Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-1

S.E. (Mech./Auto) (II Sem.) EXAMINATION, 2018
PRODUCTION TECHNOLOGY
(2008 Pattern)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answers to the two sections should be written in separate books.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

SECTION I

UNIT I

1. (*a*) Draw neat sketch of single point cutting tool explaining various angles of that. [8]

(*b*) The following data from an orthogonal cutting test is as follows :

Rake angle = 15°

Chip thickness ratio = 0.383

Uncut chip thickness t = 0.5mm

Width of cut b = 3mm

Yield stress of material in shear = 280 N/mm^2

Average coefficient of friction on tool face = 0.7

Determine normal and tangential forces on tool face. [10]

P.T.O.

OR

2. (*a*) Explain various types of chips ? [6]

(*b*) Write a short note on machinability. [6]

(*c*) The following data relate to orthogonal turning process : [6]

Chip thickness = 0.62 mm

Feed = 0.2 mm/rev

Rake angle = 15°

(1) Calculate cutting ratio and chip reduction coefficient

(2) Calculate shear angle

(3) Calculate dynamic shear strain involved in deformation process

UNIT II

3. (*a*) Explain gear finishing methods. [8]

(*b*) Explain gear hobbing and its advantages as well as disadvantages. [8]

OR

4. (*a*) Explain process of thread rolling and advantages of thread rolling. [6]

(*b*) The bore of an alloy steel component prior to broaching is $32.25^{+0.05}$ mm and the cutting speed is 0.15 m/s determine broaching power for broaching and design the broach [10]

Value of 'C' alloy steel = 45 N/mm^2

UNIT III

5. (*a*) Write short notes on the following : [8]

(*i*) Advantages of CNC system

(*ii*) Direct Numerial Control

(*b*) Explain automatic tool changing and components of the system. [8]

OR

6. (*a*) Write down features and characteristics of a typical flexible manufacturing system. [8]

(*b*) Describe in brief the basic components of tape operated numerical control machine tool. [8]

SECTION II

UNIT IV

7. (*a*) Differentiate between shearing and blanking, bending and drawing. [8]

(*b*) Enlist various types of dies used in press work and with neat sketch, explain progressive die. [8]

OR

8. (*a*) Explain the operations that can be carried out with the press. [8]

(*b*) Estimate the blanking force to cut the blank 25mm wide and 30mm long from a l.5 mm thick metal strip, if the ultimate shear stress of material is 450 N/mm^2. Also determine the work done in percentage penetration is 25 percentage of material thickness. [8]

UNIT V

9. (*a*) What are the advantages of unconventional machining over the conventional machining ? [4]

(*b*) Explain the working of EBM with neat sketch. [8]

(*c*) What are the advantages and limitations of plasma arc machining (PAM) ? [4]

OR

10. (*a*) Enlist various non conventional machining processes. [2]

(*b*) Compare ECM with EDM. [6]

(*c*) Explain the working of EDM with neat sketch. [8]

UNIT VI

11. (*a*) Explain with neat sketch, various clamping devices. [8]

(*b*) Explain with neat sketch, different types of drilling jigs. [10]

OR

12. (*a*) What are the essential features of milling fixture ? [6]

(*b*) What are the causes of errors in the design and operation of jigs and fixtures ? What measures should be taken to minimize the effects of the causes of errors ? [8]

(*c*) What is meant by 2-3-1 principle of location ? [4]

Total No. of Questions—**12**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-10

S.E. (Instru. & Cont.) (II Sem.) EXAMINATION, 2018
TRANSDUCERS AND SIGNAL CONDITIONING
(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) 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**, Q. No. **9** *or* Q. No. **10**, Q. No. **11** *or* Q. No. **12**.

(*ii*) Write Section I and Section II on separate answer-sheet.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of electronic pocket calculator is allowed.

(*vi*) Assume suitable data, if necessary.

Section-I

Q1) a) List and Explain different signal conditioning circuits required for conversion of temperature into voltage signal. [10]

b) With neat sketch explain radiation pyrometer. [8]

OR

Q2) a) Design a signal conditioning circuit for PT-100 RTD used for measurement of temperature from 0°C to 200 °C to get required output 0 to 5 V. [10]

b) List different types of semiconductor type temperature sensors. Explain any one in detail. [8]

Q3) a) What is load cell? Discuss working operation of stain gauge load cell with figure. [8]

b) Explain piezoelectric type force transducer and its signal condoning circuit. [8]

OR

Q4) a) Discuss how temperature compensation is made using strain gauges in load cell. Also explain different strain gauge bridge configurations with neat diagram. [8]

b) Explain any technique for signal conversion from pressure to voltage in detail. [8]

Q5) a) Explain demodulator circuit used in LVDT signal conditioning circuit in detail. Also give its advantage. [8]

b) List different types of proximity sensors. Explain inductive proximity sensor in detail. [8]

P.T.O.

OR

Q6) a) Explain photoelectric displacement transducer and its signal conditioning circuit. [8]

b) With neat sketch explain working and application of stroboscope. [8]

Section-II

Q7) a) Explain block diagram of signal conditioning of Ultrasonic level transducer. [8]

b) Explain signal conditioning circuits for capacitive level transducer. [8]

OR

Q8) a) Explain excitation and detection technique of differential capacitive transducer for measurement of liquid level. [8]

b) Give selection criteria for nuclear level gauge and explain its working. [8]

Q9) a) With neat sketch explain electromagnetic flow transducer in detail. [8]

b) Explain working principal and application of mass flow meter [8]

OR

Q10) a) Explain application of DP for measurement of flow in detail. [8]

b) Explain working principle of vortex flowmeter and its required circuit in block diagram. [8]

Q11) a) Write short notes on [10]

i) pH electrodes

ii) Electromagnetic vibration transducer

b) Explain microphone for measurement of sound with neat sketch. [8]

OR

Q12) a) Write short notes on [10]

i) Conductivity cell

ii) Piezoelectric vibration transducer

b) Explain any acoustic transducer in detail. [8]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-101

S.E. (Civil) (I Sem.) EXAMINATION, 2018

BUILDING TECHNOLOGY AND MATERIALS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

Q.1 a) What are the merits of 'Mat foundation'? (6)

b) Explain with neat sketch the casting procedure of RCC footing? (6)

OR

Q. 2 a) Compare course rubble and ashlar masonry (6)

b) What are the advantages of cellular light weight concrete blocks? (6)

Q.3 a) What are the different types of tests conducted on flooring materials? (6)

b) Explain with neat sketch the method of 'Arch' construction? (6)

OR

Q.4 a) Explain with neat sketch the fixing details of roof covering? (6)

b)Draw neat sketch(sectional plan and details of joint) of 'Fully paneled door'. (3+3)

P.T.O.

Q.5 a)Draw neat sketches of various types of pointing (6)

b) Explain with neat sketch the defects in plastering? (7)

OR

Q.6 a) Compare Escalators and Lifts. (6)

b)Draw line diagrams of various types of staircases? (7)

Q.7 a) Enlist the engineering properties of

i) Glass ii) Aluminium (3+3)

b) Define timber; Explain any three defects in timber? (7)

OR

Q.8 a)What do you understand by 'seasoning of timber'? Explain any one method of seasoning in detail. (7)

b)what are the different safety measures at construction site? (6)

Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

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[5352]-102

S.E. (Civil) (I Sem.) EXAMINATION, 2018

STRENGTH OF MATERIALS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of electronic pocket calculator is allowed.

(*iv*) Assume suitable data, if necessary.

(*v*) Neat diagrams must be drawn wherever necessary.

1. (*a*) A steel bar 22 mm in diameter 3 m long is subjected to an axial pull of 60 kN. If E = 2×10^5 N/mm^2 & m = 4. Calculate the : [6]

(1) Change in length

(2) Change in diameter

(3) Change in volume.

(*b*) The cross-section of a beam is shown in figure the beam is made of material with permissible stress in compression & tension equal to 100 MPa & 140 MPa respectively. Calculate

P.T.O.

the moment of resistance of the cross-section, when subjected to a moment causing compression at the top & tension at the bottom : [6]

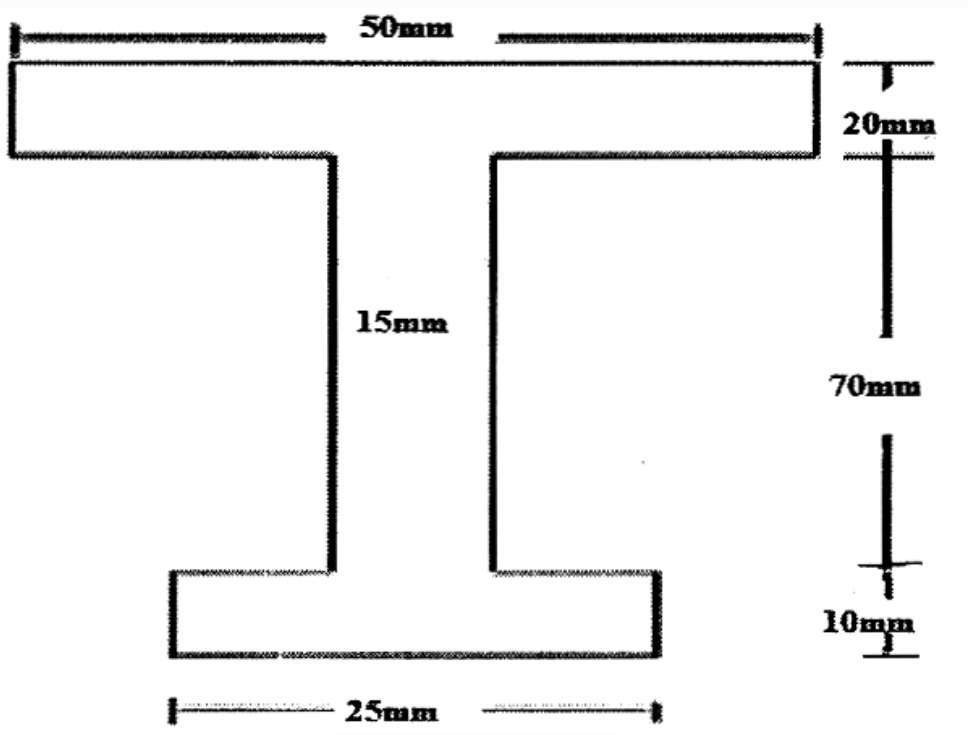

Fig. 1

Or

2. (*a*) A steel tube of 4.5 cm external diameter & 3 mm thickness encloses centrally a solid copper bar of 3 cm diameter. The bar & tube are rigidly connected together at the ends at a temperature of 30°C. Find the stress in each metal when heated to 180°C.

Take α_s = 1.08 × 10^{-5} °C, α_c = 1.7 × 10^{-5} °C, Es = 210 GPa, Ec = 110 GPa. [6]

(*b*) A beam of rectangular section $b \times d$ in size is carrying sagging bending moment of 40 kNm about XX-axis. Determine the dimension of the section if maximum bending stress is not exceed 105 N/mm^2. Take ratio $d = 1.5b$. [6]

3. (*a*) A solid steel shaft has to transmit l20 kW at 140 rpm. Taking allowable shear stress as 80 MPa. Find the suitable diameter of the shaft. The maximum torque transmitted in each revolution exceed the mean by 20%. [6]

(*b*) An element in a strained body is subjected to a compressive stress of 100 MPa & a clockwise shear stress 25 MPa on the same plane. Calculate the values of normal & shear stresses on the plane inclined at 25° with compressive stress. Also calculate the value of maximum shear stress in the element. [6]

Or

4. (*a*) A bar 10 mm in diameter & 500 mm long is hung vertically & a collar is attached at the lower end. A weight of 500 N falls through a height of 200 mm on the collar. Calculate the maximum instantaneous stress elongation & the strain energy in the bar. E = 2×10^5 N/mm^2. [6]

(*b*) State assumption made in the theory of torsion. Derive the relationship of torsion formula $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau}{R}$. [6]

5. (*a*) Draw the shear force & bending moment diagrams for the beam as shown in Fig. Indicate on the diagram the values of shear force & bending moment at significant points. Find & show the location & magnitude of the maximum bending moment. Refer Fig. 2. [7]

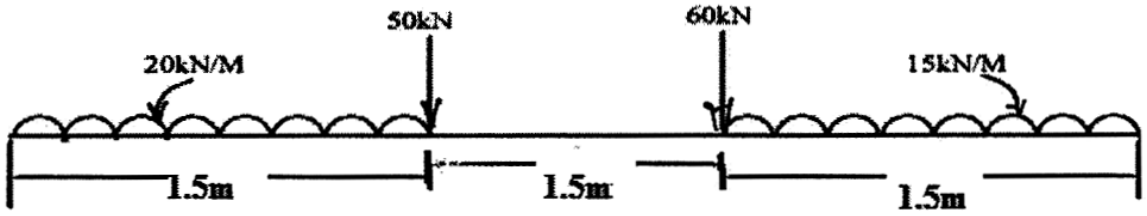

Fig. 2

(*b*) The Fig. 3 shows SFD for a beam. Mention the type of beam given and draw BMD and the loading diagram for the beam. [6]

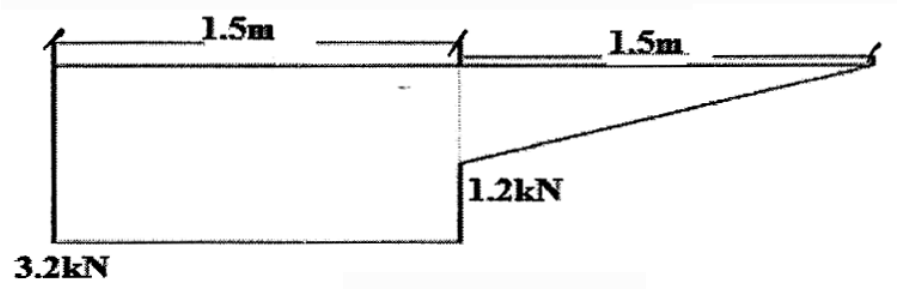

Fig. 3

Or

6. (*a*) Draw SFD & BMD for the beam shown in Fig. 4 indicating all important values. [6]

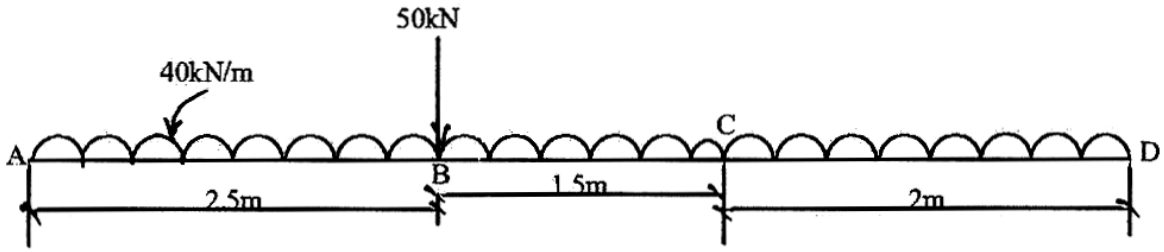

Fig. 4

(*b*) Draw SFD & BMD for the beam shown in figure mark the position of the maximum bending moment & determine its value. Refer Fig. 5. [7]

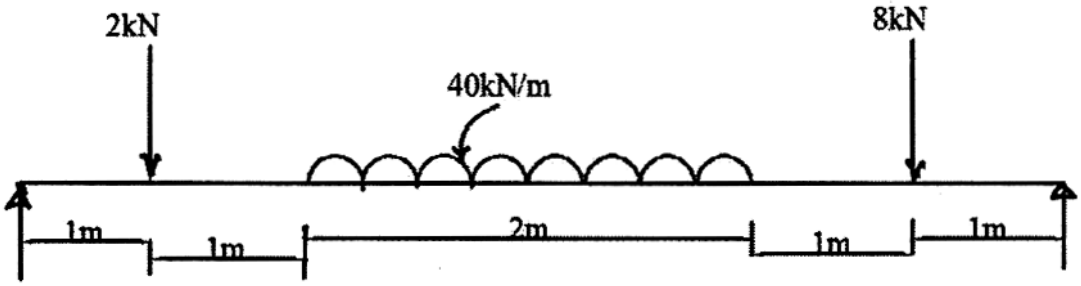

Fig. 5

7. (*a*) State the assumption made in Euler's theory & derives the expression for the critical load for a column pinned at both end. [6]

(*b*) A solid circular column is 4 m long with both ends fixed. Design the section by taking yield stress = 550 N/mm^2, safe axial load = 500 kN & FOS = 2.5, E = 100 kN/mm^2 by using Euler's equation. [7]

Or

8. (*a*) A hollow circular column made up of steel has external diameter 150 mm & internal diameter 125 mm. The length of column is 3 m with both ends fixed. Calculate the buckling load $\sigma_c = 500$ N/mm^2 & $\alpha = \frac{1}{1600}$. [7]

(*b*) Find the maximum eccentricity of the load 800 kN from geometrical axis along longer side for the strut of hollow rectangular section as shown in Fig. 6. Find maximum & minimum stresses induced in the section. [6]

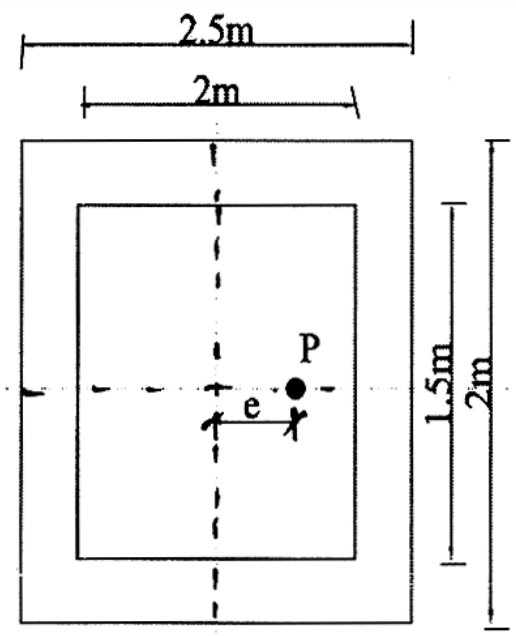

Fig. 6

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-103

S.E. (Civil) (First Semester) EXAMINATION, 2018

GEOTECHNICAL ENGINEERING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve question Nos. Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data if necessary.

1. (*a*) Derive with usual notations : [6]

$$\rho = \frac{(1+w)G\,\rho_w}{1+e}.$$

(*b*) The total unit weight of the soil sample is 18.5 kN/m^2. Calculate the dry unit weight, porosity, void ratio, degree of saturation, if the same soil sample has water content 17% and specific gravity 2.65. [6]

Or

2. (*a*) With the help of neat sketch, explain quick sand phenomenon and derive the relation involved. [6]

P.T.O.

(*b*) A constant head permeability test was run on a sand sample 16 cm in length and 60 cm^2 in cross-sectional are porosity was 40%. Under a constant head of 30 cm, the disharge was found to be 45 cm^3 in 18 seconds. Calculate coefficient of permeability. Also determine the discharge velocity and seepage velocity. [6]

3. (*a*) Write a short note on pressure bulb and its significance. [6]

(*b*) A triaxial test was conducted on sand specimen and the sample failed at a deviator stress of 480 kN/m^2, when the cell pressure was 100 kN/m^2 under drained conditions. Find the effective angle of shearing resistance of sand. [6]

Or

4. (*a*) Describe the procedure of direct shear test with sketch. Also state the merits and demerits of the test. [6]

(*b*) What is compaction ? Compare it with consolidation process ? Discuss any *one* factor affecting compaction. [6]

5. (*a*) Write a note on Culmann's graphical method. [6]

(*b*) A retaining wall, 10 m high retains a cohesionless soil having $\phi = 30^\circ$. The surface of the soil is in level with top of the wall. The top 3 m has a unit height of 18 kN/m^3 and that of the rest is 20 kN/m^3. Determine the magnitude and point of application of active pressure per 'm' length of the wall. The value of ϕ is same for both layers. [7]

Or

6. (*a*) Derive the relation for lateral thrust in active state for submerged backfill with cohesionless soil including its pressure diagram. [6]

(*b*) What is critical height of excavation ? Derive the relation for critical height of an unsupported vertical cut in cohesive soil. [7]

7. (*a*) Explain with sketches modes of failure for infinite and finite slopes. [6]

(*b*) Explain the impact of subsurface constamination on Geoenvironment. [7]

Or

8. (*a*) Explain landslides with its causes and remedial measures. [7]

(*b*) Describe vacuum extraction technique and biosparging. [6]

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-104

S.E. (Civil) (I Sem.) EXAMINATION, 2018
SURVEYING
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8**.
(*ii*) Neat sketches must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.
(*v*) Use of electronic pocket calculator is allowed in the examination.
(*vi*) Use of cell phone is prohibited in the examination hall.

Q. 1 a) Explain intersection method of plane table surveying with sketch. Give it's advantages and disadvantages over other methods. **[06]**

b) Following readings were observed during a reciprocal leveling with one level, **[06]**

Instrument at	Staff Readings on		Remark
	A	B	
A	1.115	1.615	Distance between A & B is 1200 m
B	1.750	2.255	

Find:
a) the true R.L. of B, if R.L. of A = 500.5025 m.
b) the combined correction due to curvature and refraction
c) the error in the collimation adjustment of the instrument.

OR

Q. 2 a) Find the included angles of the closed traverse PQRSTP and correct them. **[06]**

Line	PQ	QR	RS	ST	TP
F.B.	150^0 00'	230^0 30'	306^0 15'	298^0 00'	49^0 30'
B.B.	330^0 00'	48^0 00'	127^0 45'	120^0 00'	229^0 30'

P.T.O.

b) What is visible horizon distance? State its formula. Calculate visible horizon distance from 60 m high tower. **[06]**

Q. 3 a) Define following terms: **[06]**
Right Swing, Bubble down, Face left, Transiting

b) Two tangents intersect at chainage of 1210 m with deflection angle of 36^0. Calculate the necessary data for setting out a curve with radius of 250 m by deflection angle method. Take peg interval as 30 m. **[06]**

OR

Q. 4 a) PQRSP is a closed traverse. Determine the missing data in following table. **[06]**

Line	PQ	QR	RS	SP
Length (m)	156.5	-----	234.8	203.1
Bearing	$78^0\ 40'$	-----	$251^0\ 18'$	$3^0\ 45'$

b) What are vertical curves? Explain with sketches. Give their necessity. **[06]**

Q. 5 a) Explain the procedure for making horizontal axes perpendicular to vertical axis. **[05]**

b) A tacheometer fitted with analytic lens was used to observe the following readings: **[08]**

Instrument at	Staff at	Vertical angle	Staff Readings
	P	$+ 12^0$	0.906, 1.721, 2.550
A	Q	$- 10^0$	0.744, 2.199, 3.654

Determine the RL of Q. Take multiplying constants as 100 and RL of A = 500.000 m.

OR

Q. 6 a) Enlist and explain various errors in the tachometry survey. **[04]**

b) What is tacheometric surveying? Explain principle of tacheometry with sketch. **[05]**

c) Readings on a vertical staff are taken from a station O which is 70 m from A and 120 m from B. The stadia readings on staff at A are 1.235, 1.483, 1.731 and that on staff at B are 1.345, 1.843, 2.341. Determine the instrument constants. **[04]**

Q. 7 a) Write a short note on Special features of Electronic Total Station (ETS). **[06]**

b) Write a short note on Tunnel survey with respect to transferring the alignment through shafts, with sketch. **[07]**

OR

Q. 8 a) Describe the procedure of setting out sewage line. **[06]**

b) What is ETS? Enlist various advantages and disadvantages of ETS over other surveying instruments. **[07]**

Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

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[5352]-105

S.E. (Civil) (I Sem.) EXAMINATION, 2018

ENGINEERING MATHEMATICS—III

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Non-programmable electronic pocket calculator is allowed.

(*iv*) Assume suitable data, if necessary.

(*v*) Neat diagrams must be drawn wherever necessary.

1. (*a*) Solve any *two* of the following : [8]

(*i*) $\left(D^2 + 9\right) y = x^2 + 2x - \cos 3x$

(*ii*) $\left(x^2 D^2 + 5xD + 3\right) y = \frac{\log x}{x^2}$

(*iii*) $\left(D^2 - 4D + 4\right) y = e^{2x} \sec^2 x.$

(By method of variation of parameters.)

(*b*) Solve the following system of equation by Gauss-Seidel Iteration Method : [4]

$$10x_1 + x_2 + x_3 = 12$$

$$2x_1 + 10x_2 + x_3 = 13$$

$$2x_1 + 2x_2 + 10x_3 = 14.$$

P.T.O.

Or

2. (*a*) Weight 1 N, stretches a spring '5 cm'. A weight of '3 N' is attached to the spring and weight 'W' is pulled '10 cm' below the equilibrium position and then released. Determine the position and velocity as function of time. [4]

(*b*) Use Runge-Kutta method of fourth order to solve :

$$\frac{dy}{dx} = \frac{1}{x + y},$$

given that $x_0 = 0$, $y_0 = 1$, $h = 0.2$ therefore find y at $x = 0.4$. [4]

(*c*) Solve the following system of equation by Cholesky's Method : [4]

$$9x_1 + 6x_2 + 12x_3 = 17.4$$
$$6x_1 + 13x_2 + 11x_3 = 23.6$$
$$12x_1 + 11x_2 + 26x_3 = 30.8.$$

3. (*a*) The first four moments of a distribution about the value of '4' of the variable are –1.5, 17, –30 and 108. Find the moments about mean, skewness and kurtosis. [4]

(*b*) In certain examination, 200 students appeared in the subject of statistics. Average marks obtained were 50% with standard deviation 5%. How many students are expected to obtain more than 60% marks with the assumption that marks are distributed normally. Given that P($z = 2$) = 0.4772. [4]

(*c*) Find the directional derivative of $\phi = xy^2 + yz^2$ at $(2, -1, 1)$ in the direction of vector $2\hat{i} + \hat{j} + 3\hat{k}$. [4]

Or

4. (*a*) Attempt any *one* : [4]

(*i*) Show that :

$$\nabla^2 \left(\frac{\bar{a} \cdot \bar{b}}{r} \right) = 0,$$

where $\bar{a}, \bar{b}$ are constant vectors.

(*ii*) Show that :

$$\nabla \times \left[\bar{a} \times \left(\bar{b} \times \bar{r} \right) \right] = \bar{a} \times \bar{b}.$$

(*b*) Show that :

$$\bar{F} = \left(2xz^3 + 6y \right) \hat{i} + \left(6x - 2yz \right) \hat{j} + \left(3x^2 z^2 - y^2 \right) \hat{k}$$

is irrotational. Find the scalar potential ϕ such that $\bar{F} = \nabla\phi$. [4]

(*c*) Given :

x	*x*-series	*y*-series
Mean	18	100
Standard deviation	14	20

and coefficient of correlation is 0.8. Find the most probable value of *y* if $x = 70$ and most probable value of *x* if $y = 90$. [4]

5. (*a*) Find the work done by the force :

$$\bar{F} = \left(x^2 - yz\right)\hat{i} + \left(y^2 - xz\right)\hat{j} + \left(z^2 - xy\right)\hat{k},$$

in moving a particle from the point (1, 2, 1) to the point (2, –5, 7). [4]

(*b*) Use Gauss's Divergence theorem, to evaluate :

$$\iint_S \bar{F} \cdot \hat{n}\, ds$$

where

$$\bar{F} = y^2 z^2\, \hat{i} + x^2 z^2\, \hat{j} + x^2 y^2\, \hat{k},$$

and 'S' is the upper part of the sphere $x^2 + y^2 + z^2 = a^2$, above XOY-plane. [5]

(*c*) Evaluate :

$$\iint_S \left(\nabla \times \bar{F}\right) \cdot d\bar{s},$$

where

$$\bar{F} = (2x - y)\hat{i} - yz^2\, \hat{j} - y^2 z\, \hat{k},$$

and 'S' is the Hemi-sphere $x^2 + y^2 + z^2 = 1$, above XOY-plane. [4]

Or

6. (*a*) Evaluate :

$$\int_C \bar{F} \cdot d\bar{r},$$

where

$$\bar{F} = \cos y\, \hat{i} + x(1 - \sin y)\, \hat{j},$$

and 'C' is the Ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1,\ z = 0.$ [4]

(*b*) Evaluate :

$$\iint_S \left(x\hat{i} + y\hat{j} + z\hat{k}\right) \cdot d\bar{s},$$

using Gauss' Divergence theorem, where 'S' is the surface bounded by $x \geq 0$, $y \geq 0$, $z \geq 0$, $(x + y + z) \leq 1$. [5]

(*c*) Using Stokes' theorem, evaluate :

$$\int_C \left(x^2 + y - 4\right) dx + (3xy)\, dy + \left(2xz + z^2\right) dz,$$

where 'C' is the curve of intersection of $z = 9 - (x^2 + y^2)$ and $z \geq 0$. [4]

7. (*a*) An elastic string is stretched between two fixed points at a distance '*l*' apart. One end is taken at origin and, at a distance $\left(\frac{2l}{3}\right)$ from this end, the string is displaced at a distance '*a*' transversely and released from rest when in this position. Find $y(x, t)$ if y satisfies the equation :

$$\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}.$$ [7]

(*b*) Solve :

$$\frac{\partial u}{\partial t} = k\frac{\partial^2 u}{\partial x^2},$$

for the conduction of heat along a rod without radiation, subject to conditions :

(*i*) $u(x \cdot t)$ is bounded at $t \to \infty$

(*ii*) $\frac{\partial u}{\partial x} = 0$ for $x = 0,\ x = l$

(*iii*) $u = lx - x^2$ for $t = 0,\ 0 \leq x \leq l$. [6]

Or

8. (*a*) If a string of length 'l' is initially at rest in its equilibrium position and each of its point is given a velocity $v(x)$ such that :

$$u(x) = ax, \qquad 0 \leq x \leq \frac{l}{2}$$

$$= a(l - x), \qquad \frac{l}{2} \leq x \leq l$$

Obtain the displacement $y(x, t)$ at any time 't'. [7]

(*b*) Solve $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0$ with conditions :

(*i*) $v = 0$, as $y \to \infty \quad \forall\ x$

(*ii*) $v = 0$ at $x = 0, \quad \forall\ y$

(*iii*) $v = 0$ at $x = \pi, \quad \forall\ y$

(*iv*) $v = v_0$ at $y = 0, \quad 0 < x < \pi$. [6]

Total No. of Questions—8] [Total No. of Printed Pages—4

Seat No.	

[5352]-106

S.E. (Civil) (Second Semester) EXAMINATION, 2018

FLUID MECHANICS—I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data if necessary.

1. (*a*) State and prove Newton's law of viscosity. Classify the fluids giving example of each type. [6]

(*b*) The space between 2 square plates is fluids with oil. Each side of plate is 60 cm. The thickness of oil film is 12.5 mm. The upper plate moves with 2.5 m/s and requires a force of 98.1 N to maintain speed. Determine : [6]

(*i*) Dynamic viscosity of oil in poise and

(*ii*) Kinematic viscosity of oil in stokes.

Take sp. gr. of oil = 0.95.

P.T.O.

Or

2. (*a*) What are the different methods of dimensional analysis ? Explain Buckingham-II theorem method of Dimensional Analysis. [7]

(*b*) What do you understand by similitude ? What are the different types of similitude ? Explain Mach No. and its significance. [5]

3. (*a*) Differentiate between : [4]

(*i*) Absolute and gauge pressure

(*ii*) Simple and differential manometer.

(*b*) Define total pressure and centre of pressure. Derive the expression for total and centre of pressure on a plane surface held below free surface of fluid. [8]

Or

4. (*a*) What is continuity equation and derive the expression for continuity equation. [6]

(*b*) Given $V = x^2yi + y^2zj - (2 \times yz + yz^2)$ K. Prove that it is a case of steady incompressible flow and calculate the velocity and acceleration at (2, 1, 3). [6]

5. (*a*) Derive the equation for discharge through an horizontal venturimeter. What would be the change in discharge for the same flow condition if the venturimeter is held either vertical or inclined. Give reasons. [7]

(*b*) A 20 cm × 10 cm horizontal venturimeter is used to measure flow of oil having specific gravity 0.90. The discharge flowing through venturimeter is 70 LPS, find the reading of the mercury in the manometer. Assume C_d = 0.98. [6]

Or

6. (*a*) What are the characteristics of Laminar flow. Explain Reynold experiment with necessary sketch classifying the flow regime. [4]

(*b*) An oil of viscosity 2.0 poise flow through a circular pipe of diameter 15 mm, held vertical. The pressure measured at 2 points 15 m apart had a value of 150 kPa at upper point and 450 kPa at lower level. Find the direction of flow if the sp. gr. of oil is 0.9. [5]

(*c*) Show that the drag force on a sphere placed in the flow of a highly viscous fluid at low velocity is given by $F_D = 3\pi \mu v d$. [4]

7. (*a*) Explain : [6]

(*i*) Degree or level of turbulence

(*ii*) Intensity of turbulence

(*iii*) Wall and free turbulence.

(*b*) List out the semi-empirical theory and formula to find the shear stress in turbulent flow. [4]

(*c*) Explain briefly hydrodynamically smooth and rough boundaries. [3]

Or

8. (*a*) What are the different types of minor losses that occur due to local disturbances in flow through pipe. Derive the Borda-Carnot equation for loss due to sudden expansion. [7]

(*b*) Explain pipe in series and pipe in parallel. Sketch the hydraulic gradient and total energy line for a compound pipe having the following details :

Pipe of 5 cm diameter connected to pipe of diameter 7.5 cm which is further connected to pipe of 5 cm diameter. The pipes are connected in series also indicate the various losses that occur. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-107

S.E. (Civil) (II Sem.) EXAMINATION, 2018
ARCHITECTURAL PLANNING & DESIGN OF BUILDING
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Assume suitable data, if required.
(*ii*) Figures to the right indicate full marks.
(*iii*) Solve Q. No. **1** *or* Q. No. **2** and Q. No. **3** *or* Q. No. **4** in answer-book.
(*iv*) Solve Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8** on Drawing Sheet only.

Q 1 A) Enlist the documents to be submitted for seeking Commencement Certificate and list out the terms on 7/ 12 abstract. (7)

B) Explain the following principles of architectural planning with suitable sketches : i) Privacy, ii) Roominess (6)

OR

Q2 A) Elaborate the term, 'Land use zoning' & mention the requirements of each of them. (Minimum 4 zones) (6)

B) Elaborate need for earthquake resistant structures in relation with - loss of human life; property and infrastructure. (7)

Q3 A) The internal dimensions of a factory building are 30 m x 20 m x 10 m. The number of air changes required per hour are 6, the indoor temperature is 36°C and outdoor temperature is 30°C. Find the area of openings required, if the distance between the inlet and outlet openings is 6 m. (6)

B) Differentiate between building line & control line by drawing a suitable sketch. (6)

P.T.O.

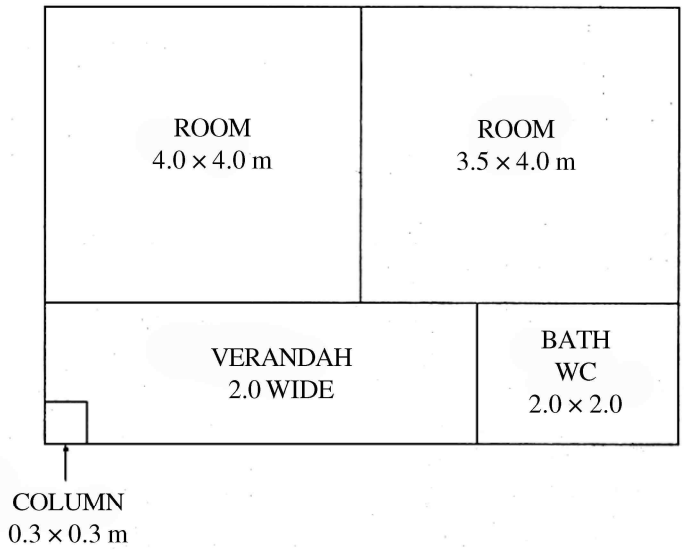
OR

Q4 A) What are Acoustic Defects? Explain the need of rectifying the same in relation with auditorium. (6)

B) Explain the following terms: (6)

i) SP ii) VPL iii) PP

Q 5 Draw a detailed Floor Plan to a scale of 1:50 OR otherwise, of a residential building for the given line plan below. Use following data: RCC framed structure, Wall thickness: 150 mm, Single storey building, Plinth height 450 mm, All dimensions in the sketch are in m. Indicate suitable locations & sizes of doors, windows in schedule of openings. (13)



OR

Q 6 Draw a detailed Floor Plan to a scale of 1:50 with following data: (13)

i) Living room 1 no. approx. area 15 m^2

ii) Kitchen cum Dining 1 no. approx. area 15 m^2

iii) Bed rooms 2 no. approx. area 12 m^2 each

iv) Floor to floor height 3.0 m

v) R. C. C. structure

vi) Plinth in UCR masonry

vii) Varandah, Passage, Staircase, W.C. and Bath / attached toilet etc. of suitable sizes should be provided. Indicate the North line.

Q 7 Design a single storey hostel building for girls and draw only the Line Plan with following data: (12)

i) Number of girls to be accommodated : 75

ii) Thirty rooms are two seated with 7.5 sq m area per student and fifteen single seated with 9.5 sq m area.

iii) Recreation room approx. area 40 m^2

iv) Gymnasium approx. area 25 m^2

v) Office space approx. area 12 m^2

vi) Store room approx. area 15 m^2

vii) Varandah, Passage, Staircase, W.C. and Bath etc. of appropriate dimensions should be provided.

Show North direction and mention scale.

OR

Q8 Draw a line plan of a Post Office using following data. (12)

Entrance and moving space : 30 m^2 with seating arrangement

Public dealing counters : 6 in no with 0.5 m width

Post master's room :15 m^2

Working area for other staff : 30 m^2

Post separation room : 30 m^2

Safe custody area for cash : 10 m^2

Cash transaction room : 12 m^2

Speed Post Delivery Section : 12 m^2

Water room and Toilet (separate for male and female) : 7.5 m^2

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-108

S.E. (Civil Engineering) (Second Semester)

EXAMINATION, 2018

CONCRETE TECHNOLOGY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. **1** *or* **2**, **3** *or* **4**, **5** *or* **6**, **7** *or* **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Your answers will be valued us a whole.

(*v*) Use of electronic pocket calculator is allowed.

(*vi*) Assume suitable data, if necessary.

(*vii*) Use of IS code 10262,456 is not allowed.

1. (*a*) Explain the dry process of manufacturing of cement. [6]

(*b*) Define creep of concrete. What are factors affecting creep of concrete ? [6]

Or

2. (*a*) What are the different functions of admixtures ? [6]

P.T.O.

(*b*) Write short notes on : [6]

(*i*) Shrinkage

(*ii*) Swelling.

3. (*a*) State the different types of destructive tests carried on hardened concrete. Explain Flexural test. [6]

(*b*) Write short notes on : [6]

(*i*) Ready mix concrete

(*ii*) Hot weather concreting.

Or

4. (*a*) What is light weight concrete ? How it can be achieved in practice ? [6]

(*b*) Write the comparison between ferrocement and RCC construction work. [6]

5. (*a*) What do you mean by concrete mix design ? What are the objectives in mix design ? [6]

(*b*) Briefly outline the IS code method of concrete mix design. Write the procedure of trial mixes. [7]

Or

6. (*a*) Write a short note on statistical quality control of concrete. [4]

(*b*) Explain the factors affecting the mix design. [4]

(*c*) Explain DOE method of mix design in brief. [5]

7. (*a*) What is durability ? What is significance of durability ? What effect of water cement ratio makes on durability ? [5]

(*b*) Write short notes on : [8]

(*i*) Shotcrete

(*ii*) Corrosion monitoring techniques and preventive measures.

Or

8. (*a*) What are the symptoms and diagnosis of distress of concrete ? [5]

(*b*) Write short notes on : [8]

(*i*) Attack by sea water

(*ii*) Carbonation of concrete and its determination.

Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

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[5352]-109

S.E. (Civil) (II Sem.) EXAMINATION, 2018

STRUCTURAL ANALYSIS I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6** and Q. **7** or Q. **8**.

(*ii*) Neat sketches must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

(*v*) Use of electronic pocket calculator is permitted.

(*vi*) Use of cell phone is prohibited in the examination hall.

1. (*a*) Determine maximum slope and deflection for the simply supported beam AB of span 4 m loaded with uniformly distributed load 20 kN/m over a whole span. Assume uniform flexural rigidity. [6]

(*b*) A fixed beam of span 10 m subjected to point load 30 kN at 4 m from left support. Determine fixed end moments and draw bending moment diagram. [6]

Or

2. (*a*) Define conjugate beam and explain characteristics of conjugate beam. [6]

P.T.O.

(*b*) A beam ABC has fixed end at A and C. The beam AB of span 4 m subjected to central point load of 10 kN and beam BC is 3 m long carries a uniformly distributed load 30 kN/m. Analyse the beam using Clapeyron's theorem and draw bending moment diagram. [6]

3. (*a*) Find the vertical displacement of joint D for the pin jointed truss as shown in Fig. 1. The cross-sectional area of the members AD, DB and CD is 1500 mm^2 and the areas of the members AC and BC are 2000 mm^2 each.

Take E = 200 kN/mm^2. [6]

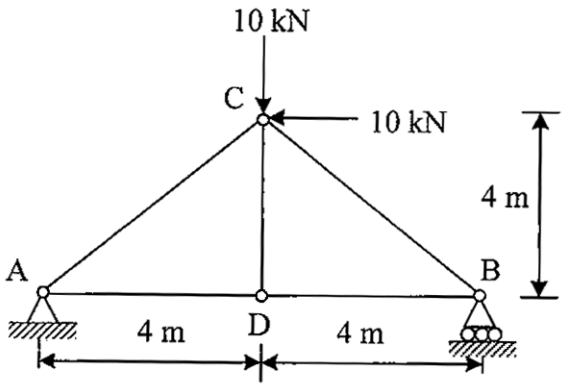

Fig. 1

(*b*) Draw influence line diagrams for forces in the members L_1L_2, L_2U_3 and U_4U_5 of the through type bridge truss as shown in Fig. 2. Height of truss is 4 m. [6]

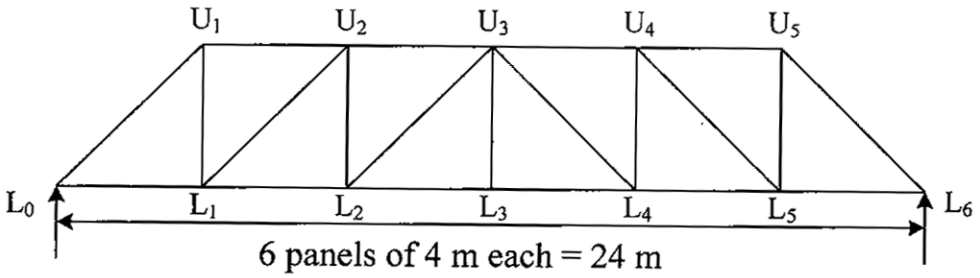

Fig. 2

Or

4. (*a*) Determine maximum shear and moment by influence line method for a simply supported beam of span 5 m with overhang of 1.5 m on either side and loaded with uniformly distributed load 50 kN/m on entire span. [6]

(*b*) Two pin jointed rods AC and BC are hinged to a rigid ceiling at point A and B, 2.5 m apart. AC is 2 m long and makes a right angle to BC. If a vertical bar DC, hinged at C and to the ceiling at D is added, calculate the force in the three members when a load of 10 kN is suspended from C. All three rods have the same cross-sectional area. Refer Fig. 3. [6]

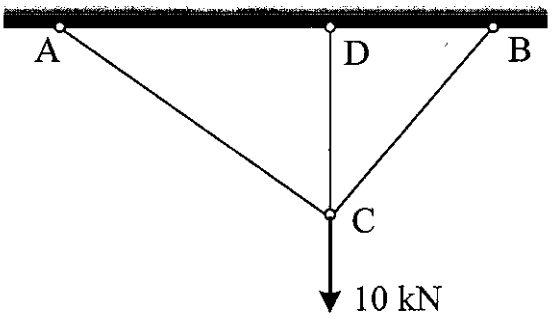

Fig. 3

5. (*a*) A two hinged parabolic arch of span L and rise *h* subjected to a uniformly distributed load *w* kN/m on entire span. Determine horizontal thrust of the arch. [6]

(*b*) A three hinged circular arch of span 40 m and rise 10 m is subjected to uniformly distributed load 20 kN/m on the left half of the arch. Determine the horizontal thrust, normal thurst, radial shear and bending moment at 5 m from left hinge. [7]

Or

6. (*a*) A three hinged circular arch of span 30 m and rise 6 m carries point load 15 kN at crown and uniformly distributed load 10 kN/m on entire span. Determine reaction at supports, normal thrust and radial shear at quarter span. [6]

(*b*) A two hinge parabolic arched rib of 25 m span with central rise of 5 m is hinged at the springing. It carries a point load of 125 kN at 7.5 m from the left hand hinge and uniformly distributed load of 10 kN/m over a left half span. Calculate the reactions at the supports and the maximum positive BM. [7]

7. (*a*) A beam (I section) having both flanges 200 × 20 mm and web 400 × 10 mm, if permissible yield stress is tension and compression is 250 MPa, determine shape factor. [6]

(*b*) Determine plastic moment of resistance for a simply supported beam of span 10 m subjected to uniformly distributed load of 20 kN/m on entire span. [7]

Or

8. (*a*) Explain types of possible mechanisms in plastic analysis of frame with example. [6]

(*b*) A fixed beam is loaded and supported as shown in Fig. 4. Calculate the collapse load for the beam if the plastic moment of resistance of the uniform section of the beam is 50 kNm. [7]

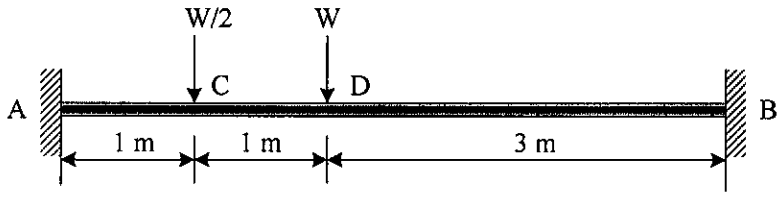

Fig. 4

Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-11

S.E. (Instru. & Cont.) (Second Semester) EXAMINATION, 2018

PHOTONICS AND INSTRUMENTATION

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. **:—** (*i*) Answers to the two sections should be written in separate answer books.

(*ii*) Answer any *three* questions from each section.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right side indicate full marks.

(*v*) Use of calculator is allowed.

(*vi*) Assume suitable data if necessary.

Section-I

1. (*a*) Draw electromagnetic spectrum of light and show different ranges in Hz. [12]

(*b*) A light source of wavelength $\lambda = 0.53$ μm is used in laboratory. Calculate the energy in electron volt. [4]

Or

2. (*a*) Describe wavelength in meter and Angstrom. Light is having frequency range of 3.4×10^{13} Hz. [6]

P.T.O.

(*b*) Differentiate between the following terms : [10]

(*i*) Reflection and Refraction

(*ii*) Interference and Diffraction.

3. (*a*) With neat diagram explain any *one* gas discharge lamp. Enlist advantage and application. [10]

(*b*) Explain units used for calculation of point light source Radiometry. [6]

Or

4. (*a*) With neat diagram explain the construction and working of incandescent lamp. [10]

(*b*) For an incandescent lamp the design parameter are : [6]

(*i*) Design voltage = 5 V

(*ii*) Design current = 0.145 Amp

(*iii*) M.S.C.P. at design voltage = 0.16

(*iv*) Lamp life = 10,000 Hrs

If this lamp is operated at 4.5 V, then calculate :

(1) Rerated M.S.C.P.

(2) Rerated life.

5. (*a*) What is elector luminescent process of LED ? And list out applications. [6]

(*b*) What do you understand by a term radiation pattern of emitting diode ? Suggest experimental set up and procedure to draw it. [12]

Or

6. (*a*) Explain the following terms of LASER : [12]

(*i*) Population Inversion

(*ii*) Spontaneous emission

(*iii*) Stimulated emission.

(*b*) Explain in short IR sources. [6]

Section-II

7. (*a*) Explain any *two* types of thermal detector with suitable diagram. [8]

(*b*) Explain in short : [8]

(*i*) Phototransistor

(*ii*) IR detectors.

Or

8. (*a*) Explain any *one* type of Quantum detector with suitable diagram. [4]

(*b*) Explain in short : [2×6]

(*i*) Photomultiplier Tube

(*ii*) Solar cell.

9. (*a*) Explain the diffraction grating equation with its application. Suggest experimental set up to determine the unknown wavelength. [10]

(*b*) Explain the Absorption type filter. Give their application. [6]

Or

10. (*a*) List out the different applications of filter. [4]

(*b*) Write short notes on : [2×6]

(*i*) Beam splitter

(*ii*) Polarizers.

11. (*a*) Explain working principle of Astronomical Telescope with suitable diagram. [9]

(*b*) Explain working of Abbes Refractromator with suitable diagram. [9]

Or

12. (*a*) Explain with neat diagram construction of Camera. [9]

(*b*) Explain with neat diagram Monochromator. [9]

Total No. of Questions—**5**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-110

S.E. (Civil) (II Sem.) EXAMINATION, 2018

ENGINEERING GEOLOGY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

Q. 1 a) Describe in detail classification of Sedimentary rocks. [06]

b) Discuss in brief the Igneous Rocks Classification by genetics [04]

OR

a) Describe in detail the classification of Metamorphic rocks [06]

b) Describe the structure and streak physical property of mineral with suitable examples. [04]

Q.2 a) Define a Fault. Discuss in detail parts of fault also discuss different types of fault [06]

b) Explain how folds are converted to faults in detail. [04]

OR

a) Explain in detail the Vindhyan system. [06]

b) Describe in detail the Unconfirmity with suitable sketches. [04]

Q.3 a) How geophysical studies support the preliminary geological explorations at engineering projects. [04]

b) Write in brief Preservation of Cores. [04]

OR

a) Describe in detail the groundwater movement. [04]

b) Explain in brief earthquakes. [04]

P.T.O.

Q.4 a) Discuss the feasibility of tunnel which is passing through [08]
1. Compact Basalt
2. Amygdaloidal Basalt.

b) Discuss in brief how geology plays a vital role in dam failures. [04]

OR

a) Discuss feasibility of Dam site on dipping beds [08]

b) Application of remote sensing techniques in engineering projects [04]

Q.5 a) What are the landslides? How to classify the various mass movements? [06]

b) How weathering and textural variation affect the durability of dimension stones with suitable example [04]

OR

a) Write a note on hill slope stability. [06]

b) Write a note on ex bow. [04]

Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

Seat No.	

[5352]-111

S.E. (Mech./Prod./Auto/S/W) (I Sem.) EXAMINATION, 2018

ENGINEERING MATHEMATICS—III

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, Mollier charts, non-programmable electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Solve any *two* : [8]

(*i*) $\left(D^3 - 3D^2 + 3D - 1\right) y = e^x x^{1/2}$

(*ii*) $\left(D^2 + 1\right) y = \tan x$ (by variation of parameter method)

(*iii*) $x^2 \frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = x^5.$

(*b*) Find Fourier cosine transform of : [4]

$$f(x) = \begin{cases} x & 0 \le x \le 1 \\ 2 - x & 1 \le x \le 2. \\ 0 & x > 2 \end{cases}$$

P.T.O.

Or

2. (*a*) A body of weight 9.8 N is suspended from a spring having constant 'K' 4 N/m. An external force $16 \sin t$ is applied and damping force is negligible. Determine the position and the velocity of the weight at any time. [4]

(*b*) Solve any *one* : [4]

(*i*) Find Laplace transform of $\frac{1 - e^{-t}}{t}$.

(*ii*) Find inverse Laplace transform of :

$$F(s) = \frac{s^2 + 2s - 3}{s(s-3)(s+2)}.$$

(*c*) Solve by Laplace transform method : [4]

$y'' - 3y' + 2y = 12e^{-2t}, \quad y(0) = 2, \; y'(0) = 6.$

3. (*a*) Find the coefficient of correlation for the following data : [4]

x	***y***
10	18
14	12
18	24
22	06
26	30
30	36

(*b*) Number of road accidents on a highway during a month follows the Poisson's distribution with mean 6. Find the probability that in a certain month number of accident on a highway will be : [4]

(*i*) less than 2

(*ii*) more than 2.

(*c*) Find the directional derivative of $\phi = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of $\overline{PQ}$, where Q(5, 0, 4). [4]

Or

4. (*a*) The two regression equations of the variables x and y are : [4]

$$x = 19.13 - 0.87y$$

$$y = 11.64 - 0.5x$$

The value of variance of x is 9.

Find :

(*i*) the mean values of x and y

(*ii*) the standard deviation of x.

(*b*) Prove the following (any *one*) : [4]

(*i*) $$\nabla \times \left(\frac{\bar{a} \times \bar{r}}{r^n} \right) = \frac{(2 - n)\bar{a}}{r^n} + \frac{n(\bar{a} \cdot \bar{r})}{r^{n+2}} \bar{r}$$

(*ii*) $$\nabla \cdot \left(r \nabla \left(\frac{1}{r^3} \right) \right) = \frac{3}{r^4}.$$

(*c*) Show that the vector field : [4]

$$\bar{F} = (x + 2y + 4z)i + (2x - 3y - z)j + (4x - y + 2z)k$$

is irrotational. Find scalar potential ϕ such that $\bar{F} = \nabla\phi$.

5. (*a*) Evaluate : [4]

$$\int_C \bar{F} \cdot d\bar{r}$$

where

$$\bar{F} = (x - 3y)i + (2x - y)j + z^2 k$$

where 'C' is $x^{2/3} + y^{2/3} = a^{2/3}$.

(*b*) Evaluate : [5]

$$\iint_S \bar{F} \cdot d\bar{S}$$

where

$$\bar{F} = x^2 i + 2xyj + 3z^2 k$$

and 'S' is the curved surface of the paraboloid $z = 4 - x^2 - y^2$ above XY-plane.

(*c*) Using Stoke's theorem, evaluate : [4]

$$\iint_S \nabla \times \bar{F} \cdot d\bar{S}$$

where

$$\bar{F} = (x^3 - y^3)i - xyzj + y^3 k$$

and S is the surface $x^2 + 4y^2 + z^2 - 2x = 4$ above the plane $x = 0$.

Or

6. (*a*) Using Green's theorem evaluate : [4]

$$\int_C \left[(y - \sin x)\, dx + \cos x\, dy \right]$$

where 'C' is a triangle whose vertices are (0, 0), $\left(\frac{\pi}{2},\ 0\right)$ and $\left(\frac{\pi}{2},\ 1\right)$.

(*b*) Evaluate : [5]

$$\iint_S \bar{F} \cdot d\bar{S}$$

where

$$\bar{F} = (x - 2z)\,i + (x + 3y + z)\,j + (5x + y)\,k$$

where 'S' is the upper side of the triangle ABC with vertices at the points A(1, 0, 0), B(0, 1, 0), C(0, 0, 1).

(*c*) Prove that : [4]

$$\int_C \left[\bar{u} \times (\bar{r} \times \bar{v}) \right] \cdot d\bar{r} = -(\bar{u} \times \bar{v}) \cdot \iint_S d\bar{S}$$

where $\bar{u}$ & $\bar{v}$ are constant vectors and $\bar{r} = xi + yj + zk$.

7. (*a*) Solve $\frac{\partial u}{\partial t} = 16 \frac{\partial^2 u}{\partial x^2}$ if : [6]

(*i*) u is finite for all t

(*ii*) $u(0,\ t) = 0$ for all t

(*iii*) $u(l,\ t) = 0$ for all t

(*iv*) $u(x,\ 0) = \frac{2u_0}{l}$ for all $0 \le x \le l$,

where l being the length of the bar.

(*b*) If $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}$ represents the vibrations of a string of length l fixed at both ends, find the solution with conditions : [7]

(*i*) $u(0, t) = 0 \quad \forall \ t$

(*ii*) $u(l, t) = 0 \quad \forall \ t$

(*iii*) $u(x, 0) = kx, \ 0 \leq x \leq l$

(*iv*) $\left(\frac{\partial u}{\partial t}\right)_{t=0} = 0.$

Or

8. (*a*) A rectangular plate with insulated surface is 20 cm wide and so long compared to its width that it may be considered infinite in length without introducing an appreciable error. If the temperature along short edge $y = 0$ is given $u(x, 0) = \sin\left(\frac{\pi x}{20}\right)$, $0 \leq x \leq 20$, while the two long edges $x = 0$ and $x = 20$ as well as the other short edge are kept at 0°C. Find the steady-state temperature $u(x, y)$. [7]

(*b*) Use Fourier transform to solve the equation : [6]

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \ 0 < x \ \infty, \ t > 0$$

Subject to the following conditions :

(*i*) $u(0, t) = 0, \quad t > 0$

(*ii*) $u(x, 0) = \begin{cases} 8, & 0 < x < 1 \\ 0, & x > 1 \end{cases}$

(*iii*) $u(x, t)$ is bounded.

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-112

S.E. (Mechanical & Automobile) EXAMINATION, 2018

MANUFACTURING PROCESSES—I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) *All* the four question should be solved in one answer-book and attach the extra supplements if required.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of non-programmable electronic pocket calculator is allowed.

(*v*) Assume suitable data, if necessary.

(*vi*) Solve Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

1.(a) Explain any three types of patterns used in casting process with neat sketch and application. [6]

1.(b) An aluminium billet of length 60mm and diameter 20mm is to be extruded by direct extrusion process. It has extrusion ration of 3. The extrudate has a round cross-section. The work metal has flow curve defined by strength coefficient 380MPa and strain hardening exponent 0.18. Determine the pressure applied to the end of billet (at Lengths = 60mm, 40mm, 20mm) as the ram moves forward. Take a=0.8 and b = 1.5 for the Johnson equation. [6]

Or

2.(a) Compare open-die and closed-die forging. [6]

2.(b) Calculate the size of cylindrical riser with d/h ratio as 1.5, required to feed a steel slab casting of 350X350X50mm^3. Assume the volume shrinkage on solidification as 5% for steel and volume of riser is three times that directed by shrinkage consideration done. If required also find corrected volume of riser. [6]

P.T.O.

3.(a) Explain Projection welding. State the advantages and limitations of the process. [6]

3.(b) Explain with sketch Extrusion of pipes and state its application. [6]

Or

4.(a) Explain with sketch FCAW. State the advantages and limitations of the process. [6]

4.(b) Explain with sketch Pressure thermoforming process. [6]

5.(a) Explain with neat sketch what is clearance and angular clearance; also explain size calculation of punch and die for blanking and piercing operation. [7]

5.(b) Determine Force required for manufacturing the washer of 40mm outer diameter and 20mm inner diameter by press work from M.S. sheet of 1 mm thickness. Shear strength of material is 380 N/mm^2. Calculate die and punch dimensions for piercing operation. Consider clearance of 10 % of stock thickness.(Assume staggering of punches) [6]

Or

6.(a) Explain with sketch any three metal forming operations. [7]

6.(b) A square washer with 10mm internal hole and 25mm outer square is to be made from 1 mm thickness with ultimate tensile strength 250N/mm^2 [6]
Find i) Draw strip layout
ii) Percentage utilization for the same.

7.(a) Explain with neat sketch back gear cone pulley type headstock. [7]

7.(b) Explain following lathe operations with neat sketch: [6]
i) Eccentric turning
ii) Grooving
iii) Knurling

Or

8.(a) State various units of feed mechanism and explain one with sketch. [7]

8.(b) Determine the angle at which the compound rest will be swiveled when cutting a taper on a workpiece having outside diameter 90mm, length of the tapered portion 60mm and Conicity is 1 . Also find small diameter of taper. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-113

S.E. (Mechanical/Auto/Sandwich) (I Sem.) EXAMINATION, 2018

THERMODYNAMICS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer **4** questions out of 8.

(*ii*) 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**.

(*iii*) *All* the **4** questions should be solved in one answer-book and attach extra supplements, if required.

(*iv*) Draw neat diagrams wherever necessary.

(*v*) Use of steam tables, Mollier charts, scientific calculator is allowed.

(*vi*) Assume suitable data, if necessary.

1. (*a*) What is Microscopic and Macroscopic approach ? Write down the differences between them. [6]

(*b*) Prove that Heat and work are a path function. [6]

Or

2. (*a*) Explain the principle of "Increase in Entropy". [4]

P.T.O.

(*b*) One kg of gas is confined to a constant volume tank. Initial pressure and volume are 4 bar and 0.21 m^3 respectively. When a heat energy of 82 kJ is supplied to the system, the final temperature becomes 127°C. Determine :

(*i*) Work done

(*ii*) Change in internal energy

(*iii*) Specific heat at const. volume

(*iv*) Change in entropy. [8]

3. (*a*) What are the Assumptions made in Air Std. cycle ? Derive equations for Air Std. cycle efficiency, Mean effective Pressure of "Diesel cycle". [8]

(*b*) Derive an equation for optimum pressure Ratio for Maximum Network for Brayton cycle. [4]

Or

4. (*a*) Find out specific volume of steam, when its pressure is 07 bar and when the condition of steam is :

(*i*) Wet, having dryness fraction 0.20,

(*ii*) Dry saturated

(*iii*) Superheated, the temperature being 250°C. [6]

(*b*) Explain with neat sketch working of "Throttling Calorimeter". [6]

5. (*a*) Explain with neat sketch working of "Dead weight safety valve". [6]

(*b*) Explain with neat sketch working of "Economiser". [7]

Or

6. (*a*) Define :

(*i*) Boiler efficiency

(*ii*) Equivalent evaporation

(*iii*) Factor of evaporation. [6]

(*b*) The following readings were recorded during a boiler trial for 06 hrs duration :

(*i*) Mean steam pressure = 12 bar

(*ii*) Mass of steam generated = 40,000 kg

(*iii*) Dryness fraction of steam = 0.85

(*iv*) Feed water temp. = 30°C

(*v*) Calorific value of coal = 33,400 kJ/kg.

Determine :

(*i*) Equivalent evaporation from and at 100°C

(*ii*) Efficiency of Boiler

(*iii*) Heat rate of Boiler

(*iv*) Factor of Evaporation. [7]

7. (*a*) Define :

(*i*) Stoichiometric Air

(*ii*) Excess Air

(*iii*) Stoichiometric Mixture

(*iv*) Actual A : F ratio

(*v*) Stoichiometric A : F ratio

(*vi*) Mass Fraction

(*vii*) Mole Fraction. [7]

(*b*) Determine the A : F ratio and the theoretical amount of air required by mass for complete combustion of a fuel containing 85% Carbon, 08% Hydrogen, 03% Oxygen, 01% Sulphur and remaining is ash. If 40% of excess air is used, what volume of air at 27°C and 1.05 bar pressure, does this fuel represent per kg ? [6]

Or

8. (*a*) Write a short note on "Proximate and Ultimate Analysis" of Coal. [4]

(*b*) Calculate stoichiometric Air to fuel ratio for the combustion of a sample of dry Anthracite coal of the following composition by mass : Carbon = 88%; Hydrogen = 04%; Oxygen = 3.5%; Sulphur = 0.50% and Ash = 03% and Nitrogen = 01%. If 30% Excess air is supplied. Determine :

(*i*) A : F ratio

(*ii*) Dry analysis of products of combustion by volume. [9]

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-114

S.E. (Mechanical/Automobile) (I Sem.) EXAMINATION, 2018
MATERIAL SCIENCE
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. No. **1** *or* Q. No. **2,** Q. No. **3** *or* Q. No. **4,** Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8.**
(*ii*) Figures to the right indicate full marks.
(*iii*) Draw the neat sketch wherever necessary.

Q.1 (a) What do you mean by the term "Lattice in Crystal Structures"? What are the different types of lattice parameters? [4]

(b) What do you mean by 'imperfections in crystal'? Define its types with suitable example for each. [4]

(c) What is composite material? Explain with its types. [4]

OR

Q.2 (a) Calculate modulus of elasticity of a kelvar fiber reinforced epoxy composite with 82 % of kelvar fiber positioned in isostrain condition. [4]
E for kelvar is 131GPA and E for Epoxy is 2.51GPA

(b) What is polymer? Distinguish between thermosetting and thermoplastic material? [4]

(c) Differentiate between cold working and hot working, on basis of changes in properties of the material. [4]

Q.3 (a) Differentiate between engineering stress and true stress? List out using suitable figure, any four properties of materials, while performing Tensile test. [5]

(b) What is toughness? What are the effects of velocity, size of specimen, and temperature, on the specimen during performing impact test on the materials? [4]

(c) Explain magnetic particle inspection method with a neat diagram for longitudinal inspection? [4]

P.T.O.

OR

Q.4 (a) Identify the methods of Material Testing to be used in following [5]

i) Material resistance for indentation for a coat of Chromium.

ii) Slow and progressive deformation of material with time under a constant stress at elevated temperature.

iii) Defects in materials such as cracks, porosity present on surface in metallic and non metallic components during or after production.

iv) Inspection of many components at the same time having blowholes, gas cavities, inclusions etc.

v) Measurement of cracks in Fe component inside the component

(b) Explain the pulse echo method of ultrasonic inspection, with neat sketches and its application. [4]

(c) What do you mean by the term "Fatigue"? Explain the methods of prevention of fatigue in the materials. [4]

Q.5 (a) Define the term 'powder metallurgy'? Explain it's any two applications with proper justification for each. [6]

(b) What is the purpose of sintering in powder metallurgy? Explain the stages of sintering with neat sketches. [7]

OR

Q.6 (a) What is a 'self lubricated bearing'? Explain the roll of powder metallurgy for manufacturing of 'self lubricated bearings? [5]

(b) What are the different properties to be evaluated of powder material in powder metallurgy? (explain any four) [6]

(c) What do mean by conditioning of powder? [2]

Q.7 (a) Explain the following terms (any two) [4]

i) Piezometric materials

ii) Superconductors

iii) Cryogenic applications of smart materials

(b) What do you mean by the term 'biomaterials'? Explain with any one example? [4]

(c) Explain 'Biosensors' with its principal and advantages ? [4]

OR

Q.8 (a) Explain the following term, (any two) [4]

(*i*) Dielectric materials

(*ii*) Modern materials for high temperature applications

(*iii*) Soft and hard ferrites

(b) Explain the concept of nanoscience and Nanotechnology? [4]

(c) Explain the concept of 'shape memory alloy' with advantages, disadvantages? [4]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-115

S.E. (Mechanical/Automobile) (I Sem.) EXAMINATION, 2018
FLUID MECHANICS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer *four* questions out of **8**.
(*ii*) Attempt Q. Nos. **1** *or* **2,** Q. Nos. **3** *or* **4,** Q. Nos. **5** *or* **6** and Q. Nos. **7** *or* **8**.
(*iii*) *All* questions should solve in one answer-book and attach extra supplements if required.
(*iv*) Draw diagrams wherever necessary.
(*v*) Use of scientific calculator is allowed.
(*vi*) Assume suitable data wherever necessary.

Q.1 (a) Derive an expression for total pressure and center of pressure for inclined plane submerged in liquid and hence derive expression for center of pressure for vertical plane. [6]

(b) The velocity distribution for flow over a flat plate is given by $u = [3/4]y - y^2$ in which u is the velocity in m/sec at a distance y meter above the plate. Determine the shear stress at y = 0.15m. Take dynamic viscosity of fluid is 8.6 poise. [6]

OR

Q.2 (a) State and explain Newton's law of viscosity. Explain the importance of viscosity in fluid motion. [6]

(b) Explain Velocity potential, Stream function, Vorticity. [6]

P.T.O.

Q.3 (a) Define HGL and TEL. Draw a neat diagram of Venturimeter and show HGL and TEL for it. [6]

(b) Determine the (i) Pressure gradiant (ii) the shear stress at the two horizontal parallel plates and (iii) the discharge per meter, for the laminar flow of oil with a maximum velocity of 2 m/sec between two parallel fixed plates which are 100mm apart. Given μ =2.4525 Ns/m^2. [6]

OR

Q.4 (a) A horizontal venturimeter with inlet diameter 20cm and throat diameter 10 cm is to measure flow of water. The pressure at inlet is 17.658 N/cm^2 and the vaccum pressure at throat is 30cm of mercury. Find the discharge of water through venturimeter. Take Cd =0.98 [6]

(b) Derive expression for velocity distribution for flow in fixed parallel plates. [6]

Q.5 (a) Derive Darcy- Weisbach equation to calculate loss of head due to friction in pipe. [6]

(b) The frictional torque T of a disc diameter D rotating at a speed N in fluid of viscosity μ and density ρ in a turbulent flow is given by

$$T = D^5 N^2 \rho \phi \{[\mu] / [D^2 N \rho]\}$$

Prove this relations using Buckingham's π-theorem. [7]

OR

Q.6 (a) Explain Reynolds number, Weber number, Euler number. [6]

(b) Explain minor energy losses with suitable figures. [7]

Q.7 (a) A thin plate is moving in still atmospheric air at velocity of 5 m/sec. The length of the plate is 0.6 m and width is 0.5 m. Calculate the drag force at one side of plate, if density of air is 1.24 kg/m^3 and kinematic viscosity 0.15 strokes. [6]

(b) Derive an expression for displacement, momentum and energy thickness. [7]

OR

Q.8 (a) Discuss the boundary layer formation over a flat plate. [6]

(b) A flat plate 1.5m × 1.5m moves at 50 km/hour in stationary air of density 1.15 kg/m^3. If the co-efficients of drag and lift are 0.15 and 0.75 respectively determine The lift force, The drag force, The resistance force and Power required to keep the plate in motion. [7]

Total No. of Questions—8] [Total No. of Printed Pages—6

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[5352]-116

S.E. (Mech./Mech. Sand/Auto) (II Sem.) EXAMINATION, 2018

THEORY OF MACHINES—I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Define Grashof's law and explain the effect of changing in length of links on inversion of four bar chain. [5]

(*b*) The connecting rod of a gasoline engine is 300 mm long between it centres. It has a mass of 15 kg and mass moment of inertia of 7000 kg-mm^2. Its centre of gravity is at 200 mm from its small end centre. Determine the dynamical equivalent two-mass system of the connecting rod if one of the masses is located at the small end centre. [5]

P.T.O.

Or

2. (*a*) Sketch and describe the working of crank and slotted lever mechanisms. Give examples of their applications. [5]

(*b*) Explain dynamically equivalent system and correction couple. [5]

3. (*a*) A multi-disc clutch has three discs on the driving shaft and two on the driven shaft. The outside diameter of the contact surfaces is 240 mm and inside diameter 120 mm. Assuming uniform wear and coefficient of friction as 0.3, find the maximum axial intensity of pressure between the discs for transmitting 25 kW at 1575 rpm. [5]

(*b*) In an I.C. Engine mechanism, the crank is 250 mm long and connecting rod is 800 mm long. The crank rotates at uniform speed of 800 rpm. When the piston has moved through 250 mm from TDC position. Calculate acceleration of piston and angular acceleration of connecting rod. [5]

Or

4. (*a*) Explain epicyclic gear train dynamometer with neat sketch and also explain how power measurement is done. [5]

(*b*) Two shafts with an included angle of 160° are connected by a Hooke's joint. The driving shaft runs at a uniform speed of 1500 rpm. Determine the angle turned through by the driving shaft when the velocity ratio is maximum and unity. [5]

Or

5. (*a*) The crank OA of a mechanism, as shown in Fig. 1, rotates clockwise at 120 rpm. The length of various links are : OA = 100 mm; AB = 500 mm; AC = 100 mm and CD = 750 mm. Line of action for slider D is horizontal. Find, by instantaneous centre method : 1. Velocity of point C; 2. Velocity of slider D; and 3. Angular velocities of the links AB and CD. [12]

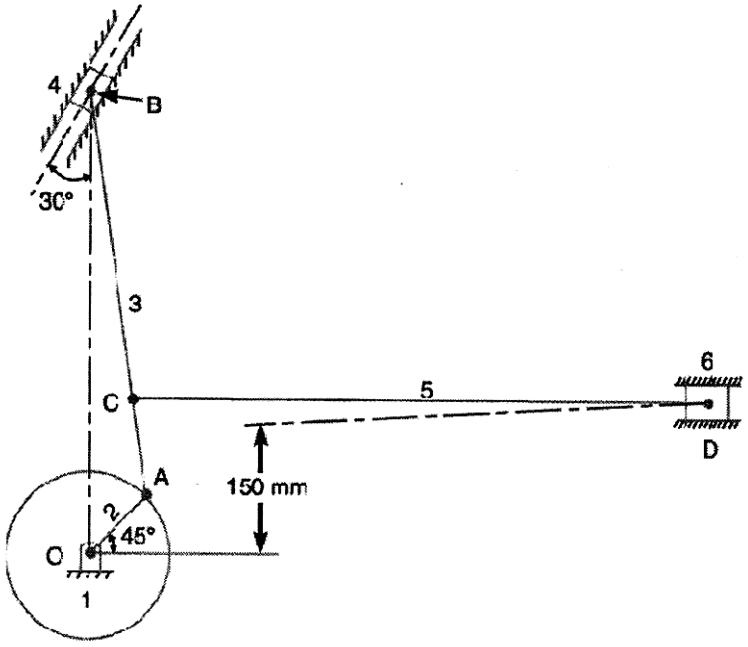

Fig. 1

(*b*) State and prove Kennedy's theorem of three centre in line. [3]

Or

6. (*a*) A mechanism as shown in Fig. 2 has the following dimensions; OA = 200 mm, AB = 1500 mm and BE = 400 mm. If crank OA rotates uniformly at 120 rpm, find the angular velocity and angular acceleration of link AB and BE. [12]

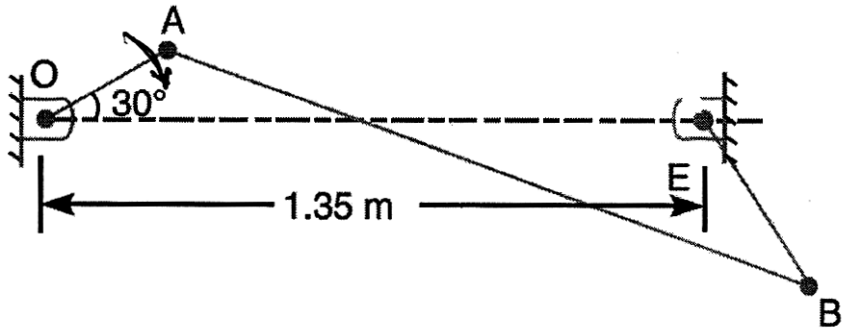

Fig. 2

(*b*) Derive an expression for tangential acceleration when the motion of particle is along circular path. [3]

7. (*a*) In a Whiteworth quick return motion, as shown in Fig. 3, OA is a crank rotating at 30 rpm in a clockwise direction. The dimensions of various links are : OA = 150 mm, OC = 100 mm. [12]

Determine the acceleration of point B on slotted lever and the angular acceleration of the slotted lever CA.

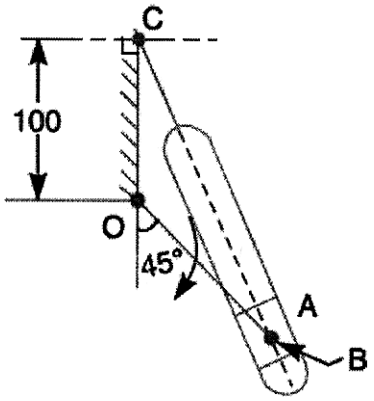

Fig. 3

(*b*) Give Klein's construction for determining the acceleration of piston of a reciprocating engine, when the crank is rotating with uniform velocity. [3]

Or

8. (*a*) The following data relate to a slider crank mechanism, crank radius = 300 mm, connecting rod length = 1500 mm, crankshaft speed = 180 rpm. By Klein's construction. Determine : [12]

(*i*) Velocity and acceleration of the mid-point of the connecting rod.

(*ii*) Angular velocity and angular acceleration of connecting rod and

(*iii*) Velocity of slider.

For the instants when the slider has Zero Acceleration.

(*b*) Explain the procedure to decide direction of Coriolis component of acceleration. [3]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

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[5352]-117

S.E. (Mechanical/Automobile) (II-Sem.) EXAMINATION, 2018

ENGINEERING METALLURGY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Draw neat, well labelled sketch wherever necessary.

1. (*a*) Explain the following terms used in Engineering Metallurgy : Polycrystalline, Grains. [4]

(*b*) Write a short note on spark test. [4]

(*c*) Explain classification of stainless steel. [4]

Or

2. (*a*) What is etching ? Why is it done ? [4]

(*b*) What is the effect of Carbon and Nickel on mechanical or thermal properties of steel ? [4]

(*c*) What is the difference between microscopy and macroscopy ? [4]

3. (*a*) What is the difference between annealing and normalising. [4]

(*b*) What is the effect of tempering on hardened steel ? [4]

(*c*) Explain the action of inhibitors used in corrosion prevention.[4]

P.T.O.

Or

4. (*a*) What is hardening of steel ? What changes occur in the microstructure ? [4]

(*b*) What is Retained Austenite ? How is it reduced in steel ? [4]

(*c*) What is cathodic protection ? What are its advantages ? [4]

5. (*a*) What is malleabilising ? What is the effect of malleabilising on properties of white cast iron ? [5]

(*b*) What are the different types of cast iron ? [4]

(*c*) How is the graphite in Speroidal cast iron made round ? What is the effect of this shape of graphite on strength of S.G. iron ? [4]

Or

6. (*a*) What is the effect of cooling rate and amount of silicon on cast iron ? [5]

(*b*) Between steel and gray cast iron, why does steel have better tensile strength ? [4]

(*c*) Draw a well labelled microstructure of Nodular cast iron explaining the phases present. [4]

7. (*a*) What is precipitation hardening ? On which alloy is it usually done ? [5]

(*b*) What are the requirements of a bearing material ? [4]

(*c*) Why is a brass containing 60% Copper and 40% Zinc required to be hot worked ? [4]

Or

8. (*a*) Explain modification treatment used in Aluminium alloys. [5]

(*b*) How are copper alloys classified ? [4]

(*c*) Write a short note on soldering alloy. [4]

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-118

S.E. (Mechanical/Auto.) (Second Semester) EXAMINATION, 2018

APPLIED THERMODYNAMICS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. Nos. Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) All the four questions should be solved in one answer book and attached extra supplements if required.

(*iii*) Draw neat labeled diagrams wherever necessary.

(*iv*) Use of Steam Tables, Mollier Charts and Scientific Calculator is allowed.

(*v*) Assume suitable data wherever necessary.

(*vi*) Figures to the right indicate full marks.

1. (*a*) Draw and explain with neat sketch Simple carburetor. [6]

(*b*) Explain the following losses (any *three*) : [6]

(1) Time loss

(2) Direct heat loss

(3) Exhaust blow down loss

(4) Pumping loss.

P.T.O.

Or

2. (*a*) Explain stages of combustion in SI engine with the help of P-Theta diagram. [6]

(*b*) Draw and explain valve timing diagram for 4-Stroks SI engine. [6]

3. (*a*) Draw and explain working of automatic injector. [6]

(*b*) Obtain cylinder dimensions of a twin-cylinder, 2-Stroke IC engine from the following data :

Engine speed = 4000 RPM; Volumetric efficiency = 77%; Mech. Efficiency = 75%; Fuel consumption = 10 lit/hr; Sp. Gr. of fuel = 0.73; A/F ratio = 18; Piston speed = 600 m/min; imep = 5 bar.

Also, determine power output at STP conditions (p = 101325 N/m^2; Ta = 25ºC; R for air = 0.287 kJ/kgK). [6]

Or

4. (*a*) Explain with neat sketch any *one* type of combustion chambers used in CI engine. [6]

(*b*) Compare abnormal combustion in SI and CI engine. [6]

5. (*a*) Explain magneto-ignition system with neat sketch. [6]

(*b*) Enlist and explain in brief, types of catalytic convertor. [7]

Or

6. (*a*) Draw a neat sketch of Thermosyphon cooling system and explain its working. [6]

(*b*) Explain exhaust gas recirculation method used to control NOx emission. [7]

7. (*a*) Explain Vane type of Compressor with neat sketch. [6]

(*b*) A three stage reciprocating air compressor compresses air from 1 bar and 17ºC to 35 bar. Follows $PV^{1.25} = C$ and is same for all stages of compression. Assuming perfect intercooling, neglecting clearance, find the minimum power required to compress 15 m^3/min of free air. Also find the intermediate pressure. [7]

Or

8. (*a*) Write down the advantages of Multistaging in reciprocating air compressor. [6]

(*b*) A 2 stage single acting air compressor takes in air at 1 bar and 300K. Air is discharged at 10 bar. The intermediate pressure is ideal and intercooling is perfect. The law of compression is $PV^{1.3} = C$ Rate of discharge is 0.1 kg/sec

find : [7]

(1) Power required to drive the compressor

(2) Saving in work compared to single stage

(3) Isothermal efficiency for single and multistage

Take $Cp = 1$ kJ/kgK, $R = 0.287$ kJ/kgK

Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5352]-119

S.E. (Mechanical/Mechanical-SW/Automobile)

EXAMINATION, 2018

STRENGTH OF MATERIALS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) *All* the four question should be solved in one answer-book and attach the extra supplements if required.

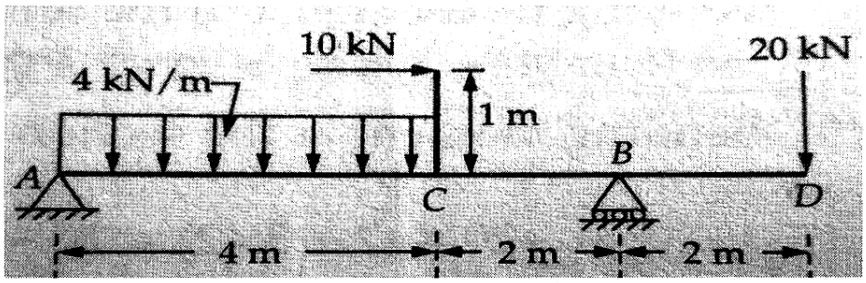
(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

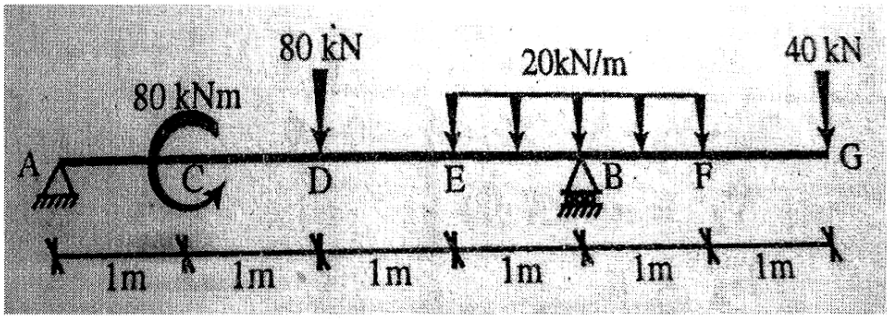
Q.1 A) A bar of cross section 8 mm X 8 mm is subjected to an axial pull of 7000 N. The lateral dimension of the bar is found to be changed to 7.9985 mm X 7.9985 mm. If the modulus of rigidity of the material is 0.8 X 10^5 N/mm^2, determine the Poisson's ratio and modulus of elasticity. **[06]**

B) Draw SFD and BMD for the beam shown in following figure. Also locate the points of contra flexure if any. **[06]**

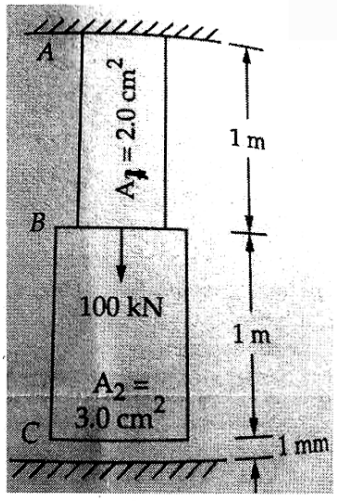


P.T.O.

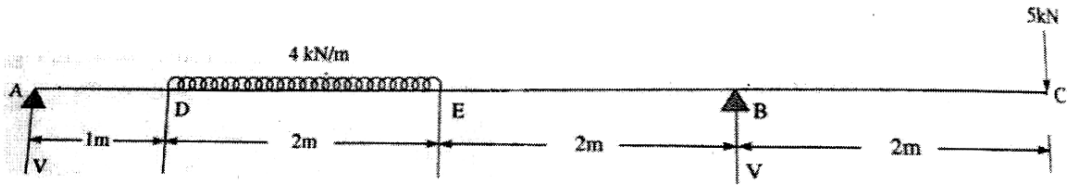
Q.2 A) The beam is supported and loaded as shown in figure. Draw SFD and BMD indicating all important values. **[06]**



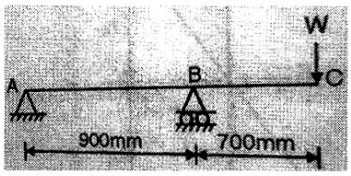
B) A bar ABC shown in figure consist of two parts, AB and BC, each part being 1 m long and having cross sectional areas 2 cm^2 and 3 cm^2 respectively. The bar is suspended from A and there is a rigid horizontal support at 2.001 m from A. A force of 100 kN acting vertically downwards is applied at B. Determine the stresses in parts AB and BC of the bar. Take E = 200 GN/m^2. **[06]**

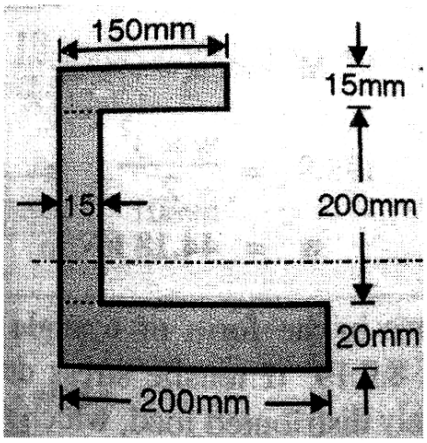


Q.3 A) For the loaded beam shown in figure. Find the deflection at free end and the maximum deflection between the supports. Take E = 200 kN/mm^2 and I = 9 X 10^6 mm^4. **[06]**



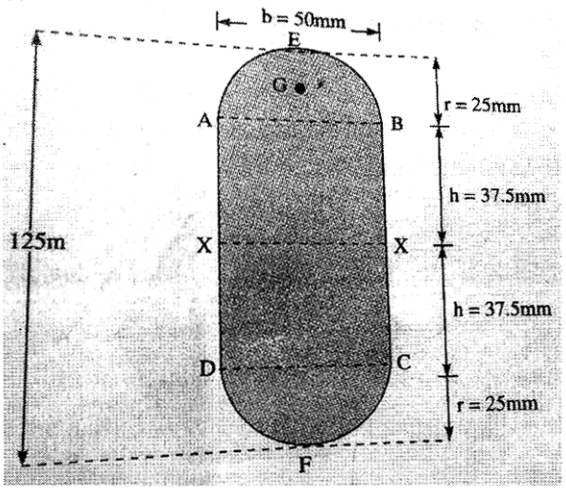
B) A simply supported overhang is loaded with point load as shown in figure. A CI beam of C section with top flange 150 mm X 15 mm, bottom flange 200 mm X 20 mm and web 15 mm X 200 mm. The allowable stresses in tension and compression are 120 Mpa and 90 Mpa. Find the safe value of load 'W' on the overhang. **[06]**





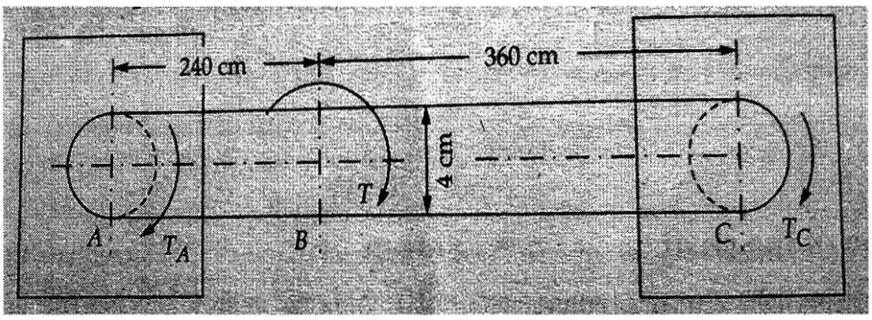
Q.4 A) A crane chain whose cross sectional area is 6.25 cm^2 carries a load 10 kN which is being lowered at uniform rate of 40 m/minute when the length of the chain unwound is 10 m the chain jams suddenly on the pulley. Estimate the stress induced in the chain due to sudden stoppage. Neglect the weight of chain. Take E = 210 GPa. **[06]**

B) The section of a steel bar 50 mm X 125 mm rounded by semicircles as shown in figure. Find the maximum shearing stress produced due to a vertical shear force of 250 kN. **[06]**

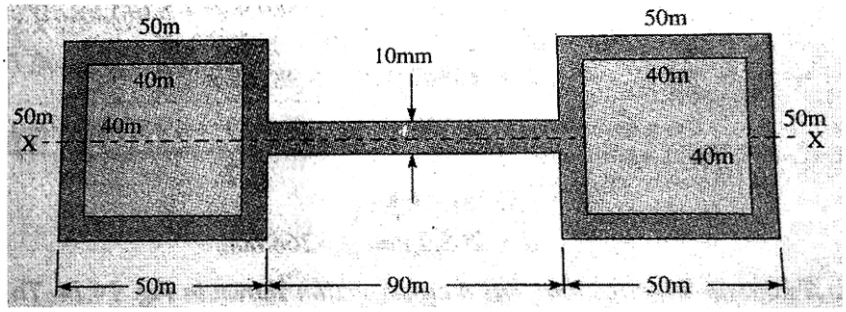


Q.5 A) Determine the ratio of the buckling strengths of a solid steel column to that of a hollow column of same material and having same cross sectional area. The internal diameter of hollow column is half of its external diameter. Both the columns are of the same length and are pinned at both ends. **[07]**

B) A 600 cm long solid shaft is fixed at both ends. A torque of 75 kN cm is applied to the shaft at a section of 240 cm from one end. What are the fixing torques set up at the ends of the shaft? If the diameter of the shaft is 4 cm, calculate the maximum stress developed in the two portions. Also find the angle of twist at the point where the torque is applied. Take G = 75 kN/cm^2. **[06]**



Q.6 A) Figure shows the cross section of a member of a machine. If the member is 1.25 m long with both the ends fixed. Calculate the safe axial thrust the member can resist. Take σ_c = 320 N/mm^2 **[07]**



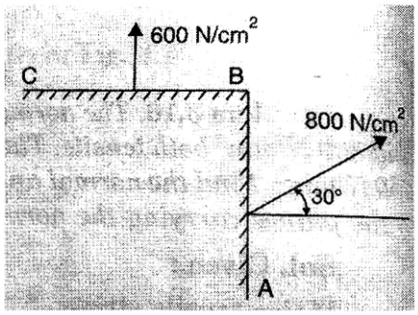
B) A hollow shaft of diameter ratio 3/5 is required to transmit 482 KW at 125 rpm. The shearing stress in the shaft must not to exceed 65 N/mm^2 and the twist in a length of 2 m not to exceed 1 degree. Calculate minimum external diameter of shaft which would satisfy these conditions. Take G= 8 X 10^4 N/mm^2. **[06]**

Q.7 A) A solid circular shaft is subjected to a bending moment of 8 kNm and a torque of 12 kNm. In a uniaxial test the shaft material gave the following results: Modulus of elasticity = 200 GN/m^2, Stress at yield point = 300 N/mm^2, Poisson's ratio = 0.3, Factor of safety = 3. Estimate the least diameter of the shaft using **[06]**

i) Maximum principal stress theory

ii) Maximum principal strain theory

B) The intensity of resultant stress on a plane AB as shown in figure at a point in a material under stress is 800 N/cm^2 and it is inclined at 30^0 to the normal to that plane. The normal component of stress on another plane BC at right angles to plane AB is 600 N/cm^2. Determine: i) the resultant stress on the plane BC, ii) the principal stresses and their directions and iii) the maximum shear stress. **[07]**



Q.8 A hollow circular shaft whose outside diameter is 3 m and whose inside diameter is equal to one half the outside diameter. The shaft subject to a twisting moment of 20,000 N-m as well as a bending moment of 30,000 N-m. Detremine the principal stresses in the body. Also determine the maximum shearing stress. **[13]**

Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-12

S.E. (Instrumentation and Control) (II Sem.) EXAMINATION, 2018

DRIVES AND CONTROL

(2008 Pattern)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any **3** questions from each section.

(*ii*) Answers to the two sections should be written in separate books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) A 4 pole long shunt lap wound generator supplies 25kW at the terminal voltage of 500V. The armature resistance is 0.03 Ω, series field resistance is 0.04 Ω and shunt field resistance is 200 Ω. The brush drop may be taken as 1.0 V. Determine the emf generated. Calculate also number of conductors if the speed is 1200 rpm and flux per pole is 0.02 Wb. Neglect armature reaction. [8]

(*b*) With neat diagram explain the 3 point starter for dc motor. [8]

P.T.O.

Or

2. (*a*) Explain the working principle of DC generator. Also, derive the equation for emf generated for DC generator. [8]

(*b*) A 240 V DC series motor is running at speed of 900 rpm and draws 90 A current. Calculate at what speed the motor will run when developing half the torque. Total resistance of armature and field is 0.1 Ω. Assume magnetic circuit is unsaturated. [8]

3. (*a*) A three-phase induction motor has a rotor resistance and standstill reactance of 0.2 ohm and l.8 ohm per phase respectively. The no. of poles are 4 with supply voltage of 440V, 50Hz. The full load slip is 5%. Find the synchronous speed, full load speed and the ratio of starting torque to maximum torque. Also find the resistance to be added to R2 for making the starting torque equal to maximum torque. [8]

(*b*) Compare slip ring and squirrel cage type of Induction motor. [8]

Or

4. (*a*) What are the different methods of starting of 3-phase Induction motor ? Explain any *two* methods in detail. [8]

(*b*) With neat diagram explain the AC position control system.[8]

5. (*a*) With neat diagrams explain the two types of stepper motors. [10]

(*b*) With neat diagrams, explain any *two* types of single-phase induction motor. [8]

Or

6. Write short notes on : [18]

(*a*) Servomotor

(*b*) Reluctance motor

(*c*) Synchronous motor

SECTION II

7. (*a*) What is a UJT ? Explain how it is used for firing of SCRs. [8]

(*b*) Explain in detail the construction, operation and characteristics of IGBT. [8]

Or

8. (*a*) Describe the following terms as applicable to SCR : [8]

(*i*) Latching

(*ii*) Holding current

(*iii*) Reverse Breakover voltage

(*iv*) dv/dt rating

(*b*) Draw and discuss the characteristics of Diac and Triac. [8]

9. (*a*) Explain the Step up and Step down choppers. [8]

(*b*) With a neat diagram, explain the working of Inverters. Also list a few applications. [8]

Or

10. With neat waveforms and diagram explain the working of single phase fully controlled rectifier with resistive and inductive load. Also draw waveforms if freewheeling diode is connected across load. [16]

11. (*a*) Explain the methods of electrical braking of Induction motor. [10]

(*b*) With a neat diagram explain the Controlled slip system for AC motor control. [8]

Or

12. Write short notes on :

(*a*) VFD

(*b*) Three-phase SCR drive for DC motors

(*c*) DC motor closed loop control system [18]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-120

S.E. (Mechanical, Mechanical Sandwich, Automobile) (II Sem.) EXAMINATION, 2018
ELECTRONICS AND ELECTRICAL ENGINEERING
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Figures to the right indicate full marks.
(*iii*) Assume data if necessary and state the same clearly.
(*iv*) Neat diagrams must be drawn whenever necessary.
(*v*) Use of electronic pocket calculator is allowed.

Q.1. (a). What is Program Status Word (PSW)? State the function of each flag in it. [6]

(b) Explain use of following registers associated with 8051 microcontroller. [6]

i) DPTR ii) Program counter iii) Accumulator

OR

Q. 2. (a). Differentiate between asynchronous and synchronous data transfer. [6]

(b) Explain different addressing mode supported by 8051 microcontroller. [6]

Q. 3. (a). Explain speed control methods for DC shunt motor. [6]

(b). A 4 pole, 250 V DC series motor has wave wound connected armature winding with 1254 conductors. The flux/pole is 22 mWb, when the motor is taking 50 A. The armature and series field coil resistance are 0.3Ω and 0.2Ω respectively. Calculate the speed and torque of the motor and also power developed in Watts. [7]

OR

Q. 4 (a) Distinguish between Squirrel cage and slip ring induction motor. [6]

(b) The output of three phase, 415 V induction motor running at 2% slip is 36.775 KW.

Determine i) Rotor speed and slip speed.
ii) Rotor output and rotor copper loss.

P.T.O.

iii) Efficiency of motor at given loading condition.

Assume motor is wound for 4 pole and supply frequency to be 50 Hz. Given: friction and windage losses are 1500W, while stator losses are 3 KW. [7]

Q. 5. (a). Explain working of Digital multimeter with the help of block diagram [6]

(b). Explain working of digital frequency counter with the help of block diagram. [6]

OR

Q. 6. (a). Explain working of conventional standard signal generator with the help of neat diagram. [6]

(b). Compare Analog voltmeter and Digital voltmeter. [6]

Q. 7 (a). Explain two wattmeters method used for measuring three phase power in a star connected balanced load, supplied by symmetrical AC with the help of neat connection diagram and phasor diagram. [6]

(b). Draw the Maxwell's Induction-capacitance bridge and derive the bridge balance equation. Also give its advantages and disadvantages. [7]

OR

Q.8. (a). A three phase, 50 Hz, 500 V a.c. motor working at certain load has 0.4 lag power factor. Two wattmeters connected to measure input power of the motor. Two wattmeter show total input power 30 KW. Find the reading on each wattmeter and total three phase reactive power of the motor load. [6]

(b). Explain 'resistance potential divider method' for measurement of high voltage with the help of neat diagram. [7]

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-121

S.E. (Mechanical Sandwich) (Sem. I) EXAMINATION, 2018
MATERIAL SCIENCE AND METALLURGY
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Question No. 1 or 2, Question No. 3 or 4, Question No. 5 or 6, Question No. 7 or 8.

(*ii*) Figures to the right indicate full marks.

(*iii*) Draw neat, well labelled sketch wherever necessarv.

1. (*a*) What is the role of grain boundary in crystalline materials ? Explain grain size measurement. [4]

(*b*) What is precipitation hardening ? Illustrate with suitable example. [4]

(*c*) Define “toughness”. What are the methods to evaluate toughness of a material ? [5]

Or

2. (*a*) Explain in brief ultrasonic test. [4]

(*b*) What is “Intergranular corrosion” ? How can it be reduced ? [5]

(*c*) What is creep ? How to improve the creep resistance ? [4]

3. (*a*) Draw and label Fe-Fe3C phase equilibrium diagram. Show the critical temperatures. [4]

P.T.O.

(*b*) Draw microstructure of a slowly cooled medium carbonS steel. What are its properties and applications ? [4]

(*c*) Explain in brief "Carbo Nitriding" process. What are its advantages. [4]

Or

4. (*a*) What is "austempering" ? What are its advantages ? [4]

(*b*) Classify in brief different stainless steels. [4]

(*c*) Why is chromoum added in alloy steels ? Explain the effect of chromium % on mechanical properties of alloy steel. [4]

5. (*a*) Explain in brief "sintering" process of metal powders. [4]

(*b*) Write short note on carbide tip tools. [4]

(*c*) What is the common name of Cu-Zn alloy ? What are the effects of Zn % on properties of Cu-Zn alloy ? [5]

Or

6. (*a*) What is powder conditioning ? Write short note. [4]

(*b*) What is LM series of alloys ? Give composition and properties with one application of LM-6. [4]

(*c*) Explain in brief the importance of copper in white metal babbitts. [5]

7. (*a*) What are thermoplastics ? Illustrate any *one* thermoplastic material with its "mer" structure. Give its applications. [4]

(*b*) What is RCC ? Why is it called a multiple composite ? [4]

(*c*) What are "ceramics" ? Give examples of any *two* different materials used for thermal and electrical insulation which belong to "ceramics" class. What are their advantages ? [4]

Or

8. (*a*) What are "particulate composites" ? Illustrate with sketch, any *one* such composite. [4]

(*b*) Which class of material is sensitive to ultra violet rays ? Explain in brief "radiation damage". [4]

(*c*) Suggest the suitable material for any *four* of following applications. Justify your selection : [4]

(*i*) Safety helmet

(*ii*) Contact lenses

(*iii*) Crain hook

(*iv*) Transformer Core

(*v*) Crank shaft of IC engine

(*vi*) Electrical contact brush.

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-122

S.E. (Mechanical Sandwich) (I Sem.) EXAMINATION, 2018

FLUID MECHANICS AND MACHINERY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Answers should be written in same answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Your answers will be valued as a whole.

(*vi*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vii*) Assume suitable data, if necessary.

1. (*a*) The velocity distribution of fluid flow over plate is given by : $u = 4y - y^2$ for $y \leq 2$ m where, u is the velocity in m/s at a distance 'y' meter above plate. If the coefficient of dynamic viscosity is 1.5 Pa-s. Determine the shear stress at $y = 0$ and at $y = 2$. [6]

(*b*) Define and explain : [6]

(*i*) Buoyancy

(*ii*) Metacentric height.

P.T.O.

Or

2. (*a*) With usual notations prove that : BM = I/V [8]

Where, B = Centre of Buoyancy

M = Metacentric height

I = Moment of inertia of cross-sectional area.

V = Volume of liquid displaced.

(*b*) Define Centre of Pressure and Total pressure. [4]

3. (*a*) Obtain the expression for the force exerted by a jet of water on a stationary curved plate striking the jet at centre. [5]

(*b*) The vertical pipe 2 m long has 200 mm diameter at the lower end, 400 mm diameter at upper end. It carries water of 200 lps. If loss in pipe is 1 m of water. Find pressure; difference in N/m^2 between two ends of pipe. Also find velocities at upper and lower ends of pipe. [8]

Or

4. (*a*) Two pipes running parallel, are joined end to end, The total discharge to be carried by the system is 2000 lit/sec. Determine the discharge carried by each pipe. Particular of pipes are as follows : [7]

Pipe	**Friction Factor**	**Diameter** (m)	**Length** (m)
A	0.018	0.60	1000
B	0.020	0.80	800

(*b*) Define and explain hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine. [6]

5. (*a*) Using Buckingham's π-theorem, shown that the shear stress of the pipe wall given by, $\tau_0 = \rho V^2 \, f\left(\frac{\rho V d}{\mu}\right)$. [7]

Where, V = Average velocity, ρ = density, μ = viscosity, d = Pipe diameter.

(*b*) Derive an expression for the power transmission through the pipes. Find also the condition for maximum transmission of power. [6]

Or

6. (*a*) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 lps under a head of 30 m. The bucket deflects the jet through an angle of 160°. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assumo coefficient of velocity as 0.98. [8]

(*b*) Describe briefly the functions of various main components of Pelton turbine with neat sketch. [5]

7. (*a*) Centrifugal pump is to discharge 0.118 m^3/s at a speed of 1450 rpm against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and Manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. [6]

(*b*) Describe multistage pump with : [6]

(*i*) Impellers in parallel, and

(*ii*) Impellers in series.

Or

8. (*a*) The diameters of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. Determine the minimum starting speed of the pump if it works against a head of 30 m. [6]

(*b*) What is cavitation and what are its causes ? How will you prevent the cavitation in hydraulic machines ? [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-123

S.E. (Mechanical Sandwich) (II Sem.) EXAMINATION, 2018

METROLOGY AND QUALITY CONTROL

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) *All* questions are compulsory. i.e. (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**.)

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Assume suitable data, if necessary.

(*iv*) Use of calculator is allowed.

(*v*) Figures to the right indicate full marks.

1 (a) Explain different types of errors in measurement. [6]

(b) What are optical flat? How are pattern of fringes interpreted? [6]

OR

2 (a) Write a short note on LVDT and its application in metrology. [6]

(b) Describe with neat sketch Tomlinson surface meter. [6]

3 (a) Explain with neat sketch pitch measuring machine. [6]

(b) Write a short note on PDCA and PDSA. [6]

OR

4 (a) Write a short note on Brain storming and Pareto analysis. [6]

(b) Sketch and describe Parkinson gear tester. [6]

P.T.O.

5 (a) What do you mean by FMECA? Explain in detail. [7]

(b) Explain Kanban in details. [6]

OR

6 (a) Write a short note on (any two) [8]

1. Quality Audit
2. ISO 9000
3. Poka Yoke

(b) Explain JIT Concept in Industry. [5]

7 (a) Explain analysis on out of control condition referring control charts. [5]

(b) Following given table shows the number of defective found in inspection of 10 lots of 100 each. Construct appropriate control chart and state weather the process is in statistical control or not [8]

Lot No.	1	2	3	4	5	6	7	8	9	10
Number of Defective	12	9	4	6	7	3	10	7	4	3

OR

8 (a) Write a note on OC curve. [5]

(b) Write note on Production part approval method. [8]

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-124

S.E. (Mechanical Sandwich) (Second Semester)

EXAMINATION, 2018

MANUFACTURING ENGINEERING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. (*a*) List out the various types of patterns. Explain any *one*. [5]

(*b*) Describe the pattern making allowances. [4]

(*c*) Explain principle of resistance welding and its applications. [4]

Or

2. (*a*) Describe various types of adhesive and their applications. [4]

(*b*) Differentiate between spot and seam welding. [4]

(*c*) Explain rolling operation and various types of rolling mills. [5]

P.T.O.

3. (*a*) List out the various operations performed on lathe machine. Explain any *one* with neat sketch. [6]

(*b*) Calculate the machine time required to reduce 60 mm diameter shaft to 50 mm diameter for a length of 1500 mm with depth of cut of 2 mm for rough cut and 1 mm for finish cut. [7]

Given :

(*i*) Cutting speed—30 m/min

(*ii*) Feed-0.5 mm/rev

(*iii*) Approach length—5 mm

(*iv*) Over run length—5 mm

(*v*) No. of Passes—3 (2 rough cut plus 1 finish cut).

Or

4. (*a*) What are the various types of rake angle and its effect on orthogonal cutting operation ? [4]

(*b*) It is required to divide the periphery of a job into 28 equal divisions. Find the indexing arrangement. [4]

(*c*) Define and state the importance of the speed, feed and depth of cut in cutting operation. [5]

5. (*a*) Define centre of pressure and sheet utilization ratio. [4]

(*b*) Explain the various force reduction methods. [4]

(*c*) Differentiate between blanking and piercing. [4]

Or

6. (*a*) Define spring back and explain how allowances may be made to compensate it ? [6]

(*b*) What are the various types of strippers ? Explain their functions with suitable sketches. [6]

7. (*a*) What is meant by locating and clamping of work-piece ? What are the materials used for locating and clamping elements ? [6]

(*b*) Explain the 3-2-1 principle of location. [6]

Or

8. (*a*) Define a jig and a fixture. What are the functions of jigs and fixtures ? [6]

(*b*) Explain function of quick acting clamps, sketch any *one*. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-125

S.E. (MECHANICAL SANDWICH) (II Sem.) EXAMINATION, 2018

THERMAL ENGINEERING

(2012 Pattern)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve any **4** questions (Q. No. **1** or Q. No. **2**, Q. No. **3** or Q. No. **4**, Q. No. **5** or Q. No. **6**, Q. No. **7** or Q. No. **8**.)

(*ii*) All the *four* questions should be solved in one answer-book and attached extra supplements if required.

(*iii*) Draw neat and labelled diagrams wherever necessary.

(*iv*) Use of steam tables, Mollier charts, scientific calculator is allowed.

(*v*) Answer suitable data wherever necessary.

(*vi*) Figures to the right indicate full marks.

1. (*a*) Derive an expression of COP for Bell Coleman cycle in terms of pressure ratio. [6]

(*b*) Explain the constructional details of single compressor ? Write uses of compressed air. [6]

Or

2. (*a*) Explain with a neat schematic diagram vapor compression refrigeration cycle. [6]

P.T.O.

(*b*) Explain workdone by reciprocating air compressor without clearance valume. [6]

3. (*a*) Explain with a neat sketch winter air-conditioning system. [6]

(*b*) Explain with neat sketch battery ignition system. [6]

Or

4. (*a*) Represent the following processes on psychometric chart and Explain. [6]

(*i*) Cooling and dehumidification

(*ii*) Adiabatic evaporative cooling

(*iii*) Heating and humidification.

(*b*) Explain with neat sketches different types of superchargers.[6]

5. (*a*) Explain stages of combustion in SI engine. [6]

(*b*) Explain the types of combustion chambers in C.I. engines.[7]

Or

6. (*a*) Compare diesel knock and detonation. [6]

(*b*) Write a short note on catalytic converter. [7]

7. (*a*) What are the advantages of closed cycle gas turbines and Open cycle gas turbines ? [5]

(*b*) The gas turbine unit has a pressure ratio of 6 : 1 and maximum cycle temperature of 610ºC. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kilowatts of an electric generator geared to the turbine when the air enters the compressor at 15°C at the rate of 16 kg/s. Take C_p = 1.005 kJ/kg K, γ = 1.4 for the compression process, and C_P = 1.11 kJ/kg K, γ = 1.33 for the expansion process. [8]

Or

8. (*a*) Explain theory of Jet engines and its applications : [5]

(*b*) Explain the following with sketch (any *two*) : [8]

(*i*) Turbo jet Engine

(*ii*) Ram jet Engine

(*iii*) Rocket Engines.

Total No. of Questions—**6**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-13

S.E. (Computer Engg. & Infor. Technology)
EXAMINATION, 2018
HUMANITIES AND SOCIAL SCIENCES
(2008 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

SECTION I

Q-1 a) Define Marriage. Explain the salient features of Modern Indian family. [08 marks]

b) India is land of Unity in Cultural Diversity. Comment. [08 marks]

OR

a) Discuss the structure of Indian Society. [08 marks]

b) Describe the role of Panchayat Raj Institutions in India. [08 marks]

Q-2 a) Industrial Revolution is a tool for Social Change. Comment. [08 marks]

b) Discuss the features of National Education Policy in brief. [08 marks]

OR

a) Explain the need and reasons for Scientific Study of Human beings. [08 marks]

P.T.O.

b) Discuss the important salient features of National Policy on Health and Health care [08 marks]

Q-3 a) Discuss the changes that have taken place in the development of Agricultural Sector due to advent of Technology. [09 marks]

b) Explain in brief the Employment schemes for the Rural and Urban masses by introduced by Government of India . [09 marks]

OR

a) Explain the role of Private Sector in the Industrial Development of India. [09 marks]

b) Discuss the Infrastructure Development in India. [09 marks]

SECTION II

Q-4 a) Explain the concept of Global Warming and its effects and strategies to control it. [08 marks]

b) Population Control is necessary for future economic growth. Discuss. [08 marks]

OR

a) State and explain the different sources of Renewable and Non Renewable energy. [08 marks]

b) What is Bio diversity? What are the causes of loss of Biodiversity? [08 marks]

Q-5 a) Explain the need for planned economic development. [08 marks]

b) Explain the Law of Demand with exception. [08 marks]

OR

a) What the basic features of Indian Economy? Explain in brief. [08 marks]

b) Explain the following concepts in Brief. [08 marks]
   (i) Inflation
   (ii) National Income

Q-6 a) Explain the need and importance of Ratio Analysis. [06 marks]

b) Explain the role of RBI in Indian Banking Sector. [06 marks]

c) What is Cost Analysis? Why is it important? Discuss. [06 marks]

OR

Write Short notes on [18 marks]

(i) Financial Institutions in India
(ii) International Economy
(iii) WTO

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-131

S.E. (E&TC/Electronics) (First Semester) EXAMINATION, 2018

SIGNALS AND SYSTEMS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Use of non-programmable calculator is allowed.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

Q.1) A) Determine if the following systems described by y (t) = sin[x (t+2)] are
1. Static/Dynamic 2. Linear/Nonlinear 3. Time invariant/ Time variant
4. Causal/Non-causal [6]

B) Find the following linear convolution sum
If x (n) = {2, 3, 1, 4} h (n) = {− 1, 2, 3}
↑ ↑
And y (n) = x (n) * h (n) [3]

C) Determine whether the following LTI system described by impulse
Response h (t) = e^{-t}u (t+1) is stable and causal. [3]

OR

Q.2) A) Find the convolution Integral of following signal x (t) = u (t)
And h (t) = 1 for − 1≤ t ≤ 1. [6]

P.T.O.

B) Find whether the following signal is energy or power. Find Appropriate value

$$x(t) = 4\cos\left(\frac{\pi}{4}t\right) \quad \text{for} \quad -\frac{1}{2} \le t \le \frac{1}{2}$$ [6]

Q.3) A) State and prove the following properties of Laplace Transform.

i) Integration in time domain ii) Time shifting in time domain [6]

B) Find the Quadrature Fourier series for the given signal x (t) = $\sin\omega_0 t$. [6]

OR

Q.4) A) State conditions for the existence of Fourier Transform. Find fourier transform of the given signal y(t) = $e^{-at}u(t)$. [6]

B) Find the Laplace transform of the following signal with ROC:

1) x (t) =$e^{3t}u(t) + e^{-t}u(-t)$. 2) x (t) = $5e^{-3t}\sin(2t)$. [6]

Q.5) A) State and Describe the properties of Energy Spectral Density.(ESD) [6]

B) Calculate the ESD, total energy of a signal x(t)=Asinc(2Wt) [7]

OR

Q.6.A) State and Describe properties of cross-correlation of the CT energy signals. [6]

B) Find the auto correlation using basic autocorrelation equation of the following signals.
$x_1[n]=[4,3,2,1]$ $x_2[n]=u[n]$ [7]

Q.7.A) Explain probability distribution model of Binomial distribution. [3]

B) If A and B are two events such that p(A)=0.3, p(B)=0.4, $p(A \cap B)=0.2$
Find i) $p(A \cup B)$ ii) $p(\overline{A}/B)$ [4]

C) The probability that a student gets A grade, B grade, C grade, D grade and E grade in a course are 0.2, 0.3, 0.15, 0.25 and 1.0 respectively. What are the probabilities that he/she gets i)A,B or C grade ii) B,C or D grade.[6]

OR

Q.8) A) A certain random variable has the CDF given by: [6]

$F_X(x) = 0$, for $x \leq 0$

$= kx^2$, for $0 < x \leq 10$

$= 100k$, for $x > 10$.

1) Calculate the value of k.

2) Find the values of P ($x \leq 5$) and P ($5 < x \leq 7$).

3) Plot the corresponding PDF.

B) State the properties of probability density function. [3]

C) Find the mean and variance of uniform distribution function. [4]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-132

S.E. (E&TC/Electronics) (I Sem.) EXAMINATION, 2018

ELECTRONIC DEVICES AND CIRCUITS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of scientific calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) List the causes of instability in BJT and hence define any *two* stablity factors. [6]

(*b*) Determine d.c. operating point parameters for the circuit as shown in Fig. 1. Assume V_{BE} = 0.3 V, I_{CEO} = 0, β_{dc} = 55. [6]

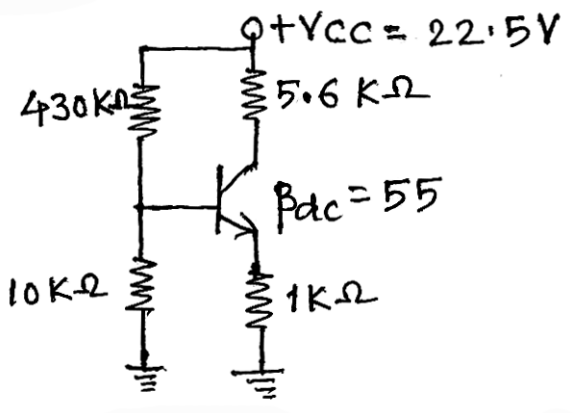


Fig. 1

P.T.O.

Or

2. (*a*) Compare various configurations of BJT amplifier on the basis of input impedance and their applications. [6]

(*b*) Determine Av, Ri, Ro for the circuit as shown in Fig. 2. Assume h_{re} = h_{oe} = 0, R_1 = 5 kΩ, R_2 = 500 Ω, R_C = 1 kΩ and R_E = 100 Ω. V_{CC} = 10 V, h_{fe} = 100 and h_{ie} = 1.1 kΩ. [6]

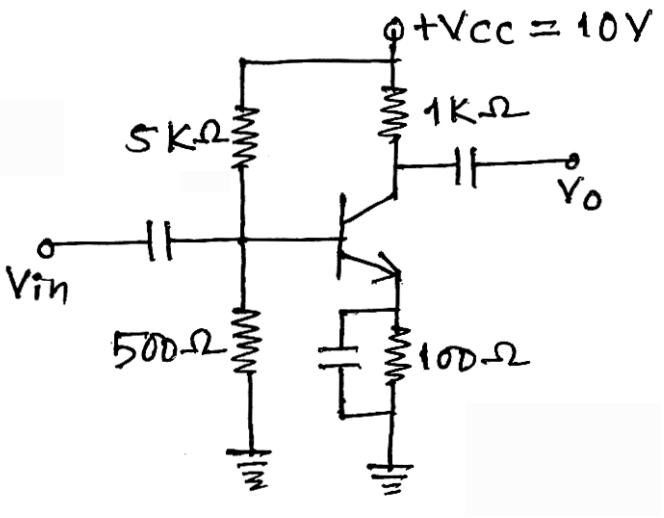


Fig. 2

3. (*a*) State Barkhousen criterion for sustained oscillations. Draw ckt. diagram of Hartely oscillator and hence determine the oscillation freq. of the oscillator for L_1 = L_2 = 1 μH and C = 100 nF. [6]

(*b*) Draw frequency response curve of RC-coupled CE amplifier. Explain the effect of bypass and inter-electrode capacitance on cutoff frequencies. [6]

Or

4. (*a*) Explain any *three* advantages of feedback amplifier with suitable justification. [6]

(*b*) A step response of C.E. amplifier gives tilt (*p*) of 2% and rise time (*tr*) of 20 μs. Tilt of 2% is observed at 400 Hz. Therefore, determine lower cutoff frequency higher cutoff frequency and bandwidth. [6]

5. (*a*) Compare Class A and Class B amplifier based on their collector efficiency, distortion and operating point. [6]

(*b*) Draw and explain series fed Class A amplifier with input and output waveforms. [7]

Or

6. (*a*) Draw and explain push-pull amplifier with neat waveforms. [7]

(*b*) For a Class B amplifier following parameters are observed :

$I_{d.c.}$ = 1.75 A, $V_{o(p\text{-}p)}$ = 44 V

The amplifier has R_L = 8 Ω and V_{CC} = 25 V.

Determine $P_{ind.c.}$, $P_{outa.c.}$ and efficiency. [6]

7. (*a*) List various non-ideal characteristics of E-MOSFET. Explain any *two* non-ideal characteristics. [8]

(*b*) Draw and explain E-MOSFET construction. [5]

Or

8. (*a*) Determine operating (2) point of the given ckt. as shown in Fig. 3. Give parameters are V_T = 1.5 V, K = 0.8 mA/V^2. [6]

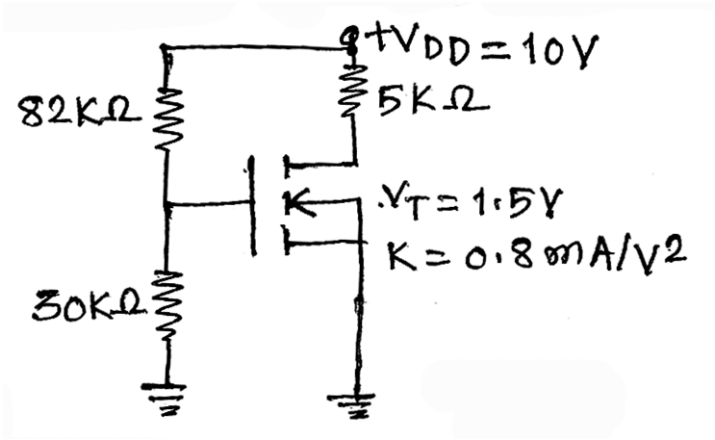


Fig. 3

(*b*) Explain constant current source biasing in E-MOSFET based circuit using suitable diagram. [7]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-133

S.E. (E&TC/ELECTRONICS) (I Sem.) EXAMINATION, 2018

NETWORK THEORY

(2012 PATTERN)

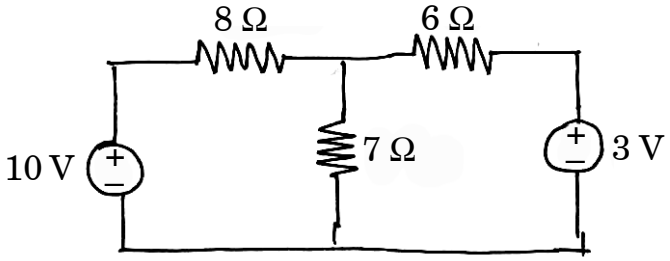
Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if necessary.

1. (*a*) For the network shown below, find current through 7 Ω resistor using superposition theorem. [6]



(*b*) Explain the following terms with example : [6]

(*i*) Oriented graph

(*ii*) Rank of graph

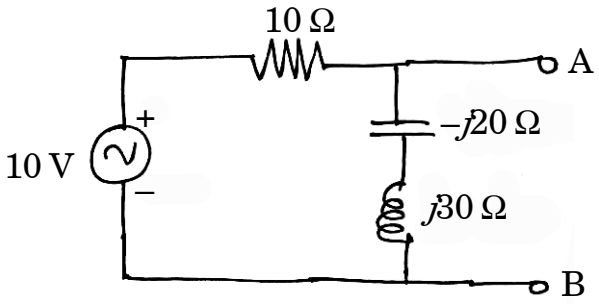
(*iii*) CoTree

(*iv*) Twig.

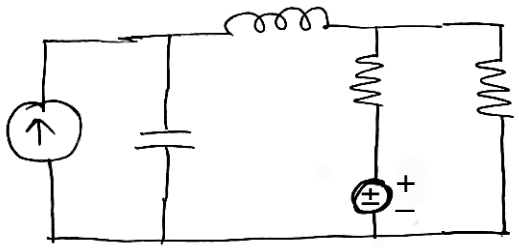
P.T.O.

Or

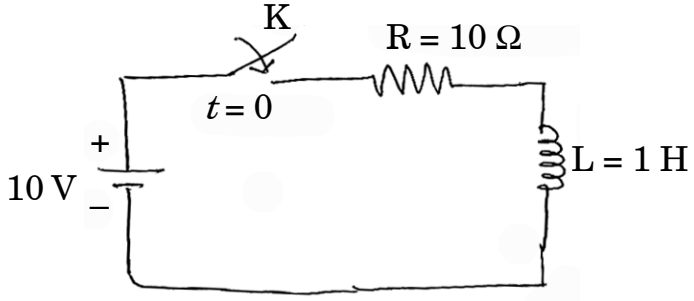
2. (*a*) Obtain Thevenin's equivalent circuit w.r.t. points A & B for the circuit below : [6]



(*b*) Find the maximum possible number of trees for the network shown in Fig. [6]



3. (*a*) The switch is closed at $t = 0$. Find value of i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume initial current of inductor to be zero. [6]



(*b*) An inductive coil having resistance of 50 Ω and inductance of 0.05 H is connected in series with 0.02 μF capacitor. Find : [6]

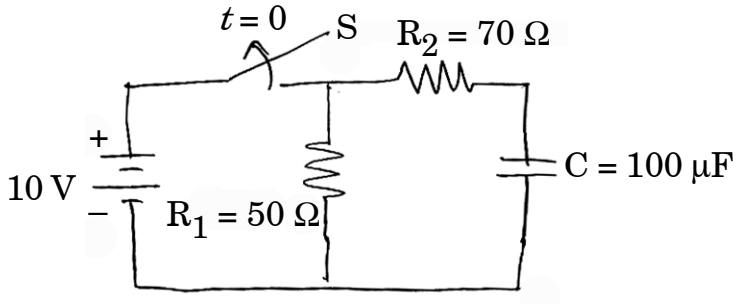
(*i*) Q factor of coil

(*ii*) Resonant frequency

(*iii*) Half power frequency.

Or

4. (*a*) In Fig., the switch 'S' is opened at $t = 0$. Find the expression for voltage across C for $t > 0$. Also find voltage at $t = 0.036$ sec. [6]



(*b*) Define Q-factor and derive equations for Q-factor of L&C. [6]

5. (*a*) For any symmetrical network, prove that the characteristic impedance z_0 is the geometric mean of open and short circuit impedances. [6]

(*b*) Design constant K-HPF having cut-off frequency 5500 Hz and design impedance of 750 Ω. Draw : [7]

(*i*) T-section

(*ii*) π-section.

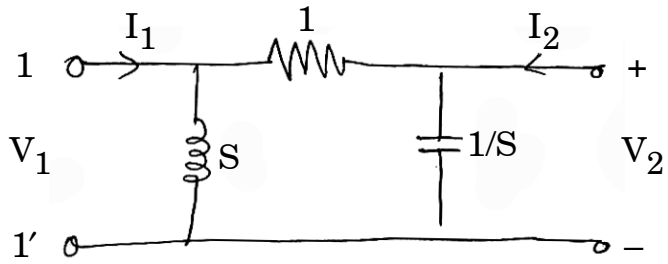
Or

6. (*a*) Design a symmetrical π attenuator to work into 600 Ω and provide a loss of 20 dB. [6]

(*b*) What are the limitations of prototype filters ? How these limitations are overcomed using *m*-derived filters ? Explain composite filters with its block diagram. [7]

7. (*a*) Derive the condition of reciprocity and symmetry for *z* parameters. [6]

(*b*) Determine the transmission parameters for the network shown in Fig. [7]



Or

8. (*a*) Current I_1 and I_2 entering at port 1 and port 2 respective of two port network are given by the following equations :

$$I_1 = 0.5V_1 - 0.2V_2$$

$$I_2 = 0.2V_1 + V_2.$$

Find *z* parameters. [7]

(*b*) Write a short note on : Pole-zeros of network functions and stability. [6]

Total No. of Questions—8] [Total No. of Printed Pages—2

Seat No.	

[5352]-134

S.E. (E & TC/Electronics) (I Sem.) EXAMINATION, 2018
DATA STRUCTURE AND ALGORITHM
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8**.
(*ii*) Assume suitable data, if necessary.
(*iii*) Neat diagrams wherever necessary.

Q1 a What is dynamic memory allocation Process? Explain 6
1. malloc () 2. Free() 3. Sizeof() function .

b Explain parameter passing call by value and call by reference with suitable example. 6

OR

Q2 a What is string? Explain the usage of string function strcmp and strlen. 6

b Sort the following data in ascending order by using bubble and selection sort method 6
10, 30, 20, 5,15 write down all passes

Q3 a Define Doubly Linked List and Write a structure for doubly linked list? 6
Write a algorithm to delete first node in Doubly Linked List?

b What is linked list ? write a C function for to insert element in the Singly Linked List. 6

OR

Q4 a Show the following postfix arithmetic expression evaluation in stack 6
4, 5, 4, 2, ^ , +, *, 2, 2, ^, 9, 3, /, *, - **Note:-** ^ is consider a exponential operator

b Explain 1. Linear queue. 2. Circular Queue with example 6

P.T.O.

Q5 a From given traversal construct binary tree 7

Inorder : D, B,F,E,G,A,H,I,C

Postorder : D,F,G,E,B,I,H,C,A

b Write recursive function for in-order,preorder, and postorder traversal of Binary tree. 6

OR

Q6 a For following data from BST Show steps in detail 7

Traverse the tree in inorder, preorder and postorder from

45 68 35 42 15 64 78.

b What is binary tree ? Explain Representation of binary tree in memory? 6

Q7 a What is BFS? Write a non-recursive function for BFS using graph. 7

b What is minimum spanning tree? Using Prims algorithm find minimum spanning tree of given fig no.Q.7 b 6

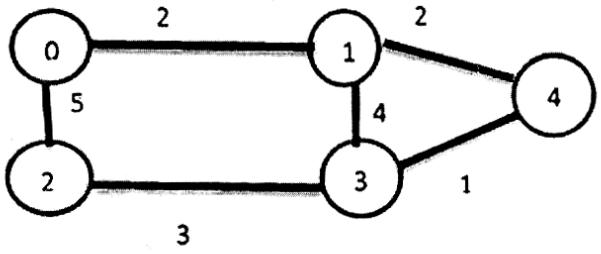


Fig Q 7 b.

OR

Q8 a What is DFS? Write an algorithm for DFS? 7

b Explain Kruskal's Algorithm? Explain with suitable example. 6

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-135

SE (E & TC/ELECT) EXAMINATION, 2018

DIGITAL ELECTRONICS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if necessary.

1. (*a*) State the following characteristics of digital TTL and CMOS ICS : [6]

(1) Noise Margins

(2) Propagation Delay Time

(3) Current Parameters.

(*b*) Explain the design of full adder using 8 : 1 Multiplexer IC. [6]

Or

2. (*a*) Draw and explain the working of two input CMOS NOR gate. [6]

(*b*) Design a 2-bit comparator circuit using gates. [6]

P.T.O.

3. (*a*) Differentiate between Moore and Mealy machine with example. [6]

(*b*) Explain the design of J-K latch using 2-input NAND gates. [6]

Or

4. (*a*) Design a sequence generator circuit to generate the following sequence 101 using non-overlapping technique. [6]

(*b*) Explain the following basic steps used to design the state machines : [6]

(1) State Diagram

(2) State Table

(3) State Reduction.

5. (*a*) With neat diagram, explain in brief the architecture of FPGA. [6]

(*b*) What is PAL ? Explain the various types of PALs ? [7]

Or

6. (*a*) Obtain a 1024 × 8 (RAM) memory using 256 × 8 memory chips. [7]

(*b*) Implement the following Boolean functions with a PLA : [6]

$$F1(A, B, C) = \Sigma M(0, 1, 2, 4)$$

$$F2(A, B, C) = \Sigma M(3, 5, 6, 7)$$

7. (*a*) Write a VHDL code for D Flip-flop using synchronous reset input. [6]

(*b*) Explain the difference between concurrent statement and sequential statement in VHDL. [4]

(*c*) Write a short note on entity. [3]

Or

8. (*a*) Write a VHDL code for 4 : 1 Multiplexer. [6]

(*b*) Write a short note on data objects in VHDL. [4]

(*c*) Explain signal and variable used in VHDL. [3]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-136

S.E. (E&TC/Elect.) (II Sem.) EXAMINATION, 2018
INTEGRATED CIRCUITS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Use of electronic pocket calculator is allowed.
(*v*) Assume suitable data, if necessary.

Q. 1 **(a)** Draw the block diagram of op-amp and explain the function of each block in detail. **[04]**

(b) Define the following op-amp parameters. **[04]**

1) Slew rate
2) CMRR
3) Input offset voltage
4) PSRR

(c) State and compare different op-amp technologies. **[04]**

OR

Q. 2 **(a)** What is the need of frequency compensation? Explain any one method of external frequency compensation. **[06]**

(b) The dual input balanced output difference amplifier has following specifications. **[06]**

R_C =2.5kΩ, R_E=4.8kΩ, $R_{b1}=R_{b2}=R_b$=50Ω, $+V_{CC}$ = +10V, $-V_{EE}$ = -10V, β =100, V_{BE} = 0.8V. Assume h_{ie} = 1.1kΩ. Calculate:

1) Q-point values
2) Voltage gain
3) Input & Output Resistance

P.T.O.

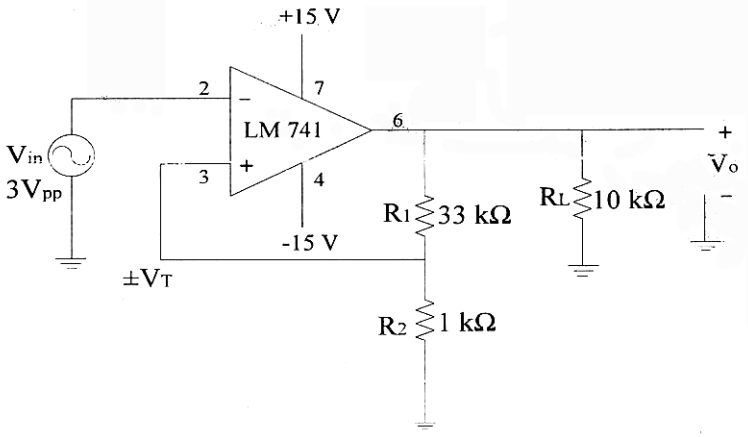
Q. 3 **(a)** Why ideal integrator is required to be modified? Draw the practical integrator and explain its operation with frequency response. **[06]**

(b) Draw and explain precision half wave rectifier circuit using op-amp. **[04]**

(c) List out the characteristics of a typical/good instrumentation amplifier. **[02]**

OR

Q. 4 **(a)** For the Inverting Schmitt trigger shown below, Calculate UTP, LTP & hysteresis width. Draw input & output waveforms. Also comment on Hysteresis loop. **[06]**



(b) Draw a neat circuit diagram of two inputs inverting summing amplifier using op-amp & obtain expression for output voltage. **[06]**

Q. 5 **(a)** Draw the circuit diagram and explain working of voltage mode R-2R ladder DAC. **[05]**

(b) Explain grounded load V to I converter with necessary derivation. **[04]**

(C) Explain current to voltage converter using Op-amp. **[04]**

OR

Q. 6 **(a)** Write a note on 2 bit Flash type analog to digital converter (ADC). **[06]**

(b) A 5 bit R-2R ladder network with reference voltage of 10V. Find **[07]**

1) Analog output due to LSB change.
2) Full scale output voltage
3) Analog output for digital input 11001

Q. 7 **(a)** Explain the operation of PLL using a neat block diagram. Define the terms Centre frequency and capture time related to PLL. **[06]**

(b) Explain low drop-out regulator. **[04]**

(c) Explain frequency multiplier using PLL. **[03]**

OR

Q. 8 **(a)** Calculate output frequency f_o, lock range and capture range of PLL if the timing parameters are C_T=0.1μf, R_T=1kΩ. The filter capacitor is 10μf. **[06]**

(b) Draw a neat diagram and explain three terminal adjustable voltage regulator with expression for output voltage. **[07]**

Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5352]-137

S.E. (Electronics/E&TC) (II Sem.) EXAMINATION, 2018

CONTROL SYSTEMS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Determine the transfer function $V_o(s)/V_{in}(s)$ for the system shown in Fig. 1. [6]

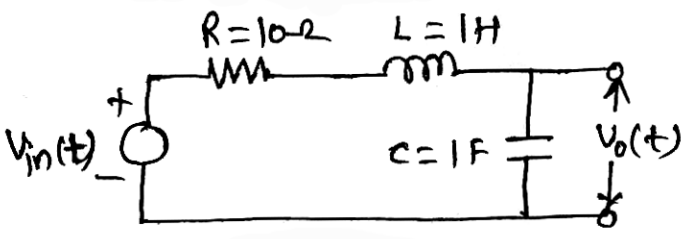


Fig. 1

P.T.O.

(*b*) For the system with closed loop transfer function : [6]

$$G_{CL}(s) = \frac{100}{s^2 + 12s + 100}.$$

Determine ξ, ω_n, t_p, t_r, m_p and t_s for 2% setting.

Or

2. (*a*) Explain the open loop and closed loop control system with the help of neat block diagram and real life examples. [6]

(*b*) For the unity feedback system with open loop transfer function : [6]

$$G(s) = \frac{100(s+5)}{s(s^2 + 7s + 20)(s+10)},$$

determine order, type of the system k_p, k_v, k_a and steady state error for unit ramp input.

3. (*a*) For the system with closed loop characteristic equation : [4]

$$Q(s) = s^4 + 7s^3 + 9s^2 + 12s + 2 = 0,$$

investigate the stability using Routh stability criterion.

(*b*) Sketch the Bode plot of the system with open loop transfer function : [8]

$$G(s) = \frac{20}{s(s+2)(s+10)}$$

and determine gain crossover frequency, phase crossover frequency, gain margin and phase margin. Also comment on stability.

Or

4. (*a*) For the system with closed loop tranfer function : [4]

$$G_{CL}(s) = \frac{9}{s^2 + 3s + 9},$$

determine ξ, ω_n, resonant peak and resonant frequency.

(*b*) Sketch the root locus for the system with open loop transfer function : [8]

$$G(s) = \frac{k}{s(s+1)(s+4)}.$$

5. (*a*) Obtain the controllable canonical and observable canonical state models for the system with transfer function : [6]

$$G(s) = \frac{s^2 + 5s + 2}{s^3 + 4s^2 + 11s + 3}.$$

(*b*) Investigate the controllability and observability of the system with state model : [7]

$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -7 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 2 & 1 & 0 \end{bmatrix} x$$

Or

6. (*a*) Obtain the state transition matrix for the system with state model : [6]

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ 0 & -2 \end{bmatrix} x$$

(*b*) Derive the formula for the conversion of state model to transfer function and obtain the transfer function of the system with state model : [7]

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -3 & -8 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 3 & 4 \end{bmatrix} x$$

7. (*a*) Explain the architecture of PLC with the help of neat block diagram. [6]

(*b*) Obtain pulse transfer function, impulse response and step response of the system shown in Fig. 2. [7]

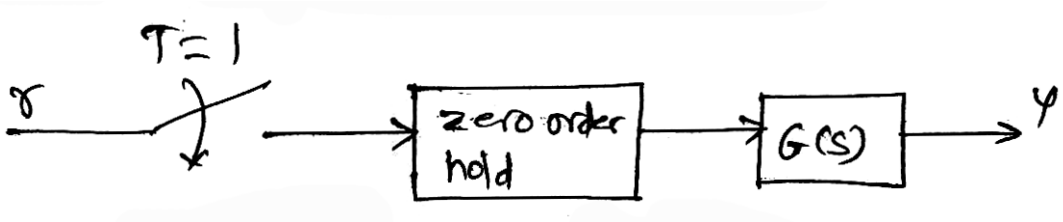


Fig. 2

$$G(s) = \frac{1}{s+2}.$$

Or

8. (*a*) Write a short note on PID controller. [6]

(*b*) Obtain the pulse transfer function of the system shown in Fig. 3 using first principle (starred Laplace and *z*-transform method). [7]

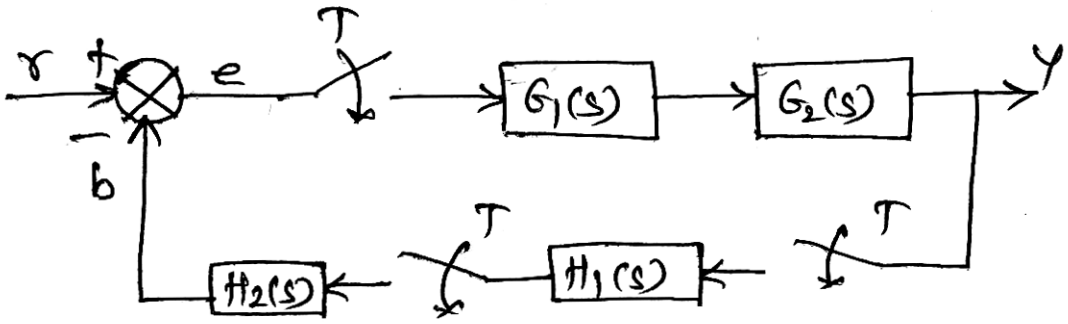


Fig. 3

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-138

S.E. (Electronics/E & TC) (II Sem.) EXAMINATION, 2018

ANALOG COMMUNICATION

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Explain ring modulator for DSB-SC. [6]

(*b*) State and compare different SSB generation methods. [6]

Or

2. (*a*) Explain Armstrong method of FM generation. [6]

(*b*) Determine the deviation ratio and worst-case bandwidth for FM signal with a maximum frequency deviation Δf = 25 kHz and maximum modulation singal $f_{m(\max)}$ = 12.5 kHz. [6]

P.T.O.

3. (*a*) Explain with waveform and block diagram AM superheterodyne receiver. [7]

(*b*) Define noise and explain various sources of noise. [6]

Or

4. (*a*) Describe the operation of a PLL FM demodulator. [6]

(*b*) For a non-ideal amplifier and the following parameters : [7]

Input noise power = 2×10^{-18} W

Input signal power = 2×10^{-10} W

Power gain = 10,00,000

Internal noise (N_d) = 6×10^{-12} W.

Determine :

(*i*) Input (S/N) ratio in dB

(*ii*) Output (S/N) ration in dB

(*iii*) Noise Factor (F) and Noise Figure (NF).

5. (*a*) Derive expression for signal-to-noise ratio in DSBSC system. [6]

(*b*) Explain the types of sampling with waveforms. [6]

Or

6. (*a*) Write a note on angle thersholding. [6]

(*b*) What is aliasing ? How is it reduced ? [6]

7. (*a*) Explain the performance of AM in presence of noise. [6]

(*b*) Draw and explain functional block diagram of PCM encoder and decoder. [7]

Or

8. (*a*) Compare the noise performance of DSBSC and SSBSC systems. [6]

(*b*) Draw and explain with waveforms generation and re-generation of PPM. [7]

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-139

S.E. (E&TC/Elect.) (Second Semester) EXAMINATION, 2018

COMPUTER ORGANIZATION

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data if necessary.

1. (*a*) Draw and explain the Von-Neumann Architecture. [6]

(*b*) Multiply (-7) and (3) using Booths algorithm. Register size 5 bits. [6]

Or

2. (*a*) Draw and explain multiple bus organization of CPU. [6]

(*b*) Represent $(178.1875)_{10}$ in single and double precision floating point format. [6]

3. (*a*) Represent (–13) in Booths recoded format and bit-pair recoded format. [6]

(*b*) Differentiate between hardwired and micro-programmed control. [6]

P.T.O.

Or

4. (*a*) Explain different methods to handle multiple interrupt request. [6]

(*b*) Explain any *two* DMA data transfer modes. [6]

5. (*a*) Write a short note on Virtual memory. [6]

(*b*) Explain different mapping schemes for cache memory. [7]

Or

6. (*a*) Write short note on Synchronous DRAM. [6]

(*b*) Explain the connection of memory to processor. [7]

7. (*a*) Explain functions of the following pins of 8086 : [6]

(*i*) NMI

(*ii*) INTR

(*iii*) RESET.

(*b*) Draw the bit pattern for flag register of 8086 and explain significance of each bit. [7]

Or

8. (*a*) List out the features of 8086. [6]

(*b*) Explain logical to physical addressing of 8086. [7]

Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

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[5352]-14

S.E. (Computer Engineering) (I Sem.) EXAMINATION, 2018

PROGRAMMING AND PROBLEM SOLVING

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

SECTION I

1. (*a*) Explain the difference between variables and constants. [4]

(*b*) Consider any *one* problem and solve that problem using six steps of problem solving. Explain each step in detail. [8]

(*c*) Compare an algorithmic solutions and heuristics solution. Support your answer with suitable example. [4]

Or

2. (*a*) Draw interactivity chart and IPO chart to balance your cheque book. [8]

(*b*) Define a function. Explain each category with a suitable example. [4]

(*c*) Set up an equation to calculate the following : [4]

(*i*) The average of three numbers.

(*ii*) The sale price of an item given an original price and a discount percentage.

P.T.O.

3. (*a*) Explain what is meant by the cohesion a module and the coupling of modules. [6]

(*b*) Using negative logic, write the algorithms and draw the flowcharts for the following set of conditions : [6]

R = 50 for S <= 1000

R = 100 for S = 1001 – 4000

R = 250 for S = 4001 – 8000

R = 75 for S > 8000

(*c*) What is a Data Dictionary ? Build a data dictionary for the parameters in the problem. Calculate salary of an employee, according to destination, No. of days worked, wages per day and deductions. [6]

Or

4. (*a*) Broadband Internet connection charges the following rates for the use of internet : [12]

First 1 GB : Free

Extra usage > 1 GB : ₹ 1

All customers are charged monthly rental of ₹ 250 and sevice tax of 12.5% on total bill amount. Describe and explain complete steps of Solution Development to read name of customers, tariff of internet usage and print out the total amount to be charged.

(*b*) Distinguish between the parameter techniques a call by value and call by reference with suitable example. [6]

5. (*a*) Design an algorithm that will reverse the digits in a given number. For *e.g.*, algorithm should convert the number 251 to the number 152. [8]

(*b*) Design and explain an algorithm to find the sum of the digits of an integer number. [8]

Or

6. (*a*) Design pseudo algorithm to check given non-negative integer number is palindrome or not. [8]

(*b*) Given an integer *n* device pseudo algorithm that will find its smallest exact divisor other than one. [8]

SECTION II

7. (*a*) Write short notes on the following : [8]

(*i*) Table look up technique

(*ii*) Pointer technique

(*b*) Write an algorithm to find the frequency of each vowel in a line of text. [8]

Or

8. (*a*) Write pseudo algorithm to rearrange the elements in an array so that they appear in reverse order. [8]

(*b*) Write pseudo algorithm for finding *k*th smallest element. [8]

9. (*a*) Explain algorithm for line editing. [8]

(*b*) Explain algorithm for left right justification of given text. [8]

Or

10. (*a*) Write pseudo algorithm for linear pattern search. [8]

(*b*) Explain the following algorithm : [8]

(*i*) Count number of spaces on each line for given text

(*ii*) Search keyword from given text.

11. (*a*) Write a program in C++ for a Video CD Library that need to track Customers, Video CD's and its rentals and late fees : [8]

(*i*) Design classes you would create the application.

(*ii*) Write what methods would be needed for the classes ?

(*iii*) Print the customer and its rentals.

(*b*) Can we use the same function name for a member function of a class and an outside function in the same program file ? If yes, how are they distinguished ? If no, give reasons. [4]

(*c*) Explain the following features of an object oriented programming with suitable examples : [6]

(*i*) Polymorphism

(*ii*) Encapsulation.

Or

12. (*a*) Explain the following term : [9]

(*i*) Static member functions

(*ii*) Access specifier

(*iii*) Friend function

(*b*) Write a C++ program to implement the concept of polymorphism. [5]

(*c*) Distinguish between object and classes. [4]

Total No. of Questions—8] [Total No. of Printed Pages—6

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S.E. (Electronics/E & TC) (I Sem.) EXAMINATION, 2018

ENGINEERING MATHEMATICS—III

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn, wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of non-programmable, pocket calculator (electronic) is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Solve any *two* : [8]

(*i*) $(D^2 - 4D + 4)\ y = 8(e^{2x} + \sin 2x)$

(*ii*) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = e^{e^x}$

(*iii*) $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = 2 \sin [\log(1 + x)]$.

(*b*) Solve the integral equation : [4]

$$\int_0^\infty f(x) \cos \lambda x \, dx = e^{-\lambda}, \ \lambda > 0.$$

P.T.O.

Or

2. (*a*) An uncharged condenser of capacity C, charged by applying an e.m.f. of value $E \sin\left(\frac{t}{\sqrt{LC}}\right)$, through the leads of inductance L and of negligible resistance. The charge Q on the plate of the condenser satisfies the differential equation : [4]

$$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E}{L} \sin \frac{t}{\sqrt{LC}}$$

Prove that :

$$Q = \frac{EC}{2}\left[\sin\left(\frac{t}{\sqrt{LC}}\right) - \frac{t}{\sqrt{LC}} \cos\left(\frac{t}{\sqrt{LC}}\right)\right].$$

(*b*) Solve any *one* : [4]

(*i*) Find z transform of $f(k) = 3^k \quad k < 0$

$= 4^k \quad k \geq 0$

(*ii*) Find z inverse of $\frac{1}{\left(z - \frac{1}{2}\right)\left(z - \frac{1}{3}\right)}, \frac{1}{3} < |z| < \frac{1}{2}.$

(c) Obtain $f(k)$, given that : [4]

$12 f(k+2) - 7 f(k+1) + f(k) = 0 \quad k \geq 0,$

$f(0) = 0, \quad f(1) = 3.$

3. (*a*) Solve the following differential equation to get $y(0.1)$ given that : [4]

$$\frac{dy}{dx} = x + y^2,$$

and

$y = 1$ when $x = 0.$

(*b*) Use Lagrange's interpolating polynomial passing through set of points and : [4]

x	y
0	4.3315
1	4.7046
3	5.6713
6	7.1154

find y when $x = 2$.

(*c*) Find the directional derivative of : [4]

$\phi = x^2 - y^2 - 2z^2$ at the point P(2, –1, 3)

in the direction of $\overline{PQ}$ where Q is (5, 6, 4).

Or

4. (*a*) Show that (any *one*) : [4]

(*i*) $\nabla \times (\bar{r} \times \bar{u}) = \bar{r}(\nabla \cdot \bar{u}) - (\bar{r} \cdot \nabla)\, \bar{u} - 2\bar{u}$

(*ii*) $\nabla^4 \, e^r = \left(1 + \frac{4}{r}\right) e^r.$

(*b*) Show that $\bar{F} = \frac{1}{r}[r^2 \bar{a} + (\bar{a} . \bar{r})\bar{r}]$ is irrotational where $\bar{a}$ is a constant vector. [4]

(*c*) Evaluate $\int_1^2 \left(\frac{1}{x}\right) dx$, using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule taking $h = 0.25$. [4]

5. (*a*) Evaluate : [4]

$$\int_C \bar{F}\, d\bar{r},$$

where

$$\bar{F} = (2xy + 3z^2)i + (x^2 + 4yz)j + (2y^2 + 6xz)k$$

and C is a curve $x = y = z$ from (0, 0, 0) to (1, 1, 1)

(*b*) Use Green's Lemma, to evaluate : [4]

$$\int_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$$

over the region bounded between $y = \sqrt{x}$ and $y = x^2$.

(*c*) Use Stokes' theorem to evaluate : [5]

$$\oint \bar{F} . d\bar{r},$$

where

$$\bar{F} = y^2 i + x^2 j - (x + z)k$$

over the area of triangle whose vertices are (0, 0, 0), (1, 0, 0) and (1, 1, 1).

Or

6. (*a*) Find the work done by a force field : [4]

$$\bar{F} = 3x^2 yi + (x^3 + 2yz)j + y^2 k$$

in moving a object from (1, –2, 1) to (3, 1, 4).

(*b*) Use Gauss divergence theorem to evaluate : [5]

$$\iint_S \left(\bar{F} . \hat{\bar{n}}\right) dS,$$

where $\bar{F} = 4xzi - y^2 j + yzk$ and S is the surface bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$.

(*c*) If : [4]

$$\nabla . \bar{H} = 0, \nabla \times \bar{E} = -\frac{\partial \bar{H}}{\partial t}, \nabla \times \bar{H} = \frac{\partial \bar{E}}{\partial t}$$

then show that $\bar{H}$ satisfies the equation :

$$\nabla^2 u = \frac{\partial^2 u}{\partial t^2}.$$

7. (*a*) If $f(z) = u + iv$ is analytic and $v = -\frac{y}{x^2 + y^2}$, find $f(z)$ in terms of z. [4]

(*b*) Find bilinear transformation which maps the points $z = 1$, i, -1, to the points 0, 1, ∞, respectively. [4]

(*c*) Evaluate : [5]

$$\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$$

if C is the circle $|z| = 3$.

Or

8. (*a*) Show that the transformation $w = \frac{z - a}{z + a}$ maps the right half of z plane into the unit circle $|w| < 1$. [4]

(*b*) If : [4]

$$f(a) = \int_C \frac{3z^2 + 5z + 2}{z - a}\, dz,$$

where 'C' is ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$, find $f(1)$.

(*c*) If $f(z)$ is an analytic function of z . $f(z) = u + iv$, prove that : [5]

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |\operatorname{Re} f(z)|^2 = 2|f'(z)|^2.$$

Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

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S.E. (Electrical/Instrumentation & Control)

(I Sem.) EXAMINATION, 2018

ENGINEERING MATHEMATICS—III

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of electronic pocket calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Solve any *two* differential equations : [8]

(*i*) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = x\,e^x \sin x$

(*ii*) $r^2\frac{d^2u}{dr^2} + r\frac{du}{dr} - u = r^3$

(*iii*) $\frac{d^2y}{dx^2} + 9y = \text{cosec } 3x$,

by the method of variation of parameters.

P.T.O.

(*b*) Solve the differential equation by Laplace transform method :

$$\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = \frac{6}{e^{2t}},$$

where $x(0) = 0$, $x'(0) = 0$. [4]

Or

2. (*a*) An electrical circuit consists of an inductance L, and condenser of capacitance C is applied with emf $E = E_0 \cos \omega t$. The charge q satisfies the differential equation :

$$\frac{d^2q}{dt^2} + \frac{1}{LC}q = \frac{E_0}{L}\cos \omega t, \quad \text{where} \quad \omega^2 = \frac{1}{LC}.$$

Show that the current at any time t is given by

$$q = q_0 \cos \omega t + \frac{i_0}{\omega} \sin \omega t + \frac{E_0}{2LW} t \sin \omega t,$$

provided $q = q_0$, $i = i_0$ at $t = 0$. [4]

(*b*) Solve any *one* of the following : [4]

(*i*) $$L\left[e^{-4t} \int_0^t t \sin 3t \, dt \right]$$

(*ii*) $$L^{-1}\left[\log\left(\frac{s^2 + 1}{s^2} \right) \right].$$

(*c*) Evaluate the integral using Laplace transform : [4]

$$\int_0^\infty e^{-4t} t \sin 3t \, dt.$$

3. (*a*) Find the Fourier cosine transform of the function : [4]

$$F(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}.$$

(*b*) Attempt any *one* : [4]

(*i*) Find *z*-transform of :

$$f(k) = \frac{1}{2!}(k+1)(k+2)a^k; \quad k \geq 0.$$

(*ii*) Find inverse *z*-transform of :

$$\frac{z^3}{(z-1)\left(z-\frac{1}{2}\right)^2}, \quad |z| > 1.$$

(*c*) Find directional derivative of :

$$\phi = 4xz^3 - 3x^2y^2z$$

at (2, –1, 2) along a line equally inclined with co-ordinate axes. [4]

Or

4. (*a*) Establish any *one* of the following : [4]

(*i*) $\nabla(\bar{r} \cdot \bar{u}) = \bar{r} \times (\nabla \times \bar{u}) + (\bar{r} \cdot \nabla)\bar{u} + \bar{u}$

(*ii*) $\nabla \times (\bar{r} \times \bar{u}) = \bar{r}(\nabla \cdot \bar{u}) - (\bar{r} \cdot \nabla)\bar{u} - 2\bar{u}.$

(*b*) Show that $\bar{F} = r^2\bar{r}$ is conservative and obtain the scalar potential associated with it. [4]

(*c*) Solve the difference equation : [4]

$f(k+2) + 3f(k+) + 2f(k) = 0, \; f(0) = 0, \; f(1) = 1.$

5. (*a*) Find the work done by the field :

$$\bar{F} = 2xy^2\,\hat{i} + \left(2x^2y + y\right)\hat{j} + xz^2\,\hat{k},$$

in moving a particle from the point A(0, 0, 0) to point B(2, 4, 0) along the curve $y = x^2$, $z = 0$. [4]

(*b*) Evaluate : [5]

$$\iint_S \bar{F} \cdot d\bar{S},$$

where

$$\bar{F} = \frac{\bar{r}}{r^2},$$

and 'S' is the surface of the sphere $x^2 + y^2 + z^2 = 4$.

(*c*) Evaluate : [4]

$$\iint_S \left(\nabla \times \bar{F}\right) \cdot d\bar{S},$$

where

$$\bar{F} = xy^2\,\hat{i} + y\,\hat{j} + xz^2\,\hat{k},$$

and 'S' is a rectangular surface bounded by $x = 0$, $y = 0$, $x = 1$, $y = 2$, $z = 0$.

Or

6. (*a*) Evaluate : [4]

$$\int_C \left(\sin y - y^3\right)dx + \left(xy^2 + x\cos y\right)dy,$$

using Green's theorem, where 'C' is the circle $x^2 + y^2 = a^2$.

(*b*) Using Gauss' Divergence theorem, evaluate : [5]

$$\iint_S \bar{F} \cdot d\bar{S},$$

where

$$\bar{F} = yz\,\hat{i} + xz\,\hat{j} + xy\,\hat{k},$$

and 'S' is the surface of the sphere $x^2 + y^2 + z^2 = 1$, in the first octant.

(*c*) Prove that : [4]

$$\int_C (\bar{a} \times \bar{r}) \cdot d\bar{r} = 2 \iint_S \bar{a} \cdot d\bar{S},$$

where $\bar{a}$ is a constant vector.

7. (*a*) Show that analytic function $f(z)$ with constant amplitude is constant. [4]

(*b*) Evaluate : [5]

$$\oint_C \frac{z^4 - 3z^2 + 6}{(z+i)^3}\,dz$$

where C is the circle $|z| = 4$.

(*c*) Find the bilinear transformation which maps the points $z = 1, i, 2i$ on the points $\omega = -2i, 0, 1$ respectively. [4]

Or

8. (*a*) Show that $V(x, y) = -\sin x \sinh y$ is harmonic. Find harmonic conjugate of $V(x, y)$. [5]

(*b*) Evaluate : [4]

$$\oint_C \frac{2z^2 + z + 5}{\left(z - \frac{3}{2}\right)^2} \, dz$$

where C is the ellipse :

$$\frac{x^2}{4} + \frac{y^2}{9} = 1.$$

(*c*) Find the map of the straight line $y = 4x$ under the transformation : [4]

$$\omega = \frac{z - 1}{z + 1}.$$

Total No. of Questions—8] [Total No. of Printed Pages—2

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S.E. (Electrical) (I Sem.) EXAMINATION, 2018

POWER GENERATION TECHNOLOGY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.
(*ii*) Figures to the right indicate full marks.
(*iii*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
(*iv*) Assume suitable data, if necessary.

1. (*a*) Differentiate between outdoor and indoor stroage in thermal power plant. [6]

(*b*) With the help of neat diagram, explain nuclear power plant layout. [6]

Or

2. (*a*) What are draught systems in thermal power plants ? Explain any *one* type of draught system. [6]

(*b*) Explain open loop and closed loop cycle gas power plants. [6]

3. (*a*) With neat diagram explain general arrangement of hydro power plant. [7]

(*b*) Derive the relation of pwoer in the wind. [6]

P.T.O.

Or

4. (*a*) Explain control of hydro turbines. [7]

(*b*) With the help of block diagram explain wind turbine power convertors. [6]

5. (*a*) Describe solar energy collectors used in solar thermal applications. [6]

(*b*) Explain a generic PV cell. [6]

Or

6. (*a*) Explain I-V curve of PV cell under standard test conditions. [6]

(*b*) Explain impact of insolation on I-V curves of PV cell. [6]

7. (*a*) With the help of sketch explain how municipal solid waste is converted to energy. [8]

(*b*) Explain the harnessing of ocean energy. [5]

Or

8. (*a*) What are the requirements for storage of fuel cell energy ? [5]

(*b*) With the help of diagram explain grid connected renewable system. [8]

Total No. of Questions—8] [Total No. of Printed Pages—2

Seat No.	

[5352]-143

S.E. (Electrical) (I Sem.) EXAMINATION, 2018
MATERIAL SCIENCE
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

Physical Constants :

1. Angstrom Unit(AU) = 1×10^{-10} metres
2. Boltzmann's Constant (k) = 1.380×10^{-23} joule.degree -1
3. Charge on Electron (e) = 1.601×10^{-19} coulomb
4. Mass of Electron (m) = 9.107×10^{-31} kg
5. Electron volt (eV) = 1.602×10^{-19} joules
6. Mass of Proton (m_p) = 1.627×10^{-27} kg
7. Velocity of light (c) = 2.998×10^{8} m/sec
8. Dielectric Constant of free space (ε_0) = 8.854×10^{-12} F/m
9. Permeability of free space (μ_0) = $4\pi \times 10^{-7}$ H/m
10. Debye Unit = 3.33×10^{-30} coulomb.metre

Q.1 a) Write note on Dielectric loss and loss tangent (tan ∂). **(6)**

b) Explain the various factors that affect the breakdown in solid insulating material. **(6)**

OR

Q.2 a) The relative permittivity of a parallel plate capacitor of 6 microfarad is 150. For an applied voltage of 1200V, find the energy stored in the capacitor as well as energy stored in polarizing the dielectric. **(6)**

b) Explain properties of insulating materials used for capacitor. **(6)**

Q.3 a) In a material an application of magnetic field of 275×10^4 A/m causes a magnetic flux density of 0.22 Wb/m^2. Calculate its permeability, susceptibility & magnetization. **(6)**

b) Write note on Materials used for lamp filament and fuses. **(7)**

P.T.O.

OR

Q.4 a) Derive Curie –Weiss law for magnetic materials. **(7)**

b) A filament of a 230V, 60W lamp is to be manufactured. The temperature of the filament is to be 2700° at 60W dissipation. Resistivity of the filament material at 20°C is 4.3 x 10^{-6} ohm-cm and $\alpha_{20} = 0.005/^{0} C$. Calculate the length of the filament at 20°C if its diameter at 20°C is 0.028 mm. **(6)**

Q.5 a) What do you mean by Single Electron Transistor (SET)? **(6)**

b) Write a short note on C_{60}. **(6)**

OR

Q.6 a) Discuss briefly, the energy bands in conductors and insulators. **(5)**

b) What are carbon nanostructures and carbon clusters? **(7)**

Q.7 a) Describe a method to determine the flux density by using Gauss meter. **(7)**

b) Describe measurement of dielectric strength of solid insulating material with reference to IS 2584. **(6)**

OR

Q.8 a) How will you test transformer oil? Explain it, with a neat diagram of test setup. **(7)**

b) Describe the different tests to be carried out on high voltage cables as per relevant IS code practice. **(6)**

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

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[5352]-144

S.E. (Electrical) (I Sem.) EXAMINATION, 2018
ANALOG AND DIGITAL ELECTRONICS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

Q1.a) Convert the following numbers: [6]

i) $(5386.345)_{10}$ to hexadecimal

ii) $(8BF.A3)_{16}$ to octal

iii) $(656.625)_{7}$ to hexadecimal

b) Draw and explain the working of universal shift register. [6]

OR

Q2.a) Draw and explain 3-bit SISO shift register. [6]

b) Draw and explain JK flip flop with timing diagram. [6]

Q3.a) Explain V-I converter with grounded load. [6]

b) Explain the working of op-amp as peak detector. [7]

P.T.O.

OR

Q4.a) What is an instrumentation amplifier? What are the requirements of a good instrumentation amplifier? [6]

b) Draw and explain pin and functional (internal) block diagram of IC555. [7]

Q5.a) List the advantages and disadvantages of FET. [6]

b) Explain how thus the Darlington pair improves the current gain. [6]

OR

Q6.a) Draw and explain direct coupled BJT amplifier. [6]

b) Explain multistage BJT amplifier with neat diagram. [6]

Q7.a) Along with waveforms explain single phase half wave rectifier having RC load. [7]

b) Compare single phase half wave and full wave rectifiers. [6]

OR

Q8.a) what is the need of filter circuit? Explain LC circuit. [6]

b) Draw and explain three phase rectifier with RL load with adequate waveforms [7]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

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[5352]-145

S.E. (Electrical) (I Sem.) EXAMINATION, 2018

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

Q.1

a) Describe construction and working of Permanent Magnet Moving Coil (PMMC) instruments with suitable diagrams. [6]

b) Which three torques are required for satisfactory operation of analog indicating instruments? State the function of each torque. [6]

OR

Q.2

a) Draw circuit diagram of Kelvin's Double Bridge. Derive expression for unknown resistance with usual notations. [6]

P.T.O.

b) In a Maxwell's inductance bridge 4 arms of the bridge are arm AB has coil of inductance L1, and its inherent resistance r1, and also connected in series a resistance R1, arm AD has standard variable inductor of resistance 32 ohm arm BC has resistance = 100 ohm and arm CD has resistance = 100 ohm. To find the inductance value of coil the Null-point is obtained on the detector when standard inductor B adjusted for a value of 50 mH, and resistance R1=1.30 ohm in arm AB. Draw the bridge circuit and find the parameters of coil under test. [6]

Q.3

a) Explain how the following adjustments are made in a single phase induction type energy meter.
   a. Lag adjustment.
   b. Adjustment for friction compensating [6]

b) Three equal impedances each consisting of R and L in series are connected in star and are supplied from a 400 volts, 50Hz, 3-Phase, 3 Wire balanced supply system. The power input to the load is measured by 2-Wattmeter method and the two wattmeter's read 3kW and 1kW. Determine the values of R and L connected in each phase. [7]

OR

Q.4

a) State and explain errors in dynamometer type wattmeter. [6]

b) A 230 volt, 50 Hz single phase energy meter has a constant of 200 revolutions per kWh. While supplying a non inductive load of 4.4 A at normal voltage, the meter takes 3 minutes for 10 revolutions. Calculate the % error of the meter. [7]

Q.5

a) Explain capacitance pressure transducer with a neat diagram. Write advantages and disadvantages of capacitive pressure transducer [6]

b) Explain the measurement of voltage current phase angle frequency using CRO. [7]

OR

Q.6

a) Draw and Explain block diagram of Digital Storage Oscilloscope [7]

b) Explain Pirani gauge for measurement of low pressure. Also state advantage and disadvantages. [6]

Q.7

a) With neat diagram explain pneumatic method for level measurement. [6]

b) What are the types of strain gauge? Explain foil strain gauge. [6]

OR

Q.8

a) Draw and explain ultrasonic flow meter method for level measurement. [6]

b) Explain construction and working of RVDT with a neat diagram. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-146

S.E. (Electrical) (II Sem.) EXAMINATION, 2018
POWER SYSTEMS—I
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Your answer will be valued as a whole.
(*v*) Use of electronic pocket calculator is allowed.
(*vi*) Assume suitable data, if necessary.

Q1 a) The load on the power plant on a typical day is as under:

Time	12 – 5 am	5 – 9 am	9 – 6 pm	6 – 10 pm	10 – 12 Midnight
Load (MW)	20	40	80	100	20

(6)

Plot the load curve hence find load factor of the plant and the energy supplied by the plant in 24 hours.

b) Explain function and list necessary specifications required to be printed on name plate of following equipments in power plant (6)
i) Power Transformers
ii) Circuit Breakers

OR

Q2. a) Define string efficiency. Derive an expression for string efficiency of a string insulator consisting of four discs (6)

b) List and explain in brief various incentives and penalties applied to various types consumers in electricity bill (6)

Q3 a) Derive an expression for insulation resistance of single core cable hence calculate insulation resistance of 5 km length of single core cable having resistivity $5*10^{14}$ Ω-cm, thickness of insulation is 1 cm and radius of conductor is 1.25 cm (7)

P.T.O.

b) Explain the following effects and factors affecting them
i) Skin effect
ii) Proximity effect (6)

OR

Q4 a) What is sag? What is vertical sag, hence explain effect of wind and ice loading on calculation of sag (6)

b) Three phase single circuit transmission line has its conductors are situated at the corners of a triangle with spacing of 4, 5 and 6 meters. Line is completely transposed and its inductance is measured to be 1.29 mH/ph/km. determine radius of each conductor (7)

Q5 a) Derive an expression for capacitance of three phase line when conductors are unsymmetrically spaced but transposed (6)

b) Determine capacitance of single phase, 50 Hz, 50 km long transmission line consists of a pair of conductors 0.5 cm in diameter, spaced 1.5 m apart and 7 meters above the ground by considering effect of earth (6)

OR

Q6 a) Explain effect of un-transposed unsymmetrically spaced three phase transmission line on line capacitance. Hence explain necessity of transposition of line conductors in three phase lines. (6)

b) A three phase, 110 kV, 50 Hz transmission line has flat horizontal configuration with 3.5 m distance between adjacent conductors. Diameter of each conductor is 1.05 cm. find capacitance to neutral and charging current per km (6)

Q7 a) Define generalized circuit constants of transmission line hence prove that for any transmission line value of AD – BC = 1 (6)

b) The ABCD constants of three phase transmission line are A = D = 0.936+j0.016, B = 33.5 + j138 Ω and C = $(-0.9280+j901.223)*10^{-6}$ mho. The load at the receiving end is 40 MW at 200 kV with power factor of 0.86 lagging. Find sending end voltage, sending end current and sending end power factor (7)

OR

Q8 a) Obtain the relationship for the sending end voltage and current in terms of receiving end voltage and current for medium transmission line with nominal 'T' method. Draw phasor diagram (7)

b) A three phase, 50 Hz, 300 km long transmission line has following line parameters. If the line is represented by nominal 'Π' method, determine ABCD constants of the line (6)

R = 0.15 Ω/km, X= 0.5 Ω/km Y = $3*10^{-6}$ S/km

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

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[5352]-147

S.E. (ELECTRICAL) (II Sem.) EXAMINATION, 2018

ELECTRICAL MACHINES-I

(2012 COURSE)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) 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**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of scientific pocket calculator is allowed.

(*iv*) Assume suitable data, if necessary.

1. (*a*) With neat connection diagram, explain the procedure to conduct O.C. and S.C. test on 1-ph transformer to obtain voltage regulation and efficiency. [6]

(*b*) Explain V-V connection of transformers and obtain relation between V-V capacity and delta-delta capacity. [6]

Or

2. (*a*) What is the necessity of parallel operation of transformers ? State and explain conditions to be satisfied for parallel operation of transformers. [6]

(*b*) 20 kVA, 440/220 V, 1-ph, transformer has full load iron loss of 400 W and half load copper loss 120 W. Calculate :

(*i*) efficiency at full load and p.f = 0.75 lagging.

(*ii*) kVA loading at maximum efficiency. [6]

P.T.O.

3. (*a*) Sketch neat construction diagram of D.C. machine and explain each part. [6]

(*b*) A 20 kW, 250 V, d.c. series motor has armature resistance of 0.1 ohm and series field resistance of 0.05Ω. The brush voltage drop is 3V. It runs at 650 rpm while drawing 80 A. Calculate the speed, when it draws armature current of 100 A. [6]

Or

4. (*a*) Explain the speed control of d.c. shunt motor by :

(*i*) Flux control

(*ii*) Voltage control.

Draw the necessary circuit diagrams. [6]

(*b*) For d.c. motor, obtain the following expressions :

(*i*) Arm. torque

(*ii*) Shaft torque

(*iii*) Lost torque. [6]

5. (*a*) Compare squirrel cage and wound rotor of 3-ph induction motors. [6]

(*b*) A 20 kW, 3-ph, 4-pole, 50 Hz, induction motor has rotational losses of 2.5 % of output. It has slip of 4%. Calculate for full load :

(*i*) Rotor Cu loss

(*ii*) Rotor input

(*iii*) Shaft torque. [7]

Or

6. (*a*) Sketch and explain family of torque-slip characteristics of 3-ph induction motor. [6]

(*b*) Obtain the relationship between :

(*i*) T_{st} / T_{max}

(*ii*) T_{fl} / T_{max}. [7]

7. (*a*) With neat connection diagram, explain the no load and blocked rotor test on 3-ph induction motor to determine equivalent circuit parameters. [6]

(*b*) 3-ph induction motor is known as a generalised transformer. Explain with phasor diagram. [7]

Or

8. Write short notes on :

(*i*) D.O.L. Starter. [6]

(*ii*) Star-Delta starter. [7]

Total No. of Questions—8] [Total No. of Printed Pages—6

Seat No.	

[5352]-148

S.E. (Elect. Engg.) (Second Semester) EXAMINATION, 2018

NETWORK ANALYSIS

(2012 PATTERN)

Time : Three Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer question Nos. Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data if necessary.

1. (*a*) For the network shown in Fig. 1. find the voltage V_{AB} using the nodal method. [6]

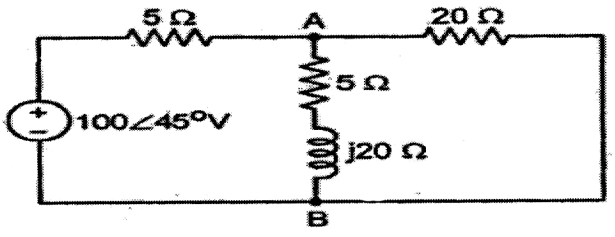

Fig. 1

P.T.O.

(*b*) Obtain Norton's equivalent network between terminals A and B as shown in Fig. 2. [7]

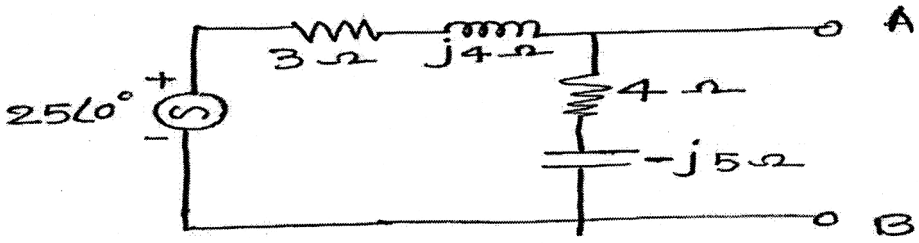

Fig. 2

Or

2. (*a*) Find current through $(3 - j4)\Omega$ by using Thvenin's Theorems as shown in Fig. 3. [7]

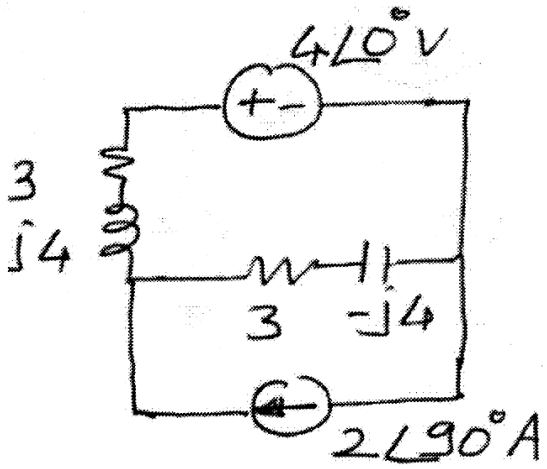

Fig. 3

(*b*) Find current through 5 ohm resistance by using Kirchhoff's voltage law (Refer Fig. 4). [6]

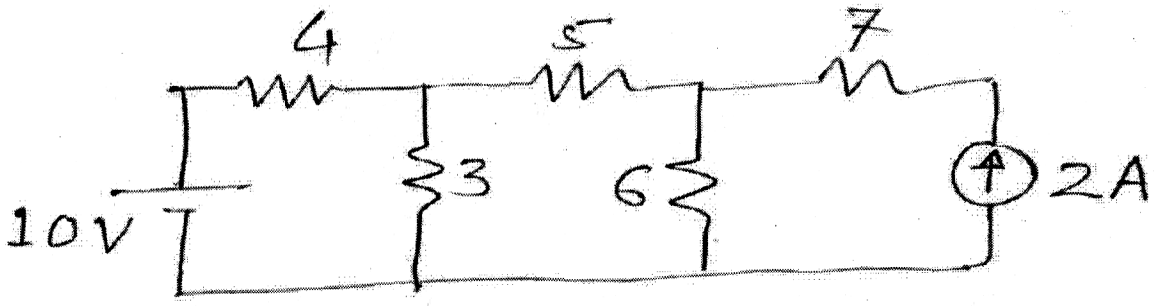

Fig. 4

3. (*a*) Find voltage V for t = 0.1 sec. after closing the switch at t = 0 (Refer Fig. 5) [7]

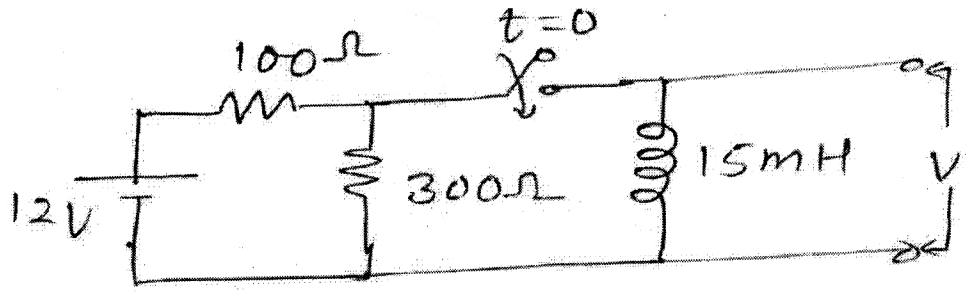

Fig. 5

(*b*) Write short notes on initial and final conditions. Justify your answers. [6]

Or

4. (*a*) After being on position 1 for long time, the switch is thrown on position 2 at time $t = 0$, find current using Laplace Transform technique (Refer Fig. 6). [7]

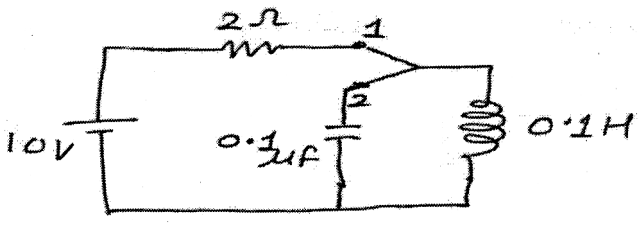

Fig. 6

(*b*) The switch is closed at time $t = 0$, obtain the particular solution for current $i(t)$ using Laplas Transform technique. Assume initial condition is zero (Refer Fig. 7). [6]

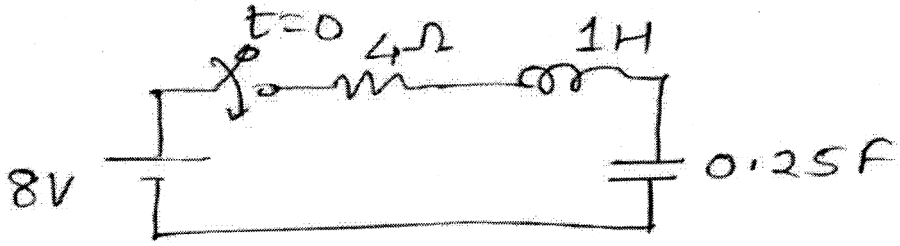

Fig. 7

5. (*a*) Find Z parameter for the circuit as shown in Fig. 8. [6]

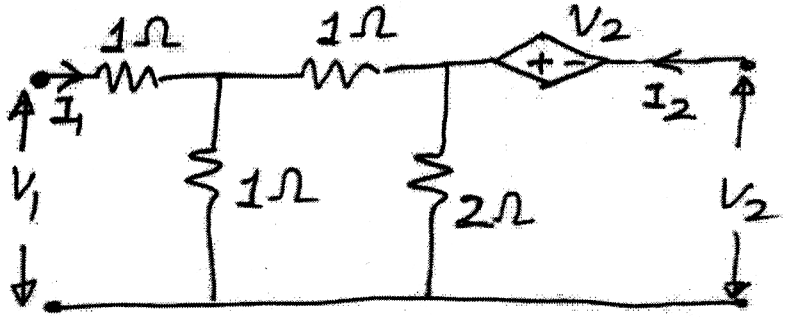

Fig. 8

(*b*) In the circuit shown in Fig. 9, find insertion loss in decibel in load resistance of 10 ohm. Inserted network is shown in dotted portion. [6]

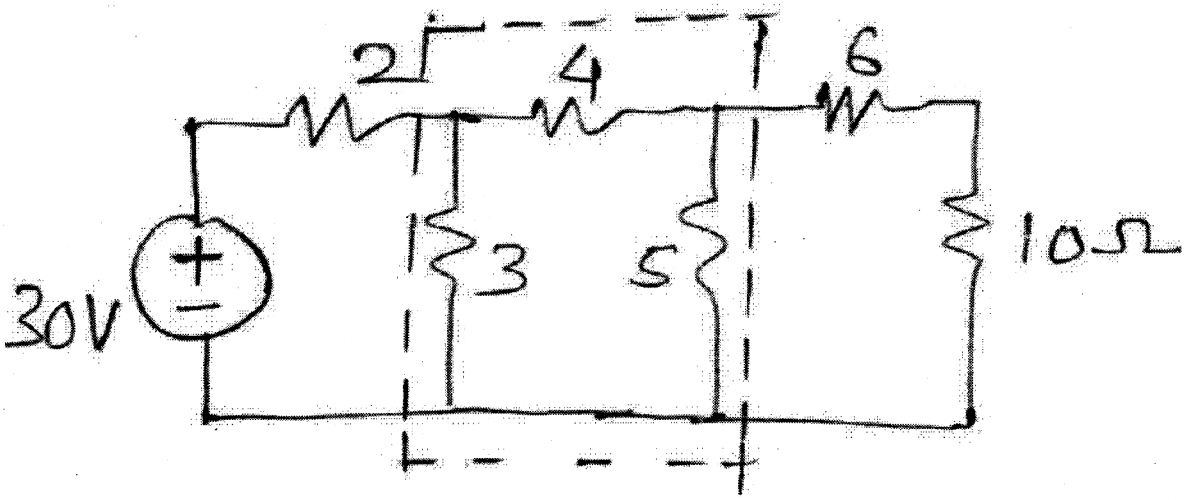

Fig. 9

Or

6. (*a*) If a constant *k* high-pass filter has cut-off frequency of 13 kHz and nominal impedance of R_0 = 600 ohm, Design the T and π sections of this filter. [6]

(*b*) Obtain Z parameter of network as shown in Fig. 10. [6]

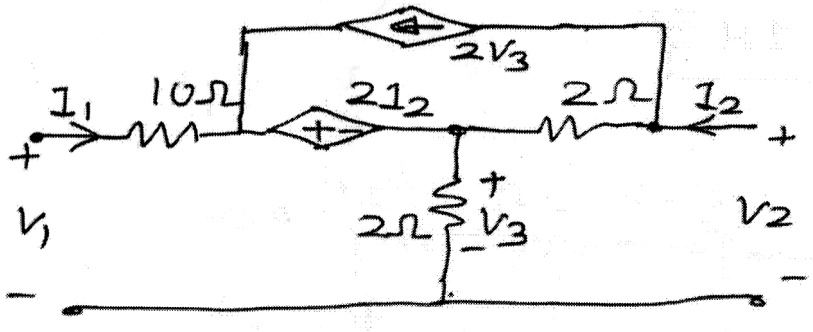

Fig. 10

7. (*a*) Find transfer function of network as shown in Fig. 11. [6]

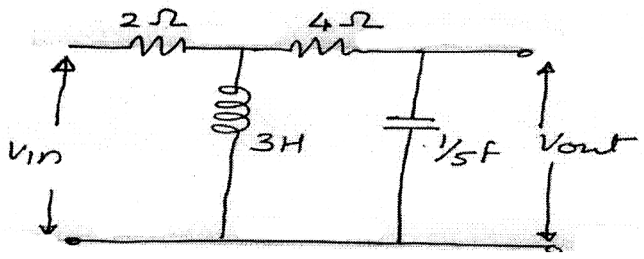

Fig. 11

(*b*) Draw the time domain wave form for various types of transfer function and comment on stability of system. [6]

Or

8. (*a*) Find poles and zero of the impedance of the following network and plot them on the s-plane in Fig. 12. [6]

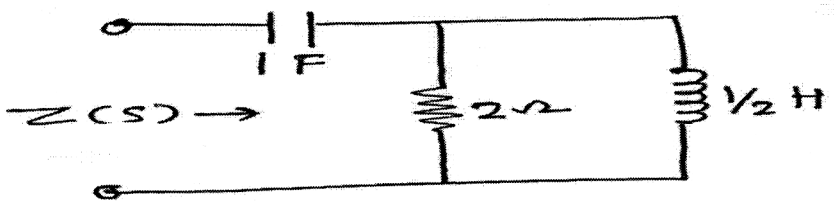

Fig. 12

(*b*) Explain parallel resonance condition drive the formula for anti-resonant frequency. [6]

Total No. of Questions—8] [Total No. of Printed Pages—2

Seat No.	

[5352]-149

S.E. (Electrical) (II Sem.) EXAMINATION, 2018
NUMERICAL METHODS AND COMPUTER PROGRAMMING
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

Q1) A) Explain Descartes' rule of sign with suitable example. [6]

B) Give the syntax of (i) if (ii) if-else (iii) do-while (iv)while loop in C-language [7]

OR

Q2) A) What are the different data types in C language? Explain each in detail with data ranges. [6]

B) Using Birge-Vieta method find the root of following equation at the end of third iteration with initial value $p_0 = 1.5$ [7]

$$f(x) = x^6 - x^4 - x^3 - 1 = 0$$

Q3) A) Derive the equations for curve fitting with parabola using least square technique. [6]

B) Use Lagrange's formula to find the value of y at $x = 6$ from following data [6]

x	3	7	9	10
y	168	120	72	63

OR

Q4) A) Find the value of y from following data at $x = 2.65$ using appropriate interpolation method [6]

x	-1	0	1	2	3
y	-21	6	15	12	3

P.T.O.

B) Apply Secant method, to find smallest positive root of $x - e^{-x} = 0$.

Take $x0 = 0$ & $x1 = 1$ [6]

Q5) A) Find largest eigen value and corresponding eigen vector of $\begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$ by using the power method at the end of five iterations with initial vector $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ [7]

B) Explain Gauss Jordon method for matrix inversion. [6]

OR

Q6) A) Solve the following system of equation using Gauss-Seidel method at the end of third iteration with $x = y = z = 0$ [7]

$$28x + 4y - z = 32$$

$$2x + 17y + 4z = 35$$

$$x + 3y + 10z = 24$$

B) Explain Gauss Elimination method to solve linear simultaneous equation. What do you mean by pivoting in elimination method and why it is required? [6]

Q7) A) A curve is passing through the points as given in following table. [6]

x	1	2	3	4	5	6	7	8	9
y	0.2	0.7	1	1.3	1.5	1.7	1.9	2.1	2.3

Find

(i) The area bounded by the curve, the x-axis, $x = 1$ and $x = 9$.

(ii) The volume of the solid generated by revolving this area about x-axis.

Use Simpson's (1/3)rd method

B) Explain Taylor's series method for solution of ordinary differential equations [6]

OR

Q8) A) Using forth order RK method find (0.1). [6]

$\frac{dy}{dx} = \frac{1}{x+y}$ with $y(0) = 1$ Take $h = 0.1$

B) Using Newton Cote's formula, derive Simpson's $\left(\frac{3}{8}\right)^{th}$ rule for numerical integration. [6]

Total No. of Questions—**12**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-15

S.E. (Computer Engg.) (II Sem.) EXAMINATION, 2018
MICROPROCESSOR AND INTERFACING TECHNIQUE
(2008 Pattern)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer **3** questions from Section I and **3** questions from Section II.
(*ii*) Answers to the two sections should be written in separate answer-books.
(*iii*) Neat diagrams must be drawn wherever necessary.
(*iv*) Figures to the right indicate full marks.
(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Draw and explain programmers' model of 8086 microprocessor. [8]

(*b*) Draw and explain Flag register of 8086. [8]

OR

2. (*a*) Draw and explain the memory read timing cycle of 8086 microprocessor for minimum mode. [8]

(*b*) Explain with neat diagram memory segmentation in 8086 microprocessor. [8]

3. (*a*) Write a delay loop which produces a delay of 500 ms on an 8086 with 5 MHz clock. [8]

(*b*) Explain the different addressing modes of 8086 along with suitable example. [8]

P.T.O.

OR

4. (*a*) Write an 8086 ALP to separate even and odd numbers in the array. [8]

(*b*) Differentiate between the following :

(*i*) Macro and procedure with examples

(*ii*) Near and Far Procedure. [8]

5. (*a*) Draw and explain 8259 A initialization command word formats and sending order. [8]

(*b*) Explain what is TSR. Explain the structure of TSR in detail. [10]

OR

6. (*a*) What are the components of MS-DOS ? Explain the steps by which MS-DOS is loaded after power on. [10]

(*b*) Compare .COM files and .EXE files. Explain the procedure to generate .COM and .EXE files from ASM files. [8]

SECTION II

7. (*a*) Explain BSR and I/O mode of 8255 with appropriate control word formats. [10]

(*b*) Show the mode set control word needed to initialize an 8255A as follows : [8]

– Port A — handshake input;

– Port B — handshake ouput;

– Port C — bits PC6 and PC7 as outputs.

OR

8. (*a*) Draw and explain the functional block diagram of 8251. [8]

(*b*) What are different methods of ADC ? Explain dual slope ADC with block diagram. [10]

9. (*a*) Explain different input modes and output modes available in 8279. [8]

(*b*) Draw the interfacing diagram of 8254 with 8086. [8]

OR

10. (*a*) Explain the various modes of operation for DMA in detail. [8]

(*b*) Explain control word format of 8254. [8]

11. (*a*) Explain the following instructions of NDP : [8]

(*i*) FMUL

(*ii*) FSTP

(*iii*) FILD

(*iv*) FISUB

(*b*) Draw and explain the architecture of 8087 NDP. [8]

OR

12. (*a*) Explain stack of 8087 with example. [8]

(*b*) Explain the use of 8284 and 8286 in interfacing memory with 8086 microprocessor. [8]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-150

S.E. (Electrical) (Second Semester) EXAMINATION, 2018

FUNDAMENTALS OF MICROPROCESSOR AND MICROCONTROLLER

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data if necessary.

1. (*a*) Explain synchronous type parallel data transfer techniques. [4]

(*b*) Draw 4K ROM interfacing with 8085 from 0000H. [4]

(*c*) Explain SIM instruction of 8085 microprocessor. [4]

Or

2. (*a*) Explain the following instruction of 8085 microprocessor LDA 3000 and LHLD 3000. [4]

(*b*) Write down assembly language program for 8085 microprocessor to multiply two 8-bit numbers stored in memory location 4050H and 4051H. Store the result in 5000H and 5001H memory location. [4]

P.T.O.

(*c*) Explain the function of pins of 8085 : [4]

(*i*) IO/$\overline{M}$

(*ii*) ALEs.

3. (*a*) With the help of interfacing diagram, explain interface of ADC 0809 with 8085. [7]

(*b*) Draw the format of TMOD and TCON register. [6]

Or

4. (*a*) Explain mode 0 and mode 1 operation of 8255. [7]

(*b*) Draw and explain the internal RAM organization of 8051 micro-controller. [6]

5. (*a*) List the various addressing modes used in instruction set of 8051. Give an example of each. [6]

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

(1) DAA

(2) CJNE#08, NEXT

(3) POP 00H.

Or

6. (*a*) Write an assembly language program to find square of number stored at a location C000H external RAM and store the LSB of the result at C001H and MSB of the result at C002H. [6]

(*b*) Explain steps to transfer data serially in 8051 and importance of Rl flag. [6]

7. (*a*) How is energy measured using 8085 ? Explain with block diagram. Draw the flowchart for the same. [6]

(*b*) Explain with interfacing diagram, speed measurement using 8051. [7]

Or

8. (*a*) Explain power factor measurement using 8085 with block diagram. [6]

(*b*) Draw and explain stepper motor control using 8051. [7]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-151

S.E. (Ins.&Con.) (First Semester) EXAMINATION, 2018

SENSORS AND TRANSDUCERS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data if necessary.

1. (*a*) Define transducer and give its detailed classification. [6]

(*b*) Discuss the working principle of strain gauge. Explain different types of strain gauges. [6]

Or

2. (*a*) Explain the following terms : [6]

1. Linearity
2. Calibration
3. Sensitivity.

P.T.O.

(*b*) State piezoelectric effect. Explain any *two* applications of piezoelectric sensor with diagram. [6]

3. (*a*) Define absolute pressure and gauge pressure. Explain U tube manometer for pressure measurement with neat diagram. [6]

(*b*) State Seebeck effect, Thompson effect and Peltier effect. [6]

Or

4. (*a*) List techniques for vacuum pressure measurement. Explain the working of any *one* of them. [6]

(*b*) Explain the principle and working of pyrometer for measurement of temperature. [6]

5. (*a*) Explain working principle of ultrasonic flowmeter using Doppler effect with neat diagram. [6]

(*b*) List various head type flowmeters and explain orifice plate with neat diagram. [7]

Or

6. (*a*) Explain electromagnetic flowmeter for flow measurement. [6]

(*b*) Explain vortex flowmeter with a neat sketch. [7]

7. (*a*) Explain ultrasonic sensor for level measurement. [7]

(*b*) Explain oscillating Coriolis for measurement of density. [6]

Or

8. (*a*) Explain the schematic of a cone and plate type viscometer with diagram. [6]

(*b*) Draw and explain pH measurement system in detail. [7]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-152

S.E. (Instru. & Control) (I Sem.) EXAMINATION, 2018

LINEAR INTEGRATED CIRCUITS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. Nos. **1** *or* **2**, Q. Nos. **3** *or* **4**, Q. Nos. **5** *or* **6** and Q. Nos. **7** *or* **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Your answer will be valued as a whole.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

Q.1

(a) What is phase and frequency compensation in OP-AMP? [6]

(b) Draw and explain the block diagram of closed-loop OP-AMP. If the feedback factor (β) of a closed-loop non-inverting OP-AMP is 10000×10^{-06} and open-loop gain is of 2, 00,000. Find out closed-loop gain(A_{CL}) . [6]

OR

Q.2

(a) An non-inverting OP-AMP has gain bandwidth product (UGB) = $2\ MH_z$. Calculate the cut-off frequency(F_c) at $-3\ dB$, if the OP-AMP is designed at a voltage gain of 2200×10^{-03}. [6]

(b) An OP-AMP has a slew-rate of $0.8 \frac{V}{\mu_S}$. Calculate the maximum sine-wave output voltage possible at a frequency of $50\ KH_z$. [6]

P.T.O.

Q.3

(a) Implement the following equation using neat diagram of inverting voltage scalar circuit.

$V_o = 4V_1 + 3V_2 + 2V_3$. In this equation V_o is the output voltage and V_1, V_2 *and* V_3 are inputs. [6]

(b) Explain basic comparators such as inverting, non-inverting and ZCD with neat diagrams. [6]

OR

Q.4

(a) Draw and Design Instrumentation amplifier using three OP-AMPS for the following details:

$A_v = 1000, A_D = 1, V_1 = 2mV, V_2 = 10mV,$ *Assume suitable data.* Find out associated Resistors and V_{out}. [6]

(b) What is called precision rectifiers? Explain Precision half-wave rectifier with neat circuit diagram using OP-AMP. [6]

Q.5

(a) What is timer? Explain the function of pins in IC 555 with neat internal block diagram. [8]

(b)Design LVR (Low Voltage Regulator) using IC 723 for the following details:

$V_0 = 5V, V_{ref} = 7.15V$. Assume suitable data. [5]

OR

Q.6

(a)Explain single-stable state multivibrator using IC 555 with neat circuit diagrams [5]

(b)Explain following terms:

A] Line Regulation B] Load Regulation C] Efficiency D] Drop-out voltage [8]

Q.7

(a) Design first-order Butterworth high-pass filter for the low cut-off frequency of 1000 Hz and DC gain is 3.9. Assume suitable data. Draw the circuit and practical response. [8]

(b)Explain why the output of low-pass filter roll-off at the -3dB cutoff frequency? [5]

OR

Q.8

(a)Explain the following terms related to filter:

1) Ripple and ringing 2) Quality factor (Q) 3) -3dB frequency 4) Damping factor 5) Pass band [5]

(b)Design second order low-pass filter for the high cut-off frequency of 1200 Hz and DC gain of

1.587. Assume suitable data. Draw neat circuit diagrams and response [8]

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-153

S.E. (Instrumentation & Control) (I Sem.) EXAMINATION, 2018
BASIC INSTRUMENTATION
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Draw neat sketches wherever necessary.
(*ii*) Figures to the right indicate full marks.
(*iii*) Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8**.
(*iv*) Assume suitable data.

Q1) a) Define any 6 static characteristics in detail. (06)
b) Write a short note on Traceability. (06)

OR

Q2) a) Explain in detail self-balancing d.c potentiometer (06)
b) Explain potential & current transformers (06)

Q3) a) Explain with diagram Wheatstone bridge. (06)
b) Draw and explain working of Maxwell Bridge. (06)

OR

Q4) a) Explain in detail construction & working of dual trace CRO. (06)
b) Draw and explain the Digital Storage Oscilloscope in detail. (06)

Q5) a) Draw and explain the construction & working of Digital Multimeter. (07)
b) Draw and explain the construction & working of Kilo Watt Hour Meter. (06)

OR

Q6) a) Draw and explain the construction & working of Digital Tachometer. (07)
b) Draw and explain the construction & working of Digital Thermometer. (06)

P.T.O.

Q7) a) Explain in detail construction & working of X-Y Recorder. (07)

b) Write a short note Virtual Instrument. (06)

OR

Q8) a) Draw and explain the working and construction of a Strip Chart Recorder. (07)

b) Explain in detail Function Generator. (06)

Total No. of Questions—**8**] [Total No. of Printed Pages—**1**

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[5352]-154

S.E. (Instrumentation & Control) (I Sem.) EXAMINATION, 2018
PHOTONICS & INSTRUMENTATION
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.

Q1) a) Draw electromagnetic spectrum of light .List the application of each region. [8]
b) State the Mauls law. [4]

OR

Q2) a) Compare the following terms: [8]
Refraction with Reflection

b) State the Plank's Equation.. [4]

Q3) a) Write a note on : Photo multiplier tube. [4]
b) Explain any one type of Gas discharge lamp with application. [8]

OR

Q4) a) Describe the working construction of Bolometer. [8]
b) Write a note on Structures of Light Emitting Diode(LED) [4]

Q5) a) Compare the different types of Losses in optical cable. [7]

b) What are different modes used in fiber optics. Explain with diagram. [6]

OR

Q6) a) Explain the concept of intramodal and intermodal losses. [7]
b) Explain in short: [6]
i) Numerical aperture
ii) Acceptance angle

Q7) a) With the help of neat sketch explain Microscope. [7]

b) Explain with suitable diagram working construction of OTDR. [6]

OR

Q8) a) Explain with neat diagram Optical Projection system. List out the optical components used in Projection system. [7]
b) Explain with neat diagram Polarimeter. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

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[5352]-155

S.E. (Instru./Cont.) (II Sem.) EXAMINATION, 2018

TRANSDUCERS AND SIGNAL CONDITIONING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, electronic pocket calculator and steam tables is allowed.

(*v*) Your answer will be valued as a whole.

(*vi*) Assume suitable data, if necessary.

Q1. **a)** A temperature control system uses RTD as a sensor. Design a Wheatsone bridge circuit if the temperature range is 20^0C to 150^0C. Assume temperature coefficient is 0.05/^{0}C. Also calculate the output of bridge circuit for above range. 8

b) If it is required to convert 0 to 5 volt into digital signal with an resolution of 1mV determine reference voltage and number of bits of ADC. 4

OR

Q2 **a)** Design a signal conditioning circuit for load cell for following data 7
Range of Measurement 0 to 5Kg.
Sensitivity of load cell 20mV/V
Desired output rane 0 to 5 volt

b) Explain the concept of loading in electronic circuit 5

Q3. a) Explain capacitive proximity sensor with neat diagram 7

b) Draw and explain phase sensitive detector 5

OR

Q4. a) Explain signal conditioning circuit for LVDT 7

b) Explain the excitation techniques for capacitive sensor 5

P.T.O.

Q5.	**a)**	Draw and explain the signal conditioning circuit for photodiode	6
	b)	Explain incremental Encoder signal conditioning scheme	7
		OR	
Q6	**a)**	Explain IR pyrometer with neat diagram	7
	b)	Explain stroboscope with neat diagram	6
Q7.	a)	Explain the glass type PH electrode with neat diagram	6
	b)	Explain with neat circuit amplification of piezoelectric sensor voltage	7
		OR	
Q8	**a)**	How multiple level in liquid tank can be measure using ultrasonic sensor	6
	b)	Explain conductivity sensor signal conditioning with neat block diagram	7

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

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[5352]-156

S.E. (Instrumentation and Control) (II Semester) EXAMINATION, 2018

ELECTRONIC INSTRUMENTATION

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6**, Q. **7** or Q. **8**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data if necessary.

1. (*a*) Draw pulse waveform and explain its characteristics. [6]

(*b*) Write features of universal counter and explain frequency ratio mode. [6]

Or

2. (*a*) What is sine wave synthesis ? Explain direct synthesis. [6]

(*b*) Draw block diagram of DMM and explain. [6]

3. (*a*) What are different sweep modes ? Explain the delayed sweep mode with suitable waveforms. [6]

(*b*) Explain any *four* ADC specifications. [6]

P.T.O.

Or

4. (*a*) With neat diagram, explain 10 : 1 attenuator probe. [6]

(*b*) Draw 3 bit flash type ADC, explain working and write output equation. [6]

5. (*a*) Differentiate between amplitude modulation and frequency modulation. [6]

(*b*) Write a note on Virtual Instrumentation system. [7]

Or

6. (*a*) Design a Virtual Instrumentation system for generating a sine wave with frequency and level adjustment knobs. [7]

(*b*) Differentiate between Time Division and Frequency Division Multiplexing. [6]

7. Write short notes on :

(1) Spectrum analyzer [7]

(2) Wave analyzer [6]

Or

8. (*a*) Explain the fundamental suppression type of distortion factor meter. [7]

(*b*) With neat block diagram, explain OTDR. [6]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-157

S.E. (Instrumentation and Control) (II Sem.) EXAMINATION, 2018
AUTOMATIC CONTROL SYSTEM
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Use of non-programmable calculator is allowed.
(*v*) Assume suitable data, if necessary.

Q.1 a) Compare following [06]

1. Open Loop Control System Vs Closed Loop Control Systems.
2. Linear Vs Non Linear control Systems
3. Time Variant Vs Time Invariant systems.

b) Define transfer function. What are advantages of Transfer function approach? [06]

OR

Q.2 a) Compare Force Voltage and Force Current Analogy. [06]

b) Determine the transfer function of the system represented by the block diagram shown below. [06]

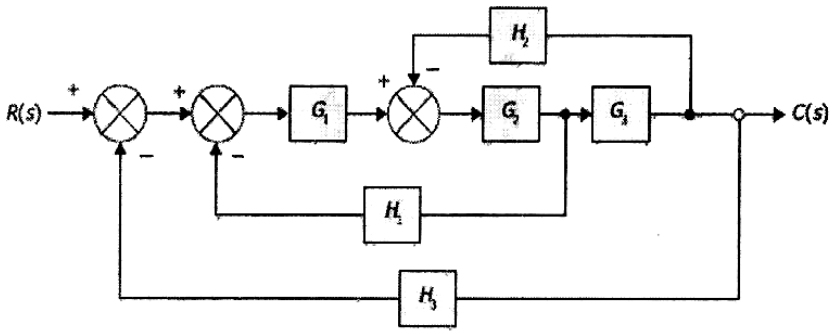


Figure 2

Q.3 a) The characteristic equation of feedback control system is given by [04]
$s^4 + 20s^3 + 15s^2 + 2s + K = 0$

Determine range of K for system stability. Determine value of gain and frequency for marginally stable system.

P.T.O.

b) Classify following system as under damped, over damped, undamped, critically damped systems with help of closed loop transfer function. [08]

(a) $\frac{C(s)}{R(s)} = \frac{8}{s^2+3s+8}$

(b) $\frac{C(s)}{R(s)} = \frac{2}{s^2+4s+2}$

(c) $\frac{C(s)}{R(s)} = \frac{2}{s^2+2s+1}$

(d) $\frac{C(s)}{R(s)} = \frac{2}{s^2+4}$

OR

Q.4 a) A unity feedback system is characterized by open loop transfer function [04]

$$G(s)H(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$$

Determine the steady state errors for unit step, unit ramp and unit acceleration input.

b) A unity feedback control system has an open loop transfer function $G(s)H(s) = \frac{K}{s^2(s+2)}$; Sketch the root locus of system. Comment on system stability. [08]

Q.5 a) Write correlation between frequency domain and time domain response. [04]

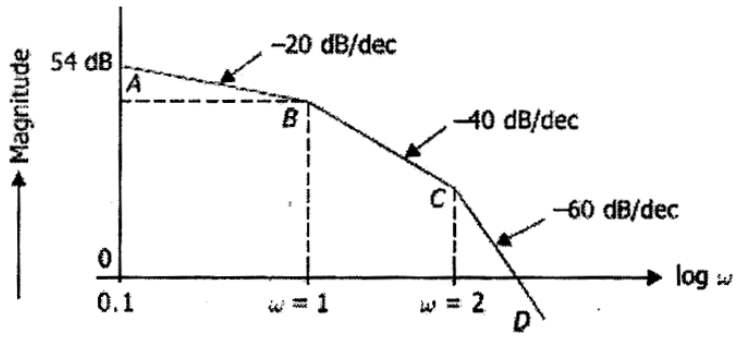
b) Sketch the bode plot of system, show all stability margins. [09]

$$G(s) = \frac{1}{s(0.5s+1)(0.05s+1)}$$

OR

Q.6 a) A unit step response test conducted on second order system yielded peak overshoot $M_p = 0.12$ and Peak time $t_p = 0.2\text{sec}$ .Obtain the Resonant peak and resonant frequency. [05]

b) Find the open-loop transfer function of a system whose approximate Bode plot is shown below. [08]



Q.7 a) Explain mapping theorem. [04]

b) Draw polar plot of system with transfer function [09]

1) $G(s)=\frac{1}{s(T_1s+1)}$

2) $G(s)=\frac{1}{(T_1s+1)(T_2s+1)}$

OR

Q.8 a) Explain polar plots. [04]

b) Draw Nyquist plot for system whose open loop transfer function is [09]

$G(s)=\frac{K}{s(0.1s+1)(s+1)}$ determine value of K such that Phase margin is $40°$

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-158

S.E. (Instrumentation and Control) (Second Semester) EXAMINATION, 2018

DIGITAL TECHNIQUE

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer any *one* question from *or* condition.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if necessary.

(*iv*) Non-programmable calculator is permitted.

1. Design and implement the binary to gray code converter for 4 bit using gates and explain it. [12]

Or

2. (*a*) Perform the following decimal addition in BCD form : [6]

(*i*) $(28)_{10} + (37)_{10}$

(*ii*) $(59)_{10} + (35)_{10}$.

(*b*) Design and implement the 4 bit parity checker circuit and explain it. [6]

P.T.O.

3. (*a*) Differentiate between combinational logic and sequential logic designs. [6]

(*b*) Explain the need of Master-slave flip-flop. What is race around condition ? [6]

Or

4. Explain the importance of excitation table in SR, JK, T and D flip-flops. [12]

5. What is FPGA ? Explain its basic architecture and functions. Also comment on CPLD. [13]

Or

6. Draw and explain the basic architecture of 8085 microprocessor ? Also explain the memory read/write operation in it. [13]

7. Classify and explain the memory elements and its types in detail with working principle and functioning. [13]

Or

8. Design and explain the frequency counter design to read the frequency of mains supply using digital technique. [13]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-159

S.E. (Instru.&Con.) (Second Semester) EXAMINATION, 2018

INDUSTRIAL DRIVES

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data if necessary.

1. (*a*) Draw and explain V-I characteristics of SCR. What is latching current and holding current. [6]

(*b*) Explain the single-phase half wave controlled rectifier with R load. Draw the waveforms. [6]

Or

2. (*a*) What are choppers ? Explain John's chopper. [6]

(*b*) Explain the single-phase half-controlled bridge rectifier with RL load. [6]

3. (*a*) Derive the EMF equation of DC generator. [6]

P.T.O.

(*b*) Write the working principle and construction induction motor. [6]

Or

4. (*a*) Explain why DC series motor damages mechanically if it is started on load. [6]

(*b*) 3-phase induction motor is wound for 4 poles and is supplied from 50-Hz system. [6]

Calculate :

(*i*) The synchronous speed

(*ii*) The rotor speed when slip is 4%

(*iii*) Rotor frequency when rotor runs at 600 rpm.

5. (*a*) Explain the working principle and construction of alternators. [7]

(*b*) Write a short note on synchronous motors. Why synchronous motor is not self starting ? [6]

Or

6. (*a*) Explain the working principle and construction of single-phase induction motors. [7]

(*b*) Why synchronous motor is not self starting ? Explain magnetic locking condition. [6]

7. (*a*) Write a working principle of stepper motor. Why is it widely used in automation. Mention the *two* applications of it. [7]

(*b*) What do you mean by servomotors ? Give its classification. Explain the A.C. servomotors. [6]

Or

8. (*a*) Classify the stepper motors. Explain any one in detail. [7]

(*b*) Explain the characteristics of Universal motor with suitable diagram. [6]

Total No. of Questions—8] [Total No. of Printed Pages—5

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[5352]-161

S.E. (Computer) (First Semester) EXAMINATION, 2018

DISCRETE STRUCTURES

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. (*a*) There are 3 sets A, B and C where, [4]

A = Whole numbers less than 7

B = Odd numbers greater than or equal to 1 but less than 10

C = Factors of 9

Find $(A \cup B) \cap (B \cup C)$

(*b*) Explain the following with examples : [4]

(*i*) Composite relation

(*ii*) Composition of functions.

(*c*) Using truth table prove that $((p \rightarrow q) \wedge \sim q) \rightarrow \sim p$ is a tautology. [2]

P.T.O.

(*d*) Explain which of the following relations is transitive :

1. $\leq$ on any set of real no's

2. Relation divides on set of positive integers. [2]

Or

2. (*a*) There are 2 sets A, B. use set theory laws to prove $A \cup (B - A) = A \cup B$. [4]

(*b*) Draw the Hasse diagram for the following POSET, where denotes relation divides [{2, 3, 6, 12, 18, 36, 72, 108}; |] [4]

(*c*) Give the definition for : [2]

(*i*) One to one function

(*ii*) Onto function.

(*d*) Explain tautology Vs. satisfiability with an example. [2]

3. (*a*) Explain the following with the help of examples : [6]

(*i*) Algebraic system

(*ii*) Semi-groups

(*iii*) Monoid

(*iv*) Group.

(*b*) Find the chromatic number with the help of graph coloring for : [6]

(*i*) K_5 (complete graph with 5 vertices)

(*ii*) Any complete bipartite graph.

(*iii*) C_4 (cyclic graph with 4 vertices).

Or

4. (*a*) Let ({*a, b,*}, *) be a semi-group where $a * a = b$, show that : [6]

(*i*) $a * b = b * a$

(*ii*) $b * b = b$.

(*b*) Explain the following types of graphs with the help of examples : [6]

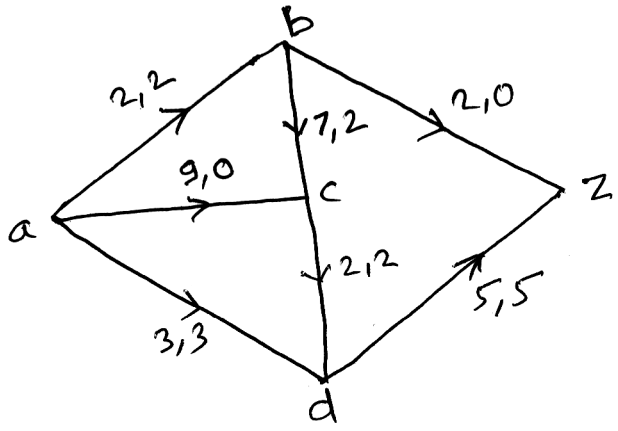
(*i*) Simple graph

(*ii*) Asymmetric diagraph

(*iii*) Symmetric diagraph

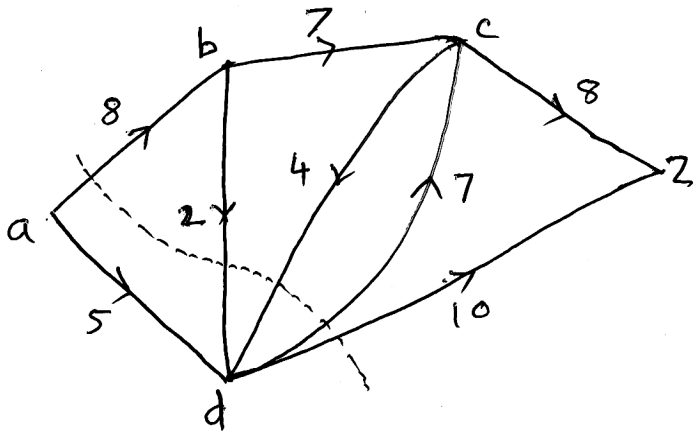
(*iv*) Connceted and disconnected graphs.

5. (*a*) Using labelling procedure, find the max flow for the following transport network. [5]



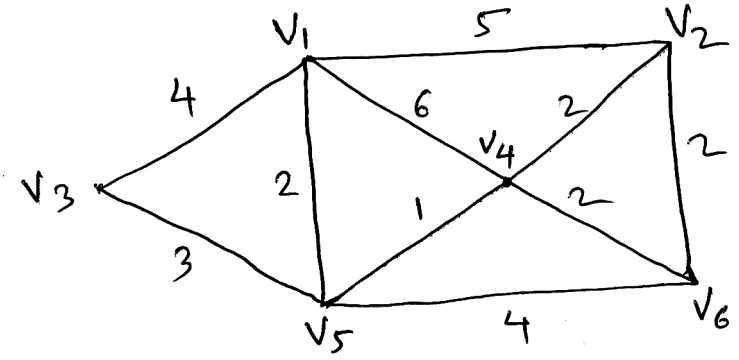
(*b*) Let us consider a hypothetical computer that has an instruction which computes sum of 3 numbers at given instance. Suppose, we want to find sum of 9 numbers x_1, x_2 ,....., x_9. How many (minimum) branch or internal nodes are required if we represent '+' as branch node and numbers as leaf nodes. Justify the answer with the help of tree representation. [4]

(*c*) Find the capacity of the following cut : [4]

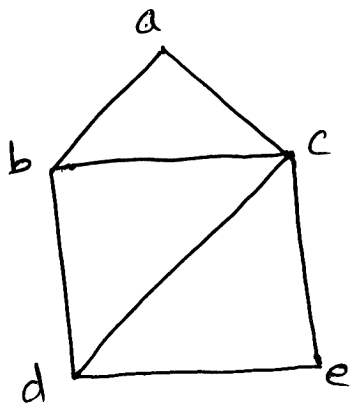


Or

6. (*a*) Build a minimum spanning tree for the following graph using Prim's algorithm. Consider starting vertex as V_1. Explain the procedure with steps. [6]



(*b*) Define spanning tree. Draw at least 3 spanning trees of the following graph, without using any algorithm/procedure. [4]



(*c*) Explain weight of a binary tree with example. [3]

7. (*a*) How many 4 digit even numbers have all 4 digits distinct ? [5]

(*b*) A box contains 3 black, 3 white and 3 red balls. How many ways we can draw 3 balls so that at least one black is included ? [4]

(*c*) How many different salads can be made from 5 different fruits ? Only one fruit can also be used. [4]

Or

8. (*a*) You want to be opener in cricket final match. It depends on who is coach that day. With coach Ravi probability of being opener is 0.5 and with coach Greg it's 0.3. Ravi is coach for 60% time. What is the probability of you being opener for final match ? [5]

(*b*) How many ways we can distribute 6 similar balls in 3 numbered boxes ? [4]

(*c*) If 4 coins are tossed at a time, find probability of getting two heads and two tails. [4]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

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[5352]-162

S.E. (Computer) (I Sem.) EXAMINATION, 2018

DATA STRUCTURE AND PROBLEM SOLVING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagram must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Explain O(*n*), Ω(*n*) and θ(*n*) with best, worst and average time complexify assume sequential search prog. to support your answer. [6]

(*b*) State at least *six* application of stack. [3]

(*c*) What are the rules for naming and using variable and logical and relational operator ? [3]

Or

2. (*a*) Draw interactivity chart and IPO chart to solve mathematical quadratic equation. [3]

P.T.O.

(*b*) Examine the following program and mention the output with suitable explanation : [3]

```
#include<iostream>
using namespace std;
int operate(int a, int b)
{
    return(a * b);
}
float operate(float a, float b)
{
    return(a/b);
}
int main( )
{
    int x = 5, y = 2;
    float n = 5.0, m = 2.0;
    cout<<operate(x, y);
    cout<<"if";
    cout<<operate(n, m);
    return 0;
}
```

(*c*) Obtain Huffman encoding for the data : [3]

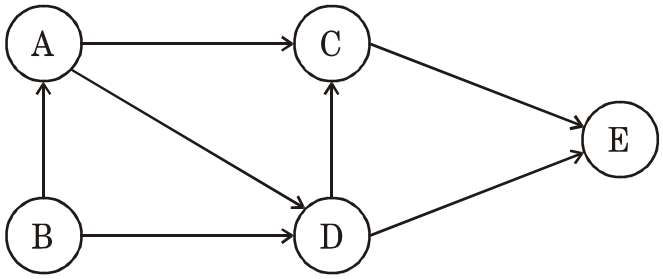
a : 39, b : 10, c : 9, d : 25, e : 7, f : 3.

(*d*) Construct a binary tree for the sequence : [3]

Postorder : HIDEBFGCA

Inorder : HDIBEAFCG.

3. (*a*) Sort the diagraph for topological sort : [3]



(*b*) Write a Pseudo C/C++ code for computing indegree of a node of a given graph using Adjacency matrix representation. [3]

(*c*) What is collision ? What are different collision resolution techniques ? [3]

(*d*) Draw a binary search tree for the following data : [3]
10, 08, 15, 12, 13, 07, 09, 17, 20, 18, 04, 05.

Or

4. (*a*) Write a Pseudo C/C++ code for non-recursive DFS traversal of graph. [3]

(*b*) Write a Pseudo C/C++ code for Kruskal's algorithm. [3]

(*c*) Explain with an example difference between chaining with replacement and chaining without replacement. Also explain which method is better ? [3]

(*d*) Explain with suitable example all kinds of rotations associated with AVL tree. [3]

5. (*a*) Why do you need an EOF marker when you process file sequentially ? [3]

(*b*) What do you mean by max-heap and min-heap ? [4]

(*c*) What is a B+ tree ? Give structure of its internal node. What are the variations of B and B+ tree ? Give any *two* variations. [7]

Or

6. (*a*) What is B tree ? Generate a B tree of order 5 for given data 50, 85, 12, 10, 6, 60, 70, 80, 37, 100, 120, 65, 150, 62, 30, 17, 15, 28, 75, 78. [6]

(*b*) Sort the following element with heap sort : 14, 12, 9, 8, 7, 10, 18. What is time complexity of heap sort ? [7]

7. (*a*) Write an algorithm for odd-even merge sort and explain it with suitable example. [6]

(*b*) Write a Prefix computation problem ? Explain in brief. [7]

Or

8. (*a*) State and explain pointer doubling problem with example. [6]

(*b*) Write in brief about parallel computation model. [7]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

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[5352]-163

S.E. (Computer Engineering) (I Sem.) EXAMINATION, 2018
DIGITAL ELECTRONICS AND LOGIC DESIGN
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Figures to the right indicate full marks.
(*iii*) Assume suitable data, if necessary.

Q1) a) Minimize the following function using K-map & realize using Logic gates. [4]
$F(A,B,C,D) = \sum m(1,5,7,13,15)\ d(0,6,12,14)$

b) Convert following : [2]
$(46)_{10} = (?)_8$

c) List the differences between CMOS and TTL [6]

OR

Q2) a) Convert the following numbers into binary numbers. [4]
i) $(37)_8$ ii) $(25.5)_{10}$

b) Explain standard TTL Characteristics in detail [6]

c) Represent the following signed number in 2s complement method: [2]
i) + 25 ii) -25

Q3) a) Design a 3-bit Excess 3 to 3-bit BCD code converter using logic gate. [6]

b) Design Mod-5 synchronous counter using JK FFs. [4]

c) Draw the excitation table of J-K Flip-flop. [2]

P.T.O.

OR

Q4) a) Design a 4-bit Binary to Gray code converter circuit using logic gates [4]

b) Design a Mod 20 counter using decade counter IC 7490 [6]

c) Perform the following: [2]

$$(11011)_2 + (0101)_2 = (?)_2$$

Q5) a) State and explain basic component of ASM chart? Also explain the Salient features of ASM chart? [7]

b) Write VHDL code 4:1 Multiplexer using Behavioral and Dataflow modeling style. [6]

OR

Q6) a) Design a sequence generator circuit to generate the sequence 1-2-3-7-1 using Multiplexer Controller based ASM approach. [7]

Consideration :

i) If control input C = 0, the sequence generator circuit in the same state.

ii) If control input C = 1, the sequence generator circuit goes into next state.

b) Explain the following statements used in VHDL with suitable examples: [6]

i) CASE.

ii) With - Select - When.

iii)Loop statement.

Q7) a) Comparison between PROM, PLA and PAL [7]

b) Draw and explain the basic architecture of FPGA. [6]

OR

Q8) a) A combinational circuits is defined by the function [7]

$F_1(A,B,C) = \sum m(0,1,3,7)$

$F_2(A,B,C) = \sum m(1,2,5,6)$

Implement this circuit with PLA.

b) A combinational circuits is defined by the function [6]

$F_1(A,B,C) = \sum m(0,1,5,6,7)$

Implement this circuit with PAL.

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-164

S.E. (Computer Engg.) (I Sem.) EXAMINATION, 2018
OPERATING SYSTEM AND ADMINISTRATION
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.

1. (*a*) Enlist any six features of UNIX operating system. [6]
(*b*) Explain the file system data structures of UNIX with neat diagrams (UFDT, FT and IT). [6]

OR

2. (*a*) Enlist the characteristics of Unix file system. [6]
(*b*) Draw and explain the block diagram of system kernel. [6]

3. (*a*) Write a short note on bootstrapping. [6]
(*b*) List the various file access permissions that can be assigned in NFSv4 system. [6]

OR

4. (*a*) Explain the run levels of booting process in Unix. [6]
(*b*) Explain the following commands in Unix :
grep, pipe, stat, mount, chmod, ln [6]

P.T.O.

5. (*a*) What is role based access control ? [6]

(*b*) Write a short note on signal handling. List and explain any 6 signals. [7]

OR

6. (*a*) Explain how kill function can be used to send signal to a group of process. Also give the syntax of kill function. [4]

(*b*) What is a shadow password file ? Where does user password reside in Unix ? [3]

(*c*) Differentiate between user mode and kernel mode instructions. Explain how does a user level process change to kernel level. [6]

7. (*a*) What is meant by disk partitioning and disk formatting ? [4]

(*b*) What are storage devices ? Explian any *three* of them. [6]

(*c*) What are startup files ? What are the tasks of startup files ? [3]

OR

8. (*a*) Define disc partitioning. Explain the following : [7]

(*i*) useradd

(*ii*) userdel

(*iii*) RAID

(*b*) Write short notes on the following : [6]

(*i*) File system polymorphism

(*ii*) File system mounting

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-165

S.E. (Computer Engineering) (Sem. I) EXAMINATION, 2018
MICROPROCESSOR ARCHITECTURE
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

1. (A) Explain memory organization of 8086. [6]

(B) Explain architecture of 8086. [6]

Or

2. (A) Explain how logical address is converted into Physical address in 8086 with neat diagram. [6]

(B) List features of 8086. [6]

3. (A) Differentiate between CALL and JMP Instruction. [3]

(B) Explain with example addressing modes of 80386. [6]

(C) Explain the following instruction with example : [3]

(*i*) BOUND

(*ii*) CLD

(*iii*) XCH4.

Or

4. (A) Explain non-pipelined write cycle with timing diagram. [6]

(B) Compare macro and procedure in ALP. [3]

(C) Define macro and explain how macro is call in ALP. [3]

5. (A) Explain any multicore architecture with neat diagram. [5]

(B) What is cache memory ? List its advantages. [4]

(C) What is front side bus and back side bus. [4]

P.T.O.

Or

6. (A) Write a short note on multicore design and is implementation. [5]

(B) Explain software developer viewpoint about multicore architecture. [4]

(C) Explain multi-processing concept in detail. [4]

7. (A) Give the features of SSE. [4]

(B) What is hyper-threading and its advantages. [5]

(C) Explain functional block diagram of micro architecture code name Nehalem. [4]

Or

8. (A) Explain virtualization technology in detail. [4]

(B) Draw and explain 64 bit architecture block diagram. [5]

(C) Explain different data types of 64 bit architecture. [4]

Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

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[5352]-166

S.E. (Computer Engineering/Information Technology)

(II Sem.) EXAMINATION, 2018

ENGINEERING MATHEMATICS—III

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of electronic non-programmable calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Solve (any *two*) : [8]

(*i*) $\left(D^3 - 7D - 6\right) y = e^{2x}(1 + x)$

(*ii*) $\left(D^2 + 4\right) y = \dfrac{1}{1 + \cos 2x}$ by method of variation of parameters

(*iii*) $x^3 \dfrac{d^2y}{dx^2} + 3x^2 \dfrac{dy}{dx} + xy = \sin(\log x)$.

(*b*) Find Fourier sine transform of : [4]

$$f(x) = \frac{e^{-ax}}{x}, \quad x > 0.$$

P.T.O.

Or

2. (*a*) A circuit consists of inductance L and condenser of capacity C in series. An emf $E \sin pt$ is applied at $t = 0$, the initial change and current being zero. If $p^2 = \frac{1}{LC}$, find current in the circuit at time t. [4]

(*b*) Find inverse z-transform of (any *one*) : [4]

(*i*) $F(z) = \frac{z^3}{(z-1)(z-2)^2}, \quad |z| > 2$

(*ii*) $F(z) = \frac{10z}{(z-1)(z-2)}$ by inversion integral method.

(*c*) Solve difference equation : [4]

$f(k+2) - 3f(k+1) + 2f(k), \quad f(0) = 0, \; f(1) = 1.$

3. (*a*) The first four moments of a distribution about the value 4 are 1, 4, 10 and 45. Obtain the first four central moments, mean, standard deviation and coefficient of skewness and kurtosis. [4]

(*b*) A sample of 100 dry battery cells tested to find the length of life produced the following results; $\bar{X} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life between 10 and 14 hours ? [Given : For $z = 0.67$, area = 0.2487] [4]

(*c*) If the directional derivative of : [4]

$$\phi = a(x + y) + b(y + z) + c(x + z)$$

has maximum value 12 in the direction of the line :

$$\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-1}{3},$$

find the values of *a, b, c.*

Or

4. (*a*) Find the correlation coefficient for the following data : [4]

x	***y***
43	99
21	65
25	79
42	75
57	87
59	81

(*b*) Prove (any *one*) : [4]

(*i*) $\nabla^2\left[\nabla \cdot \left(\frac{\bar{r}}{r^2}\right)\right] = \frac{2}{r^4}$

(*ii*) $\nabla \times \left[\frac{1}{r}\left(r^2\bar{a} + (\bar{a} \cdot \bar{r})\,\bar{r}\right)\right] = 0.$

(*c*) Show that : [4]

$$\bar{F} = \left(2xz^3 + 6y\right) i + (6x - 2yz)\, j + \left(3x^2z^2 - y^2\right) k$$

is irrotational. Find the scalar potential associated with it.

5. (*a*) Evaluate : [4]

$$\int_C \bar{F} \cdot d\bar{r}$$

where

$$\bar{F} = \left(x^2 + xy\right)\bar{i} + \left(x^2 + y^2\right)\bar{j}$$

and C is the square formed by the lines $x = \pm 1$, $y = \pm 1$.

(*b*) Apply Stokes theorem to evaluate : [5]

$$\iint_S \left(\nabla \times \bar{F}\right) \cdot \hat{n}\, dS$$

where

$$\bar{F} = \left(x^3 - y^3\right)\bar{i} - xyz\,\bar{j} + y^3\,\bar{k}$$

and S is the surface $x^2 + y^2 + z^2 - 2x = 1$ above the plane $x = 0$.

(*c*) Show that : [4]

$$\iiint_V \frac{dV}{r^2} = \iint_S \frac{\bar{r} \cdot \hat{n}}{r^2}\, dS.$$

Or

6. (*a*) Using Green's theorem, evaluate : [4]

$$\int_C \bar{F} \cdot d\bar{r}$$

where

$$\bar{F} = x^2\,\bar{i} + xy\,\bar{j}$$

and C is the region enclosed by $y = x^2$ and the line $y = x$.

(*b*) Apply Stokes theorem to evaluate : [5]

$$\int_C \left(\left(x^2 + y^2 \right) \bar{i} - 2xy \, \bar{j} \right) \cdot d\bar{r}$$

where C is the rectangle bounded by the lines $x = \pm a$, $y = 0$ and $y = b$.

(*c*) Evaluate : [4]

$$\iint_S 2x^2 y \, dy \, dz - y^2 \, dz \, dx + 4xz^2 \, dx \, dy$$

over the curved surface of the cylinder $y^2 + z^2 = 16$, bounded by $x = 0$ and $x = 2$.

7. (*a*) If $u = x^3 - 3xy^2$, find value of v such that $w = u + iv$ is an analytic function. Write w in term of z. [4]

(*b*) Evaluate : [4]

$$\oint_C \frac{2z^2 + z + 5}{\left(z - \frac{3}{2} \right)^2} \, dz$$

where C is the ellipse :

$$\frac{x^2}{9} + \frac{y^2}{16} = 1.$$

(*c*) Find the image of straight lines $x = 1$ and $y = 1$ under the transformation $w = z^2$. [5]

Or

8. (*a*) Show that real and imaginary parts of an analytic function are always harmonic. [4]

(*b*) Using Cauchy's residue theorem evaluate : [4]

$$\oint_C \frac{12z - 7}{(z-1)^2 (2z+3)}\, dz$$

where C is the circle :

$$|z + i| = \sqrt{3}.$$

(*c*) Find the bilinear transformation which maps the points $z = 1, i, 2i$ on the points $w = -2i, 0, 1$ respectively. [5]

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-167

S.E. (Computer) (Sem. II) EXAMINATION, 2018
OBJECT ORIENTED AND MULTICORE PROGRAMMING
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right side indicate full marks.

(*iii*) Use of Calculator is allowed.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Write short notes on : [8]

(*i*) Need of object-oriented programming

(*ii*) Dynamic memory allocation.

(*b*) Explain array of objects with example. [4]

Or

2. (*a*) Write a C++ program for vector addition using operator overloading. Vector consists of 2 attributes *ax*, *ay* for magnitude and direction (both int). Create 3 vectors v_1, v_2, v_3 with v_1 (8, 13) and v_2 (26, 7). After performing $v_3 = v_1 + v_2$; user should be able to print v_3's *ax* and *ay* values to 34 and 20 resp. [8]

(*b*) Differentiate between public, private and protected members. [4]

P.T.O.

3. (*a*) A warehouse management system requires taking user input and displaying items which are present. Use any STL (vector, list, etc) to implement the system. Item consist of 3 attributes (name, code both strings and price in float). Write menu driven C++ program to accept and display items. [8]

(*b*) Write a short note on multiple exception handling. [4]

Or

4. (*a*) Create child processes using posix_spawn( ) function. Use object oriented approach for process management. Write menu driven C++ program to create *n* processes (where *n* is any +ve integer given by user) and display their pid's on console. All *n* child processes will execute the *ps* utility, which resides in "/bin/ps". [6]

(*b*) Write in detail about anatomy/structure of a process. [6]

5. (*a*) What are the similarities between threads and processes ? [6]

(*b*) Explain in detail pthread attribute object. [7]

Or

6. (*a*) Differentiate between threads and processes. [6]

(*b*) Write a detailed note on termination of threads. [7]

7. (*a*) What is persistence of an object ? Explain persistence with respect to IPC. [4]

(*b*) Write short notes on IPC mechanism using : [9]

(*i*) Files

(*ii*) Shared memory

(*iii*) Pipes.

Or

8. (*a*) Explain PRAM model used for synchronization. [4]

(*b*) Explain the following : [9]

(*i*) Basic semaphore operations with P( ) and V( ).

(*ii*) Mutex semaphores in POSIX.

(*iii*) Delegation model for threaded application.

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

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[5352]-168

S.E. (Computer Engg.) (II Sem.) EXAMINATION, 2018

MICROPROCESSOR & INTERFACING TECHNIQUES

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Attempt total **4** questions : Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

1. (*a*) Compare 8086, 80386 processors on the basis of segmentation. [4]

(*b*) Explain the following addressing modes with suitable example in 80386 processor : [4]

(*i*) Based mode

(*ii*) Indexed mode

(*iii*) Scaled indexed mode

(*iv*) Based scaled indexed mode.

(*c*) Explain the difference between DOS calls and BIOS calls. [4]

P.T.O.

Or

2. (*a*) Differentiate between Procedure and Macro. [4]

(*b*) Draw interfacing diagram between 8086 and 8259A. [4]

(*c*) Draw and discuss initialization sequence of 8259A. [4]

3. (*a*) Draw and explain mode set control word for 8255. What will be its value to initialize 8255 for the following configuration ? [6]

(*i*) Port B as mode 1 input

(*ii*) Port A as mode 0 output

(*iii*) Port C upper as input

(*iv*) Port C bit 2 as output.

(*b*) Give salient features of 8237 DMA controller. [4]

(*c*) Define the following pins of ADC 0808 : [2]

(*i*) SOC

(*ii*) EOC.

Or

4. (*a*) Draw and explain internal block diagram of 8253 and prepare the control word for the following specifications : [6]

(*i*) BCD count

(*ii*) Counter 0

(*iii*) Mode 3

(*iv*) 16-bit count.

(*b*) Draw and explain format of command word in 8279 for Keyboard/ Display Mode Set. [4]

(*c*) What do you mean by NULL modem ? Explain it with neat diagram. [2]

5. (*a*) What is the difference between minimum and maximum mode of 8086 ? [3]

(*b*) Draw 8086 based minimum mode system showing 4 × 4 matrix keyboard using 8255. [6]

(*c*) Explain the role of the following chips in maximum mode configuration : [4]

(*i*) 8288

(*ii*) 8286.

Or

6. (*a*) What is difference between memory mapped I/O and I/O mapped I/O ? [4]

(*b*) Explain the following 8087 instructions with *one* example each : [6]

(*i*) FMUL

(*ii*) FDIV

(*iii*) FBST.

(*c*) Explain 32-bit single precision format for floating point numbers. [3]

7. (*a*) Explain the following Intel 82801 1JR I/O controller Hub capabilities : [6]

(*i*) Direct Media Interface

(*ii*) PCI Express Interface

(*iii*) Serial ATA (SATA) controller.

(*b*) Draw and explain block diagram of Intel core i5 processor. [7]

Or

8. (*a*) Explain features of Intel X58 Chipset. [5]

(*b*) Explain blocks of Intel i5 motherboard : [8]

(*i*) System memory

(*ii*) Graphics system

(*iii*) USB

(*iv*) LAN subsystem.

Total No. of Questions—8] [Total No. of Printed Pages—3

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S.E. (Computer) (II Sem.) EXAMINATION, 2018

COMPUTER GRAPHICS AND GAMING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Assume suitable data, if necessary.

(*iii*) Attempt Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8**.

Q. 1 A) Enlist applications of Computer graphics and define pixel, frame buffer 6

B) Find out which pixel would be turned on for the line with end points (0, 0) to (3, 3) using Bresenham's line algorithm. 3

C) Write a note on GTK+ architecture. 3

OR

Q. 2 A) Define following terms 3

i) Persistence

ii) Aspect Ratio

iii) Resolution

B) Write a note on Line styles. 3

C) Write a short note on Character Generation Methods. 6

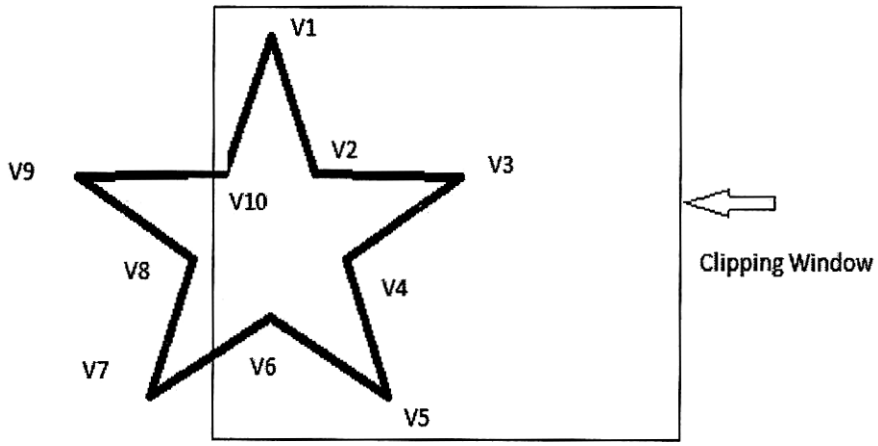
P.T.O.

Q. 3 A) Write 2D transformation matrices of translation, scaling and shearing. Give the derivation of 2D rotation matrix. 6

B) Explain Scan-Line Polygon filling algorithm in detail. 6

OR

Q. 4 A) Explain Sutherland-Hodgeman Polygon clipping algorithm. 6



Show stepwise clipping of polygon ABC in the order Left ,Top, Right and Bottom using above algorithm along with input and output set of vertices at each stage

B) Explain rotation about an arbitrary axis in 3-D. 6

Q. 5 A) Enlist hidden face removal algorithm & Explain any one of them with diagram 7

B) Explain Bezier curve? List its properties 6

OR

Q. 6 A) What is Fractals? Explain Hilbert Curve and Koch curve. 7

B) Explain and Compare shading algorithms 6

Q. 7	A)	a) Draw block diagram of NVIDIA workstation	5
	B)	b) Write a short note on	8
		i) OpenGL ES	
		ii)3DMaxStudio / Maya / any equivalent open source(like blender)	

OR

Q. 8	A)	Describe various operations carried out on the segment	6
	B)	Define animation. Explain the methods for controlling animations?	7

Total No. of Questions—8] [Total No. of Printed Pages—2

Seat No.	

[5352]-170

S.E. (Comp. Engg.) (Second Semester) EXAMINATION, 2018

COMPUTER ORGANIZATION

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. (*a*) Draw and explain Von Neumann architecture. [6]

(*b*) Using "Add and Shift" method multiply the following numbers :

Multiplicand 10, Multiplier 6. Verify result in decimal number system. [6]

Or

2. (*a*) Represent 12.125 and 10.50 in single and double precision floating point format. [6]

(*b*) Explain any THREE addressing modes of 8086 with suitable examples. [6]

3. (*a*) List and explain machine instruction characteristics. [6]

(*b*) Divide the following number using restoring division algorithm : [7]

Dividend – 1100 and Divisor – 11.

P.T.O.

Or

4. (*a*) Explain the communication between processor and coprocessor. [6]

(*b*) Explain the Register organization in i7 microprocessor. [7]

5. (*a*) Compare memory mapped I/O and I/O mapped I/O with merits and demerits. [6]

(*b*) Explain the need of bus arbitration ? Explain daisy chaining scheme. [6]

Or

6. (*a*) Differentiate between UMA and NUMA. [6]

(*b*) What is DMA ? Explain DMA cycle stealing. [6]

7. (*a*) Draw and explain the block diagram of NVIDIA's GPU architecture. [7]

(*b*) Write short notes on the following with an example : [6]

(*i*) IA-64 model

(*ii*) AMD Multi core Opteron.

Or

8. (*a*) Explain advantages and disadvantages of Parallel Processing. [7]

(*b*) Differentiate between desktop and mobile version of i7 processor. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-171

S.E. (Information Technology) (I Sem.) EXAMINATION, 2018
DISCRETE STRUCTURE
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Use of calculator is allowed.
(*v*) Assume suitable data, if necessary.

Q1 a Calculate CNF, DNF, PDNF for the formula $p \rightarrow (p \wedge (q \rightarrow p))$. (6)

b Using Warshall's Algorithm find the transitive closure {(1,2),(1,3),(2,3),(2,4),(3,4)} (6)

OR

Q2 a Prove that $1 \cdot 1! + 2 \cdot 2! + \cdots + n \cdot n! = (n+1)! - 1$ using mathematical induction. (6)

b Draw the Hasse diagram for divisibility on the set (6)

a. {1,2,3,4,5,6,7,8}

b. {1,2,3,5,7,11,13}

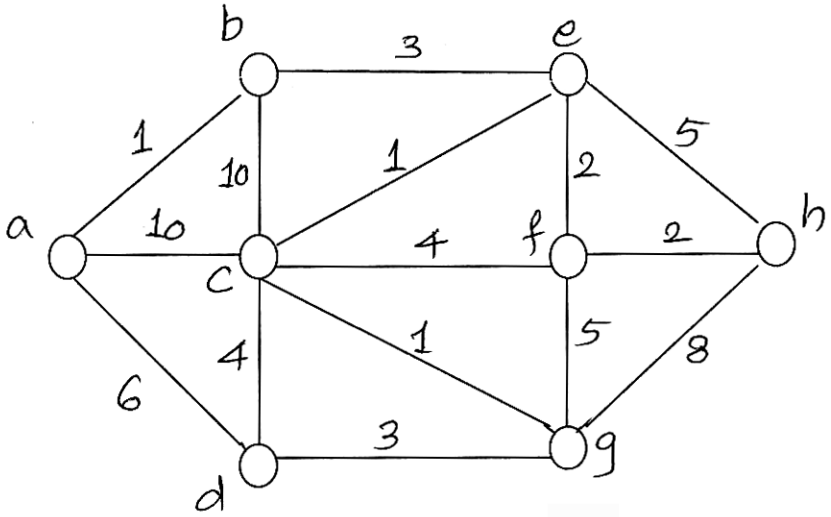
c. {1,2,36,12,24,36,48}

Q3 a Let $Z_6 = \{0,1,2,3,4,,5\}$. Let $\oplus$ denote the binary operation of mod n addition (6)

i.e. $p \oplus q = \begin{cases} p+q, if\ p+q < 6 \\ p+q-6,\ if\ p+q \geq 6 \end{cases}$

Let $\odot$ denote modulo multiplication. Prove that $(Z_6, \oplus, \odot)$ is a ring

b Find the shortest path using Djikstra's algorithm



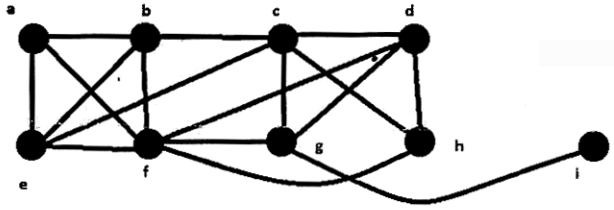
P.T.O.

OR

Q4 a Explain the terms (6)

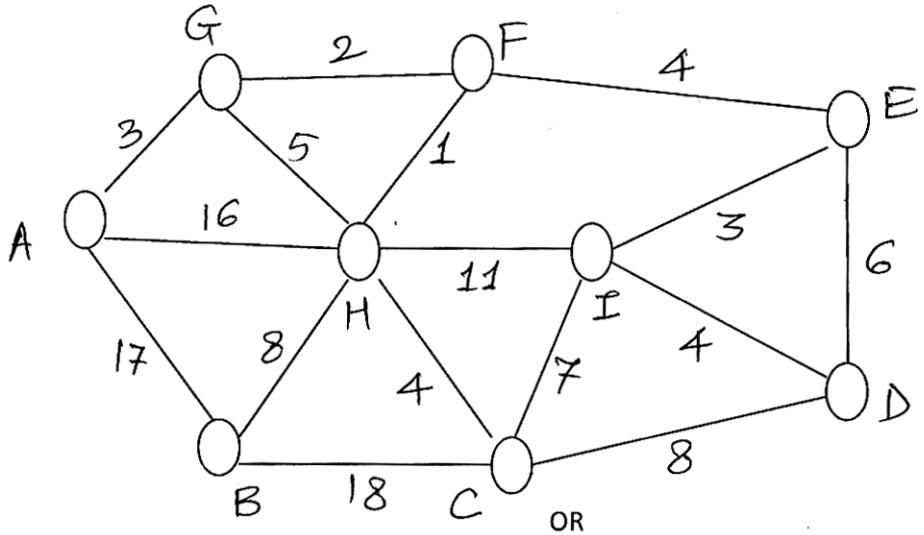
a. Group homomorphism
b. Group isomorphism
c. Group Auto morphism

b For the graph given , define Euler path, Euler circuit and determine the same. (6)



Q5 a Using Huffman coding encode the symbols with given frequencies a: 0.2, b: 0.1, c: 0.15, d: 0.25, e:0.3. What is the average number of bits to encode the character? (6)

b Find the minimum spanning tree for the following graph using Prim's algorithm (7)



OR

Q6 a Find the minimum spanning tree for the graph using Kruskal's algorithm Refer to figure (7)

b Draw the expression tree and find the value of the expression (6)

1. 5 2 1 - - 3 1 4 + + *
2. + * + - 5 3 2 1 4
3. 9 3 / 5 + 7 2 - *

Q7 a Suppose there are m girls and n boys in a class. What is the number of ways of arranging them in a line so that all the girls are together? (6)

b Find the probability for the following descriptions (7)

I. Find the probability of winning a lottery by selecting the correct six integers where the order in which these integers are selected does not matter, from the positive integers not exceeding 30, 36,42 and 48.

Ii Suppose that 100 people enter a contest and that different winners are selected at random for first, second, and third prizes. What is the probability that Kumar, Janice, and Pedro each win a prize if each has entered the contest?

OR

Q8 A Find the probability of selecting exactly one of the six integers in a lottery where the order in which these integers are selected does not matter, from the positive integers not exceeding 30, 36,42 and 48 (7)

b A club has 25 members. (6)

1. How many ways are there to choose four members of the club to serve on an executive committee?
2. How many ways are there to choose president, vice-president, secretary and treasurer of the club where no person holds more than one office?

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-172

S.E. (I.T.) (I-Sem.) EXAMINATION, 2018

COMPUTER ORGANIZATION

(2012 COURSE)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Neat diagram must be draw wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if necessary.

1. (*a*) With the help of block diagram differentiate Von Neumann and Harvard architecture. [6]

(*b*) List functionalities of different pins of 8086 while working in Minimum mode operation. [7]

Or

2. (*a*) With the help of flowchart, explain non-restoring division algorithm. [7]

(*b*) List out various operations supported by 8086 processor, explain any *three* Logical instructions in detail with example. [6]

3. (*a*) Elaborate need & various aspects of Memory Segmentation in 8086. [6]

(*b*) Explain the term software interrupt of 8086. Describe the response of 8086 on generation of software interrupt. [6]

P.T.O.

Or

4. (*a*) Explain different string related instructions of 8086 microprocessor. Specify the role of direction flas in their execution. [6]

(*b*) With the help of diagram explain register transfer mechanism of control unit. [6]

5. (*a*) Write a note on High Speed Memories. [6]

(*b*) Do the comparative analysis of Direct mapping, Associative mapping and Setassociative mapping techniques. [6]

Or

6. (*a*) which are the different cache updation polices, describe in detail. [6]

(*b*) Draw and explain MESI Protocol. [6]

7. (*a*) Draw and explain Polling method of Bus Arbitration. [7]

(*b*) Explain functions of following blocks of 8237 : [6]

- Priority encoder
- Program command control.

Or

8. (*a*) Write a note on : [6]

- CAN bus
- Serial & parallel data transfer in USART.

(*b*) Explain need of 8255 and list various features of it. [7]

Total No. of Questions—8] [Total No. of Printed Pages—2

Seat No.	

[5352]-173

S.E. (Information Technology) (Sem. I) EXAMINATION, 2018
DIGITAL ELECTRONICS AND LOGIC DESIGN
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer question 1 *or* 2, 3 *or* 4, 5 *or* 6 and 7 *or* 8.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data if neceessary.

1. (A) Perform the following operations using 2's complement method : [6]

(*i*) $-(48)_{10} - (23)_{10}$

(*ii*) $-(48)_{10} - (-23)_{10}$

(B) Design Full Subtractor using suitable DEMUX. [6]

Or

2. (A) Draw and explain 2 inputs TTL NOR gate. [6]

(B) Design Excess 3 Adder using Binary Adder IC 7483. [6]

3. (A) Construct State Table of JK Flip-Flop. What is Race around condition ? How it can be avoided ? [6]

(B) Explain with a neat diagram working of Parallel In Serial Out 4 bit shift resister. [6]

P.T.O.

Or

4. (A) Fxplain the Glitch Problem in the Ripple Counter. Also convert JK Flip-Flop to D Flip-Flop. [6]

(B) What is ASM Chart ? Design 2 bit Up Counter using Mux Controller method. [6]

5. (A) Draw & explain the basic architecture of CPLD. [6]

(B) A combinational circuit is defined by the following functions. Design the circuit with a PLA having 3 inputs, 3 product terms and two outputs. [7]

$$F1 = \sum m(3,5,7), \quad F2 = \sum m(4,5,7).$$

Or

6. (A) Explain the basic architecture of FPGA. [6]

(B) Design Full Adder using PLA. [7]

7. (A) Write a VHDL Code for Half Adder using Behavioral Modeling. [6]

(B) What is VHDL ? What are the important features of VHDL ? List & explain any three VHDL constructs. [7]

Or

8. (A) Explain with example “signal” and “variable” in VHDL. [6]

(B) List VHDL Modelling Styles. What is the difference between Behavioral and Data Flow VHDL Modellling Style. [7]

Total No. of Questions—8] [Total No. of Printed Pages—2

Seat No.	

[5352]-174

S.E. (IT) (I Sem.) EXAMINATION, 2018
FUNDAMENTALS OF DATA STRUCTURES
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer *four* questions.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.

Q 1) **a)** Explain logical operators in C with example? [06]

b) Explain call by value and call by reference with suitable example? [06]

OR

Q 2) **a)** Describe auto, static and register storage classes? [06]

b) Write recursive functions for the following: [06]

a. To find factorial of a given positive no.

b. To find sum of digits of given positive no.

Q 3) **a)** Write characteristics of an algorithm? Explain big-oh, omega and theta notations? [06]

b) Write algorithm to sort a list of integers using insertion sort. Show output of each pass for the following list: 16, 36, 4, 22, 100, 1, and 54. [06]

OR

Q 4) **a)** Differentiate between [06]

1. Primitive and non-primitive data structures
2. Linear and non-linear data structures

b) What is sorting? Sort the following elements in ascending order using bucket sort. Show all passes: 121, 8, 235, 055, 973, 97, 327, and 179. [06]

P.T.O.

Q 5) **a)** Write algorithm/ C function to find transpose of a sparse matrix using fast transpose algorithm. Analyze its time complexity? [08]

b) Explain sequential and linked memory organization? [06]

OR

Q 6) **a)** Explain row and column major representation of a matrix? [06]

b) Represent the following polynomial using array [08]

a. $X^2 + XY + 2\,X^3Y$

b. $3\,X^3 + 2\,Y^2X + 5\,Y^3X^3$

Q 7) **a)** Write a short note on- [08]

1. CLL
2. DLL
3. SLL
4. Skip list

b) Write a C functions that reverse the SLL using three pointers variables? [04]

OR

Q 8) **a)** What is generalized linked list? Represent the following lists: [08]

1. (a, b, c, (d, e, f), g, h)
2. (p, (q, r), s, (t, u), v)

b) Compare SLL and DLL? [04]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-175

S.E. (I.T.) (I Sem.) EXAMINATION, 2018
PROBLEM SOLVING AND OBJECT ORIENTED PROGRAMMING CONCEPTS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

Q1) a) What are the various types of modules? Explain the term coupling and cohesion related to module. [6]

b) What is the difference between an expression and equation? Write an equation to calculate the following: [4]

i. The average of five numbers.

ii. The sale price of an item given an original price and a percentage discount.

iii. The amount when the principal, interest and period of time is given.

c) Evaluate for A = 5, B = 3 and C = 2: [2]

i. F = A * C \ (A + C)

ii. F = (C * (B + 3 * A) + 5 * A) / C

OR

Q2) a) Design an algorithm to calculate the salary of an employee using the following problem solving strategies: [8]

a. Sequential Logic

b. Decision Logic

c. Loop Logic

d. Selection Logic

To calculate the salary consider designation, no. of days worked, wages per day, basic salary, allowances and deductions. Calculate salary according to designation of employee.

b) Define Algorithm. What are the various types of algorithm explain them with suitable example. [4]

P.T.O.

Q3) a) An instructor has a class of 25 students. Each student is identified by a number from 1 to 25. All tests are stored in a 2-dimensional array, with each column containing the grades for each test. The instructor would like to enter the student number and the test number and have the grade for that test printed on the monitor. Develop a solution to output the needed information. [6]

b) Explain how the polymorphism is achieved in C++ with suitable examples. [6]

OR

Q4) a) Define Constructor and Destructor. Explain various types of constructors with syntax. [6]

b) Explain the algorithm to count the number of times a particular word occurs in a text. [6]

Q5) a) Explain with a suitable example how code reusability is achieved in C++. [6]

b) What are the various rules for overloading the operators? [4]

c) Define Friend Class. Explain the concept of forward declaration of a class. [3]

OR

Q6) a) Define inheritance. Explain various types of inheritance with suitable example. [10]

b) What is an operator function? Describe the syntax of an operator function. [3]

Q7) a) What is generic programming? How it is implemented in C++ ? [3]

b) Define exception. Explain various types of exception with example. [10]

OR

Q8) a) Describe briefly the features of I/O system supported by C++ . [4]

b) Explain how the exception is handled in C++ . [4]

c) What is STL? Explain various components of STL. [5]

Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5352]-176

S.E. (Inform. Tech.) (Second Semester) EXAMINATION, 2018

COMPUTER GRAPHICS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Question Nos. Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data if necessary.

1. (*a*) Explain DDA algorithm and rasterize the line from (6, 0) to (–8, –4) using simple DDA algorithm. [6]

(*b*) Describe Bresenham's algorithm for line drawing. Explain gentle slope and sharp slope cases. [6]

Or

2. (*a*) List various polygon filling algorithms. Explain scan line algorithm with mathematical formulation. [6]

(*b*) Write a pseudo-C algorithm for polygon filling by Boundary fill and Flood fill recursive method. [6]

P.T.O.

3. (*a*) What is a segment ? How do we create it ? Why do we need segments ? Explain in detail the various operations of segments. [6]

(*b*) Use the Cohen-Sutherland Outcode algorithm to clip *two* lines : [6]

$P_1(40, 15)$, $P_2(75, 45)$ and $P_3(70, 20)$, $P_4(100, 10)$ against a window A(50, 10), B(80, 10), C(80, 40), D(50, 40).

Or

4. (*a*) Describe Sutherland-Hodgman polygon clipping algorithm. What is its limitation ? [6]

(*b*) Perform *x*-shear and *y*-shear on a triangle having A(2, 1), B(4, 3), C(2, 3). Consider the constant value $a = b = 2$. [6]

5. (*a*) Explain RGB, HSV and HLS color models. [7]

(*b*) What is surface rendering ? Explain Gourand method of shading. [6]

Or

6. (*a*) Explain CIE chromaticity diagram. Also explain two RGB to CMY conversion is done. [7]

(*b*) Explain Pseudo-C algorithm for Gourand shading. [6]

7. (*a*) Explain how fractals are used to generate fractal surfaces. [7]

(*b*) Explain Bezier curve and B-spline curve functions for generating curves. [6]

Or

8. (*a*) What is true curve generation ? Write a pseudo code to implement DDA arc generation. [7]

(*b*) Write a short note on : Curve generating by using approximation. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-177

S.E. (Information Technology) (II Sem.) EXAMINATION, 2018

PROCESSOR ARCHITECTURE AND INTERFACING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data if necessary.

1. (*a*) What is the purpose of assembler directives ? Explain the following assembler directives used in 80386 programming :

(*i*) DW

(*ii*) MACRO

(*iii*) EXTRN [6]

(*b*) Differentiate between the steps performed by processor when near and far procedure call occurs. [6]

Or

2. (*a*) Explain how pipelined processing improves performance of the system as compared to non-pipelined processing of 80386. [6]

(*b*) Draw and explain EFlag register of 80386 processor. [6]

P.T.O.

3. (*a*) Explain the paging mechanism implemented in 80386 and how the protection features are achieved. [6]

(*b*) What is Multitasking ? How is it achieved in 80386 processor ? [6]

Or

4. (*a*) Explain the working of confirming code segment in 80386 processor. [6]

(*b*) What is dual core processor ? Give the differences between single core and dual core processor. [6]

5. (*a*) Explain function of the following pins of 8051 micro-controller : [6]

(*i*) ALE

(*ii*) INT0

(*b*) Draw and explain memory organisation of 8051 micro-controller. [7]

Or

6. (*a*) Explain the following instructions of 8051 microcontroller : [6]

(*i*) ANL C, bit

(*ii*) RRC A

(*iii*) MOVX A, @DPTR

(*b*) Write a program to continuously send out to port 0 of 8051 the alternating values of 55H and AAH. [7]

7. (*a*) Explain PCON and TCON registers of 8051 micro-controller. [6]

(*b*) State and explain SFR's related to serial communication in 8051 microcontroller. [7]

Or

8. (*a*) Draw and explain the Mode 0 and Mode 1 of timer in 8051 microcontroller. [7]

(*b*) Explain the interrupt programming with the help of IE and IP SFR in 8051 microcontroller. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-178

S.E. (Information Technology) (II Sem.) EXAMINATION, 2018

DATA STRUCTURES AND FILES

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer *four* questions in all.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

1. a) Explain stack as an ADT. List applications of stack. 6

b) Write pseudo 'C++' code to implement linear queue using array. 6

OR

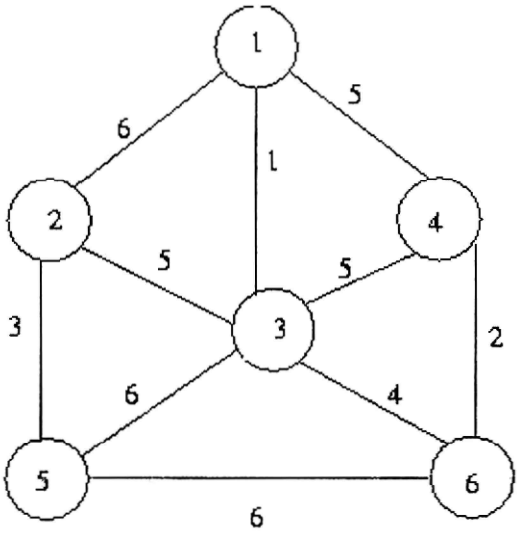
2. a) Clearly indicate the contents of stack during conversion of given infix expression into postfix expression : A ^ B * C – D + E / F / (G + H). Consider ^ as exponent operator. 6

b) What is circular queue ? How is it better than linear queue ? Explain priority queue in brief. 6

3. a) What is Threaded Binary Tree ? Explain inorder threaded binary tree with example. 6

P.T.O.

b) For the given graph below, draw the minimum spanning tree step wise using Krushkal's method. 6



OR

6

4. a) Define Binary Search Tree. Draw the BST stepwise for given nodes by assuming node's incoming sequence from left to right.

i , h , b , m , e , c , f , a , d , k

b) What is topological sorting? Write an algorithm for topological sorting with its time complexity. 6

5. a) What is hashing? Explain various hash collision resolution techniques. 6

b) Obtain an AVL tree by inserting one data element at a time in the following sequence. Label the rotations appropriately at each stage. 8

3,2,1,4,5,6,7, 16,15

OR

6. a) Sort the following numbers in ascending order using heap sort. Show the sorting stepwise. 6

5, 3, 17, 10, 84, 19, 6, 22, 9

b) Why is Huffman code used for data compression? Draw a Huffman tree for the given sentence & find the corresponding Huffman codes for every characters present in sentence. (Note: Count "spaces" & "." Operator also as characters) 8

Eerie eyes seen near lake.

7. a) What is file? Compare features of different types of file organization. 6

b) Write C++ program to perform the following operations on sequential file. 6
   i. Create records
   ii. Delete record with given key value
   iii. Display records

OR

8. a) Explain fread() , fwrite(), seekg() functions with example. 6

b) Write C++ program to perform the following operations on index sequential file. 6
   i. Create records.
   ii. Display records.

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-179

S.E. (Information Technology) (II Sem.) EXAMINATION, 2018
FOUNDATION OF COMPUTER NETWORKS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Assume suitable data, if necessary.
(*ii*) Neat diagrams must be drawn wherever necessary.

Q1 a) Explain various transmission impairments in data communications. **[4]**

b) Explain the Nyquist Theorem and solve the following: Television channels are 6 MHz wide. How many bits/sec can be sent if 4 level digital signals are used? Assume a noiseless channel. **[4]**

c) What are the different performance factors of data communication **[4]**

OR

Q2 a) Explain Manchester Encoding schemes with the help of diagram **[6]**

b) What is serial transmission? Explain synchronous & asynchronous transmission. **[6]**

Q3 a) Explain in detail Analog to digital conversion Scheme. **[7]**

b) Explain the Packet Switching and Circuit Switched Network. What are the three phases of it? **[6]**

OR

Q4 a) Explain OSI reference model of TCP/IP in detail **[5]**

b) Explain Bus Backbone Network with diagram. **[4]**

c) What are different connecting devices? Explain in brief each **[4]**

P.T.O.

Q5 a) What is block Coding and explain in brief **[4]**

b) Discuss the concept of redundancy in error detection and correction. **[4]**

c) What is CRC? Generate the CRC code for message 1101010101. Given generator polynomial g(x) = 10101 **[5]**

OR

Q6 a) Explain stop and wait ARQ, Go Back-N ARQ and Selective repeat ARQ. Comment on the performance of each. **[8]**

b) What is hamming distance? Explain with example. Explain simple parity check code. **[5]**

Q7 a) Explain CSMA/CD and CSMA/CA protocols used in LAN's **[6]**

b) Explain various stations types and configurations used in HDLC. **[6]**

OR

Q8 a) Explain CDMA, FDMA and TDMA. **[4]**

b) Describe different controlled access protocol mentioned below: **[4]**

i. Reservation
ii. Polling

c) Differentiate between Pure Aloha and Slotted Aloha. **[4]**

Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

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[5352]-181

S.E. (Chemical) (I Semester) EXAMINATION, 2018

CHEMISTRY I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Draw the resonating structure of : [6]

(*i*) Naphthalene

(*ii*) Phenoxide ion

(*iii*) Chlorobenzene.

(*b*) Derive an integrated rate equation for first order reaction. [6]

Or

2. (*a*) What is the effect of resonance on pK_a values of acids. [6]

(*b*) Explain activated complex theory and derive the expression for rate equation. [6]

P.T.O.

3. (*a*) Explain any *two* detectors used in gas chromatography. [6]

(*b*) Derive the equation for molar mass of solute by depression in freezing point. [4]

(*c*) Boiling point of chloroform increases by 0.32°C. When 0.51 gm of a solute is dissolved in 35 gm chloroform. If K_b for chloroform is 3.9. Calculate molar mass of solute. [3]

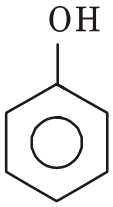
Or

4. (*a*) Explain the principle, technique and application of TLC. [6]

(*b*) Describe the measurement of vapour pressure by Berkley and Hartley method. [4]

(*c*) A solution of 10 gm NaCl in 900 gm of water freezes at –.62°C. The K_f for water is 1.85 k. kg per mole. Calculate Van't Hoff factor. (Given molar mass of NaCl is 58.5) [3]

5. (*a*) Predict the product : [6]

(*i*) 

$\xrightarrow[\text{nitrating mix}]{\text{excess}}$?

(*ii*)  + $CH_3COCl \xrightarrow[\text{anhydrous}]{AlCl_3}$?

(*iii*) $CH_3CH_2CH_2OH \underset{140°C}{\overset{75\%\ H_2SO_4}{\rightleftharpoons}}$?

(*b*) Give the mechanism of Claisen rearrangement. [6]

Or

6. (*a*) Write short notes on the following : [6]

(*i*) Deactivating group

(*ii*) Carbocation

(*iii*) Reformatsky rearrangement.

(*b*) What are the effects of the following factors on S_N1 and S_N2 reaction : [6]

(*i*) Nature of nucleophile

(*ii*) Nature of substrate

(*iii*) Nature of leaving group

(*iv*) Nature of solvent.

7. (*a*) Explain any *two* methods of synthesis : [6]

(*i*) Pyrrole

(*ii*) Furan.

(*b*) Explain diazotisation reaction and its application in synthesis of azo dyes. [7]

Or

8. (*a*) Describe the Skraup synthesis of Quinoline. [6]

(*b*) Give synthesis of the following : [7]

(*i*) Crystal violet

(*ii*) Phenolphthalein.

Total No. of Questions—8] [Total No. of Printed Pages—3

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[5352]-182

S.E. (Chemical Engineering) (I Sem.) EXAMINATION, 2018
CHEMICAL ENGINEERING FLUID MECHANICS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Attempt Q. No. **1** or **2**, **3** or **4**, **5** or **6**, **7** or **8**.
(*ii*) Figures to the right indicate full marks.
(*iii*) Neat diagrams must be drawn wherever necessary.
(*iv*) Assume suitable data, if necessary.
(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.

1. (*a*) Distinguish between : [6]
(*i*) Steady and unsteady flow
(*ii*) Uniform and non-uniform flow
(*iii*) Laminar and turbulent flow

(*b*) Explain relationship between absolute, gauge, vacuum and atmospheric pressure. [6]

OR

2. (*a*) Calculate density, specific weight and weight of one litre of petrol of specific gravity 0.7 [6]

(*b*) What are different types of manometers ? Explain any *one* one type of simple manometer in detail. [6]

P.T.O.

3. (*a*) Derive Bernoulli's equation. State assumptions made. [8]

(*b*) The diameters of a pipe at the sections 1 and 2 are 10 cm and 15 cm repectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2. [4]

OR

4. (*a*) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take C_d = 0.98. [6]

(*b*) Derive the expression of discharge for orifice meter. [6]

5. (*a*) Define and write expression of momentum and energy thickness. [4]

(*b*) Derive expression of displacement thickness. [4]

(*c*) Define any 5 dimensionless numbers used in fluid mechanics. [5]

OR

6. (*a*) The pressure difference ΔP in a pipe of diameter D and length L due to viscous flow depends on velocity V, viscosity μ and density ρ. Using Buckingham's theorem, obtain an expression for ΔP. [7]

(*b*) Explain growth of boundary layer over a flat plate. [6]

7. (*a*) Explain different types of fluidization. [5]

(*b*) Explain operating characteristics of centrifugal pump. [8]

OR

8. (*a*) Explain major and minor losses. [5]

(*b*) An oil of specific gravity 0.7 is flowing through a pipe of diameter 300 mm at the rate of 500 litres/sec. Find head lost due to friction and power required to maintain the flow for a length of 1000 m. Take kinematic viscosity as 0.29 stokes. [8]

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-183

S.E. (Chemical) (I Sem.) EXAMINATION, 2018
CHEMICAL ENGINEERING MATERIALS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.
(*ii*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.
(*iii*) Assume suitable data, if necessary.

Q1 a) Define the following terms: 6

i. Stiffness

ii. Resilience

iii. Malleability

b) Draw and explain stress-strain curve for Brittle materials. 6

OR

Q2) a) Explain in brief types for testing of materials. 6

b) Write short notes on: 6

i) Slip and Deformation

ii) Hardness Testing

Q3) a) Explain in detail Ultrasonic flow inspection test for testing of Engineering materials. 6

b) Define Nanotechnology. Explain the applications of Nanomaterials in chemical Industry. 7

P.T.O.

OR

Q4) a) Write short notes on the following: 7

i. Sol-Gel Method.

ii. Carbon Nanotubes.

b) Write down the classification of Nanomaterials. 6

Q5) Write short notes on: Scanning Electron Microscopy. 13

OR

Q6) Explain principle and working of Transmission Electron Microscope (TEM) 13

Q7) Write short notes on: 12

i. Glass

ii.Refractories

OR

Q8) a) Write a short note on Applications of Ceramic Materials. 6

b) Discuss in detail applications of Glass materials. 6

Total No. of Questions—8] [Total No. of Printed Pages—4

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[5352]-184

S.E. (Chemical Engineering) (First Semester)

EXAMINATION, 2018

PROCESS CALCULATIONS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagram must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Explain different methods of expressing composition. [4]

(*b*) Crystals of $MgCl_2.6H_2O$ have solubility of 190g/100g ethanol at 298 K. It is desire to make 1000 kg of saturated solution. Calculate the quantities of the crystals and ethanol required to make the above solution. Also, find the composition of saturated solution by mass. [8]

P.T.O.

Or

2. (*a*) Explain distillation operation with block diagram and material balance equations. [4]

(*b*) A mixed is to be prepared from spent acid, 99% H_2SO_4 and 95% HNO_3. Determine the mass of sulfuric acid, Nitric acid and water necessary to convert 1100 kg of spent acid containing 40% H_2SO_4, 20% HNO_3, 40% H_2O to a mixed acid containing 50% H_2SO_4, 40% HNO_3 and 10% H_2O. [8]

3. (*a*) Define limiting reactant, excess reactant, % conversion, yield and selectivity. [5]

(*b*) Flue gases leaving the boiler stack at 523 K have the following composition by volume :

CO_2 = 11.31%, H_2O = 13.04%, O_2 = 2.17% and N_2 = 73.48%

Calculate the heat removed from 1 kmole of gas mixture to cool from 523 K to 298 K using the heat capacity data given below : [8]

$C_p^0 = A + BT$, kJ/(kmole, K)

Gas	A	$B \times 10^3$
CO_2	21.3655	64.2841
H_2O	32.4921	0.0796
O_2	26.0257	11.7551
N_2	29.5909	–5.141

Or

4. (*a*) What is heat capacity ? Explain its temperature dependency. [5]

(*b*) The analysis of the gas entering the secondary converter in an contact sulfuric acid plant is 4% SO_2, 13% O_2 and 83% N_2 (on volume basis). The gas leaving the converter contains 0.45% SO_2 on SO_3^- free basis (by volume). Calculate the percentage of SO_2 entering the converter getting converted to SO_3. [8]

5. (*a*) Define absolute humidity, molal humidity, relative humidity and percentage humidity. Give the relation between absolute and molal humidity. [5]

(*b*) A solution of potassium dichromate in water contains 15% potassium dichromate by weight. 1000 kg of this solution is evaporated to remove some of the water. The remaining solution is cooled to 298 K. If the yield of potassium dichromate crystals is 75%, calculate the amount of water evaporated.

Solubility of potassium dichromate in water is 115 kg/1000 kg water. [8]

Or

6. (*a*) Explain drying operation with block diagram & material balance equations. [5]

(*b*) A continuous distillation column is fed with 35% by weight aqueous methanol to give a distillate containing 85% methanol by weight and a bottom product containing 95% by weight water. Compute the material balance for a feed rate of 1200 kg/h. [8]

7. (*a*) Write a note on the Orsat apparatus. [4]

(*b*) A natural gas contains 85% methane and 15% ethane by volume. Calculate the GHV and NHV of the fuel in kJ/kg from the standard heats of combustion of ethane and methane. [8]

$CH_4(g) + 2O_2 \rightarrow CO_2(g) + 2H_2O; \Delta H_c^0 = -802.62$ kJ/mol

$C_2H_6 + 3.5\ O_2 \rightarrow 2CO_2(g) + 3H_2O; \Delta H_c^0 = -1428.64$ kJ/mol

Latent heat of vaporization of water at 298 K is 2442.5 kJ/kg. [8]

Or

8. (*a*) Write a note on ultimate analysis. [4]

(*b*) The Orsat analysis of the flue gases gives CO_2 = 11.4%, O_2 = 4.2%, N_2 = 84.4% on mole basis. Assuming that complete combustion takes place :

(*i*) Calculate % excess air used

(*ii*) Find the C/H ratio in the fuel. [8]

Total No. of Questions—8] [Total No. of Printed Pages—6

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S.E. (Chemical/Printing Engineering) (First Semester)

EXAMINATION, 2018

ENGINEERING MATHEMATICS-III

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Solve Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Figures to right indicate full marks.

(*iii*) Use of non-programmable calculator is allowed.

(*iv*) Assume suitable data if necessary.

1. (*a*) Solve any *two* : [8]

(*i*) $(D^2 - 3D + 2)\, y = e^{e^{-x}}$

(*ii*) $(x+1)^2 \frac{d^2y}{dx^2} - (x+1)\frac{dy}{dx} - 3y = 6x$

(*iii*) $\frac{xdx}{z^2 - 2yz - y^2} = \frac{dy}{y+z} = \frac{dz}{y-z}$.

P.T.O.

(*b*) Find the Fourier cosine transform of $f(x) = e^{-x}$ and hence show that : [4]

$$\int_0^\infty \frac{\cos mx\, dx}{1+x^2} = \frac{\pi}{2} e^{-m}.$$

Or

2. (*a*) A weight of 3kg stretches a spring 15 cm. If the weight is pulled 10 cm below the equilibrium position and released, find the position at any time *t*. Also find the amplitude and frequency of motion. [4]

(*b*) Find $f(x)$ if $F_s(\lambda) = \frac{1}{\lambda} e^{-a\lambda}$. [4]

(*c*) Find the Fourier transform of : [4]

$f(x) = 1 - x^2, \quad |x| \leq 1$

$= 0, \quad |x| > 1$

and hence evaluate :

$$\int_0^\infty \left(\frac{x\cos x - \sin x}{x^3} \right) \cos \frac{x}{2}\, dx.$$

3. (*a*) Attempt any *one* :

(*i*) Find Laplace transform of : [4]

$$t^2 e^{3t} \sin 4t.$$

(*ii*) Find inverse Laplace transform of :

$$\log \left(\frac{s^2+9}{s^2+4} \right).$$

(*b*) Solve by Laplace transform : [4]

$$\frac{d^2y}{dt^2} + 5\frac{dy}{dt} + 4y = 0, \quad y(0) = 1, \; y'(0) = -1.$$

(*c*) Find directional derivative of $\phi = x^2y + y^3z$ at (2, –1, 1) along a line equally inclined with co-ordinate axes. [4]

Or

4. (*a*) Show that (any *one*) : [4]

(*i*) $r^5[\bar{b} \cdot \nabla(\bar{a} \cdot \nabla \frac{1}{r})] = \frac{(\bar{a} \cdot \bar{r})(\bar{b} \cdot \bar{r})}{r^2} - \frac{\bar{b} \cdot \bar{a}}{r^4}$

(*ii*) $\nabla\left(\nabla \cdot \frac{\bar{r}}{r}\right) = -\frac{2\bar{r}}{r^3}$.

(*b*) Show that :

$$\bar{F} = (2xy + z^3)\,\bar{i} + x^2\bar{j} + 3xz^2\,\bar{k}$$

is irrotational and find scalar ϕ such that $\bar{F} = \nabla\phi$.

(*c*) The transfer function of a second-order system is given as :

$$G(s) = \frac{6}{s^2 + 1.8\,s + 1}$$

Find overshoot, period of oscillation, $y(t)_{max}$.

5. (*a*) Evalute :

$$\int_c \bar{F} \cdot d\bar{r}$$

where $\bar{F} = xi + (2xz - y)j + 3z^2\bar{k}$

along the straight line joining (0, 0, 0) and (3, 1, 2). [4]

(*b*) Use the divergence theorem to evaluate : [4]

$$\iint_S (y^2 z^2 \bar{i} + z^2 x^2 \bar{j} + x^2 y^2 \bar{k}).\, d\bar{s}$$

where s is the upper part of the sphere $x^2 + y^2 + z^2 = a^2$ above the $x0y$ plane.

(*c*) Evaluate using Stokes' theorem : [5]

$$\int_C (ydx + zdy + xdz)$$

C being intersection of :

$$x^2 + y^2 + z^2 = a^2,\ x + z = a$$

Or

6. (*a*) Find the work done in moving a particle once round the circle $x^2 + y^2 = 4,\ z = 0$ under the field of force given by :

$$\bar{F} = (2x - y - z)\,\bar{i} + (x + y - z^3)\,\bar{j} + (2x - 3y + 4z)\,\bar{k}.$$

(*b*) Evaluate :

$$\iint_S (x^3 \bar{i} + y^3 \bar{j} + z^3 \bar{k}).\, d\bar{s},$$

where s is the surface of sphere $x^2 + y^2 + z^2 = a^2$.

(*c*) Test whether the motion specified by :

$$\bar{q} = \frac{(x\bar{j} - y\bar{i})}{x^2 + y^2}$$

is possible fluid motion for an incompressible fluid. If so determine the equation of the streamlines. [5]

7. (*a*) If $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ represent the vibrations of a stretched string of unit length fixed at both ends. Find solution with boundary conditions :

(*i*) $u(0, t) = 0, \forall t$

(*ii*) $u(1, t) = 0, \forall t$

(*iii*) $\left(\frac{\partial u}{\partial t}\right)_{t=0} = 0 \; \forall x$

(*iv*) $u(x, 0) = (x - x^2), 0 \leq x \leq 1$

(*b*) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ if : [6]

(*i*) u is finite

(*ii*) $u(0, t) = 0 \; \forall t$

(*iii*) $u(\pi, t) = 0 \; \forall t$

(*iv*) $u(x, 0) = \pi x - x^2, \; 0 \leq x \leq \pi$.

Or

8. (*a*) A rectangular palte with insulated surfaces is 10 cm wide and so long compared to its width that it may be considered infinite length without introducing an appreciable error. If the temperature along short edge $y = 0$ is given $u(x, 0) = 100 \sin\left(\frac{\pi x}{10}\right), 0 \leq x \leq 10$ while the two long edges $x = 0$, and $x = 10$ as well as other short edge are kept at 0ºC. Find steady state temperature $u(x, y)$.

(*b*) Use Fourier transform to solve equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, 0 < x < \infty,$ $t > 0$ subject to conditions :

(*i*) $u(0, t) = 0 \quad t > 0$

(*ii*) $u(x, 0) = \begin{cases} 1 & 0 < x < 1 \\ 0 & x > 1 \end{cases}$

(*iii*) $u(x, t)$ is bounded.

Total No. of Questions—8] [Total No. of Printed Pages—3

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S.E. (Chemical) (Second Semester) EXAMINATION, 2018

CHEMISTRY-II

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic tables, slide rule, Mollier charts, Electronic pocket calculator and Steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Explain on the basis of VBT $[Ni(CN)_4]^{-2}$ is diamagnetic and $[NiCl_4]^{-2}$ is paramagnetic. [6]

(*b*) Draw the structures of Amylase, Amylopection and cellulose. [6]

Or

2. (*a*) Explain the following terms with example : [6]

(*i*) ligand

(*ii*) coordination number

(*iii*) effective atomic number.

P.T.O.

(*b*) Give an account of CFT for tetrahedral complex. [6]

3. (*a*) Give the mechanism of metal co-ordination compound catalysed reactions in Wacker process. [6]

(*b*) What is complexometric titration ? Explain with suitable example. [6]

Or

4. (*a*) What is adsorption isotherm ? Derive expression for Freundlich adsorption isotherms. [6]

(*b*) 25 ml of standard solution of 0.05 MKCl solution takes 37.5 ml of $AgNO_3$. 100 ml of chloride water sample requires 12.3 ml of same $AgNO_3$ solution upto end point. Calculate the quantity of chloride ions per liter in given water sample. [6]

5. (*a*) What do you understand by the term conformations ? Draw all conformations of *n*-butane. [5]

(*b*) Draw chair and boat conformations of cyclohexane, showing axial and equatorial hydrogen. [4]

(*c*) What is optical isomers ? Define the term enantiomers, diastereomers with example. [4]

Or

6. (*a*) Explain Baeyer's strain theory for cycloalkanes. [5]

(*b*) Explain geometrical isomerism with example. [4]

(*c*) Explain staggered conformation of *n*-butane is stable. [4]

7. (*a*) Write a note on sulfonating agents and their applications. [5]

(*b*) Discuss the design and construction of equipment for halogenation. [4]

(*c*) Give mechanism and kinetics involved in nitration reaction. [4]

Or

8. (*a*) Explain continuous nitration process. [5]

(*b*) Discuss the commercial processes in preparation of vinyl chloride. [4]

(*c*) Give the mechanism and kinetics involved in sulphonation reaction. [4]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-187

S.E. (Chemical) (II Sem.) EXAMINATION, 2018

HEAT TRANSFER

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Explain : [6]

(*i*) Conduction

(*ii*) Convection

(*iii*) Radiation.

(*b*) Explain fundamental laws for heat transfer. [6]

Or

2. (*a*) One end of a very long aluminium rod of 3 mm in diameter is connected to a wall at 413 K, while the other end protrudes/

P.T.O.

projects into a room whose air temperature is 288 K. Calculate the total heat dissipated by the rod.

Data :

K for aluminium = 150 W/(m.K)

H between the rod surface and environment = 300 W/(m^2K) [6]

(*b*) A flat plane of thickness *x* has one surface maintained at T1 and other at T2. If the thermal conductivity varies with temperature as per the following equation :

$$K = a + bT.$$

where *a* and *b* are constants, then derive an expression for one-dimensional heat flux Q/A. [6]

3. (*a*) Explain : [6]

(*i*) Natural Convection

(*ii*) Forced Convection.

(*b*) Explain : [6]

(*i*) Film-wise Condensation

(*ii*) Effect of Non-Condensable Gases.

Or

4. (*a*) Explain : [6]

(*i*) Absorptivity

(*ii*) Reflectivity

(*iii*) Transmissivity.

(*b*) Explain : [6]

(*i*) Black Body

(*ii*) Kirchhoff's Law.

5. Explain design procedure for Double pipe heat Exchanger. [13]

Or

6. Explain design procedure for Shell and Tube heat Exchanger. [13]

7. (*a*) Calculate the boiling point elevation and the driving force for the heat transfer. Use the following data :

Solution boils at temperature of 380 K and the boiling point of water at a pressure in the vapour space is 373 K. Temperature of condensing steam is 399 K. [8]

(*b*) Explain Material and energy balance over single effect evaporator. [5]

Or

8. (*a*) An evaporator is operating at atmospheric pressure. It is desired to concentrate a feed from 5% solute to 20% solute (by weight) at a rate of 5000 kg/h. Dry saturated steam at a pressure corresponding to the saturation temperature of 399 K used. The feed is at 298 K and the boiling point rise 5 K. The overall heat transfer coefficient is 2350 W/(m^2K). Calculate the

steam economy of the evaporator and the area of heat transfer to be provided.

Data :

Treating the solution as a pure water and neglecting BPR, the latent heat of Condensation of steam at 399 K is 2185 kJ/kg.

Latent heat of vaporisation of evaporation of water at 101.325 kPa and 373 K = 2257 kJ/kg.

Sp. heat of feed is 4.187 kJ/(kgK). [9]

(*b*) Differentiate between Evaporation and Drying. [4]

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

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S.E. (Chemical) (II Sem.) EXAMINATION, 2018

PRINCIPLES OF DESIGN

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Distinguish between codes and standards state the engineering aspects covered in standard specifications. [6]

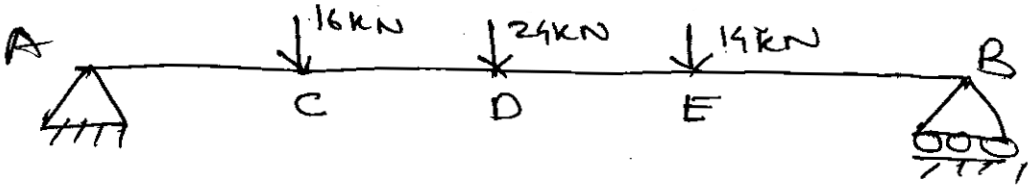
(*b*) A hollow shaft is required to transmit 600 kW at 110 rpm the maximum torque being 20% greater than the mean. The shear stress is not to exceed 63 MPa and twist in a length of 3 metres not to exceed 1.4 degrees. Find the external diameter of the shaft, if the internal diameter to the external diameter is 3/8. Take modulus of rigidity as 84 GPa. [6]

Or

2. (*a*) What are the various theories of failure ? Explain in detail. [6]

P.T.O.

(*b*) A simply supported beam AB of span 8 m carries three point loads as shown in fig. Draw S.F. and B.M. diagrams. [6]



3. (*a*) How are the keys classified ? Draw neat sketches of different types of keys and state their applications. [6]

(*b*) A shaft made of mild steel is required to transmit 100 kW at 300 rpm. The supported length of the shaft is 3 metres. It carries two pulleys each weighing 1500 N supported at a distance of 1 metre from the ends respectively. Assuming the safe value of stress, determine the diameter of the shaft. [7]

Or

4. (*a*) Design a belt drive to transmit 110 kW for a system consisting of two pulleys of diameters 0.9 m and 1.2 m, centre distance of 3.6 m, a belt speed 20 m/s, coefficient of friction 0.3, a slip of 1.2% at each pulley and 5% friction loss at each shaft, 20% over load. [6]

(*b*) What are rolling contact bearings ? Discuss their advantages over sliding contact bearings. [5]

(*c*) How do you express the life of bearing ? [2]

5. (*a*) Calculate the thickness of torispherical (100 – 6) head, torispherical (80 – 10) head and elliptical head (2.1) for a vessel having 1.0 m diameter and having a design pressure of 3.5 kg/cm^2. Welded joint is fully tested so welded joint efficiency can be considered as 100%. Permissible stress for material of construction = 1250 kg/cm^2. 6

(*b*) A vessel is designed for an internal pressure 100 kg/cm^2. A spiral wound metal fibre stainless steel gasket with inside diameter 36 cm and width 2.0 cm is used.

Gasket factor is 3.0, while gasket seating stress is 675 kg/cm^2. Permissible stress for bolt material at atmospheric and operating condition is 1300 kg/cm^2. Check whether the gasket width is sufficient to keep it away from crushing out ? [6]

Or

6. (*a*) A pressure vessel has inside diameter 1470 mm and a plate thickness of 5 mm. Inside diameter of flange is 1482 mm. A gasket is provided over the flange face. Gasket factor is 2.0 and the gasket seating stress is 120 kg/cm^2.

Inside diameter of gasket is 1485 mm. Pressure inside the vessel is 2.5 kg/cm^2. Permissible stress in bolts under atmospheric condition is 600 kg/cm^2. Permissible stress in bolts at operating conditions is 550 kg/cm^2. Diameter of bolt is 20 mm.

Calculate : [12]

(*i*) The bolt load

(*ii*) The bolt area and

(*iii*) Flange thickness

7. (*a*) The inside radius of a hydraulic cylinder is 20 cm. Calculate the required thickness if it operates at 500 kg/cm^2. The permissible tensile stress of material is 2400 kg/cm^2. [7]

(*b*) Write short note on "Autofrettaging" of monoblock pressure vessels. [6]

Or

8. (*a*) A tall vertical vessel 2.2 min outside diameter and 34 m in height has a shell thickness 14 mm. Corrosion allowance is not necessary. The vessel is insulated with 80 mm thick magnesia insulation. The vessel has no attachments. Wind force acting over the vessel is 128 kg/m^2. Weight of the vessel = 91000 kg. Calculate the bending moment induced in the vessel and estimate the resulting bending stress. [7]

(*b*) With neat sketches explain types of flanged joints used in pressure vessels. [6]

Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

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[5352]-189

S.E. (Chemical Engineering) (II Sem.) EXAMINATION, 2018
CHEMICAL ENGINEERING THERMODYNAMICS—I
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) 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**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Use of calculator is allowed.
(*v*) Assume suitable data, if necessary.

Q1) a) What are the limitations of the first Law of Thermodynamics? [6]

b) Derive an equation for work done for an isothermal and an isochoric (constant volume) process. [7]

(OR)

Q2) a) Explain the Virial equations and compressibility factor. [6]

b) One kmol of CO_2 occupies a volume of 0.381 m^3 at 313 K. Compare the pressures given by : (i) ideal gas equation, (ii) van der Waals equation (a = 0.365 m^4 N/mol^2 and b = 4.28 x 10^{-5} m^3/mol). [7]

Q3) a) Define heat of formation, heat of reaction, heat of combustion. [6]

b) Pure Carbon Monoxide is burned completely with 50% excess air at constant pressure. The products of combustion leave the reaction chamber at 600 K. Calculate the heat evolved or absorbed in the reaction chamber per kmol of CO burned. ΔH_R^0 = - 283.028 kJ/mol CO at 298 K. The mean heat capacities applicable in the temperature range are 29.1, 41.45, 29.7 and 29.1J/mol K for CO, CO_2, O_2 and N_2. [6]

(OR)

Q4) a) Prove that entropy is a state function. [6]

P.T.O.

b) Ten kg of water at 375 K is mixed adiabatically with 30 kg of water at 275 K. What is the change in entropy? [6]

Q5) a) Derive the Clausius Clayperon Equation. [6]

b) Develop equations for evaluating the change in internal energy and change in entropy for process involving ideal gas. [6]

(OR)

Q6) a) Prove the following equation [6]

$dS=Cv\ dT/T + \beta\ dV/K$

b) Explain Thermodynamic diagrams. [6]

Q7) a) Explain the ideal refrigeration cycle. [6]

b) A vapour compression cycle using ammonia as the refrigerant is rated at 5 ton. The evaporator is at 273 K and the condenser is at 303K. The saturation pressures of ammonia corresponding to these temperatures are 4.29 and 11.67 bar respectively. Allowable temperature rise for cooling water is 10 K. Enthalpy of saturated liquid and vapour at 273 K are 168 kJ/kg and 1300 kJ/kg respectively and the values at 303 K are 300 and 1327 kJ/kg respectively. Enthalpy of superheated vapour leaving the compressor at 11.67 bar is 1445 kJ/kg. Determine the hp required for the compressor, refrigerant circulation rate, cooling water circulation rate and COP. [7]

(OR)

Q8) a) Explain the desirable characteristics of a refrigerant. [6]

b) Explain the ideal refrigeration cycle. [7]

Total No. of Questions—8] [Total No. of Printed Pages—2

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[5352]-190

S.E. (Chemical) (II Sem.) EXAMINATION, 2018
MECHANICAL OPERATIONS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6**, Q. **7** or Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

1. (*a*) What is screen efficiency and screen effectiveness ? [6]

(*b*) Derive the relation for screen effectiveness. [6]

OR

2. (*a*) Explain with a neat sketch Open-circuit grinding and Close-circuit grinding. [6]

(*b*) Explain with a neat sketch Cyclone separator. [6]

3. (*a*) Describe in detail elements of pneumatic conveying systems. What are the merits and demerits of pneumatic conveyors ? [7]

(*b*) Enlist objectives of conveyors. Draw at least *four* types of belt drive arrangements. [6]

P.T.O.

OR

4. (*a*) Write an explanatory note on : [7]

(*i*) Radial flow impellers

(*ii*) Axial flow impellers

(*b*) Explain in detail Mixing Index. [6]

5. (*a*) What are the various factors whioh affect the rate of filtration ? Derive an expression to calculate the rate offiltration. [8]

(*b*) Explain the operating cycle of centrifuge filter. [5]

OR

6. (*a*) A rotary filter operating at 2 rpm, filters 1000 lit/min. operating under the same vacuum neglecting the resistance of the filtercloth, at what speed must the filter be operated to give afiltration rate of 2000 lit/min. [9]

(*b*) Write a note on Bag Filters. [4]

7. (*a*) What is minimum fluidization ? Derive an expression for it. [8]

(*b*) Write note on Particulate fluidization. [4]

OR

8. (*a*) Calculate the settling velocity of glass spheres having a diameter of 1.554×10^{-4}m in water at 293.2 K. The slurry contains 60 wt% solid. The density of the glass spheres is 2467 kg/m^3, density of water 998 kg/m^3 and viscosity of water is 1.005×10^{-3}Pa.s [8]

(*b*) Distinguish between free settling and hindered settling. [4]

Total No. of Questions—**12**] [Total No. of Printed Pages—**5**

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[5352]-2

S.E. (Mechanical S/W) (II Sem.) EXAMINATION, 2018

COMPUTER APPLICATIONS

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** from Section I and Q. No. **7** *or* Q. No. **8**, Q. No. **9** *or* Q. No. **10**, Q. No. **11** *or* Q. No. **12** from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of calculator is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Explain Modified Newton Raphson method graphically and list its disadvantages. [8]

(*b*) Find root of $e^{-x} - x = 0$ correct to four decimal places using Newton Raphson method consider starting point as $x = 0$. [8]

P.T.O.

Or

2. (*a*) List different Numerical methods for integration with advantages and disadvantages. [8]

(*b*) Evaluate : [8]

$$\int_{2}^{4} \left(1 + x^4\right)$$

using Gauss Quadrature 2 point formula.

3. (*a*) Find the value of y at $x = 310$ using Lagrange's Interpolation : [8]

x	***y***
300	2.4771
304	2.4829
305	2.4843
307	2.4871

(*b*) List different Numerical methods for differentiation with advantages and disadvantages. [8]

Or

4. (*a*) Find the value of y at $x = 9$ using Lagrange's Interpolation : [8]

x	***y***
5	150
7	392
11	1452
13	2366

(*b*) Explain the selection criteria for Numerical Interpolation methods. [8]

5. (*a*) Solve the following set of simultaneous equations using Gauss Siedel method. Do *six* Iterations : [10]

$$10x - 2y - 2z = 6$$
$$-x + 10y - 2z = 7$$
$$-x - y + 10z = 8.$$

(*b*) Explain with flow chart Gauss Elimination method. [8]

Or

6. (*a*) Solve the following set of simultaneous equations using Gauss Elimination method : [10]

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16.$$

(*b*) Explain with flow chart Gauss Siedel method. [8]

SECTION II

7. (*a*) Draw flow chart for fitting straight line using least square technique. [8]

(*b*) Fit $y = ax^b$ equation through the following set of points : [8]

x	*y*
2000	15
3000	15.5
4000	16
5000	17
6000	18

Or

8. (*a*) Explain error propagation with suitable example. [4]

(*b*) Explain *relative error* and *round-off error* with suitable example. [4]

(*c*) Fit a straight line through the following set of points : [8]

x	y
1	1.5
3	2.8
5	4
7	4.7
9	6

9. (*a*) Draw flow chart to solve Ordinary differential equations using Modified Euler's method. [8]

(*b*) Using 'Runge Kutta method of order 4', find y at $x = 0.1$ and 0.2 for the following equation $dy/dx = x + y^2$, where $y(0) = 1$. [8]

Or

10. (*a*) Draw flow chart to solve Ordinary differential equations using Milne's method. [8]

(*b*) Given $\frac{dy}{dx} = \log_{10}(x^2 + y)$, find $y(0.4)$ with step size of 0.2, using modified Euler's order method for accuracy of 0.001 with initial condition as $y(0) = 1$. [8]

11. (*a*) Draw flow chart to solve Hyperbolic equation. [8]

(*b*) Solve the Parabolic equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to condition $u(x, 0) = \sin \pi x$, $0 \leq x \leq 1$, $u(0, t) = u(1, t) = 0$ using Crank-Nicolson method, do two iterations taking $h = 1/3$, $k = 1/36$. [10]

Or

12. (*a*) Draw flow chart to solve elliptic equation. [8]

(*b*) Evaluate the pivotal values of equation $u_{tt} = 16 u_{xx}$, taking $\Delta x = 1$ upto $t = 3$. The boundary conditions are $u(0, t) = u(5, t) = 0$ and $u(x, 0) = x^2(5 - x)$. List values for 3 iterations. [10]

Total No. of Questions—**12**] [Total No. of Printed Pages—**5**

Seat No.	

[5352]-4

S.E. (Electronics/E&TC) (I Sem.) EXAMINATION, 2018
POWER DEVICES AND MACHINES
(2008 Pattern)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any *three* questions from each section.
(*ii*) Answers to the *two* sections should be written in separate answer-books.
(*iii*) Neat diagrams must be drawn wherever necessary.
(*iv*) Figures to the right indicate full marks.
(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Draw the vertical cross-section of power MOSFET and explain the following :
(*i*) Reason for "Body-Source" short in the MOSFET structure.
(*ii*) Presence of integral reverse diode in the structure. [8]

(*b*) State True or False and justify :
(*i*) Schottky diodes are used as feedback diodes.
(*ii*) The principle of operation of IGBT is similar to that of MOSFET. [4]

(*c*) Write short note on methods of isolating control and power circuits in power converters. [6]

OR

2. (*a*) The Thevenin equivalent of an IGBT gate driven circuit is a DC source of 10V in series with a resistance R. The

P.T.O.

IGBT parameters are C_{gs} = 100 PF, C_{gd} = 150 PF and $V_{GS}(Th)$ = 3V. Calculate the value of R so that the turn-on delay, *i.e.* time taken for V_{GS} to rise from zero to $V_{GS}(Th)$ is 5 ns. [6]

(*b*) Justify :

(*i*) Parallel operation of MOSFETS can be done more easily as compared to thyristors.

(*ii*) Power MOSFET is best switch in PWM inverter.

(*iii*) SOA of an IGBT is superior to that of power BJT. [6]

(*c*) Draw and explain reverse recovery characteristics of power diode. [6]

Or

3. (*a*) Draw a two transistor equivalent circuit of SCR and derive an expression for the anode current in terms of the gate current and transistor parameters. [6]

(*b*) Why is a high frequency pulse train preferred for gating SCRs as compared to DC triggering. [4]

(*c*) A SCR is connected in series with a RL load and is fed from 120V, 60 Hz A.C. supply. The load resistance is 15 ohm and load inductance is 0.75 H. What is the maximum allowable latching current of the triac if the gate trigger circuit output pulse is of 100 microseconds duration at a delay angle of 45°. [6]

Or

4. (*a*) Write a short note on 'Turn-ON' and 'Turn-OFF' snubbers. [4]

(*b*) Describe the following ratings as applicable to SCR :

(*i*) Surge current rating

(*ii*) di/dt rating

(*iii*) I^2t rating

(*iv*) dv/dt rating. [8]

(*c*) Describe the different modes of operation of thyristor with the help of its static V-I characteristics. [4]

5. (*a*) Draw the circuit diagram and waveforms of output voltage, output current, supply current, SCR current and voltage for a single-phase fully controlled bridge feeding a highly inductive load. [8]

(*b*) For the above circuit, the supply voltage is 230V, 50Hz, load resistance is 30 ohm. If the firing angle is 30°, calculate :

(*i*) Average load current

(*ii*) DC load power

(*iii*) Supply power factor

(*iv*) Reactive power input. [6]

(*c*) What do you mean by communication of a SCR. [2]

OR

6. (*a*) Draw the circuit diagram of a three-phase full converter with a resistive load. Explain its working and draw the load voltage, input supply, load current at $\alpha = \frac{\pi}{3}$. [10]

(*b*) Explain the semi-converter operation of full converter, note that no free wheeling diode is used. Draw suitable waveforms. [6]

SECTION II

7. (*a*) Draw the neat circuit diagram and waveform of single-phse bridge inverter for RL load. Explain its operation. [8]

(*b*) Write a short note on : Offline UPS. [4]

(*c*) Explain the control techniques used in chopper circuits. [4]

OR

8. (*a*) Explain 180° conduction mode for there-phase VSI bridge inverter having balanced star connected resistive load. [8]

(*b*) Give advantages and applications of SMPS. [4]

(*c*) Explain cross conduction or shoot through fault in inverters. How will you overcome it ? [4]

9. (*a*) Sketch and explain torque-slip characteristics of three-phase induction motor. Explain the effect of change in rotor resistance on the torque-slip characteristics of an induction motor. [6]

(*b*) Explain the principle of operation of Universal Motor. [4]

(*c*) A 4 pole, 250 volts, d.c. series motor has a wave connected armature with 200 conductors. The flux per pole is 25 mwb when motor is drawing 60 amperes from the supply. Armature resistance is 0.15 ohms, while series field winding resistance is 0.2 ohms. Calculate the full speed under this condition. [6]

OR

10. (*a*) Explain the effect of change in supply voltage on the speed of three-phase induction motor. [4]

(*b*) Explain construction of D.C. motor with a neat diagram. [6]

(*c*) Plot the torque-armature current characteristics for D.C. series motor and explain it. [6]

11. Write short notes on (any *three*) : [18]

(*a*) Stepper motor control

(*b*) Step up chopper

(*c*) Online UPS

(*d*) Characteristics of current transformer and potential transformer.

OR

12. (*a*) What is a servomotor and what are the requirements of good servomoter ? [4]

(*b*) Explain the construction of BLDC motor and state its applications. [4]

(*c*) Write comparison between variable reluctance and permanent magnet stepper motor. [4]

(*d*) Draw the circuit diagram and explain star-delta connection of three-phase transformer. Draw the phasor diagram. [6]

Total No. of Questions—**6**] [Total No. of Printed Pages—**3**

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[5352]-5

S.E. (E & TC) (II Semester) EXAMINATION, 2018

ELECTROMAGNETICS

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6**.

(*ii*) Answer *all* questions in same answer book.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Neat diagrams must be drawn wherever necessary.

(*vi*) Assume suitable data, if necessary.

1. (*a*) State Coulomb's law and derive the expression for $\overline{E}$ using Coulomb's law of force. [8]

(*b*) Define electric field intensity. Calculate $\overline{E}$ at (3, 4, –2) in free space caused by a charge of 3 μC at origin. [8]

Or

2. (*a*) What is Laplace equation ? Derive expression for parallel plate capacitor using Laplace's equation. [8]

(*b*) A point charge of 10 *n*C is placed at the origin. While another point charge of 8 *n*C is placed at (2, 3, 4). Find the potential at point (–1, 2, –3). [8]

P.T.O.

3. (*a*) State Ampere's circuital law and derive an expression for magnetic field intensity due to long straight filament. [8]

(*b*) The plane $z = 0$ makes the boundary between the free space and dielectric medium with a dielectric constant 40. The electric field next to the interface in free space is $\overline{E} = 13\overline{a}_x + 40\overline{a}_y + 50\overline{a}_z$ (V/m). Determine the electric field on the other side of the interface. [8]

Or

4. (*a*) Derive the electrostatic boundary conditions at an interface between conductor and free space. [8]

(*b*) Given the magnetic vector potential $\overline{A} = -r^2/4\overline{a}_z$ (Wb/m). Calculate the total magnetic flux crossing the surface $\phi = \frac{\pi}{2}$, $1 \leq r \leq 2m$, $0 \leq z \leq 5m$. [8]

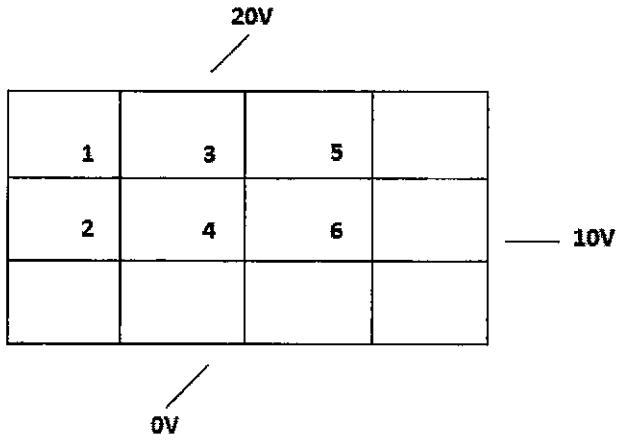
5. (*a*) Explain method of moments (MOM) in brief and give the comparison between FDM and FEM. [10]

(*b*) The electric field intensity $\overline{E} = 250 \sin 10^{10} t$ V/m for a field propagating in the medium whose $\sigma = 5.0$ S/m and $\in_r = 1.0$. Calculate the displacement current density J_d, the conduction current density J_c and the frequency at which $J_c = J_d$. [8]

Or

6. (*a*) State Poynting Theorem, give its significance. Derive the expression for Poynting vector $\overline{P}$. [10]

(*b*) Consider a potential system shown in figure below, obtain the potentials at free nodes using FDM. [8]



Total No. of Questions—**12**] [Total No. of Printed Pages—**4**

Seat No.	

[5352]-6

S.E. (Electro. E & TC) (II Semester) EXAMINATION, 2018

ELECTROMAGNETICS

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer to the *two* sections should be written in separate answer-books.

(*ii*) Answer *three* questions from each section.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right side indicate full marks.

(*v*) Use of calculator is allowed.

(*vi*) Assume suitable data if necessary.

SECTION I

1. (*a*) Develop an expression for $\overline{E}$ at point P due to infinite sheet of charge in XY plane with uniform charge density ρ_s. [9]

(*b*) A uniform charge of 2μC/m is located on *z*-axis. Find $\overline{E}$ at point P(1, 2, 3) and Q(2, 1, 3) in Cartesian co-ordinates, if charge extends from $-\infty$ to $+\infty$. [9]

Or

2. (*a*) State and explain Gauss's Law. Obtain the expression for $\overline{D}$ and $\overline{E}$ due to point charge Q and infinite line charge using Gauss's law. [9]

P.T.O.

(*b*) A uniform infinite line charge with density 20 nC/m lies along the *z*-axis. Find the $\overline{E}$ at (6, 8, 3) m. [9]

3. (*a*) Derive the expression for electric field due to electric dipole with centre at origin. [8]

(*b*) A parallel plate capacitor with area 0.3 m^2 and separation 5.5 mm contains three dielectrics with interface normal to $\overline{E}$ and $\overline{D}$ as $\in r_1 = 3$, $d_1 = 1$ mm and $\in r_2 = 4$, $d_2 = 2$ mm and $\in r_3 = 6$, $d_3 = 2.5$ mm. Find Capacitance. [8]

Or

4. (*a*) Derive an expression for capacitance of two co-axial cylindrical conductors separated by dielectric medium with permittivity $\in$. Assume $V = V_0$ at $\rho = a$ and $V = 0$, $\rho = b$; $b > a$. [8]

(*b*) Derive the expression for the energy stored per unit volume in an electric field in terms of $\overline{D}$ and $\overline{E}$. [8]

5. (*a*) In free space magnetic flux density is $\overline{B} = y^2\overline{a}_x + z^2\overline{a}_y + x^2\overline{a}_z$ wb/m^2. [8]

(1) Show that $\overline{B}$ is magnetic field.

(2) Find magnetic flux through X = 1, 0 < Y < 1, 1 < Z < 4.

(*b*) State and explain the Stokes' Theorem. Also explain physical significance of curl. [8]

Or

6. (*a*) Derive relationship between magnetic flux density $\overline{\mathbf{B}}$ and vector magnetic potential $\overline{\mathbf{A}}$. [8]

(*b*) A current distribution gives rise to vector magnetic potential $\overline{\mathrm{A}} = x^2 y\hat{a}_x + y^2 x\hat{a}_y - 4xyz\hat{a}_z$ Wb/m. Calculate : [8]

(*i*) $\overline{\mathrm{B}}$ at (–1, 2, 5)

(*ii*) the flux through the surface defined by $z = 1$, $0 \leq x \leq 1$, $-1 \leq y \leq 4$.

SECTION II

7. (*a*) Derive the boundary condition for magnetic field at an interface between two magnetic medium having permeability μ_1 and μ_2. [9]

(*b*) A boundary exist at Z = 0 between two dielectrics $\varepsilon_{r1} = 2.5$ in region Z < 0 and $\varepsilon_{r2} = 4$ in region Z > 0. The field in the region ε_{r1} is $\overline{\mathrm{E}}_1 = -30\hat{a}_x + 50\hat{a}_y + 70\hat{a}_z$ V/m. Find : [9]

(*i*) Normal component of $\overline{\mathrm{E}}_1$

(*ii*) Tangential component of $\overline{\mathrm{E}}_1$

(*iii*) The angle α_1 between $\overline{\mathrm{E}}_1$ and normal to the surface

(*iv*) Normal component of $\overline{\mathrm{D}}_2$

Or

8. (*a*) Derive the boundary condition for electric field at an interface between free space and dielectric. [9]

(*b*) $\overline{H}_1 = -2\overline{a}_{x+} + 6\overline{a}_y + 4\overline{a}_z$ A/m in region $y - x - 2 \leq 0$ where $\mu_1 = 5\mu_0$. Calculate : [9]

(*i*) $\overline{B}_1$

(*ii*) $\overline{H}_2$ and $\overline{B}_2$ in region $y - x - 2 \geq 0$ where $\mu_2 = 2\mu_0$.

9. (*a*) State and explain Maxwell's equations for static electric and magnetic fields in both integral and point form. [8]

(*b*) In free space $\overline{E} = 20 \cos(\omega t - 50x)\hat{a}_y$ V/m. Calculate $\overline{J}_d$ and $\overline{H}$. [8]

Or

10. (*a*) State and prove Poynting theorem. State significance of Poynting vector. [8]

(*b*) In a free space $\overline{E}(z, t) = 50 \cos(\omega t - \beta z)\hat{a}_x$ V/m. Find the power flowing in the circular area of radius 2.5 m in the plane z = constant. [8]

11. (*a*) Explain with example Finite Difference Method. [8]

(*b*) Explain the different steps in graphical representation of electric field lines and equipotential lines. [8]

Or

12. (*a*) What is finite element method ? Explain *four* steps of realization. [8]

(*b*) Explain Method of Images in detail. [8]

Total No. of Questions—**12**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-7

S.E. (Electrical) (II Sem.) EXAMINATION, 2018
MICROPROCESSOR FUNDAMENTALS AND PROGRAMMING
(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any **3** questions from each Section.
(*ii*) Answer **3** questions from Section I and **3** questions from Section II.
(*iii*) Neat diagrams must be drawn wherever necessary.
(*iv*) Your answers will be valued as a whole.

SECTION I

1. (*a*) Draw and explain in detail architecture of 8085 microprocessor. [10]

(*b*) What is "Addressing Mode" ? Explain the various addressing modes of 8085 microprocessor. [8]

OR

2. (*a*) Explain the following instruction of 8085 microprocessor :
(*i*) LDA 3000
(*ii*) LHLD 3000
(*iii*) SIM [10]

(*b*) List the registers in 8085 and explain their functions. [8]

3. (*a*) Draw and explain the 2K ROM interfacing with 8085 from 0000H. [8]

(*b*) Write a program to find out the number of negative numbers in an array of ten elements. [8]

P.T.O.

OR

4. (*a*) What is an interrupt ? Explain interrupt structure in 8085. [8]

(*b*) Discuss the stack and its uses in the 8085. [8]

5. (*a*) Explain different parallel data transfer schemes of 8085 microprocessor. [8]

(*b*) Draw and explain function block diagram of 8251. [8]

OR

6. (*a*) Explain serial data communication. What is baud rate ? [8]

(*b*) State various bus interface standards and explain in detail RS-232. [8]

SECTION II

7. (*a*) With the help of diagram explain Mode 0 and Mode 1 of 8254 PIT. [8]

(*b*) Draw the functional block diagram of 8255 PPI and explain the function of each block. [8]

OR

8. (*a*) Explain B.S.R. mode of operation of 8255 P.P.I. Explain how various bits of port C can be set or reset in this mode of operation. [8]

(*b*) Draw and explain functional block diagram of 8254 PIT. [8]

9. (*a*) Explain the procedure of interfacing of DAC 0808 to 8085 microprocessor. [8]

(*b*) With the help of block diagram and flowchart, explain the measurement of current using 8085 microprocessor. [8]

OR

10. (*a*) With the help of relevant block diagram, explain the interfacing of ADC 0809 with 8085 microprocessor. [8]

(*b*) With the help of diagram and flowchart, explain the concept of measurement of frequency using 8085 microprocessor. [8]

11. (*a*) Explain the procedure to control the DC motor using 8085 microprocessor. [8]

(*b*) With the help of diagram explain the interfacing of 7 segment display with 8085 microprocessor. [8]

OR

12. (*a*) With relevant flowchart explain the flow measurement application of 8085 microprocessor. [8]

(*b*) Explain with a schematic diagram and flowchart how 8085 can be used for stepper motor control. [8]

Total No. of Questions—**12**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-8

S.E. (Instrumentation & Con.) (I Sem.) EXAMINATION, 2018

PRINCIPLES OF SENIORS AND TRANSDUCERS

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION - I

Q1. **A.** Explain importance of performance characteristics of sensors **8**

B. Write specification of level sensor. **8**

OR

Q2. **A.** Explain the following terms **8**

(i) Repeatability
(ii) Accuracy
(iii) Drift
(iv) Precision

B. Explain systematic error and discuss methods to reduce these errors **8**

Q3. **A.** Explain fluid expansion thermometer. **9**

B. List suitable sensors to measure shaft power and explain any one. **9**

OR

Q4. **A.** Explain bellows with neat sketch and material use for same. **9**

B. Explain integrating gyroscope. **9**

P.T.O.

Q5.	**A.** Explain measurement of flow using Rotameter.	**8**
	B. Explain any one hydrometer.	**8**
	OR	
Q6	Explain working of Pitot tube with neat sketch	**8**
	Discharge of water through an orifice meter was 0.070 m3/s which was fitted in 250 mm diameter pipe with orifice diameter 125 mm differential mercury manometer reads 31.75cm deflection. Calculate coefficient of discharge for the meter (gm = 13600 kg/m3)	**8**

SECTION – II

Q7.	**A.** A thermister has resistance of 3000 ohm at the ice point and 600 At 40°C the resistance temperature relationship is given by RT = Ro.a.exp (b/T). Calculate constants a and b. Calculate the constant range of resistance to be measured in case thetemperature varies from 40°C to 100°C.	**9**
	B. Explain capacitive level sensor with neat diagram.	**9**
	OR	
Q8	**A.** Explain eddy current type tachometer.	**9**
	B. Explain how thickness can be measure using LVDT suitable diagram.	**9**
Q9.	**A.** Explain Hall effect. Which parameters can be measured with this effect. Explain any one	**8**
	B. Explain Electrodynamic transducers for vibration measurement	**8**
	OR	**8**
Q10	**A.** Explain Magnetostriction Phenomena and how it can be used to measure force	**8**
	B. How vaccum can be measure with radioactive gauges.	**8**
Q11	**A.** Explain feedback transducer system.	**8**
	B. Explain servo operated system.	**8**
	OR	
Q12	**A.** Explain Analog tape recorder	**8**
	B. Explain alphanumeric display.	**8**

Total No. of Questions—**12**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-9

SE (Instrumentation and Control) EXAMINATION, 2018

APPLIED ELECTRONICS

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer **3** questions from Section I and **3** questions from Section II.

(*ii*) Answers to the two sections should be written in separate answer-books.

(*iii*) Neat diagrams msut be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Your answers will be valued as a whole.

(*vi*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vii*) Assume suitable data, if necessary

SECTION I

1. (*a*) Explain SAR type ADC circuit with neat circuit diagram. [8]

(*b*) Explain Analog Mux/De-Mux using IC CD4051 along with neat circuit diagram. [10]

Or

2. (*a*) Explain Sample and Hold circuit with neat circuit diagrams. [8]

(*b*) Explain Integration type ADC with suitable block diagram. [10]

P.T.O.

3. (*a*) Explain binary weighted register type DAC with suitable circuit diagram. [8]

(*b*) Design 4-bit binary-weighted register type DAC using OP-AMP IC-741 for the digital input signal of 1111. Assume one binary equal to 10 V, 16R = 32 kΩ, 8R = 16 kΩ, 4R = 8 kΩ, 2R = 4 kΩ and the feedback resistor Rf is 2 kΩ. 8

Or

4. (*a*) Explain R-2R type DAC with a neat diagram. [8]

(*b*) Explain the two parameters which describe the quality and performance of a DAC. [8]

5. (*a*) Explain SCR with neat symbol and diagrams. [8]

(*b*) Compare DIAC and TRIAC. [8]

Or

6. (*a*) Explain in detail any *one* turn-on method for SCR. [8]

(*b*) How DIAC is used to turn-on TRIAC ? Explain with neat circuit diagram. [8]

SECTION II

7. (*a*) Explain how the energy is stored in the form of chemical compound in batteries ? [6]

(*b*) Explain the safety circuit used inside lithium-ion battery. [6]

(*c*) Explain any *two* performance specifications of batteries ? [6]

Or

8. (*a*) Why lithium-ion batteries are commonly used ? [6]

(*b*) Explain with details any *two* battery charging methods. [6]

(*c*) Explain with suitable application, how solar cells are used along with battery ? [6]

9. (*a*) A pressure transmitter gives output in the range of 4 to 20 mA. Design current to voltage circuit that gives output in the range of 1 to 5 Volts. [8]

(*b*) What is PLL ? Explain captured range, locked range and tracking range of PLL. [8]

Or

10. (*a*) Explain any type of V to I with neat circuit diagram. [8]

(*b*) Explain any type of frequency to voltage (FVC) conversion technique with neat block diagram. [8]

11. (*a*) Explain how frequency modulation is used in wireless data transmission ? [8]

(*b*) Explain SFK with neat diagrams. [8]

Or

12. (*a*) Describe the concept of FDM with suitable diagrams. [8]

(*b*) What is modulation index ? Explain FM in detail. [8]