain bagging and boosting techniques can improve an algorithms effectiveness. **[4]**

P.T.O.

Q5) a) What is GAN. Explain its use in attack and defense scenarios. **[8]**

b) Explain the attacks against facial recognition procedures using adversarial examples. **[6]**

c) Explain the steps involved in model substitution. **[4]**

OR

Q6) a) Explain the main libraries and tools for developing adversarial examples. **[8]**

b) Explain the attacks against deep neural networks (DNNs) via model substitution. **[6]**

c) Explain the attacks against intrusion detection systems (IDS) via GANs. **[4]**

Q7) a) Explain the steps to be followed in preparation of raw data in Feature engineering. **[7]**

b) Explain how to split sample data into training and test sets. **[6]**

c) Explain bias—variance trade-offs with cross validation. **[4]**

OR

Q8) a) Evaluate a detector's performance using the ROC curve. **[7]**

b) What is cross validation. Explain its technique used for bias-variance trade-offs. **[6]**

c) Explain how to manage algorithms overfitting **[4]**

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Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 2

PB-4000

[6262]-346

T.E. (Computer Science & Design)

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

(2021 Pattern) (Semester - I) (318241)

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) ***Figures to the right indicate full marks.***
3) ***Neat labelled diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain user interface design issues **[5]**

b) Explain in detail following **[6]**

i) Architectural Design Elements

ii) Deployment-Level design elements

c) Explain FURPS quality attributes **[6]**

OR

Q2) a) Describe following terms in relation with the design **[5]**

i) Refinement

ii) Refactoring

b) Explain in detail following **[6]**

i) Data - centered Architecture

ii) Data - flow architecture

c) What are the golden rules of user interface design? Explain in detail all the rules **[6]**

Q3) a) Explain COCOMO II Model for project estimation with suitable example. **[7]**

b) Explain the term the people and the product of management spectrum. **[7]**

c) What is time line chart explain with suitable example how it is used in scheduling of software project. **[4]**

OR

Q4) a) What is a task network in project scheduling? Explain with an example. **[7]**

b) Write short note on W5HH Principle. **[7]**

c) Explain LOC based software estimation decomposition technique. **[4]**

Q5) a) Compare reactive and proactive risk strategies. Which one you think is more intelligent strategy. **[4]**

b) What is the role of SCM repository? Explain it's advantages. **[6]**

c) What is risk identification? What are different types of risks. **[7]**

OR

Q6) a) Explain forward and reverse engineering with example. **[4]**

b) Explain change control process in software configuration process. **[6]**

c) Explain in detail each layer of SCM process. **[7]**

Q7) a) What is the difference between verification and validation. **[4]**

b) Write short note on Test Management and Automation. **[6]**

c) What is debugging? Explain in detail debugging process. **[8]**

OR

Q8) a) What is the difference between Testing and Debugging? **[4]**

b) How Top-down and Bottom-up integration is achieved? **[6]**

c) Explain Defect Life Cycle in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB4001

[Total No. of Pages : 3

[6262]-347

T.E.(Computer Science and Design)

THEORY OF COMPUTATION

(2021 Pattern)(Semester -I)(318242)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1or 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) Check wherther the given grammar is in CNF. If not then find its equivalent CNF. **[7]**

$S \rightarrow bA \mid aB, A \rightarrow bAA \mid aS \mid a, B \rightarrow aBB \mid bS \mid b$

b) What is the ambiguous grammar? Show that the grammar below is ambiguous, & find the equivalent un ambiguous grammar. **[6]**

$S \rightarrow aS \mid \in$

$S \rightarrow aSbS$

c) Consider the following Grammar **[4]**

$E \rightarrow E+E \mid E-E \mid id$

Derive the string id-id*id using

i) Leftmost derivation

ii) Rightmost Derivation

OR

Q2) a) Find Context Free Grammar for generating the following Languages **[8]**

i) $L=\{W \in \{a,b\}^* \mid W \text{ is an even length Palindrome}\}$

ii) $L= \{a^i b^j c^k \mid i=j+k\}$

b) Simplify the following Grammar **[9]**

$S \rightarrow 0A0 \mid 1B1 \mid BB$

$A \rightarrow C$

$B \rightarrow S \mid A$

$C \rightarrow S \mid \in$

P.T.O.

Q3) a) Compare FA and PDA. **[4]**

b) Construct the PDA accepting the language **[8]**

i) L={wwR | w is in (a+b)*}

ii) L={ $a^n b^{2n}$| n>=1 }

c) Convert the following CFG to PDA- **[6]**

S-> aSb|A

A->bSa|S|$\in$

OR

Q4) a) Explain acceptance of PDA by- **[4]**

i) By final state

ii) By empty stack

b) Convert the following PDA to CFG **[8]**

M = ({q0,q1}, {0,1}, {X,Z0}, D, q0, Z0, {})

with D (delta):

d(q0,0,Z0) = (q0,XZ0)

d(q0,0,X) = (q0,XX)

d(q0,0,X) = (q1,x)

d(q0, $\in$,Z0) = (q1, $\in$)

d(q1,1,X) = (q1 , $\in$)

d(q1,0,Z0) = (q0,Z0)

c) Define pushdown Automation? Design PDA that accepts $\{a^n b^n \mid n >= 0\}$. **[6]**

Q5) a) Write short note on Halting Problem of Turing Machine. **[4]**

b) Design a Turing Machine for the following Languages by considering Transition table and diagram **[14]**

i) TM to make copy of string over{0,1}

ii) TM for checking well formness of parentheses. Expand the transition for (())()

OR

Q6) a) What is a Turing Machine? Give the formal definition of TM. Design a TM that replaces every occurrence of abb by baa. **[9]**

b) What are the different ways for extension of TM? Explain.Design TM for language L = {$a^i b^j$ |i<j} **[9]**

Q7) a) Explain Satisfiability Problem and SAT problem and comment on NP Completeness of the SAT Problem **[9]**

b) Define and compare class P and class NP problem with suitable diagram. **[8]**

OR

Q8) a) Justify " Halting problem of Turing machine in undecidable". **[7]**

b) Define and Explain Recursive and Recursively enumerable languages. **[7]**

c) Explain tractable and Intractable problem. **[3]**

Total No. of Questions : 8]

SEAT No. :

PB-4002

[Total No. of Pages : 2

[6262]-348

T.E. (COMPUTER SCIENCE AND DESIGN)

DATABASE SYSTEM DESIGN

(2021 Pattern) (Semester - I) (318243)

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.***

Q1) a) Define Normalization. Explain three normal forms with suitable example? **[8]**

b) Write short note on **[9]**

i) Functional Dependency

ii) Multi valued Dependency

iii) Transitive Dependency

OR

Q2) a) What do you mean by decomposition? What are the desirable properties of it? How can we implement them? **[8]**

b) Compute the closure of the following set F of functional dependencies for relation schema R = {A, B, C, D, E}. **[9]**

A -> BC

CD -> E

B->D

E->A

List the candidate keys for R.

P.T.O.

Q3) a) What is serializable schedule? Explain conflict and view serializable schedule **[9]**

b) What are the different states of transaction? Explain With suitable example of ACID properties. **[9]**

OR

Q4) a) To ensure atomicity despite failures we uses recovery methods. Explain in detail log-based recovery method. **[9]**

b) Explain two phase locking protocol. How does it ensure serializability? **[9]**

Q5) a) Explain distributed database system architecture. What are advantages and disadvantages of distributed database system? **[9]**

b) Explain MongoDB aggregation framework with suitable example. **[9]**

OR

Q6) a) Explain BASE properties of NOSQL database with suitable example. **[9]**

b) Explain MapReduce operation in MongoDB with suitable example. **[9]**

Q7) a) Write short note on **[8]**

i) Geometric data

ii) Geographic data

b) Explain active and deductive databases. **[9]**

OR

Q8) a) What is JSON? What are advantages and limitations of JSON. Why do we use JSON? **[8]**

b) Difference between relational databases and object relational databases with example **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4003

[Total No. of Pages : 2

[6262]-349
T.E. (Computer Science & Design)
DESIGN AND ANALYSIS OF ALGORITHM
(2021 Pattern) (Semester - I) (318244)

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) How the greedy strategy makes locally optimal choices to solve optimization problems? **[8]**

b) Explain the Fractional Knapsack problem. For the given set of items and the knapsack capacity of 15 kg, find the subset of the items to be added in the knapsack such that the profit is maximum. **[10]**

Total Items: n = 4

Profit : (p1, p2, p3, p4) = (10, 10, 12, 18)

Weight : (wl, w2, w3, w4) = (2, 4, 6, 9)

Capacity 15

OR

Q2) a) What is Dynamic Programming? Explain working of Memoization during calculation of factorial of a number. **[10]**

b) Write a note on : **[8]**

i) 0/1 Knapsack

ii) Chain Matrix Multiplication

Q3) a) What is backtracking? Explain it with the principle and control abstraction. **[8]**

b) How 8-queen problem can be solved using backtracking? Also give it's time complexity. **[10]**

OR

Q4) a) What is Branch-n-Bound strategy? Explain FIFO, LIFO and LC approaches. **[8]**

b) Explain Traveling Salesman Problem (TSP) w.r.t. Branch-n-Bound with example. **[10]**

P.T.O

Q5) a) Write a note on - Tractable and Non tractable Problems. **[8]**

b) How Amortized Analysis helps in determining the complexity of algorithm? Explain different methods involved in Amortized Analysis. **[9]**

OR

Q6) a) Explain Randomized Algorithm: Monte Carlo and Las Vegas with example. **[8]**

b) "Embedded systems often have limited processing power, memory and energy resources"- How different sorting algorithms are suitable to the embedded system? **[9]**

Q7) a) What are the Multithreaded Algorithms? Explain Parallel loops and Race Condition with example. **[8]**

b) How Multithreaded Merge Sort algorithm works? Also explain its advantages and challenges. **[9]**

OR

Q8) a) Write a note on **[8]**

i) The Naïve String-Matching Algorithm

ii) The Rabin-Karp Algorithm

b) How independent entities work together in distributed systems environment to solve the common problem? Explain Distributed Minimum Spanning Tree. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4004

[Total No. of Pages : 2

[6262]-350

T.E. (Computer Science and Design)

INTERNET OF THINGS

(2021 Pattern) (Semester - I) (318245A) (Elective-I)

Time : 2½ 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 indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) How SCADA is useful in IoT? Demonstrate the use of SCADA with the help of suitable IoT Application. **[9]**

b) Explain in detail RFID Technology with neat diagram. How RFID is useful in IoT applications? **[9]**

OR

Q2) a) What is Communication API ? Illustrate Communication API with suitable IoT System. **[9]**

b) What is role of connectivity technologies in IoT? Categorize different connectivity technologies required for IoT system development and explain any one of them in detail **[9]**

Q3) a) Explain in deatail ZigBee protocol with neat diagram. **[8]**

b) What is MQTT protocol ? Explain the use of MQTT protocol in any suitable IoT application **[9]**

OR

Q4) a) Explain in detail Modbus Protocol and M2M protocol **[8]**

b) Why Protocol Standardization needed in IoT? Explain in detail WSN Protocol. **[9]**

P.T.O.

Q5) a) What is Django framework? Explain in detail Django framework. **[8]**

b) Explain the use and design of a RESTful webservice. **[9]**

OR

Q6) a) Explain in detail Amazon Web Services for IoT **[8]**

b) Why Cloud Storage Models is important in IoT? Explain in detail any two Cloud Storage Models **[9]**

Q7) a) What are different IoT systems Vulnerabilities? Explain IoT security challenges in detail. **[9]**

b) Explain the following key elements of IoT Security: **[9]**

i) Identity establishment

ii) Access control

iii) Data and message security

OR

Q8) a) Explain in detail Nonrepudiation and availability used in IoT with example. **[9]**

b) Explain in detail Challenges in designing IoT applications. How lightweight cryptography is useful in IoT? **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4005

[Total No. of Pages : 2

[6262]-354
T.E. (Computer Science and Design Engineering)
ARTIFICIAL INTELLIGENCE
(2021 Pattern) (Semester - II) (318251)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***

Q1) a) Explain Min Max Algorithm with Example .What is the limitation of Min Max Algorithm. **[8]**

b) Using Constraint Satisfaction procedure solves the following crypt-arithmetic problem : **[9]**

```
    CROSS
+ ROADS
-------------------------
  DANGER
```

OR

Q2) a) Explain α-β Pruning algorithm with example. **[8]**

b) Apply Constraint satisfaction method to solve the following Crypt arithmetic problem : **[9]**

TWO+TWO=FOUR

Q3) a) Explain WUMPUS World Environment giving its PEAS description.**[9]**

b) Explain various methods of Knowledge representation techniques with examples. **[9]**

OR

Q4) a) Explain in briefly the role of probabilistic reasoning in medical diagnostic. **[9]**

b) Explain syntax and semantics of First order predicate logic with example.**[9]**

P.T.O.

Q5) a) Explain Forward chaining algorithm with the help of example. **[8]**

b) Explain the step involved in converting propositional logic statement into CNF with suitable example. **[9]**

OR

Q6) a) Differentiate between Propositional logic and Predicate logic. **[8]**

b) Explain inference process in First order logic using forward chaining and Backward chaining. **[9]**

Q7) a) Explain Goal of Planning with Supermarket example. **[9]**

b) Compare and Contrast problem solving agent and planning agent. **[9]**

OR

Q8) a) Explain partial order planning giving suitable example. **[9]**

b) Explain various types of planning methods for handling indeterminacy. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4406

[Total No. of Pages : 2

[6262]-355
T.E. (Computer Science & Design)
Web Technology and Application Design
(2021 Pattern) (Semester-II) (318252)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.l 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) ***Make suitable assumptions if necessary***
4) ***Figures to the right indicate full marks.***

Q1) a) What is session? How cookies & URL rewriting for session management in servlet. Write any one program to demonstrate session or cookies? **[6]**

b) Explain with simple example the XMLHttp Request Object. List and explain different values of ready state and status property of the HTTP Request object. **[6]**

c) What do you understand by AJAX?. Explain it. **[6]**

OR

Q2) a) What is Servlet? Explain the life cycle of serviet. Illustrate with example. **[6]**

b) Write a servlet program to accept usernarne and password from client and verify if username = "ADMIN" and password = ADMIIN" then redirect to success page otherwise redirect to failure page. **[6]**

c) Explain the concept of DTDs with example. Differentiate DTD Vs XML Schema (Min 4) **[6]**

Q3) a) Explain the concept of struts with architecture. actions. interceptors and exception handling. **[6]**

b) Write a short notes on: **[6]**

i) SOAP

ii) WSDL

c) Explain life cycle of JSP. Write advantages of JSP over servlet. **[5]**

OR

P.T.O.

Q4) a) What do you mean by JSP processing? How JSP pages are handled? Explain with architecture. **[6]**

b) List and elaborate any 5 JSP implicit objects with example. **[6]**

c) Elaborate steps required to do JSP-MySQL Connectivity. **[5]**

Q5) a) Explain functions in PHP with example & session management. **[6]**

b) What is an Associative array in PHP? Explain it with the help of simple PHP code. **[6]**

c) Write note on: **[6]**

i) ASP. NET

ii) NodeJS

OR

Q6) a) What is difference between server side and client side scripting? Also explain the advantages of PHP over other scripting language? **[6]**

b) Write a PHP program to authenticate users using a MySQL database and grant access to certain pages based on their credentials. **[6]**

c) Explain in detail WAP Architecture & WML. **[6]**

Q7) a) What is Hashed in Ruby? Explain with example how to create Hashes? Also give difference between Arrays and Hashes? **[6]**

b) Explain in detail with example how static document request is processed in Rail framework. **[6]**

c) Explain Architecture of EJB & explain types of EJB in detail. **[5]**

OR

Q8) a) Explain scalar types, operations and pattern matching in Ruby. **[6]**

b) List & difference between Entity beans & Session Bean. Explain the callback Method. **[6]**

c) Explain classes and objects in Ruby with appropriate examples. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-4482

[Total No. of Pages : 2

[6262]-356
T.E. (Computer Science & Design)
UI/UX DESIGN
(2021 Pattern) (Semester - II) (318253)

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 labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain Shneiderman Eight Golden Rules for interface design. **[8]**

b) Explain in detail the 4 pillars of user interface design. **[5]**

c) Write short note on usability testing. **[5]**

OR

Q2) a) Explain usability principles in detail. **[8]**

b) Write short note on Acceptance testing. **[5]**

c) What are the measures of usability. **[5]**

Q3) a) Explain the Direct Manipulation interaction style with example. **[6]**

b) Explain the Navigation and Toolbars used in mobile apps. **[6]**

c) Write note on Structures of menu & functions of menus. **[5]**

OR

Q4) a) Write short note on Phrasing of menu. **[6]**

b) Explain how menu can be formatted properly. **[6]**

c) What are the characteristics of direct manipulation? Give example. **[5]**

Q5) a) Explain the various guidelines for designing dialog boxes. **[6]**

b) What are the important aspects of Graphics to be considered in any web page interface designs. **[6]**

c) Draw UI of Bank management system by using selection control. **[6]**

OR

P.T.O

Q6) a) Explain the various strategies for combining multiple Menus. **[6]**

b) Explain Selection based controls and guidelines for designing them. **[6]**

c) Write short note on screen based controls. **[6]**

Q7) a) Write a short note on Quality of service. **[6]**

b) Explain the term Information Visualization & challenges for Information Visualization. **[6]**

c) Explain web page design, window design with example. **[5]**

OR

Q8) a) Explain the following Usability Evaluation Methods **[6]**

i) Heuristic evaluations

ii) Cognitive walkthrough

iii) A/B Testing

b) Write short note on societal and individual impact of user interface. **[6]**

c) Explain user productivity in detail. **[5]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB4408

[Total No. of Pages : 2

[6262]-357

T.E. (Computer Science and Design Engineering)

MULTIMEDIA TECHNIQUES

(2021 Pattern) (Semester - II) (318254A) (Elective - II)

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) ***Mobile phones and programmable calculators are strictly prohibited.***
3) ***Assume suitable data whenever required.***

Q1) a) Write short note on analog video. Explain any two analog video types in detail? **[9]**

b) Write short note on MIDI standard? **[9]**

OR

Q2) a) Discuss the advantages and disadvantages of CRT displays compared to modern display technologies? **[9]**

b) Explain Nyquist theorem in detail? **[9]**

Q3) a) Write short note on Variable Length coding (VLC)? **[9]**

b) Explain JPEG standard in detail? **[9]**

OR

Q4) a) Explain MPEG-I standard in detail? **[9]**

b) Explain the principles behind lossless (Lossy)compression algorithms? **[9]**

Q5) a) Distinguish between Virtual reality and Augmented reality? **[9]**

b) Write short note on Head Mounted VR displays? **[8]**

OR

P.T.O.

Q6) a) Write short note on VRML? **[9]**

b) Write the technologies and techniques used to create realistic audio environments in VR and AR applications? **[8]**

Q7) a) Write short note of on Multimedia-IoT architectures? **[9]**

b) Write short note on applications of M-IoT? **[8]**

OR

Q8) a) Differentiate between IoT and multimedia-IoT **[9]**

b) Discuss the use of Multimedia IoT in industrial applications such as manufacturing, logistics, and supply chain management.? **[8]**

x x x

Total No. of Questions : 8]

SEAT No. : ____

PB4006

[Total No. of Pages : 2

[6262]-358

T.E. (Computer Science and Design Engineering)

AUGMENTED AND VIRTUAL REALITY

(2021 Pattern) (Semester - II) (Elective - II) (318254(B))

Time : 2½ Hours] ***[Max. Marks : 70***

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 do you understand by Rendering? Explain with stages of image rendering. What are the ways data is represented in the Virtual World? **[6]**

b) How vision is used in Virtual Reality Experience? Explain with its important attributes. **[6]**

c) How haptic information is used in a VR Experience. Explain different Haptic rendering methods **[6]**

OR

Q2) a) Describe Visual rendering methods in detail. **[6]**

b) Explain aural rendering systems in Virtual reality. **[6]**

c) How to render complex visual scenes? Explain with different techniques. **[6]**

Q3) a) What do you mean by Manipulation in the real world and in VW? Explain any 2 methods of manipulation. **[6]**

b) Explain Manipulation Operations in detail. **[6]**

c) How are the objects selected in VW? Explain different selection methods. **[6]**

OR

P.T.O.

Q4) a) What different properties should be associated with the manipulation of the world? Explain. **[6]**

b) Describe the process of navigation in a virtual world. **[6]**

c) How to share the experience in VW while interacting with others. Explain it's approach. **[6]**

Q5) a) Explain how AR finds its application in gaming, movies and other forms of entertainment. **[5]**

b) Explain Registration and Latency in the working of AR. **[6]**

c) Explain the working of augmented reality in detail with Outside in and Inside out tracking. **[6]**

OR

Q6) a) What are different hardwares/sensors that make AR work? **[5]**

b) What is augmented reality? Explain the history of AR. **[6]**

c) Explain how Depth Cues, Computer Graphics and Dimensionality play an important role in the working of AR? **[6]**

Q7) a) Describe which toolkits or software libraries are used for AR development. **[5]**

b) How does interaction happen in Augmented reality? Explain. **[6]**

c) What are marker based and marker-less tracking systems in augmented reality? Explain. **[6]**

OR

Q8) a) Describe Location based AR system with 1 example. **[5]**

b) How is mixed reality different from AR and VR? Explain with 1 example. **[6]**

c) What different markers should be used in an AR app? State important characteristics of good marker. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB4007

[Total No. of Pages : 2

[6262]-359

T.E. (Computer Science and Design)

CLOUD COMPUTING

(2021 Pattern) (Semester - II) (318254(C)) (Elective - II)

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.***

Q1) a) Discuss Virtualization in Grid and Virtualization in Cloud? **[9]**

b) Draw and Explain the Virtualization Architecture in detail? **[8]**

OR

Q2) a) Explain the functionality of hypervisor? What is type 1 and type 2 hypervisor? **[9]**

b) Describe CPU, Network and Storage Virtualization? **[8]**

Q3) a) Enlist the different services offered by Amazon web Service? Explain it. **[9]**

b) How cloud computing can be used for business and consumer applications like ERP or CRM? **[8]**

OR

Q4) a) Discuss Amazon Dynamo Database Service in detail? **[8]**

b) Explain Google Cloud Applications in detail? **[9]**

P.T.O.

Q5) a) Explain security authorization challenges in cloud computing? **[9]**

b) Explain the six step risk management processes? **[9]**

OR

Q6) a) Discuss the various Cloud Security Services with its necessity? **[9]**

b) Describe how to perform Secure Cloud Software Testing? **[9]**

Q7) a) What do you mean by IoT Cloud? And how IoT cloud can be used in home automation? **[9]**

b) Differentiate Distributed Cloud Computing Vs Edge Computing? **[9]**

OR

Q8) a) Explain with example, working of Docker? **[9]**

b) How the Cloud and IoT together works for Home Automation? **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4535

[Total No. of Pages :2

[6262]-360

T.E. (Computer Science and Design Engg.)

BUSINESS INTELLIGENCE AND DATA ANALYTICS

(2021 Pattern) (Semester-II) (318254D) (Elective - II)

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) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain in detail any two types of reports. **[6]**

b) Explain the filtering of reports in detail. **[6]**

c) Explain in detail drill up and drill down operations. **[5]**

OR

Q2) a) Write short note on output forms: PDF,XLS,CSV. **[6]**

b) Write short note on Dashboards. **[6]**

c) How to build dimensional data models. **[5]**

Q3) a) Explain data reduction in detail with example. **[7]**

b) Difference between Univariate, Bivariate, Multivariate analysis. **[5]**

c) Write a short note on data discretization. **[5]**

OR

Q4) a) Explain Data exploration in detail with example. **[7]**

b) Explain Data transformation in detail with example. **[5]**

c) Write short note on Data validation. **[5]**

P.T.O.

Q5) a) Explain Association rule and its types. **[5]**

b) Write a short note on classification. **[5]**

c) Consider the following dataset and we will find frequent item sets and generate association rules for them using Apriori algorithm, Consider minimum support count is 2 & minimum confidence is 60%. **[8]**

TID	items
T1	I1, I2, I5
T2	I2,I4
T3	I2,I3
T4	I1,I2,I4
T5	I1,I3
T6	I2,I3
T7	I1,I3
T8	I1,I2,I3,I5
T9	I1,I2,I3

OR

Q6) a) Explain Bayes theorem in detail. **[5]**

b) Difference between Classification and Clustering. **[5]**

c) Explain Logistics regression in detail with example. **[8]**

Q7) a) Explain applications of BI in telecommunication and banking. **[6]**

b) Explain BI application in Logistics and Production. **[6]**

c) Explain Role of BI in Finance and marketing. **[6]**

OR

Q8) a) Explain role of BI in ERP. **[6]**

b) Explain Roles of Analytical tools in BI. **[6]**

c) Explain BI application in CRM. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB4008

[Total No. of Pages : 2

[6262]-361

T.E. (Honors in Artificial Intelligence and Machine Learning)

COMPUTATIONAL STATISTICS

(2019 Pattern) (Semester - I) (310301)

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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Make suitable assumptions whenever necessary.***

Q1) a) List out various methods of statistical analysis? Explain hypothesis testing, null hypothesis, and alternative hypothesis with example. **[9]**

b) Explain the Type-I and Type-II errors in hypothesis testing. What is the role of significance level and p-value in hypothesis testing? **[9]**

OR

Q2) a) Define following terms. **[8]**

i) Sensitivity

ii) Specificity

iii) Degree of Freedom

iv) ROC and AUC

b) Consider the confusion Matrix given below. Calculate Accuracy, Precision, Recall and F-score. **[5]**

Predicted Class / Actual Class	Spam	No Spam
Spam	142	22
No Spam	29	110

c) What is confusion Matrix? Explain the True Positive, False Positive, False Negative and True Negative with example. **[5]**

P.T.O.

Q3) a) What is Normalization and Standardization? Explain different feature scaling techniques. **[9]**

b) Explain hyperparameter Tuning with GridSearchCV. **[8]**

OR

Q4) a) What is Regularization? How does it solve the overfitting problem in Machine Learning? Explain the LASSO (Least Absolute shrinkage and Selection Operator) Regularization Method. **[8]**

b) Explain the following cross validation Techniques. **[9]**

i) K-fold

ii) LOOCV

iii) Stratified K-fold,

Q5) a) What dimension reduction? State few advantages of dimension reduction. Explain any one dimension reduction technique in detail. **[10]**

b) Write short notes on under-sampling and over re-sampling. **[8]**

OR

Q6) a) Write short note on: **[10]**

i) LDA

ii) PCA

b) Explain in detail the Chi-square Test for feature selection with the help of suitable example. **[8]**

Q7) a) Write short notes on Correlation coefficient and Rank Correlation. **[8]**

b) What is Multilinear Regression? How Multilinear Regression is different from Linear Regression? Explain with suitable example. **[9]**

OR

Q8) a) Explain in detail Linear and Logistic regression with the help of suitable examples. **[8]**

b) Explain in detail the Bayes Theorem of conditional probability. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4009

[Total No. of Pages : 2

[6262]-362
T.E. (Honors in Cyber Security)
INFORMATION AND CYBER SECURITY
(2019 Pattern) (Semester - I) (310401)

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) ***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 Message Digest? Explain in detail MD5 algorithm. Applications of MD5. **[9]**

b) Discuss Diffie-Hellman key exchange algorithm with example. **[8]**

OR

Q2) a) Explain the steps for creating Digital Signature. **[9]**

b) Discuss EL-Gamal arithmetic algorithm with example. **[8]**

Q3) a) Explain risk identification, risk Assessment, risk control strategies. **[9]**

b) Explain the Laws and Ethics in Information Security. **[8]**

OR

Q4) a) Explain with suitable example. **[9]**

i) Crimes against individuals

ii) Crimes against organizations

iii) Crimes against society

b) Define cyber-crime. Explain any three categories of cyber-crime. **[8]**

Q5) a) Discuss working of PKI in detail. **[9]**

b) Explain the X.509 Certificate. **[9]**

OR

P.T.O.

Q6) a) What is Firewall? What are its types and list out its various functionalities. **[9]**

b) Explain the SSL web security in detail. **[9]**

Q7) a) Explain intrusion detection system & its types. **[9]**

b) Explain in detail SQL injection attach. **[9]**

OR

Q8) a) What is Virus? What are the types of virus? **[9]**

b) Discuss buffer overflow, spyware, adware in detail. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4010

[Total No. of Pages : 2

[6262]-363
T.E. (Honors) (Computer Engineering)
DATA SCIENCE AND VISUALIZATION
(2019 Pattern) (Semester - I) (310501)

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) State and explain how Naïve bays Theorem is used to solve classification problems. **[6]**

b) Explain the following- **[6]**

i) Data Science

ii) Big data

c) Write a note on association rules and its applicability. **[6]**

OR

Q2) a) What is clustering? Explain K-means clustering algorithm. **[6]**

b) Explain how simple linear regression is used for stock prize prediction (Assume the suitable dataset). **[6]**

c) Write a note on **[6]**

i) Distribution Model-Based Clustering

ii) Hierarchical Clustering

Q3) a) Write a note on the following. **[9]**

i) Gini Index

ii) Information gain

iii) Entropy

b) What is a feedforward neural network? Explain with suitable example. **[8]**

OR

P.T.O.

Q4) a) Explain Decision Tree algorithm. Also explain how to select the best attribute for the root node and for sub-nodes. **[9]**

b) What is a neuron? Explain the architecture of artificial neurons. **[8]**

Q5) a) What are the challenges related to data visualization? **[6]**

b) Write a note on 'Display media for dashboard'. **[6]**

c) What are the advanced data visualization techniques? Explain any 1. **[6]**

OR

Q6) a) Explain dashboard design principles in detail. **[9]**

b) Explain where and how bar-graphs, Scatterplots and histograms can be used to visualize the data. **[9]**

Q7) a) Explain Entity - Relationship (ER) Data Modelling. **[6]**

b) Write a note on the perception model. **[6]**

c) Discuss the challenges of clustering High-dimensional data. **[5]**

OR

Q8) a) What are the key steps in data modelling process? Enlist and explain. **[6]**

b) Explain multidimensional data model with one example. **[6]**

c) What do you mean by principal Component Analysis? Explain with example. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB4011

[Total No. of Pages : 2

[6262]-364

T.E. (Honors) (Computer Engineering)

EMBEDDED SYSTEMS AND INTERNET OF THINGS

(2019 Pattern) (Semester - I) (310601)

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) ***Assume suitable data if necessary.***
4) ***Use of Non-programmable scientific calculator is allowed.***

Q1) a) Draw and describe the components of Arduino. **[6]**

b) What are the analog and digital types of sensors? Discuss and provide suitable examples. **[6]**

c) Explain the working of sensors and different types of sensors. **[5]**

OR

Q2) a) What are the active and passive types of sensors? Discuss and provide suitable examples. **[6]**

b) Draw and describe the components of Raspberry Pi development board. **[6]**

c) What is the need of interfacing of sensors with development boards? How is it done? **[5]**

Q3) a) What are the limitations of IDEs for ES applications? Discuss disadvantages of open-source IDEs for Es applications. **[5]**

b) Explain Design, Components and Coding requirements of embedded systems application? **[6]**

c) What are the testing and deployment requirements of embedded systems applications? **[6]**

OR

Q4) a) What is the need of Integrated Development Platform for application development? Explain with suitable example. **[6]**

b) Describe any one open-source IDE for ES application development. **[6]**

c) Explain SDLC-Requirements of embedded systems application? **[5]**

P.T.O.

Q5) a) Draw and distinguish between physical design and logical design of IoT. **[6]**

b) Enlist and explain issues and challenges of IoT. **[6]**

c) Explain IoT functional blocks in detail. **[6]**

OR

Q6) a) Define Internet of Things (IoT). Enlist and explain its characteristics. **[6]**

b) With the help of neat diagram, explain technical building blocks of IoT. **[6]**

c) Write a brief note on communication models of IoT and Communication APIs. **[6]**

Q7) a) What is CoAP? How it is suitable for IoT applications? Discuss in detail. **[6]**

b) Write a short note on AMQP protocol for IoT. **[6]**

c) Write a short note on "Zigbee" protocol. **[6]**

OR

Q8) a) Explain the usability of MQTT protocol for IoT applications. Comment on the QoS supported in MQTT. **[6]**

b) Define Radio-Frequency Identification. Explain the role of Radio-Frequency Identification in Internet of Things. **[6]**

c) List and explain any 3 communication technologies used in IoT. **[6]**

Total No. of Questions : 8]

SEAT No. :

PB4012

[Total No. of Pages : 2

[6262]-365

T.E. (Computer Engineering - Honours in Virtual Reality and Augmented Reality)

VIRTUAL REALITY

(2019 Pattern) (Semester - I) (310701)

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, Q.9 or Q.10.***
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 in detail how to change position and rotate objects using Geometric Models. **[9]**

b) What are axis angle representations of rotation? **[8]**

OR

Q2) a) Describe Physiology of the human eye with diagram. **[9]**

b) Explain Implications for VR. **[8]**

Q3) a) Explain Monocular Depth Cues. **[6]**

b) Explain in detail Rasterization process in Visual Rendering. **[12]**

OR

Q4) a) How to correct Optical Distortions. **[6]**

b) Explain Ray Tracing and Ray Casting. **[12]**

Q5) a) Explain the role of Physics Engine in Virtual World. **[10]**

b) Explain Mismatched obstacles in VR. **[7]**

OR

P.T.O.

Q6) a) Explain Tracking in 2D Orientation. **[10]**

b) How visibility problem is solved using Camera-based implementation. **[7]**

Q7) a) Explain the term Locomotion. **[10]**

b) Illustrate the different monaural cues. **[8]**

OR

Q8) Explain Auditory Rendering in detail. **[18]**

Total No. of Questions : 8]

SEAT No. :

PB4013

[Total No. of Pages : 2

[6262]-366

T.E. (Mechanical Engineering) (Honors in Systems)

FOUNDATIONS OF SYSTEMS AND SYSTEMS ENGINEERING

(2019 Pattern) (Semester - I) (302041MJ)

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) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain systems science and provide examples of how it interacts with general systems approach, system thinking, and engineered systems. **[9]**

b) With a sketch, list and describe the system's life cycle stages. **[9]**

OR

Q2) a) Give an example to illustrate the concept of systems of systems. **[9]**

b) Represent how the operational environment's other systems interact with the system of Interest (SOI), enabling systems, and other systems. **[9]**

Q3) a) List and describe the many forms of system architecture. **[9]**

b) Describe the different architectural kinds using any two of them. **[8]**

OR

Q4) a) Using an IPO diagram, describe the architectural definition procedure. **[8]**

b) Shortly describe the trade - offs in architecture. **[9]**

Q5) a) Explain the development of MBSE in detail. **[9]**

b) Write a short notes on Modelling, simulation and trade - off analysis. **[9]**

OR

P.T.O.

Q6) a) Illustrate the SysML's fundamental structure using a sketch. **[9]**

b) Describe the MBSE modelling concept. **[9]**

Q7) a) Explain the role of modelling in decision making. **[8]**

b) Write brief comments based on quantitative modelling. **[9]**

OR

Q8) a) Evaluate system dynamics models in a few statements. **[8]**

b) Expalin how simulation modelling fits within the SE lifecycle. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB4014

[Total No. of Pages : 2

[6262]-367
T.E. (Mechanical) (Honors)
ENERGY MANAGEMENT
(2019 Pattern) (Semester - I) (302021MJ)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain salient features of Energy conservation act - 2001. **[10]**

b) Explain briefly Net Zero Energy Building (NZEB). **[8]**

OR

Q2) a) Explain some of the long-term energy strategies available for the better energy secured nation? **[10]**

b) Explain PAT scheme in brief. **[8]**

Q3) a) Discuss ten steps of detailed energy audit. What are the areas that need to be focused during pre-audit phase? **[10]**

b) Explain the different instruments used for Energy Audit with application? **[7]**

OR

Q4) a) What is need of Energy Audit? Discuss different types of Energy Audit. **[10]**

b) Discuss energy audit report format. **[7]**

Q5) a) Explain Net Present Value and how NPV is calculated. List advantages and disadvantages of it. **[10]**

b) Explain 'Return on Investment.' What are the advantages and limitations of it? **[8]**

OR

P.T.O.

Q6) a) Calculate net present value for an investment toward a Compact Fluorescent Lamp (CFL). The following table gives investment and cash flow. (Assume discount rate is 10% and life of the CFL is 2 years). **[10]**

Investment Rs. 400/-

Saving in year	Cash flow, Rs.
Year - 1	1000
Year - 2	1000

b) Define the Internal Rate of Return (IRR) and write its equation. List its advantages and disadvantages? **[8]**

Q7) a) Explain in detail about OZone Layer depletion process and its various effects. **[10]**

b) Explain environmental degradation due to greenhouse effect. **[7]**

OR

Q8) a) Explain acid rain and its adverse impact on environment. **[10]**

b) Write short note on Carbon credits. **[7]**

Total No. of Questions : 5]

SEAT No. :

PB4015

[Total No. of Pages : 2

[6262]-368

T.E. (Mechanical / Automobile) (Honors)

e - VEHICLE TECHNOLOGY

(2019 Pattern) (Semester - I) (302031MJ)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidate:

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) ***Figures to the right indicate full marks.***
3) ***Draw the neat sketch wherever necessary.***

Q1) a) Write a short note on different components of li-ion battery with neat sketch? **[4]**

b) What are the different chemistries of li-ion batteries? Mention in short significance of each of them for electric vehicle. **[8]**

c) Explain the advantages and disadvantages and applications of li-ion batteries. **[8]**

OR

Q2) a) Explain the following parameters of li-ion batteries in short (any two),**[4]**

i) Cell voltage

ii) Energy density

iii) Power density

b) What is the type of charging li-ion battery? Explain the precautions needs to be taken while charging. **[8]**

c) Write a short note on Availability of lithium ion batteries and government policies to fulfill the demands of lithium batteries for Indian e-vehicles.**[8]**

Q3) a) Explain battery management system with working mechanism and neat sketch? **[8]**

b) Explain lead acid batteries with advantages, disadvantages and applications.**[8]**

OR

P.T.O.

Q4) a) Write a short note on need of thermal management system in e-vehicles? Explain with mechanism. **[8]**

b) Explain Li-ion supercapaciter with advantages, disadvantages and applications. **[8]**

Q5) a) Write a short note on Mechanical and electrical connections of motors. **[8]**

b) List out the Output characteristics of electric motor drives for EVs? **[8]**

OR

Q6) a) Write a short note on Output Characteristics of Motor Drives in EVs? **[8]**

b) Explain different types of drives used in electric vehicle with neat sketches. **[8]**

Q7) a) Explain the significance of implementation of IOT in electric vehicle on basis of wireless sensor network with neat sketch wherever required. **[10]**

b) What is battery swapping? Explain with Advantages and Challenges of Battery Swapping. **[8]**

OR

Q8) a) Explain the Significance of IOT for modes of fast and efficient charging in electric vehicles. **[8]**

b) Write a short note on Battery Standards in electric vehicles with any two types? **[10]**

Total No. of Questions : 8]

SEAT No. :

PB-4016

[Total No. of Pages : 2

[6262]-369

T.E. (Mechanical) (Honors)

3D PRINTING

Additive Manufacturing Technology

(2019 Pattern) (Semester - I) (302011MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Draw suitable neat diagrams, whenever necessary.***
2) ***Figure to the right indicate full marks.***

Q1) a) What are the Light-Based Photo-curing? Explain any one of them with neat sketch. **[10]**

b) Write Difference between: SLA and DLP. **[8]**

OR

Q2) a) Explain with neat sketch construction & working, Advantages & limitations of Digital Light Processing (DLP) additive manufacturing technology. **[10]**

b) List out benefits and drawbacks of Stereolithography (SLA). **[8]**

Q3) a) Explain with neat sketch process mechanism and parameters of Selective Laser Sintering (SLS) process. **[10]**

b) Explain with neat sketch Laser Engineered Net Shaping (LENS) **[7]**

OR

Q4) a) Explain with neat sketch process mechanism and parameters of Electron-Beam Melting (EBM) process. **[10]**

b) What are the advantageous and limitations of Direct Metal Laser Sintering (DMLS). **[7]**

P.T.O.

Q5) a) Explain with neat sketch working principle and steps in manufacturing of parts using binder-jetting process. **[10]**

b) Differentiate between Directed Energy Deposition and Powder Bed Fusion technologies. **[8]**

OR

Q6) a) Explain with neat sketch Plasma Deposition. **[10]**

b) Write a short note on 3D Laser Cladding with its advantageous and disadvantages. **[8]**

Q7) a) What are the applications of additive manufacturing technology in defence and electronics industry? **[10]**

b) Explain the biomedical applications of additive manufacturing technology. **[7]**

OR

Q8) a) Explain the applications of additive manufacturing technology in fashion and jewellery industry. **[10]**

b) Explain with neat sketch working 4D Printing. **[7]**

Total No. of Questions : 8]

SEAT No. :

PB-4017

[Total No. of Pages : 2

[6262]-370
T.E. (Robotics)
Principles of Robotics (Honors)
(2019 Pattern) (Semester - I) (304181 HR)

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) ***Assume suitable data if necessary.***
3) ***Draw neat sketches wherever necessary.***

Q1) a) Explain working principle & advantages of vacuum guippers. **[6]**

b) State the characteristics of guippers. **[6]**

c) Explain with neat sketch tactile sensor guipper. **[6]**

OR

Q2) a) Explain working & principle of Magnetic guipper. **[6]**

b) Classify grippers based on various criterias. **[6]**

c) State and explain various tools as end effectors. **[6]**

Q3) a) Classify sensors based on working principle. **[6]**

b) Explain working & construction of capacitive sensor. **[5]**

c) Sketch & explain LVDT. **[6]**

OR

Q4) a) Explain working principle & construction of optical proximity sensors. **[6]**

b) Classify sensors based on working principle. **[5]**

c) Explain with neat sketch force sensors. **[6]**

P.T.O.

Q5) a) Enlist steps in Forward Kinematic Analysis. **[9]**

b) Explain with neat sketch D-H parameter. **[9]**

OR

Q6) a) State properties of generalised composit matrix. **[9]**

b) A 2 DOF planar RR manipulator has L1 = 120mm & L2 = 75mm. Determine joint angles using geometric approach, so that few end is located at (100,70) **[9]**

Q7) a) Explain functional safety application is Robotics. **[9]**

b) Explain various levels of Image processings. **[8]**

OR

Q8) a) Explain various applications of Robotics in Industry. **[8]**

b) Write short note on following. (Any 2) **[9]**

i) Pick & place robots.

ii) Home Automation.

iii) Hospital & patient care.

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Total No. of Questions : 8]

SEAT No. :

PB-4018

[Total No. of Pages : 2

[6262]-371

T.E. (Electrical & Tele Communication) (Honors)

BLOCKCHAIN TECHNOLOGY

Introduction to Blockchain

(2019 Pattern) (Semester - I) (304181HBCT)

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) What is permissionless blockchain? Explain its advantages and disadvantages? **[6]**

b) Explain peer to peer Network as a core component in Blockchain technology. **[6]**

c) What is "Proof of work" and "Proof of stake" in Blockchain technology? Explain. **[6]**

OR

Q2) a) Explain Hybrid blockchain technology in detail. **[6]**

b) It private Blockchain is permissioned Blockchain? Explain. **[6]**

c) What is blockchain protocol? Explain in detail. **[6]**

Q3) a) List and explain the layers in the Hyper ledger based technology. **[9]**

b) How the "Hyper ledger composer" is used in blockchain technology? Explain. **[9]**

OR

Q4) a) Explain Centralized and Decentralized ledgers used in blockchain. **[9]**

b) How the blockchain is used to build the trust in Financial Services? Explain in detail. **[9]**

Q5) a) What is Geth? Explain? How to install and run a Geth node? **[9]**

b) Explain R3 Corda blockchain in detail. **[8]**

OR

P.T.O

Q6) a) How the secure service is provided using cloud based blockchain? Explain. **[9]**

b) What are the benefits of using blockchain API's? Explain. **[8]**

Q7) a) What is "Loyalty program" in blockchain? Explain with an example. **[9]**

b) Explain the use of blockchain to support sustainable business practices. **[8]**

OR

Q8) a) How the blockchain is used in supply chain management system? Explain. **[9]**

b) What is Remittance in blockcahin technology explain in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB-4019

[Total No. of Pages : 2

[6262]-372

T.E. (Civil) (Honors)

METRO CONSTRUCTION

Surveying in Metro Construction

(2019 Pattern) (Semester - I) (301301)

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) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write a short note on Preliminary Investigations for a Metro Railway. **[9]**

b) Explain the Surveying Techniques for Difficult Terrain. **[9]**

OR

Q2) a) Write a short note on Reconnaissance Survey. **[9]**

b) What are the basic requirements of an ideal alignment. **[9]**

Q3) a) Explain the Requirements of a Good Track. **[8]**

b) Write a short note on Maintenance of Permanent Way. **[9]**

OR

Q4) a) Elaborate Track as an Elastic Structure. **[8]**

b) Explain the various forces acting on the track. **[9]**

P.T.O.

Q5) a) Write a short note on Selection of Site for a Metro Railway Station. **[9]**

b) Explain the Requirements of a Passenger Metro Railway Yard. **[9]**

OR

Q6) a) Write a short note on Classification of Metro Railway Stations. **[9]**

b) What are Station Platforms? Explain in details. **[9]**

Q7) a) Explain the necessity and advantages of a Tunnel. **[8]**

b) Write a short note on Tunnel Alignment and Gradient. **[9]**

OR

Q8) a) Write a short note on Ventilation of Tunnels. **[8]**

b) Enlist the various methods of tunnelling and explain any 2 in details. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4020

[Total No. of Pages : 2

[6262]-373

T.E. (Civil) (Honors)

ARCHITECTURE AND TOWN PLANNING

Urban Housing and Infrastructure Planning

(2019 Pattern) (Semester - I) (301401)

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 and Q. 7 or Q.8***
2) ***Figures to the right indicate full marks.***

Q1) a) What is co-operative housing? Explain role of co-operative housing. **[6]**

b) Write a note on HUDCO. **[6]**

c) How hosing demand models are useful? **[5]**

OR

Q2) a) Write a note on NHB. **[6]**

b) Explain the scenario of Rural housing finance **[6]**

c) What is the role of urban local bodies for housing **[5]**

Q3) a) Which Data is required for provision & planning of urban infrastructure? **[6]**

b) What is the need of urban infrastructure? Enlist the types. **[6]**

c) Write a note on: URDPFI guidelines and its contents for infrastructure **[5]**

OR

Q4) a) What is the significance of urban infrastructure? **[6]**

b) For physical infrastructure what guidelines are mentioned? **[6]**

c) Elaborate: modes of transport as a major component of infrastructure **[5]**

P.T.O.

Q5) a) Classify urban services mentioning its significance. **[6]**

b) What are the requirements of appropriate technology **[6]**

c) How the services are designed and planned? **[6]**

OR

Q6) a) Enlist the services you observe normally in urban areas and explain its need **[6]**

b) Elaborate cost recovery means for providing services **[6]**

c) Mention the components with its usage of any two urban services. **[6]**

Q7) a) Mention the norms for water supply **[6]**

b) Elaborate the need of health service provisions. **[6]**

c) Why recreation and open spaces are essential? **[6]**

OR

Q8) a) Write a note on "National Water Policy 2012". **[6]**

b) Elaborate the need of educational service provisions. **[6]**

c) Why street lighting and telecommunication are essential? **[6]**

Total No. of Questions : 8]

SEAT No. :

PB-4021

[Total No. of Pages : 2

[6262]-374

T.E. (Printing Engineering) (Honors)

ADVANCED PACKAGING TECHNOLOGY

Internet of Things

(2019 Pattern) (Semester - I) (308211)

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) ***Black figures to the right indicate full marks.***

Q1) a) Define sensors and Explain the working of any two types of sensors used in IOT application **[9]**

b) Explain the LED interfacing using Arduino Board **[9]**

OR

Q2) a) Define Actuator and Explain the working of any two types of actuator used in IOT application **[9]**

b) Explain the servo-motor interfacing using Arduino Board **[9]**

Q3) a) Explain the standards for IEEE 802.11 and write a note on FHSS and DSSS technique **[8]**

b) Explain the pinouts of ESP8266 **[9]**

OR

Q4) a) Explain what is web-server and mention the steps to be taken for posting the sensor data to the web-server. **[8]**

b) Explain the features and advantages of ESP 8266. **[9]**

P.T.O.

Q5) Describe the types and cioud services in detail for IOT applications **[18]**

OR

Q6) Describe the issues and challenges in IOT **[18]**

Q7) Describe in detail about the industrial IOT and its applications **[17]**

OR

Q8) Explain implementation of IOT in Printing industry **[17]**

Total No. of Questions : 8]

SEAT No. : [ ]

PB4022

[Total No. of Pages : 3

[6262]-375

T.E. (Honors)

ARTIFICIAL INTELLIGENCE

(2019 Pattern) (Semester - II) (310303)

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.***

Q1) a) Represent the following sentences into formulas in predicate logic, **[9]**

i) John likes all kinds of food

ii) Apples are food.

iii) Chicken are food.

iv) Anything anyone eats and isn't killed by is food.

v) Bill eats peanuts and is still alive

vi) Sue eats. everything Bill eats

b) What is knowledge representation in propositional logic. Compare propositional logic and predicate logic. **[8]**

OR

Q2) a) Explain Unification algorithm with suitable example. **[9]**

b) Explain various operators used in propositional logic for knowledge base building. **[8]**

P.T.O.

Q3) a) Explain **[6]**

i) Supervised learning.

ii) Unsupervised Learning.

b) Explain the architecture of Artificial Neural Network. **[6]**

c) With the help of an architecture diagram explain multilayer feed forward artificial neural network. **[6]**

OR

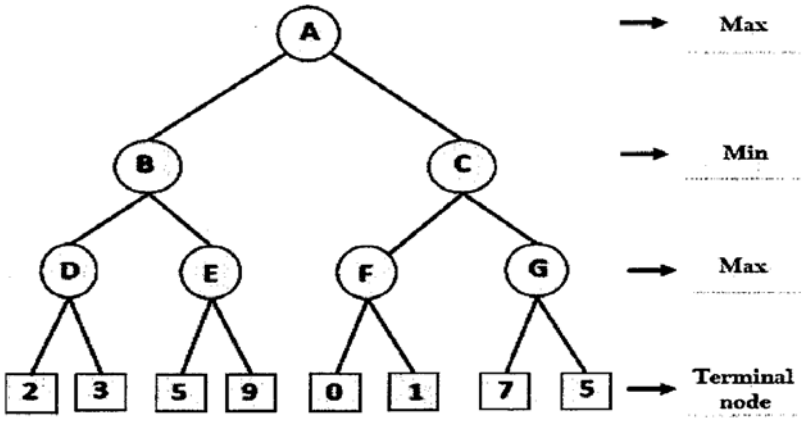
Q4) a) What is Artificial Neural Network? Give two applications of artificial neural networks in detail. **[6]**

b) Explain how Decision Trees are used in Learning. **[6]**

c) Explain how Support Vector Machines are used for classification with suitable example. **[6]**

Q5) a) Illustrate Mini-Max search for the tic-tac-toe game. **[9]**

b) Solve given two player search tree using Alpha-beta pruning. **[8]**



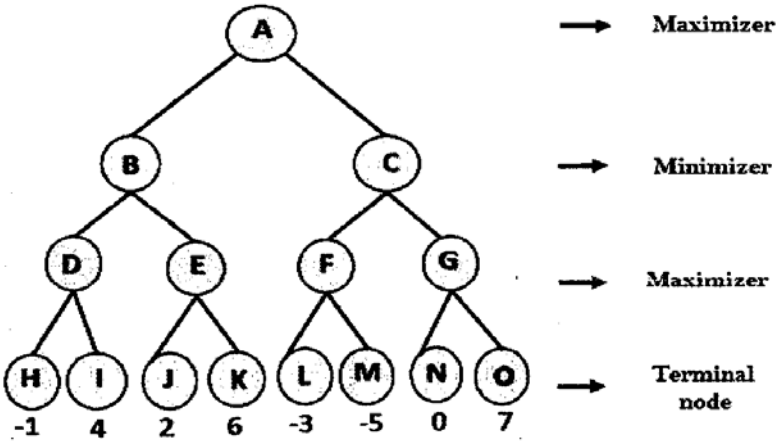
OR

Q6) a) Write a note on **[9]**

i) Types of Games in AI

ii) State-of-the-art Game Programs

b) Solve the given game tree using min max algorithm. **[8]**



Q7) a) Represent the architecture of an expert system, label the various components in the diagram and explain. **[9]**

b) Explain forward chaining and backward chaining for a simple example. **[9]**

OR

Q8) a) Explain the applications of Natural Language Processing. **[9]**

b) What is NLP. Explain all five phases of NLP. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4023

[Total No. of Pages : 2

[6262]-376

T.E. (Cyber Security) (Honors)

ENTERPRISE ARCHITECTURE AND COMPONENTS

(2019 Pattern) (Semester - II) (310403)

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) Explain and draw the component interaction diagram? **[10]**

b) List the components of information architecture. Explain information architecture in details along with its goals. **[8]**

OR

Q2) a) Explain Infrastructure Security Component and Describe component relationship diagram for enterprise information architecture (EIA) **[10]**

b) Describe the component Mashup Hub **[8]**

Q3) a) What is Service Quality? Explain various types of Service Quality in brief. **[10]**

b) Describe the standards used for operational model relationship diagram in brief. **[8]**

OR

Q4) a) Illustrate the context of operational model design techniques **[10]**

b) What is operational model? Explain various types of operational model level. **[8]**

P.T.O.

Q5) a) Elaborate with suitable diagram metadata management component model. **[10]**

b) What are the Service Quality of Metadata Management? **[8]**

OR

Q6) a) What is Service Quality of MDM? Explain the Service Quality in detail. **[10]**

b) Draw block diagram of MDM service Component & Explain in detail. **[8]**

Q7) a) Write a Short Note on COBIT? What are the principle of COBIT? **[8]**

b) Draw Block Diagram of Enterprise Security Architecture in Detail. **[8]**

OR

Q8) a) Explain TOGAF with Example? Explain TOGAF Content Meta Model. **[8]**

b) Explain SABSA Lifecycle with Example. **[8]**

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Total No. of Questions : 8]

SEAT No. :

PB-4024

[Total No. of Pages : 2

[6262]-377
T.E. (Computer Engineering) (Honors)
DATA SCIENCE
Statistics and Machine Learning
(2019 Pattern) (Semester - II) (310503)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must he drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of Scientific Calculator is permitted.***

Q1) a) Explain the concept of Partial Derivatives with example. **[9]**

b) What is the significance of chain rule in calculus? Explain chain rule with suitable example. **[9]**

OR

Q2) a) What is Linear Algebra? How to represent the systems of linear equations using matrices. **[9]**

b) Explain eigen values and eigenvectors with suitable example. **[9]**

Q3) a) Explain with examples : **[8]**

i) Unsupervised learning

ii) Supervised learning.

b) How Reinforcement learning can be applicable in games. Explain with suitable example. **[9]**

OR

Q4) a) What is Machine Learning? Describe Well posed learning problems. **[8]**

b) Explain different perspectives and issues in machine learning. **[9]**

P.T.O.

Q5) a) Explain gradient descent terms with respect to linear regression algorithm. **[9]**

b) What is multivariable regression explain with suitable example? **[9]**

OR

Q6) a) What is Regression? What are the different types of Regression mode explain in details. **[9]**

b) What are the limitations of multivariable Logistic Regression? Explain Growing complexity of Multivariable regression. **[9]**

Q7) a) Explain Classification and Regression Trees with example. **[8]**

b) Explain working of Naive Bayes Classifier? What are types of Naive Bayes classifier. Explain in brief. **[9]**

OR

Q8) a) What are advantages and disadvantages of Naive Bayes model. Describe applications of Naive Bayes model. **[8]**

b) Explain hypothesis space search in decision tree learning. Give suitable example. **[9]**

Total No. of Questions : 8]

SEAT No. :

PB-4025

[Total No. of Pages : 2

[6262]-378

T.E. (Computer Engineering) (Honors)

INTERNET OF THINGS

Internet of Things Architectures, Protocols and Systems Programming

(2019 Pattern) (Semester - II) (310603)

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) ***Assume suitable data, if necessary.***
4) ***Use of Non-Programmable scientific Calculators is allowed***

Q1) a) Describe in brief transport layer protocols. **[6]**

b) Explain in detail DCCP. **[6]**

c) Describe in detail SCTP **[5]**

OR

Q2) a) Explain the working of DTLS. **[6]**

b) Explain in brief session layer protocols. **[6]**

c) Explain in detail CoAP **[5]**

Q3) a) Explain in detail vulnerabilities security requirements and threat analysis. **[6]**

b) What is IoT Security Tomography? Explain. **[6]**

c) Describe IoT layered attacker model in detail. **[6]**

OR

P.T.O.

Q4) a) Describe Identity Management and Establishment in detail. **[6]**

b) Describe IoT Security Models. **[6]**

c) Explain in brief IoT Security Protocols **[6]**

Q5) a) Describe the components of Arduino **[6]**

b) Describe the role of Web/Cloud Services for IoT development. **[6]**

c) Explain the use of APIs. **[5]**

OR

Q6) a) Describe the components of Raspberry Pi. **[6]**

b) Explain essential features of web APIs. **[6]**

c) Describe the components of Intel Galileo **[5]**

Q7) a) Describe the role of IoT for Home Automation **[6]**

b) Describe the role of IoT for Agriculture applications. **[6]**

c) Describe the role of IoT for Telecom/5G. **[6]**

OR

Q8) a) Describe role of IoT for Smart Cities development. **[6]**

b) Describe the role of IoT for Industry. **[6]**

c) Describe the role of IoT for Health and Lifestyle **[6]**

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Total No. of Questions : 8]

SEAT No. :

PB-4026

[Total No. of Pages : 2

[6262]-379

T.E. (Computer Engineering) (Honors)

VIRTUAL REALITY AND AUGMENTED REALITY

Augmented Reality

(2019 Pattern) (Semester - II) (310703)

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 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) What are major software components for augmented reality systems? **[6]**

b) Explain the different characteristics of tracking technology? **[6]**

c) Explain in detail role of Computer Vision in Augmented Reality. **[6]**

OR

Q2) a) Explain multiple-camera infrared tracking in augmented reality **[6]**

b) Explain outdoor tracking in details. **[6]**

c) How pose estimation from Homography is done in marker tracking. Explain **[6]**

Q3) a) What is Marker based and Maker less tracking system in augmented reality? **[6]**

b) What is localization based Augmentation? **[6]**

c) What do you mean by Model based tracking? **[6]**

OR

Q4) a) Explain feature based tracking method? **[6]**

b) Write note on: (Any 2) **[6]**

i) Template markers

ii) 2D barcode markers

iii) Imperceptible markers

c) What is scene generator? **[6]**

P.T.O.

Q5) a) Explain with diagram monitor based augmented reality display. **[6]**

b) Explain the term Virtual Retinal Systems. **[6]**

c) Explain different components of augmented reality **[5]**

OR

Q6) a) Compare optical see-through and video see-through head mounted display **[6]**

b) Explain Augmented Reality based on projection systems **[6]**

c) Explain all AR devices with suitable example **[5]**

Q7) a) What is Semi-directmonocular Visual Odometry (SVO)? **[6]**

b) Explain parallel tracking and mapping (PTAM) in detail. **[6]**

c) How does Mixed Reality works? **[5]**

OR

Q8) a) Explain the working of SLAM technique **[6]**

b) What is mixed reality? Explain the different application of mixed reality. **[6]**

c) Explain dense tracking and mapping (DTAM) **[5]**

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Total No. of Questions : 8]

SEAT No. :

PB-4027

[Total No. of Pages : 2

[6262]-380

T.E. (Mechanical Engineering) (Honors)

SYSTEMS ENGINEERING

Model Based Systems Engineering

(2019 Pattern) (Semester - II) (302043MJ)

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) ***Assume suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) With a sample SysML diagram explain the General diagram concept **[9]**

b) Explain Diagram and Model with Example **[9]**

OR

Q2) a) Write short notes on SysML diagrams **[9]**

b) Demonstrate the structural features of a block. **[9]**

Q3) a) Write short notes on Requirements Interchange Format (ReqIF) **[9]**

b) Write down the difference between Modeling tool and diagramming tool **[8]**

OR

Q4) a) Explain the OOSEM approach with neat sketch. **[9]**

b) Systematically demonstrate the MBSE Methodology **[8]**

P.T.O.

Q5) a) Describe Process properties and problems associated with Process **[9]**

b) Explain in brief process library and process stakeholders. **[9]**

OR

Q6) a) Draw and explain with an example of a V-model **[9]**

b) Explain the framework context view in brief **[9]**

Q7) a) Write short notes on the model-based requirements engineering ontology with a neat sketch. **[8]**

b) List out the Typical properties of a requirement **[9]**

OR

Q8) a) Write short notes on Requirement Validation. **[8]**

b) List and explain the main views of Approach to Context-based Requirements Engineering (ACRE) that are needed according to the framework with a neat sketch. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PB-4028

[Total No. of Pages : 2

[6262]-381

T.E. (Mechanical Engineering) (Honors)

ENERGY MANAGEMENT IN UTILITY SYSTEMS

Energy Efficiency of Thermal Utilities

(2019 Pattern) (Semester - II) (302023MJ)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary and mention the same clearly.***

Q1) a) Explain energy saving opportunities in the steam distribution system **[10]**

b) What is steam trap? Explain inverted bucket steam trap **[8]**

OR

Q2) a) List the types of steam trap and explain thermodynamic steam trap. **[10]**

b) What are the advantages of condensate system in process industry? **[8]**

Q3) a) Define efficiency of furnace and explain why efficiency of furnace is lower than boiler efficiency. State measures to improve the efficiency of furnace. **[10]**

b) A furnace output is 6000 kg/hour of billets. Thermal efficiency is claimed to be 25%. Specific heat of billet is 0.11 kcal/kg°C. Billets enter the furnace at 40°C and leave at 1200°C. Calculate the hourly oil consumption in liter if GCV of oil is 9300 kcal/liter. **[7]**

OR

Q4) a) List applications of furnaces. Explain typical furnace with neat diagram. **[10]**

b) Explain the need of high emissivity coating in furnace. **[7]**

P.T.O.

Q5) a) Explain steam turbine and gas turbine cogeneration system with schematic diagram. **[10]**

b) Explain Tri-generation with suitable schematic diagram **[8]**

OR

Q6) a) What are the benefits of Cogeneration? Explain bottoming cycle cogeneration system with suitable sketch. **[10]**

b) List down all the Important Technical Parameters for Cogeneration plant. **[8]**

Q7) a) Classify waste heat recovery systems. Explain recuperators as a waste heat recovery device. **[10]**

b) Discuss heat pipe with schematic diagram. **[7]**

OR

Q8) a) What are the major points to be considered for developments of WHRS? **[10]**

b) What are the sources of waste heat in a diesel engine? **[7]**

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Total No. of Questions : 8]

SEAT No. : ____

PB-4029

[Total No. of Pages : 2

[6262]-382

T.E. (Mechanical / Electrical) (Honors)

ELECTRIC VEHICLES

e-Vehicles System Design

(2019 Pattern) (Semester - II) (302033MJ)

Time : 2½ Hours] ***[Max. Marks : 70***

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) Explain with neat diagram topology of tyres design and its different component **[8]**

b) Classify braking system used in automotive. **[9]**

OR

Q2) a) Explain elements of vehicle dynamics system **[8]**

b) Explain with neat diagram regenerative braking system (ABS) **[9]**

Q3) a) Explain multi speed electric vehicle **[8]**

b) Explain All wheel drive layout design. **[9]**

OR

Q4) a) Explain Transmission system in HEV. **[8]**

b) What is Torsen and active differential system. **[9]**

P.T.O.

Q5) a) Explain battery compartment and its need in E-vehicle **[9]**

b) Write short note on: **[9]**

i) Battery life analysis

ii) Vent management

OR

Q6) a) Explain battery performance degradation modeling **[9]**

b) Explain with neat diagram Air and Liquid cooling used for battery compartment. **[9]**

Q7) a) Explain ergonomics base Roll cage with neat sketches. **[9]**

b) Explain the importance and process involved in Crash/Impact analysis **[9]**

OR

Q8) a) What do you mean by Vehicle dynamics? Explain components of vehicle dynamics with neat sketches **[9]**

b) Explain ergonomics based packaging design. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PB-4030

[Total No. of Pages : 2

[6262]-384

T.E. (Mechanical Engineering) (Honors)

3D PRINING

Design for Additive Manufacturing

(2019 Pattern) (Semester - II) (302013MJ)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1or 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) How to select additive manufacturing technology using Decision method? **[9]**

b) Explain distortion control methods in additive manufacturing. Also write short note on defects observed in additive manufacturing. **[9]**

OR

Q2) a) Explain function trade-off and time Vs Cost for Additive Manufacturing? Also write advantages and disadvantages of AM. **[9]**

b) Explain any two defects and its rectification in 3d printing. Also write a short note on residual stresses in additive manufacturing **[9]**

Q3) a) Explain 3D slicing classification with suitable diagram. Also Explain Path Sequencing Strategy in detail. **[9]**

b) What are different types of post processing methods for additive manufacturing? explain support removal techniques with its advantages and disadvantages. **[8]**

OR

P.T.O.

Q4) a) What is Pre-processing, In-Situ Processing and Post-processing for Additive Manufacturing? **[8]**

b) Write Classification and Types of 2D and 3D path Planning. Explain Path sequencing strategy. **[9]**

Q5) a) What are various AM CAD Data/file formats for Engineering and Non-Engineering Applications? What are the issues faced during 3D model Creation. **[9]**

b) Explain Issues faced during 3D model creation. How to Repair an STL File or scanned data file? **[9]**

OR

Q6) a) Write a short note on **[9]**

i) Finite Element Analysis (FEA)

ii) Computation Fluid Dynamics (CFD).

b) What are various Infill Structure techniques? How selection of Infill Structure technique affects Printed components? **[9]**

Q7) a) What are applications of reverse engineering in Product Development and Manufacturing, Entertainment, Biomedical Engineering? **[9]**

b) Explain 3D Scanning and Reverse Engineering for 3D Printing Applications with their file format. **[8]**

OR

Q8) a) Explain Different types of 3D scanning methods. Also explain any two types measuring devices in reverse engineering. **[8]**

b) Write a short note on Scanned Geometry Refinement. How repairing is done of scanned geometry? **[9]**

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Total No. of Questions : 8]

SEAT No. :

PB-4031

[Total No. of Pages : 2

[6262]-385

T.E. (E & TC) (Honors)

ROBOTICS

Robot Programming & Simulation

(2019 Pattern) (Semester - II) (304183HR)

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) Explain motion control, hand control, program control commands used in robotic programming with example **[6]**

b) Explain any three basic commands in VAL-II with example. **[6]**

c) Briefly explain the Production rate calculations used for robot in detail **[6]**

OR

Q2) a) Explain WAIT, SIGNAL and DELAY commands used in robotics for communications using simple application. **[6]**

b) With schematic diagram, explain the robotic applications in welding industry. **[6]**

c) W. r. t. VAL-II programming language explain simple pick and place application. **[6]**

Q3) a) Explain manual and automatic mode of operation of industrial robot. **[6]**

b) List and explain Program control statements in AML. **[6]**

c) With suitable example explain different constants and variables used in AML Language of robot **[6]**

OR

P.T.O.

Q4) a) Which syntax move master command language uses? List and explain different types of commands. **[6]**

b) Describe the elements and functions used in AML robotic language. **[6]**

c) Describe the different Motion & Sensor commands of AML language of robot. **[6]**

Q5) a) Write short note on Virtual robotics. **[5]**

b) Discuss how Collision detection works in robotics. **[6]**

c) Discuss in detail about Robot studio online software. **[6]**

OR

Q6) a) What is soft robotics? Discuss robotic process automation in detail. **[6]**

b) Describe following terms **[5]**

i) Repeatability measurement

ii) Robot economics

c) Explain how multiple robot systems are handled. **[6]**

Q7) a) Explain Distributed lag models in details. **[5]**

b) Describe Analog and Hybrid simulation. **[6]**

c) Describe Monte Carlo simulation method. **[6]**

OR

Q8) a) Classify simulation software and Describe a general purpose simulation package. **[6]**

b) Compare simulation packages with programming languages. **[5]**

c) Discuss advantages and disadvantages of simulation. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PB-4032

[Total No. of Pages : 2

[6262]-386

T.E. (Electronics & Telecommunication) (Honors)

BLOCK CHAIN TECHNOLOGY

Decentralize & Blockchain Technologies

(2019 Pattern) (Semester - II) (304183HBCT)

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 and Q.7or Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) What is consensus algorithm? Explain any one type of consensus algorithm in detail. **[6]**

b) With the help of a neat sketch, define the Proof of Elapsed Time (PoET). **[6]**

c) Explain terms **[6]**

i) Proof of Activity

ii) Proof of Burn

OR

Q2) a) What is Proof of stake? Narrate with example. **[6]**

b) What are hash functions and Hash puzzles? **[6]**

c) What are Blocks in a Blockchain? Enlist the disadvantages of Proof of work. **[6]**

Q3) a) Describe scaling process in Ethereum. **[6]**

b) Explain the terms **[6]**

i) Ethereum Clients

ii) Ethereum Wallets

c) What is the Difference Between Bitcoin and Ethereum Blockchain? **[6]**

OR

P.T.O.

Q4) a) What Are the Real-World Use Cases of Ethereum? **[6]**

b) Write short note on Smart Contract. **[6]**

c) How are Ethereum keys generated? **[6]**

Q5) a) Express the selection process of Block-chain technology in detail. **[8]**

b) What are the most important opportunities for deploying blockchain technology in business? Explain one in detail. **[9]**

OR

Q6) a) What are the factors to consider when choosing Blockchains? Explain two factors in detail. **[8]**

b) What is the goal of blockchain? How does blockchain help in decision making? **[9]**

Q7) a) Explain how blockchain used in Medical record management system? **[8]**

b) Why do we need Block-chain? Explain private Block-chain Network in detail. **[9]**

OR

Q8) a) How does IoT work with block-chain? Enlist Benefits of IoT and block chain. **[8]**

b) Write short note on future of Block-chain, along with one application **[9]**

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Total No. of Questions : 8]

SEAT No. :

PB-4033

[Total No. of Pages : 2

[6262]-387

T.E. (Civil) (Honors)

METRO CONSTRUCTION

Planning and Quantity Estimation for Metro Construction

(2019 Pattern) (Semester - II) (301303)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or 0.2, Q.3 or Q.4, Q.5 or 0.6, & Q.7 or 0.8,***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answer will be valued as a whole.***
5) ***Use electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) Explain the main purpose of land acquisition under the Right to fair compensation Act 2013 (Explain in Brief)? **[10]**

b) Explain the types of Land acquisition? **[7]**

OR

Q2) a) Explain the rules for land acquisition? **[7]**

b) Explain merits and demerits of Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013 (New Act)? **[10]**

Q3) a) Prepare detailed estimate of Elevated section (viaduct). **[9]**

b) Prepare detailed estimate of Underground station (Civil work). **[9]**

OR

Q4) a) Explain the steps involved in construction of Underground section by Cut and Cover. **[9]**

b) Explain steps involved in construction of Elevated station (E&M work including lift and escalator) **[9]**

P.T.O.

Q5) a) Which factors are influencing the investment decision? **[6]**

b) Enlist capital budgeting techniques and explain any 2 in brief. **[6]**

c) Explain cost of capital and its implications in budgeting decisions **[6]**

OR

Q6) a) Define the concept of cost of capital. State how you would determine the weighted average cost of capital of firm. **[6]**

b) What are Risk identification techniques? **[6]**

c) Distinguish between Internal Rate of Return and Net Present Value techniques. Which method would you recommend for evaluating investment? Explain. **[6]**

Q7) a) Write a short note on Financial Support for PPPs in Infrastructure. **[7]**

b) Explain types of contract documents used for construction **[5]**

c) What are Construction Contract Specifications? **[5]**

OR

Q8) a) Describe types of Construction Contract Specifications. **[7]**

b) Write a short note on any two **[10]**

i) BOT

ii) BOOT

iii) EPC contracts

iv) Factors that influence procurement strategy selection

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Total No. of Questions : 8]

SEAT No. :

PB-4034

[Total No. of Pages : 2

[6262]-388

T.E. (Civil Engineering) (Honors)

ARCHITECTURE AND TOWN PLANNING

Sustainable Architecture and Landscape Design

(2019 Pattern) (Semester - II) (301403)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidate :

Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.

Q1) a) What concepts makes green building a sustainable building? **[6]**

b) Explain the role of urban planners and architect in sustainable planning **[6]**

c) Write a note on smart city explain with example. **[5]**

OR

Q2) a) Why provision of green belt is made in Eco city? Explain in detail. **[6]**

b) Explain in detail components of green building. **[6]**

c) Write a note on eco city. Explain with example. **[5]**

Q3) a) Explain the various behavioural issues in landscape design. **[6]**

b) Write a note on, Types of landscaping **[6]**

c) Enlist the elements of geomorphology in landscape planning. Explain any one in detail. **[5]**

OR

Q4) a) Enlist various principles in landscape design with explanation. **[6]**

b) Illustrate various environmental factors in landscape planning. **[6]**

c) Write a note on, landscape assessment. **[5]**

P.T.O.

Q5) a) Explain the purposes of landscape design. **[6]**

b) Write a note on green roof design. **[6]**

c) Explain the process for planning of landscape area. **[6]**

OR

Q6) a) Write the philosophy of landscape architecture along with its objectives. **[6]**

b) How landscaping impacts on the environment? **[6]**

c) Enlist the factor affecting landscaping with its explanation. **[6]**

Q7) a) Differentiate between Landscape development in rural and urban areas. **[6]**

b) Explain Landscape treatment for water logged area. **[6]**

c) How to improve landscaping of existing road? **[6]**

OR

Q8) a) Write a note on landscape development in urban areas with example. **[6]**

b) What are precautionary measures to be followed for landscape treatment for highly industrialized area? **[6]**

c) Illustrate landscape treatment for coastal area. **[6]**

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Total No. of Questions : 8]

SEAT No. :

PB-4035

[Total No. of Pages : 2

[6262]-389

T.E. (Printing) (Honors)

ADVANCED PACKAGING TECHNOLOGY

Smart Packaging

(2019 Pattern) (Semester - II) (308213)

Time : 2½ Hours] *[Max. Marks : 70*

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, jf necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Describe in detail active packaging. State 2 examples to explain the concept of active packaging. **[10]**

b) What is interactive packaging? **[7]**

OR

Q2) a) What are advantages of smart packaging **[6]**

b) Describe in details with examples the use of various sensors and indicators in packaging **[11]**

Q3) a) Name the three radio frequency bands which are used for RFID communication and frequencies used. **[12]**

b) Describe in brief the different types of RFID antennae. **[6]**

OR

Q4) a) State the classification of RFID tags based on frequency, power source and chip. **[6]**

b) State the different types of RFID tags available in the market. Briefly explain the utility of each type. **[12]**

P.T.O.

Q5) a) What do you understand by NFC? How do NFC systems vary from RFID systems? Explain in terms of functionality and applications. **[12]**

b) What are the advantages of NFC as compared to RFID systems? **[5]**

OR

Q6) a) Explain the working principle of operation of NFC. Name the different modes of operations of NFC systems. **[10]**

b) Name the different types of NFC tags. **[7]**

Q7) a) Give examples use of intelligent packaging in Food packaging **[12]**

b) Describe any implementation stage of smart packaging in a food packaging industry **[6]**

OR

Q8) a) Give examples use of intelligent packaging in pharma packaging **[6]**

b) Describe any implementation stage of smart packaging in a pharma packaging industry **[12]**

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Total No. of Questions : 10]

SEAT No. : ____

PB-4924

[Total No. of Pages : 2

[6262]-400

T.E. (Computer Engineering)

DIGITAL SIGNAL PROCESSING APPLICATIONS

(2012 Pattern) (Semester - I) (310253)

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, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary***

Q1) a) Find the linear convolution of two sequences x(n) and h(n) **[5]**

$x(n) = u(n) - u(n-4)$

$h(n) = 2\delta(n) + \delta(n-2) - 3\delta(n-3)$

b) State and prove differentiation property of Fourier transform. **[5]**

OR

Q2) a) State the sampling theorem and explain why the problem of aliasing observed during sampling process? **[5]**

b) Obtain the ZT of **[5]**

i) $u(n)$

ii) $\delta(n)$

Sketch the ROC.

Q3) a) Derive the relation between DFT and ZT. Explain the significance of ROC and State properties ROC. **[5]**

b) Derive the first stage of Radix-2 DIF FFT algorithm. **[5]**

OR

Q4) a) Compute 4 point Circular Convolution for DT signals **[5]**

$x_1(n) = u(n) - u(n-3)$

$x_2(n) = 2\ \delta(n) - \delta(n-2)$

b) State & Prove the Time Shifting and Time Reversal properties of Fourier Transform. **[5]**

P.T.O.

Q5) a) Obtain direct form I and form - II realization of system described by **[9]**

$$y(n)-\frac{3}{4}y(n\quad 1)|\frac{1}{8}y(n\quad 2)=x(n)|\frac{1}{2}x(n-1)$$

b) Obtain cascade form realization of the following system **[9]**

$$H(Z)=\left(1+\frac{1}{2}z^{-1}+z^{-2}\right)\left(1+\frac{1}{4}z^{-1}+z^{-2}\right)$$

OR

Q6) a) Obtain and realize Linear Phase FIR filter structure for a DT system **[9]**

$$y(n)=x(n)+\frac{1}{3}x(n-1)+\frac{1}{4}x(n-2)+\frac{1}{4}x(n-3)+\frac{1}{3}x(n-4)+x(n-5)$$

What are the advantages of this filter structure?

b) Derive the Direct Form-II IIR filter structure from system function $H(Z)$ and represent it using multipliers, adders and delay elements. **[9]**

Q7) a) Draw and Explain Architecture of SHARC Processor. **[8]**

b) Explain applications of DSP with respective to following **[8]**

i) Telecommunication

ii) Biomedical

OR

Q8) a) Write a short note on following **[8]**

i) Open multimedia applications platform (OMAP)

ii) Harvard Architecture

b) Draw and explain the SIMD (Single Instruction Multiple Data) architecture of SHARC DSP processor **[8]**

Q9) a) Draw and explain Human Speech Model in speech synthesis and recognition. **[8]**

b) Explain the working of following **[8]**

i) Charged coupled device (CCD)

ii) Television video signal

OR

Q10) a) What is Companding? What is its significance in audio processing? What is the impact of data rate on sound quality? **[8]**

b) What is the necessity of brightness and contrast adjustment? How it is done? **[8]**

Total No. of Questions : 10]

SEAT No. :

PB4960

[Total No. of Pages :3

[6262]-400

T.E. (Computer Engineering)

INFORMATION SYSTEMS AND ENGINEERING ECONOMICS

(2015 Pattern) (Semester-I) (310244)

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, Q.9 or Q.10.***
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 scientific Calculator is Permitted.***

Q1) a) What are the different types of information technology used in an organization? Explain them in brief. **[6]**

b) Define the following terms **[4]**

i) Bargaining power of supplier

ii) Barriers to Entry

OR

Q2) a) What are the social issues in managing the Information systems? **[6]**

b) What are the four essential features of a secure network? **[4]**

Q3) a) Name different ICT interventions and explain them in brief. **[6]**

b) What is the advantage of three-tier architecture? **[4]**

OR

Q4) a) Explain in brief the Extreme Programming. **[6]**

b) What is the meaning of Up-selling and how is it different from cross-selling? **[4]**

Q5) a) Describe briefly the Strategic Engineering Economic Decisions. **[8]**

b) What is the difference between simple and compound interest? If you deposit Rs 100 now (n=0) and Rs 200 two years from now (n=2) in a savings account that pays 10% compound interest. Assume that you don't withdraw the interest earned at the end of each period (year), but instead let it accumulate for 10 years. How much would you have at the end of year 10? **[8]**

OR

P.T.O.

Q6) a) Explain the following terms **[8]**

i) Single-payment compound-amount factor

ii) Present - worth factor

b) Explain with suitable example nominal interest rate and effective annual interest rate. **[8]**

Q7) a) What is Project cash flow? How is it different from loan cash flow? **[8]**

b) A company is planning an investment to produce sensors and control systems that have been requested by a fruit-drying company. The work would be completed in five years through a contractor. The project is expected to generate the following cash flows in actual dollars. **[8]**

Year(n)	Net Cash Flow in Actual Dollars
0	$75000
1	$32000
2	$35700
3	$32800
4	$29000
5	$58000

The general inflation rate is 5% per year and inflation free interest rate is 10%.Compute the present worth of these cash flows using adjusted-discount method.

OR

Q8) a) What is annual equivalent worth (AE)? Explain the concept of Capital Costs and Operation Costs with proper examples. **[8]**

b) A utility company's cost to supply a fixed amount of power to a new housing development is shown in the table below. **[8]**

Year	Cost
0	$504000
1	$538000
2	$55700
3	$629500

Assume that year 0 is the base period.

Determine the inflation rate of each period and calculate the average inflation over the three years.

Q9) a) Explain in detail with suitable example the income statement of a company. **[10]**

b) Consider the following data on an automobile;

Cost basis of the asset (I) = $10,000;

Useful life (N) = 5 years;

Estimated salvage value (S) = $2,000.

Compute the annual depreciation allowances and the resulting book values using the straight-line depreciation method. Illustrate the result using a diagram. **[8]**

OR

Q10)a) What is the importance of having cash-flow statements? What points do they depict? **[10]**

b) How cash flow analysis is done in start-up? **[8]**

Total No. of Questions : 10]

SEAT No. :

PB4925

[Total No. of Pages : 3

[6262]-401
T.E. (Mechanical Engineering)
REFRIGERATION AND AIR-CONDITIONING
(2015 Pattern) (Semester-II) (302049)

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, Q.9 or 10.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator, psychrometric chart is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) List four eco-friendly refrigerants with their chemical formula and designation. **[4]**

b) An ideal vapour compression system uses R -12 as the refrigerant. The system uses an evaporation temperature of 0°C and a condenser temperature of 40°C. The capacity of the system is 7 TR. Determine.**[6]**

i) The mass flow rate of refrigerant, and

ii) COP of the system.

Use the properties of R - 12 from the table given below:

Temp °C	Pressure bar	h_f kJ/kg	h_g kJ/kg	s_f kJ/kg	s_g kJ/kg.k
0	3.087	36.05	187.53	0.142	0.696
40	9.609	74.59	203.2	0.727	0.682

Take Cp for superheated vapour as 0.6kJ/Kg.K.

OR

Q2) a) What is ODP and GWP and what are their sources to contribute? **[4]**

b) Draw skeleton of p-h diagram and mark the property line on it. Sketch ideal vapour compression cycle on p-h digram and mark the name of processes. **[6]**

P.T.O.

Q3) a) Discuss the effect of subcooling on performance of VCC with the help of p-h diagram. **[4]**

b) Discuss the function of absorber in vapour absorption refrigeration system. Why cooling provision is provided for absorber? **[6]**

OR

Q4) a) Compare vapor absorption system with vapour compression system on any four criterions. **[4]**

b) Discus the effect of heat exchange between liquid refrigerant after condenser and refrigerant vapor before compression on performance of Vapor compression cycle. Draw its schematic and p-h diagram. **[6]**

Q5) a) Define effective temperature and discuss the effect of **[6]**

i) Climate and Seasonal Variation and

ii) Density of Occupation on optimum effective temperature.

b) The air at 28ºC and 1 bar has a specific humidity of 0.016 kg per kg of dry air. Determine **[10]**

i) Partial pressure of water vapour,

ii) Relative humidity, and

iii) Specific enthalpy. Use sat pressure 0.03778 bar at 28ºC. Use of psychrometric chart is not allowed.

OR

Q6) a) Define specific humidity and relative humidity. **[4]**

b) Use standard psychrometric chart and show the basic air conditioning processes on it. **[4]**

c) Air is cooled from 39ºC DBT and 29% RH to 24ºC at the rate of 5 m^3/s. Calculate the capacity of the cooling coil if the surface of the cooling coil is 20ºC. Also , calculate the by-pass factor. **[8]**

Q7) a) Draw a schematic of summer air conditioner and explain its working in brief. **[6]**

b) List the indoor and outdoor components of a split air conditioner. List any two advantages of its use over other types. **[6]**

c) Explain the working principle of capillary tube with schematic. **[6]**

OR

Q8) a) Draw p-v diagram for single acting reciprocating compressor and explian its working. **[6]**

b) Draw a schematic of Flooded evaporator and state its advantages. **[6]**

c) Compare unitary and central air conditioning systems on any three parameters. **[6]**

Q9) a) Draw an AHU and mark its components. **[4]**

b) What are desirable properties of duct material? **[4]**

c) Explain the types of fan used in air condition system for supply and return ducts. Write any two types and their causes of pressure losses in ducts. **[8]**

OR

Q10)a) Prove that the equivalent diameter of rectangular duct for same air flow rate is given by **[8]**

$$D_{eq} = 1.265\left[\frac{(ab)^3}{(a+b)}\right]^{1/5}$$

where a/b is aspect ratio.

b) Draw perimeter type and extended plenum duct arrangements and explain in brief. **[8]**

Total No. of Questions : 8]

SEAT No. :

PB4961

[Total No. of Pages :2

[6262]-401
T.E. (Electrical)
UTILIZATION OF ELECTRICAL ENERGY
(2015 Pattern) (Semester-II) (303148)

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) ***Figures to the right indicate full marks.***

Q1) a) Explain Modes of Heat Transfer with mathematical expression. **[9]**

b) Write a note on anoidizing and state its applications. **[9]**

OR

Q2) a) Explain with neat diagram Ajax Watt Furnace. **[9]**

b) Explain with neat digram electric circuit used in Refrigerator. **[9]**

Q3) a) Explain function of Interrupter and Circuit breaker used in traction substation. **[9]**

b) Draw and explain layout of traction substation. **[9]**

OR

Q4) a) Compare Steam engine drive with Electric drive. **[9]**

b) Explain following systems of track electrification. **[9]**

i) Single phase low frequency AC system

ii) Kando System

P.T.O.

Q5) a) An electric train has an average speed of 48 kmph on level track between stops 1500 m apart. It is accelerated at 2 kmphps and is braked at 3 kmphps. Estimate the energy consumption at the axle of the train per tonne km. Take tractive resistance as 50 N/ tonne and allow 10% for rotational inertia. **[10]**

b) Define: **[8]**

i) Average Speed

ii) Schedule Speed

iii) Coefficient of adhesion

iv) Tractive effort

OR

Q6) a) Elaborate the parts of total tractive effort with usual notations. **[8]**

b) The speed time curve of a train consists of uniform acceleration of 4 kmphps for 30 sec, free running for 10 minutes, uniform deceleration of 6 kmphps and a stop of 6 minutes. Find the distance between station, average speed, schedule speed. **[10]**

Q7) a) Explain open, shunt and bridge transition with neat diagram. **[8]**

b) Write a note on Anti-collision system. **[8]**

OR

Q8) a) State desirable requirements of traction motor. **[8]**

b) Obtain efficiency for Series parallel starting of two motors. **[8]**

Total No. of Questions : 10]

SEAT No. :

PB-4926

[Total No. of Pages : 3

[6262]-402

T.E. (Mechanical)

THEORY OF MACHINES - II

(2015 Pattern) (Semester - I) (302043)

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, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary***

Q1) a) What do you mean by interference and undercutting in involute gears? **[4]**

b) A two start worm rotating at 800 rpm drives a 26 tooth worm gear. The worm has a pitch diameter of 54 nmi and a pitch of 18 mm. If the coefficient of friction is 0.06, find **[6]**

i) the helix angle of worm

ii) speed of gear

iii) center distance

iv) efficiency

OR

Q2) a) Two 20° involute spur gears have a module of 10 mm. The addendum is equal to one module. The larger gear has 40 teeth while the pinion has 20 teeth. Will the interference with the pinion? **[6]**

b) Define the following terms related to bevel gear **[4]**

i) Pitch cone angle

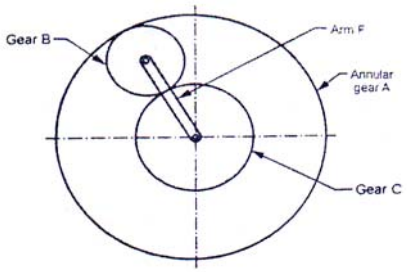
ii) Shaft angle

iii) Back cone angle

iv) Face width

P.T.O.

Q3) a) An epicyclic gear train consists of three gears A,B &C as shown in fig. The number of teeth on annulus gear A is 74 and on gear C is 34. The gear B meshes with both the gears A and C and it is carried on an arm F which rotates about the center A at 25 rpm. If the gear A is fixed, find the speed of gear B and C. **[8]**



Fig

b) What do you mean by compound epicyclic gear train? **[2]**

OR

Q4) a) Explain torque analysis in epicyclic gear train. **[6]**

b) Explain in detail simple, compound and reverted gear train. **[4]**

Q5) a) Define the following terms **[6]**

i) Cam profile

ii) Pitch curve

iii) Pressure angle

iv) Trace point

b) An eccentric cam of eccentricity 3.75 cm drives a follower of mass 1.75 kg. The spring holding against the cam has a stiffness of 24 N/mm and has a initial compression of 3.125 cm. It is observed that jump occurs at cam rotation 100° from the lowest position of the cam. Find out the speed of the cam in rpm Also find out the maximum usable speed of cam with out jump. **[10]**

OR

Q6) a) The following data relate to a cam profile in which the follower moves with uniform acceleration and retardation during ascent and descent.

Minimum radius of the cam = 25 mm, roller diameter = 7.5 mm, lift = 28 mm, offset of follower axis = 12 mm towards right, angle of ascent = 60°, angle of decent 90°. Angle of dwell between ascent and descent = 45°, speed of the cam = 200 rpm.

Draw the profile of the cam and determine the maximum velocity of the follower during outstroke and return stroke **[12]**

b) Derive the expression for displacement, velocity and acceleration of simple polynomial cam. **[4]**

Q7) a) Explain the following terms **[8]**

i) Steps in synthesis

ii) Tasks of kinematic synthesis

b) A four bar machanism generates a function y = 5sin *x*, *x* varies from 0° to 90°. Angle of driving link varies from 30° to 150°. Angle of the driven link varies from 60° to 120°. Determine three positions of crank and rocker. **[8]**

OR

Q8) a) Derive the Freudenstein' s equation for the four bar mechanism. **[8]**

b) Synthesize a four bar mechanism using following data. **[8]**

	1	2	3
θ	40°	55°	70°
ϕ	50°	60°	75°

Take length of fixed link 30 mm. Use Freudenstien's equation.

Q9) a) Write shote note on faceplate variators. **[4]**

b) The rotor of the turbine of a ship has a mass of 2500Kg and rotates at a speed of 3200 rpm counter clockwise when viewed from the stern. The rotor has a radius of gyration of 0.4 m. Determine the gyroscopic couple and its effect when **[14]**

i) the ship steers to the left in a curve of 80m radius at a speed of 15 knots (1 knot =1860 m/h)

ii) the ship pitches 5° above and 5° below the normal position and the bow is descending with its maximum velocity. The pitching motion is simple harmonic with a periodic time of 40 seconds.

iii) find the angular acceleration during pitching.

OR

Q10) a) Compare stepped and stepless regulation of speed. **[4]**

b) Each wheel of four wheeled, rear engine automobile has a moment of inertia of 2.4 Kg/m^2 and effective diameter of 660mm. The rotating parts of the engine have a moment of inertia of 1.2 Kg/m^2. The gear ratio of the engine to the back wheel is 3 to 1. The engine axis is parallel to the rear axle and the crank shaft rotates in the same sense as the road wheels. The mass of the vehicle is 2200 Kg and the center of the mass is 550 mm above the road level. The track width of the vehicle is 1.5m. Determine the limiting speed of the vehicle around a curve with 80m radius so that all the four wheels maintained contact with the road surface. **[14]**

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Total No. of Questions : 8]

SEAT No. :

PB-4962

[Total No. of Pages : 2

[6262]-402

T.E. (E & TC)

INFORMATION THEORY CODING AND COMMUNICATION NETWORKS

(2015 Pattern) (Semester - II) (304187)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side 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) Define and give example. **[7]**

i) Hamming weight

ii) Hamming distance

iii) Code rate

iv) Min hamming distance

b) Explain Shannon-Fano coding in detail. **[7]**

c) Explain Golay Code and Interleaved code in detail. **[6]**

OR

Q2) a) Define entropy and explain its properties in detail. **[7]**

b) A discrete memory less source has 4 symbols x_1, x_2, x_3, x_4 with probabilities. 0.3, 0.2, 0.4 and 0.1 respectively. Construct Huffman code, calculate code efficiency and redundancy. **[7]**

c) What do you mean by Channel Capacity? Explain Channel coding theorem in detail. **[6]**

P.T.O.

Q3) a) Define following terms related to convolutional codes with example. **[8]**

i) Constraint length

ii) Code rate

iii) Dfree (free length)

iv) Generating function

b) Design (15, 11) Rs code. Find code for message polynomial $(x + 1)$. Use primitive polynomial $P(x) = x^4 + x + 1$. **[10]**

OR

Q4) a) For systematic rate 1/2 convolutional encoder with constraint length 2 parity bit is generated by mod-2 sum $p = x + 1$ **[8]**

i) Draw the encoder

ii) Draw state diagram, trellis diagram

iii) Find out the output for message (1 0 1)

b) Explain decoding of BCH codes and decoding of RS codes in detail.**[10]**

Q5) a) Compare coaxial cable, optical fiber and twisted pair cable. **[8]**

b) Draw & explain TCP/IP model. Explain functionality of each layer. **[8]**

OR

Q6) a) Explain network design issues. **[8]**

b) Define network, Explain different network topologies. **[8]**

Q7) a) What is framing? Explain diff. types of framing methods. **[8]**

b) Give functions/services of DLL. Compare it with physical layer. **[8]**

OR

Q8) a) Explain different types of stations and data transfer modes of HDLC.**[8]**

b) What is ARQ? Explain three types of ARQ in detail. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

PB4927

[Total No. of Pages : 3

[6262]-403
T.E. (Mechanical Engineering)
TURBO MACHINES
(2015 Pattern) (Semester-I) (302044)

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, Q.9 or 10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator, Steam table, mollier diagram are allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) prove that maximum efficiency for jet of water striking on series of moving flat plates is 50%. **[4]**

b) A jet of water moving at 12m/s impinges on a vane to deflect the jet through 120º. The vane is moving at 5m/s. Find the absolute velocity of the jet at exit. Assume vane is very smooth. **[6]**

OR

Q2) a) Write a short note on 'Unit Quantities' (Any Two). **[4]**

b) A three jet pelton wheel working under net head of 400m is required to generate 10MW. The side clearance angle of the buckets is 15º. Relative velocity decreases by 5%. Overall efficiency = 82%, Coefficient of velocity = 0.97, Jet ratio = 10 and speed ratio = 0.47. **[6]**

Find

i) Diameter of jet

ii) Total Discharge

iii) Speed of wheel.

Q3) a) Write a note on 'classification of water Turbines'. **[4]**

b) The peripheral and whirl velocity at the inlet of a Francis turbine are 32m/s and 26m/s respectively. The velocity of flow is 5m/s and it remains constant during the flow through the turbine. Assuming no velocity of whirl at exit and hydraulic efficiency is 90%. Find **[6]**

i) Blade angle at inlet

ii) Guide vane angle at inlet

iii) Net head for the turbine

OR

P.T.O.

Q4) a) Explain types of draft tube in Reaction water turbine. **[4]**

b) A kaplan turbine is generating 12.5MW power against a net head of 30m. The runner tip diameter is 3.5m and hub diameter is 1.5m. The hydraulic efficiency is 92% and overall efficiency of the turbine is 88%. Both the inlet and outlet velocity triangles are right angled triangles at the tip. Find **[6]**

i) Speed of the turbine

ii) Guide vane angle at inlet

iii) Outlet blade angle

Q5) a) Explain any two methods of compounding of Steam Turbine. **[8]**

b) For Impulse steam turbine, Steam flow rate = 1kg/s, enthalpy drop in the nozzle = 500kJ/kg. Blade speed = 300m/s. Nozzle angle = 25º, Outlet blade angle = 35º. Calculate: **[8]**

i) Power developed by the turbine

ii) Diagram Efficiency

iii) Stage efficiency

OR

Q6) a) Derive an expression for maximum efficiency of Parsons Reaction Steam Turbine. **[8]**

b) A reaction turbine runs at 300rpm and its steam consumption is 15400kg/h. The pressure of the steam is 1.9 bar its dryness fraction is 0.93 and power developed is 3.5KW. The discharge blade tip angle is 20º for both fixed and moving blades and axial velocity of flow is 0.72 of the blade velocity. Find the drum diameter and blade height. Take the tip leakage as 8%. **[8]**

Q7) a) Explain following terms **[8]**

i) Manometric Head

ii) NPSHR

iii) Specific Speed

iv) Manometric Efficiency

b) A centrifugal pump having blades which are radial at outlet discharges 100Lit/sec against head of 7.5m. The diameter of the impeller at exit is 0.3m and width at the diameter at exit is 30mm. The velocity of whirl at outlet is 9.304m/s. Find **[8]**

i) Speed of the impeller

ii) Magnitude and direction of absolute velocity at the outlet of impeller.

OR

Q8) a) Classify Centrifugal pump based on any four criteria's. **[8]**

b) A pump is to deliver water from a tank against static head of 40m. The suction pipe is 50m long and 25cm diameter. The delivery pipe is 20cm diameter and 1600m long. The pump characteristics can be defined as:$H=100-6000Q^2$, where H is head in meters and Q is discharge in m^3/s. Calculate the net head and discharge of the pump. Friction factor for both the pipes is 0.02. Calculate power required to drive the pump if overall efficiency of the pump is 85%. **[8]**

Q9) a) Explain and represent flow processes in suction pipe, impeller, diffuser and delivery pipe of axial flow compressor on T-S diagram. **[8]**

b) A centrifugal compressor used for supercharging an aircraft draws air at its inlet conditions of 0.8 bar, 7ºC and velocity of 100m/s. It is compressed adiabatically in impeller up to 1.5 bar and 70ºC and velocity leaving the impeller is 300 m/s.This air enters into the diffuser where its kinetic energy is completely converted into pressure energy. Mass flow rate of air is 3kg/s. Find

i) Impeller Power

ii) Isentropic efficiency of impeller based on static conditions

iii) Isentropic efficiency of impeller based on stagnation conditions. Assume Cp = 1.005kJ/kgk. **[10]**

OR

Q10)a) Explain surging and choking in Centrifugal Compressor. **[8]**

b) Write a note on 'Losses in Axial flow Compressor'. **[5]**

c) Write a note on 'Stalling of blades' in Compressor. **[5]**

Total No. of Questions : 8]

SEAT No. :

PB-4963

[Total No. of Pages : 2

[6262]-403A
T.E. (E & TC)
BUSINESS MANAGEMENT
(2015 Pattern) (304188)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q3 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) Elaborate in detail the planning process with the help of block diagram. **[6]**

b) Explain any two Quality Management Assistance Tools in detail. **[6]**

c) Elaborate the concept of cost benefit analysis with standard graphical representation and enlist the objectives of it. **[8]**

OR

Q2) a) List out the Managerial roles as identified by Mintzberg. **[6]**

b) Explain the basic philosophy of 'Kaizen.' State it's advantages and limitations. **[6]**

c) State and explain different Project resources **[8]**

Q3) a) What is Human Resource Planning ? State the objectives of Human Resource Planning. **[8]**

b) Describe the recruitment strategy with neat schematic and list out the steps of the same. **[8]**

OR

Q4) a) Clarify the concept of career development. Judgment on career planning and management. **[8]**

b) Enlist the steps in talent acquisition process and justify-why it is needed to do the investment in training programs. **[8]**

P.T.O.

Q5) a) Identify and describe the role of an entrepreneur in the economic development. **[8]**

b) Discuss on "Women Entrepreneur" and describe policies with Schemes for it in India. **[8]**

OR

Q6) a) State the causes of Industrial disputes. **[8]**

b) Explain the need of market research and describe the salient features of it. **[8]**

Q7) a) State the objectives of pricing and explain the factors influencing pricing decision. **[10]**

b) Enlist the types of branding and enumerate the activities of sales force management. **[8]**

OR

Q8) a) Define segmentation and describe basis of segmentation of consumer goods with tree diagram. **[10]**

b) Define Supply chain management and state its benefits. **[8]**