

III B.Tech. II Semester
RCC STRUCTURAL DESIGN - II
(Civil Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

- 1 Design the combined footing for two columns C_1 (400mmx400mm with 4-25 ϕ bars) and C_2 500mmx500mm with 4-28 ϕ bars) supporting axial loads $P_1 = 800$ kN and $P_2 = 1400$ kN respectively. The column C_2 is an exterior column whose exterior face is flush with property line. The centre - to- centre distance between C_1 and C_2 4.5 m. The allowable soil pressure at the base of footing, 1.5m below ground level is 220kN/m². Adopt M₂₅ grade concrete and Fe₄₁₅ grade steel.
- 2 Design a trapezoidal footing for two columns C_1 and C_2 transmitting service loads of 900kN and 1500kN respectively. The column C_1 is 450mm X 450mm and column C_2 is 600mm X 600mm in size and they are spaced at 5m with property line is 400mm beyond the face of column C_1 . The safe bearing capacity of the soil is 180kN/m². Adopt M₂₅ grade concrete and Fe₄₁₅ grade steel.

SECTION - II

- 3 Design a cantilever retaining wall which is required to support 4.0 m high bank of earth above ground level on the toe side of the wall. Consider the backfill surface inclined at an angle of 15° with the horizontal . The unit weight of soil is 16kN/m³. The safe bearing capacity of the soil is 160kN/m². Angle of shearing resistance is 30° and coefficient of friction between soil and concrete to be 0.5. Adopt M₂₀ grade concrete and Fe₄₁₅ grade steel.
- 4 Design a counter fort type retaining wall to support an earth fill of 7.5 m height above the ground. Assume good soil foundation at a depth of 1.5 m below the ground level. The safe bearing capacity of the soil at site is 170kN/m². The unit weight of soil may be taken as 16kN/m³ and an angle of shearing resistance of 30°. Assume the value of coefficient of friction as 0.55. Spacing of counter forts is 3.0m centre to centre. Adopt M₂₀ grade concrete and Fe₄₁₅ grade steel.

SECTION - III

- 5 Design rectangular water tank with an open top is required to store 80,000 liters of water. The inside dimensions of tank is 6m x 4m. The tank rest on walls on the four sides. Adopt M₂₀ grade concrete and grade- I steel.
- 6 A circular tank has an internal diameter of 12m and the maximum height of water as 4.2m. The walls of the tank are restrained at the base. Determine the values of maximum hoop tension and its position, moment at the base and shear at the base using IS code? Assume thickness of wall as 160mm

SECTION - IV

- 7
- a) Explain the yield line theory for the analysis of slab
 - b) Derive the expression for relating yield line moment and ultimate load capacity w_u for isotropically square slab, simply supported all round.
- 8 Design a rectangular slab of size 4 m x 6m which is simply supported along the edges and has to carry a service live load of 4 kN/m². Assume coefficient of orthotropy $\mu = 0.75$. use M 20 grade concrete and Fe 415 steel. The design may restricted to bending only.

SECTION - V

- 9
- a) Write a short notes on prestressing systems used in prestressed concrete.
 - b) A rectangular concrete beam 250 mm wide by 300 mm deep is prestressed by force of 500 kN at a constant eccentricity of 60 mm. The beam supports a concentrated load of 60 kN at the centre of span of 3 m. Determine the location of the pressure line at the centre, quarter span and support sections of the beam. Neglect the self-weight of the beam.
- 10 post-tensioned concrete beam with cable of 24 parallel wires of total area 800 mm² is tensioned with 2 wires at a time. The cable with zero eccentricity at the ends and 150 mm at the centre is on a circular curve. The span of the beam is 10 m. The cross section is 250mm wide and 450mm deep. The wires are to be stressed from one end to a value of f_1 to overcome frictional loss and then released to a value of f_2 so that immediately after anchoring, an initial prestress of 820 N/mm² would be obtained. Compute f_1 and f_2 and the final design stress after all losses given in the following data:
- (a) $E_s = 210\text{kN/mm}^2$ and $E_c = 28\text{kN/mm}^2$
 - (b) Shrinkage of concrete = 0.0002
 - (c) Relaxation of stress in steel = 3 % of the initial stress
 - (d) Anchorage slip = 1.25 mm
 - (e) Friction coefficient for wave effect = 0.003 per m
 - (f) Coefficient of friction for curvature = 0.6.

B.TECH. DEGREE EXAMINATION, APRIL 2019
III B.Tech. II Semester

HYDROLOGY
 (Civil Engineering)

Time: 3 hours

Max. Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
 All Questions carry equal marks*

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SECTION-I

1. (a) Explain the procedure for checking the rainfall data for consistency.
 (b) The annual rainfalls in mm recorded at a rainfall station for a period of 19 years from 1970 to 1988 are 520, 615, 420, 270, 305, 380, 705, 600, 350, 550, 560, 400, 520, 435, 395, 290, 430, 1020 and 900 respectively. Construct a 3-year moving average curve. Are there any apparent cycles or trends? Discuss.
2. A storm commenced at 7.00 hours. The ordinates of the rainfall mass curve of this storm in mm are recorded by a recording raingauge at 15 minutes intervals are 0, 9.5, 17, 27, 40.5, 49, 63, 84. 95, 102, 110, 112, and 112. Compute the maximum rainfall intensities for durations of 15, 30, 45, 60, 90, 120 and 180 minutes and plot the intensity duration graph.

SECTION-II

3. (a) How is a double ring infiltrometer is better than a tube infiltrometer?
 (b) A 6 h storm produced rainfall intensities of 7, 18, 25, 12, 10 and 3 mm/h in successive one hour intervals over a basin of 800 sq.km. The resulting runoff is observed to be 2640 hectare-meters. Determine ϕ -index for the basin.
4. (a) Describe the ISI standard evaporation pan with a neat sketch. In what way it is different from USWB class A land pan?
 (b) Discuss the various methods of reducing evaporation from a water body.

SECTION-III

5. (a) Give a schematic representation of runoff process.
 (b) How is runoff estimated using Strange's tables.
6. The monthly runoff volumes in million m^3 for a period of 24 months recorded at a stream gauging site are 03, 06, 16, 30, 18, 15, 10, 08, 06, 04, 03, 01, 02, 05, 17, 28, 20, 15, 12, 07, 05, 04, 03 and 02. Determine the size of the reservoir proposed at the gauging site if it is to maintain an assured supply of 8.33 million m^3 per month. The water year may be taken as June to May.

SECTION-IV

7. (a) Define unit hydrograph. What are the assumptions underlying the unit hydrograph theory?
- (b) From the 4 h unit hydrograph given below derive the ordinates of 8 h unit hydrograph.

Time (h)	0	2	4	6	8	10	12	14	16
Ordinates of 4 h UH (m ³ /s)	0	12.52	21.32	23.54	17.84	14.79	12.18	10.04	8.26

Time (h)	18	20	22	24	26	28	30	32	34
Ordinates of 4 h UH (m ³ /s)	6.51	4.98	3.95	3.05	2.26	1.60	1.07	0.53	0

8. The following direct runoff hydrograph resulted from three 6 h periods of rainfall having estimated runoff excess of 1.5 cm, 4 cm and 3 cm respectively. For a basin having an area of 55.6 sq km, obtain a 6 h unit hydrograph.

Time in h	0	3	6	9	12	15	18	21	24	27	30	33	36
Flow in cumecs	0	21	84	92	248	156	240	123	69.4	42.5	14	6	0

SECTION-V

9. (a) What is a routing curve? What are the storage indications quality? What is the appropriate time interval to be adopted in reservoir routing?
- (b) Explain the method of determining the Muskingum parameters K and x of a reach from a pair of observed inflow and outflow hydrographs.
10. (a) Derive an expression for the steady state discharge of well fully penetrating into a confined aquifer.
- (b) The following is obtained from a recuperation test on an open well of diameter 6.5 m.
 R.L. of water table = 237.8 m
 R.L. of water level in the well when the pumping test is just stopped = 231.2 m
 R.L. of water level in the well 2.5 hours after the pumping is stopped = 234.5 m
 Estimate the safe yield of the well, if the working head is 3 m.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

STRUCTURAL ANALYSIS – II
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

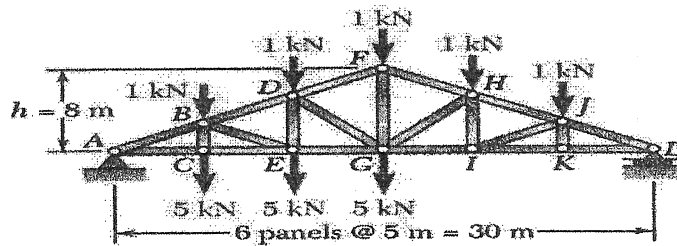
Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION – I

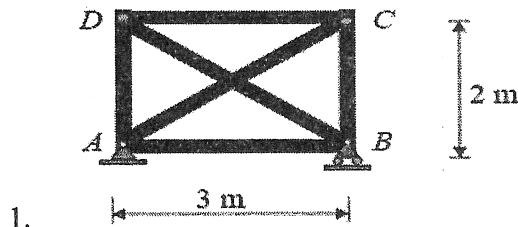
1. Construct the influence line for BM at a section of 2.5 m from left support of a simple beam of span of 6 m. determine the maximum BM when a UDL of 10 kN/m longer than the span moves across the beam.
2. Two point loads of 150kN and 250kN spaced 3.5m apart cross a girder of span 20m from left to right with the 150kN load leading. Draw the influence lines for S.F & B.M and find the values of maximum shear force and bending moment at a section 8m from the left end. Also find the absolute maximum Bending moment due to given load system?

SECTION – II

3. Find the forces in all the members of the frame as shown in figure 1. All the members have the same c/s area and young's modulus.

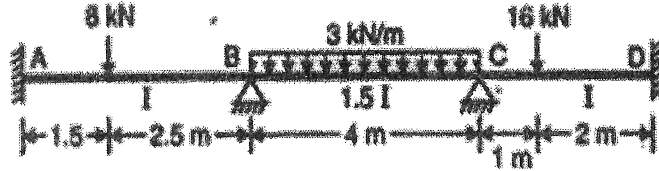


4. Determine the force in all member of the truss (shown in fig.2). If the horizontal force $P = 6 \text{ kN}$ is applied at joint C. If each bar has a cross-sectional area of 500 mm^2 and $E = 200 \text{ GPa}$.



SECTION – III

5. A continuous beam ABCD is fixed at end A and D, and is loaded as shown in fig.3, spans AB, BC and CD have moment of inertia of $I, 1.5I, I$ respectively and are of the same material. Determine the moments at the supports (by slope deflection method, if support B sinks by 25 mm in downward direction).



6. The portal frame shown in fig.4 has fixed ends. If the end D sinks by 5Δ . Find the moment induced in the frame. The members have the same uniform cross-section. (by moment distribution method)

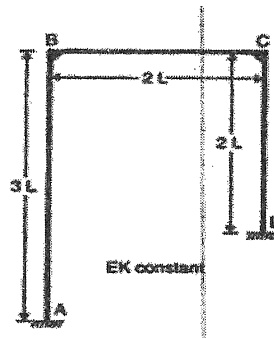


Fig.4

SECTION – IV

7. Analyse the frame loaded as shown in figure 5 by Kani's method and sketch the bending moment diagram.

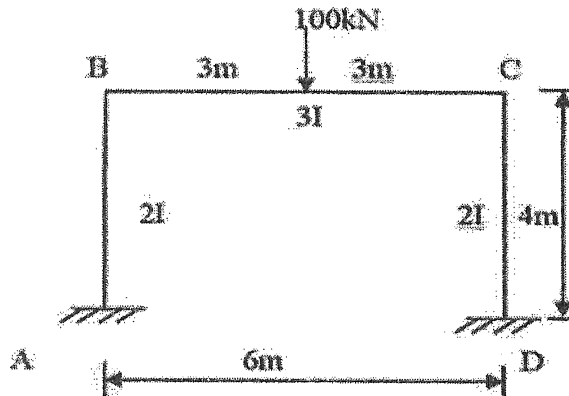


Fig.5

8. Analyze the following frame shown in figure 6 by portal method of analysis. Draw the bending moment diagram.

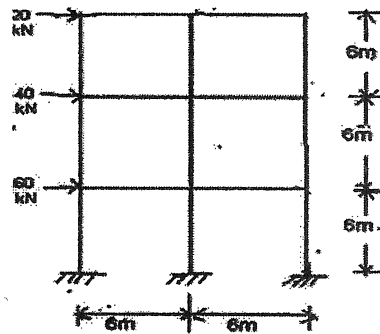


Fig.6

SECTION - V

9. Determine the collapse load for the beam as shown in the figure 7

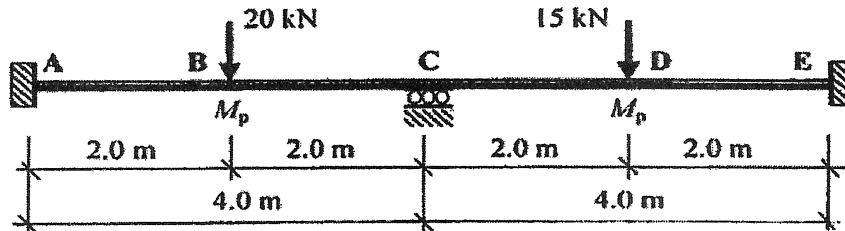


Fig.7

10. Determine the collapse load W_c in the frame shown in figure 8 given below :

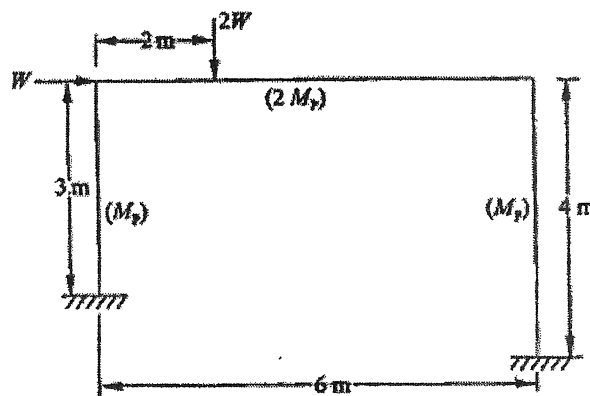


Fig.8

Code : 13CE3204

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester
CONCRETE TECHNOLOGY
(Civil Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

- 1 Discuss the properties of various types of cements with their specific applications.
- 2 (a) Explain about Air-entraining agents used in concrete.
(b) What are mineral admixtures? Explain briefly about different types of mineral admixtures.

SECTION - II

- 3 (a) Explain the following properties of aggregates :
(i) Specific gravity (ii) Bulk density (iii) Porosity
(b) Write short notes on Alkali-aggregate reaction and Deleterious substances in aggregate.
- 4 (a) Write short notes on the following :
(i) Workability (ii) Bleeding (iii) Segregation
(b) Explain about the properties of ready mixed concrete and prepacked concrete.

SECTION - III

- 5 (a) Explain the maturity concept of concrete.
(b) What is curing of concrete? Explain any one non-conventional method of curing of concrete.
- 6 (a) Briefly explain the different non-destructive testing methods of concrete.
(b) Explain briefly about abrasion of concrete.

SECTION - IV

- 7 (a) What is shrinkage? What are the major factors that influence the magnitude of shrinkage?
- (b) Explain different moduli of elasticity of concrete and explain their practical significance.
- 8 (a) Explain the factors affecting permeability of concrete.
- (b) Bring out suggestions to overcome acid attack and sulfate attack on concrete.

SECTION - V

- 9 Explain in detail the various steps involved in designing of concrete mixes by American concrete institute method.
- 10 (a) How is high strength concrete different from normal concrete? Explain briefly how to design high strength concrete mix.
- (b) Write the basic parameters that influence the design of concrete mix.

Code : 13CE3205

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester**ENVIRONMENTAL ENGINEERING - I
(Civil Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

- 1 (a) Explain the factors to be considered to decide the Design period for design of a water treatment plant.
- (b) Discuss the Factors affecting per capita demand while estimating quantity of water for a town / city.
- 2 Estimate population for a design period of two decades by Arithmetical Increase, Geometrical Increase and Incremental Increase methods for the census data given below :
- | | | | | | | | |
|------------|---|----------|----------|----------|----------|----------|----------|
| Year | : | 1961 | 1971 | 1981 | 1991 | 2001 | 2011 |
| Population | : | 1,50,000 | 1,80,000 | 2,15,000 | 2,55,000 | 2,95,000 | 3,45,000 |

SECTION - II

- 3 (a) List various types of impurities in water and their effects.
- (b) Write a note on Water borne diseases.
- 4 Draw Layout of treatment units employed to treat surface water and explain them in brief.

SECTION - III

- 5 (a) Determine the dimensions of set of Rapid sand filters for treating Water for a population of 5 lakhs with an average demand of 150 lpcd.
- (b) Give the differences between Slow sand and Rapid sand filters.
- 6 (a) Explain different methods of disinfection.
- (b) Explain Break point Chlorination.

SECTION - IV

- 7 (a) Explain the methods of removing Permanent hardness.
(b) Explain how do you remove excess Fluorides from water?

- 8 Explain how do you remove
(i) Arsenic (ii) Salinity (iii) Iron

SECTION - V

- 9 (a) What are the different types of valves ?
(b) Enumerate the gravity system of water distribution method.
- 10 (a) Discuss advantages and disadvantages of different Layouts of water distribution networks.
(b) Explain how the Mass curve technique is used to fix the capacity of Balancing reservoir.

Code :13CE32E2

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech II Semester

ADVANCED FOUNDATION ENGINEERING

(Civil Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

1. (a) What factors should be considered while selecting the location and depth of shallow foundations?
(b) A continuous footing of width 2.5m rests 1.5m below the ground surface in clay. The unconfined compressive strength of the clay is 150kN/m^2 . Calculate the ultimate bearing capacity of the footing. When there is no effect of water table and when water table reaches ground surface. Take $\gamma=18\text{kN/m}^3$, $\gamma_{\text{sat}}=20\text{kN/m}^3$.
2. (a) Discuss the various factors that affect the bearing capacity of a shallow footing.
(b) How would you fix the depth of the foundation?

SECTION - II

3. (a) Define footing and explain various types of footings with neat sketches.
(b) Enumerate the procedure for proportioning of footings.
4. (a) Under what conditions would you choose i. Raft, ii. Strap footing? Explain clearly.
(b) Design a trapezoidal combined footing for two columns (30 cm x 30 cm) carrying column loads of 1.2MN and 0.90 MN, if the spacing between the two columns is 4m. Take allowable soil pressure as 200kN/m^2 and the length of footing as 5m.

SECTION - III

5. (a) Explain different situations under which raft foundations are adopted.
(b) What is the coefficient of subgrade reaction? On what factors does it depend?
6. (a) Describe the procedure for designing a raft foundation by the conventional method. What assumptions are made in the analysis?
(b) A raft $10\text{ m} \times 20\text{ m}$ is placed at a depth of 3 m on a clay soil with the following properties: $c_u = 80\text{ kN/m}^2$; $\phi_u = 0$ and $\gamma = 18\text{ kN/m}^3$. Determine the factor of safety available against shear failure, if the raft, the structure and the live loads that it will

carry are expected to exert a pressure of 200 kN/m^2 . There is a provision for basement floor. Use Skempton's equation.

SECTION - IV

7. (a) A group of 12 piles each having a diameter of 500mm and 30 meters long supports a column. The piles are arranged in 3 rows and spaced at 1.25 meters c/c. The properties of the foundation soil (clay) are as follows:-Unit weight = 16 kN/m^3 , Unconfined compressive strength = 100 kN/m^2 . Determine the capacity of the pile group.
(b) Briefly explain the group action of piles and efficiency of pile groups.
8. (a) A 16-pile group has to be arranged in the form of a square in soft clay with uniform spacing. Neglecting end bearing determine the optimum value of the spacing of the piles in terms of the pile diameter, assuming a shear mobilization factor of 0.60.
(b) How do you estimate the group capacities of piles in sand and clay?

SECTION - V

9. (a) Write in detail about settlement of shallow foundations, clearly mentioning the components of settlement and corrections.
(b) Describe the procedure for the estimation of settlement of a pile group by considering the only bearing resistance of the pile group.
10. (a) Estimate the immediate settlement of a concrete footing $1\text{m} \times 2\text{m}$ size, founded at a depth of 1m in a soil with $E=10^4 \text{ kN/m}^2$, $\mu = 0.3$. The footing is subjected to a pressure of 200 kN/m^2 .
(b) Discuss the settlement of pile groups resting on sands and clays.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

**ELECTRONIC MEASUREMENTS
(Electrical & Electronics Engineering)**

Time : 3 hours

Max. Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

- 1 (a) Draw the block diagram of a general purpose CRO and describe each block in brief.
(b) Describe an overview of applications of a CRO.
- 2 (a) Why CRT is called heart of the CRO?
(b) Explain in detail about the sampling of or storage CRO's.

SECTION - II

- 3 (a) Explain the following
(i) Digital multi meter (ii) Digital Tachometer
(b) Explain the operation of dual slope type digital voltmeter with neat diagram.
- 4 (a) Describe the operation of SAR type DVM
(b) A 4 ½ digit voltmeter is used for voltage measurements
(i) Find its resolution
(ii) How would 12.98 V be displayed on a 10 V range
(iii) How would 0.6973 be displayed on 1 V and 10 V range.

SECTION - III

- 5 Draw the block diagram of AF wave analyzers and explain the principle of working.
- 6 (a) Draw the block diagram of function generator and explain the working of it.
(b) What are the applications of spectrum analyser.

SECTION - IV

- 7 (a) Distinguish between bonded and un bonded strain gauges.
(b) A resistance strain gauge with a gauge factor of 2 is cemented to a steel member, Which is subjected to a strain of 1×10^{-6} . If the original resistance value of the gauge is 130 ohm, calculate the change in resistance.

- 8 Discuss in detail about the following
- (i) Piezo-electric transducers
 - (ii) Variable capacitance transducers
 - (iii) Magneto strictive transducers.

SECTION - V

- 9 (a) Discuss the principle and operation of liquid level measurement.
(b) Explain the principle of temperature measurement.
- 10 Explain the following with suitable methods
- (i) Flow measurement
 - (ii) Measurement of humidity and moisture.

Code : 13EE3211

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

MODERN CONTROL THEORY
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

- 1 Design a Lead Compensator for a unity feedback system with an open loop transfer function $G(s)=K/s(s+1)$ for the specifications of $K_p = 10 \text{ Sec}^{-1}$ and $\varphi_m = 35^\circ$
- 2 Consider a unity feedback system with open loop transfer function $G(s) = 5/s(s + 0.5)(s + 1)$. Design a PD controller so that the phase margin of the system is 30° at a frequency of 6.2 rad/sec.

SECTION - II

- 3 a Determine the canonical state model of the system whose transfer function

$$T(s) = \frac{s+6}{s^2+6s+6}$$

- b The state model of a linear time invariant system is given by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ -2 & -3 & 0 \\ 0 & 2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix} [u]; \quad y = [1 \quad 0 \quad 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

convert the state model into controllable phase variable form.

- 4 a Consider the system is given by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -1 & -2 & -2 \\ 0 & -1 & 1 \\ 1 & 0 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix} [u]; \quad y = [1 \quad 1 \quad 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

is the system is completely state controllable.

- b Check observability of the system below

$$\begin{aligned} \dot{x}_1 &= x_2 \\ \dot{x}_2 &= -2x_1 - 3x_2 + u \quad \text{and} \quad y = x_1 + x_2 \end{aligned}$$

SECTION - III

- 5 a What is the significance of the state transition matrix? Write the properties of state transition matrix.
- b Consider the system matrix A, Compute state transition matrix e^{At} , where $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$
- 6 Consider the system represented by $\dot{X} = Ax + Bu$, $y=Cx$ where $A = \begin{bmatrix} 0 & 30.6 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ $C = [0 \ 1]$, Design full order observer such that eigen values are at -10, -10.

SECTION - IV

- 7 a Explain different types of non linearity's with example.
- b Find the describing function of Dead zone non-linearity
- 8 a Describe about the singular points in phase plane analysis
- b Determine the equilibrium points of the following system and classify them
- $$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} x_2 \\ x_1^2 - x_2 \end{bmatrix}$$

SECTION - V

- 9 a State and prove Liapunov stability theorem
- b Test the stability of the following system represented by
- $$\begin{aligned} \dot{x}_1 &= -2x_1 + 3x_1^2x_2 \\ \dot{x}_2 &= -4x_2 \end{aligned}$$
- 10 a Discuss the stability in the sense of Liapunov
- b Explain the direct method of Liapunov for the linear continuous time autonomous systems

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech II Semester

POWER SYSTEMS – II
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

- 1 (a) Differentiate between a nominal-T and equivalent-T representation of a transmission line?
(b) Explain clearly the 'Ferranti effect' with a phasor diagram?
- 2 (a) Derive equivalent parameters of two transmission lines when they are connected in (a) Tandem and (b) Parallel
(b) Explain the classification of lines based on their length of transmission?

SECTION - II

- 3 (a) What is 'Capacitance switching'? Explain its effect on the performance of the circuit breaker?
(b) An overhead transmission line with surge impedance 400 ohms is 300km long. One end of this line is short-circuited and at the other end a source of 11kv is suddenly switched in. Calculate the current at the source end 0.005 sec after the voltage is applied?
- 4 (a) Explain with neat sketches the mechanism of lightning discharge?
(b) Derive an expression for the restriking voltage across the circuit breaker contacts. The system consists of an unloaded alternator with neutral solidly grounded?

SECTION - III

- 5 (a) What are the various methods of neutral grounding? Compare their performance with respect to (a) Protective relaying (b) Fault level (c) Stability (d) Voltage levels of power systems?
(b) Determine the value of reactance to be connected in the neutral connection to neutralize the capacitance current of a overhead line to ground capacitance of each line equal to $0.015 \mu\text{F}$. The frequency is 50Hz.
- 6 (a) A 132 kv, 3-phase, 50 Hz overhead line of 100 km length has a capacitance to earth of each line of $0.01 \mu\text{F}$ per km. Determine inductance and KVA rating of the arc suppression suitable for this line?
(b) Explain the phenomenon of 'Arcing grounds' and suggest the method to minimize the effect of this phenomenon?

SECTION - IV

- 7 (a) What is Flexible a.c. transmission systems (FACTS)? Describe briefly various devices used in this systems?
(b) Explain the terms: (a) Infinite line (b) Flat line.
- 8 (a) Explain series and shunt compensation of lines and discuss their effect on the surge impedance loading of the lines. If shunt compensation is 100%, what happens to SIL and voltage profile.
(b) Explain with diagrams some arrangements whereby certain harmonics can be eliminated in TCR circuit?

SECTION - V

- 9 (a) Short notes on two and three winding transformers?
(b) Explain the single diagram of the Impedance system?
- 10 (a) Short notes on the (a) Reactance diagram (b) Changing the base of per unit quantities?
(b) Short notes on the line-circuit representation of synchronous machine?

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

POWER ELECTRONICS

(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION – I

- 1 (a) What are the various protection schemes used for an SCR? Explain any one method.
(b) Explain about the Dynamic characteristics of an SCR
- 2 (a) Describe the R and RC firing circuits for triggering SCR's.
(b) Explain Load commutation of SCR with necessary waveforms.

SECTION – II

- 3 (a) Discuss the operation of single phase half wave converter with RL load.
(b) Draw the typical voltage and current waveforms of a three phase, fully controlled bridge converter feeding a pure resistive load. From the Fourier expansion of the input current determine the displacement factor.
- 4 A single phase, full converter supplies an inductive load. Supply voltage is 230 V, 50 Hz and the firing angle is 60° . Assume that the output current is continuous, ripple free and equal to 10 Amp. Determine (a) Average output voltage (b) Supply RMS current (c) Input power factor (d) Average Thyristor current.

SECTION – III

- 5 (a) What is current limit control of Chopper? Explain the operation.
(b) A DC chopper has an input voltage of 230 V and an output voltage of 150 V. It is operating at a frequency of 1 kHz. Find the periods of conduction and blocking each cycle.
- 6 (a) What is a chopper? How is chopper controlled? Why forced commutation is necessary for choppers? Explain.
(b) Explain the operation of Load Commutated chopper with circuit diagram and waveforms.

SECTION – IV

- 7 (a) Mention the difference between constant pulse width and variable pulse width voltage control techniques.
(b) Explain the operation of basic series inverter.
- 8 (a) Explain the operation of Three phase inverter with R load.
(b) For the above three phase inverter draw the line and phase voltage waveforms.

SECTION – V

- 9 (a) Explain the operation of single phase step down cyclo converter with R L loads both continuous and discontinuous cases.
(b) Discuss the operation of step up cyclo converter.
- 10 (a) Derive the expressions for RMS values of output voltage and power factor for single phase AC voltage controller with R load.
(b) For a single phase AC voltage controller feeding a resistive load, draw the waveforms of source voltage, gating signals, output voltage, source and output currents and voltage across SCR's. Describe the working with respect to the waveforms drawn.

Code: 13EE32E1

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

**UTILIZATION OF ELECTRIC POWER
(Electrical & Electronics Engineering)**

Time: 3 hours

Max. Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

** * **

SECTION – I

1. Give the construction and working of the following types of lamps :
(i) Arc Lamp (ii) Neon Lamp (iii) Sodium Lamp
2. (a) Explain the laws of illumination.
(b) With a neat sketch explain the operation of sodium vapor lamp.

SECTION – II

3. What are the causes of failure in heating elements?
4. Six resistances each of 40 ohms are used as heating elements in furnace. Find the power of the furnace for various connections to a three phase 230V supply.

SECTION – III

5. Discuss the merits and demerits of the DC and 1-AC systems for the main and suburban line of the railways.
6. (a) Write the factors the influence the choice of motor.
(b) Explain the characteristics of DC series motor.

SECTION – IV

7. What are the types of electric braking used?
8. Explain how the rheostatic braking is done in DC shunt motors and series motors.

SECTION – V

9. An electric train has an average speed between start to stop, $V_a = 40\text{km/hr}$, acceleration 2.4km/hr/sec and retardation 4km/hr/sec , specific tractive resistance 55 newtons/tonne and average motor efficiency 75% . Estimate the average consumption of energy over a run of 800m , assuming trapezoidal speed time curve. Add 8% for the rotational inertia.
10. (a) Define the following:
(i) Adhesive Weight (ii) Coefficient of adhesion (iii) Tractive effort
- (b) Explain the mechanics of train movement.

* * *

Code : 13ME3201

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester
DYNAMICS OF MACHINERY
(Mechanical Engineering)

Time : 3 hours

Max. Marks :60

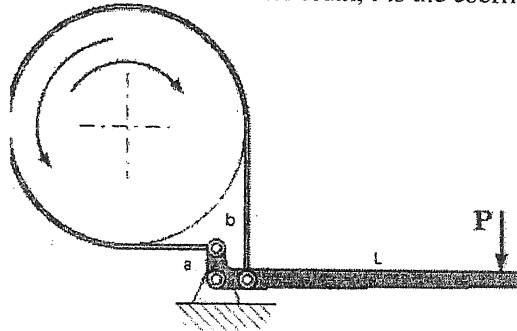
Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

- 1 Show that a cone clutch will engage it self in engagement if the tangent of the cone angle is less than the coefficient of friction.
- 2 The pitch of 70 mm mean diameter threaded screw of a screw jack is 12.5 mm. The coefficient of friction between the screw and nut is 0.13. Determine the torque required on the screw to raise a load of 25 KN, assuming the load to rotate with the screw. Determine the ratio of the torque to raise the load to the torque required to lower the load and also the efficiency of the machine.

SECTION - II

- 3 Derive an expression for braking torque for the following band brake under both clockwise and counter clockwise rotations. D is diameter of drum, f is the coefficient friction.



- 4 Classify dynamometers and explain the working principle of Dynamometers - absorption and transmission types.

SECTION - III

- 5 In a Hartnell governor the radius of rotation is 7 cm when speed is 500 rpm. At this speed, ball arm is normal and sleeve is at mid position. The sleeve movement is 2 cm with 5% of change in speed. The mass of sleeve is 6 kg and friction is equivalent to 25 N at the sleeve. The mass of the ball is 2 kg. If ball arm and sleeve arms are equal, find, (a) Spring rate, (b) Initial compression in the spring, and (c) Governor effort and power for 1% change in the speed if there is no friction.

- 6 Explain the control force diagram for spring force controlled governor and Work out the stability expression.

SECTION - IV

- 7 The turning moment diagram for a multi cylinder IC engine is drawn to the following scales 1 cm = 15 degree crank angle 1 cm = 3 k Nm During one revolution of the crank the areas with reference to the mean torque line are 3.52, (-) 3.77, 3.62, (-) 4.35, 4.40 and (-) 3.42 cm². Determine mass moment of inertia to keep the fluctuation of mean speed within 2.5% with reference to mean speed. Engine speed is 200 rpm.
- 8 A single cylinder four-stroke petrol engine develops 18.4 kW power at a mean speed of 300 rpm. The work done during suction and exhaust strokes can be neglected. The work done by the gases during explosion strokes is three times the work done on the gases during the compression strokes and they can be represented by the triangles. Determine the mass of the flywheel to prevent a fluctuation of speed greater than 2 per cent from the mean speed. The flywheel diameter may be taken as 1.5 m.

SECTION - V

- 9 The rotor of a Jet airplane engine is supported by two bearings 3.5m apart. The rotor assembly including compressor, turbine, and shaft is 6672 N in weight and has a radius of gyration of 229 mm. Determine the maximum bearing force as the airplane undergoes a pullout on a 1830 m radius curve at constant airplane speed of 966 km/h and an engine rotor speed of 10,000 rpm. Include the effect of centrifugal force due to the pullout as well as the gyroscopic effect.
- 10 The wheels of a motorcycle have a moment on inertia 68 kg m² and engine parts a moment of inertia of 3.4 kgm². The axis of rotation of the engine crankshaft is parallel to that of the road wheels. If the gear ratio is 5 to 1, the diameter of the road wheels is 65 cm and the motor cycle 107 rounds a curve of 30.5 m radius at 60 km/hour, find the magnitude and direction of the gyroscopic couple.

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B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

HEAT TRANSFER
(Mechanical Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

- 1 (a) How do three modes of heat transfer differ? What is essential for all those modes?
(b) Starting from fundamentals derive the general heat conduction equation in polar coordinate system.
- 2 (a) Obtain an expression for heat transfer rate under steady state conditions in a hollow sphere of inner and outer radii r_i and r_o maintained at temperatures T_i and T_o respectively.
(b) A hollow cylinder with inner radius of 3 cm and outer radius of 5 cm is heated at the inner surface at a rate of 105 W/m^2 and dissipates heat by convection from the outer surface into a fluid at a temperature of 100°C with a heat transfer coefficient of $400 \text{ W/m}^2\text{ }^\circ\text{C}$. There is no heat generation and the thermal conductivity of the solid is assumed to be constant. Determine the inner and outer surface temperatures of the cylinder.

SECTION - II

- 3 (a) Can we use Heisler chart for one-dimensional transient heat conduction problem at all Fourier numbers? Can we use Heisler chart for two- and three-dimensional system undergoing transient heat conduction?
(b) A glass of diameter 50 mm contains some hot milk. The height of the milk in the glass is 10 mm. To cool the milk, the glass is placed into a large pan filled with cold water at 25°C . The initial temperature of the milk is 80°C . The milk is stirred slowly and continuously so that its temperature remains uniform at all times. The heat transfer coefficient between water and glass is $100 \text{ W/m}^2\text{K}$. Determine (a) the time taken for the milk to cool from 80°C to 30°C and (b) the total amount of energy transferred from milk to water during the cooling process. $k_{\text{milk}} = 0.6 \text{ W/mK}$ $\rho_{\text{milk}} = 900 \text{ kg/m}^3$ $c_{p \text{ milk}} = 4.2 \text{ kJ/(kgK)}$. Neglect the effect of stirring work.
- 4 (a) What are the boundary conditions used in fin approximation as thermocouple?
(b) It is required to heat the oil to 300°C for frying purpose. A long ladle is used in frying pan. The section of the ladle is $5 \text{ mm} \times 18 \text{ mm}$. The surrounding air is at 30°C and the thermal conductivity of the ladle material is 205 W/mK . If the temperature at a distance of 380 mm from the oil should not exceed 40°C , determine convective heat transfer coefficient.

SECTION - III

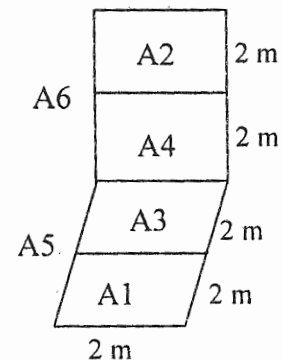
- 5 (a) Explain the physical significance of Prandtl Number giving relevant mathematical expression for the same.
(b) Air at 20 °C flows with a velocity of 8 m/s over a 1.5 m X 6 m flat plate whose temperature is 140 °C. Determine the rate of heat transfer from plate, if air flows (i) parallel to 6 m long side and (ii) parallel to 1.5 m long side. Comment on the result.
- 6 (a) Mention any three differences between dimensionless numbers of free and forced convection over cylinders?
(b) Consider a 0.6 m x 0.6 m thin square plate in a room at 30°C. One side of the plate is maintained at a temperature of 90°C, while the other side is insulated. Determine the rate of heat transfer from the plate by natural convection if the plate is (a) vertical, (b) horizontal with hot surface facing up and (c) horizontal with hot surface facing down.

SECTION - IV

- 7 (a) Discuss the LMTD and NTU – Effectiveness methods of analyzing heat exchanger; Which is preferred, when and why?
(b) In a double pipe counter flow heat exchanger, 10,000 kg/hr of an oil having specific heat of 2095 J/kgK is cooled from 80 °C to 50 °C by 8000 kg/hr of water enter at 25 °C. Determine the heat exchanger area for an overall heat transfer coefficient 300 W/m²K. Take the specific heat of water as 4.18 kJ/kgK.
- 8 (a) Draw the pool boiling curve for water indicating salient points on it and explain different regimes of it.
(b) Discuss the different types of processes for condensation of vapours on a solid surface?

SECTION - V

- 9 (a) Explain the terms reflectivity, transmissivity, absorptivity and white surface.
(b) Calculate the view factor for F_{1-2} of the following figure.



- 10 (a) State and prove Kirchoff's Law of radiation?
(b) A thin aluminum sheet with an emissivity of 0.1 on both sides is placed between two very large parallel plates that are maintained at uniform temperatures $T_1 = 800$ K and $T_2 = 500$ K and have emissivities $\epsilon_1 = 0.7$ and $\epsilon_2 = 0.2$, respectively. Determine the net rate of radiation heat transfer between the two plates per unit surface area of the plates and compare the result to that without the shield.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

INDUSTRIAL ENGINEERING & MANAGEMENT
(Mechanical Engineering)

Time : 3 hours

Max. Marks :60

Answer *FIVE* Questions, Choosing *ONE* Question from each section
All Questions carry equal marks

* * *

SECTION - I

1. (a) Enumerate and discuss the contributions of F.W. Taylor and Henri Fayol to the management thought. Compare and comment on them in brief.
(b) Discuss the differences between Line and Staff organisation with examples. Discuss its merits and demerits.
2. (a) Explain exponential smoothing with suitable example
(b) The demand for an item is given below:

Year	1	2	3	4	5	6	7	8	9	10
Demand	180	142	153	158	174	135	148	160	178	196

- (i) Calculate the forecast of the above demand using the three period moving average and five period moving average.
- (ii) Justify which of the above forecasts is the best?

SECTION - II

3. Explain the concept of weber theory and choice of city in plant location with suitable example.
4. Why plant maintenance is required? Explain various types of maintenance and its suitability with example for different plants.

SECTION - III

5. (a) Define method study? Explain the objectives and steps in a Method study.
(b) The observed time is recorded to be 25 min for a job done by a worker whose rating is 90%. The allowances given by organization is personnel needs allowance of 4%, fatigue allowance of 2%, contingency work allowance of 2% and contingency delay allowance of 1%. Determine basic time and standard time for a job.
6. Explain about the following:
(a) String diagram (b) flow process chart (c) SIMO chart (d) Time study

SECTION - IV

7. i) What is Merit rating and explain methods of merit rating.
ii) What is Job evaluation and explain different methods of job evaluation and its suitability to particular industry.
8. Explain about the following:
i) Taylor's differential piece rate system,
ii) Halsey 50-50 plan
iii) Bedaux system.

SECTION - V

9. (a) Determine the equation for the OC curve for the sampling plan $N = 5,000$, $n_1 = 100$, $c_1 = 1$, $r_1 = 3$, $n_2 = 175$, $c_2 = 3$ and $r_2 = 3.5$. Construct the curve using about 5 points.
(b) Explain the types of sampling plans.
10. a) Explain about the following:
i) TQM ii) Zero defect
(b) How can you apply Six Sigma concept in tyre manufacturing industry.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

MECHANICAL MEASUREMENTS & CONTROL
(Mechanical Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) Define readability and sensitivity of an instrument. On what factors the readability depends?
(b) What do you understand by threshold? What are the causes for threshold?
- 2 What are the different sources of errors in measurements and measuring instruments? Explain the various methods of elimination of above errors.

SECTION - II

- 3 What is a piezoelectric transducer? Write its working principle. List the advantages and disadvantages of piezoelectric transducer.
- 4 Describe the construction, and working theory of McLeod gauge for measurement of vacuum. List its advantages and disadvantages.

SECTION - III

- 5 Explain the working of a turbine flow meter with a neat sketch. Mention its advantages and disadvantages.
- 6 List the various methods used for measurement of torque. Write the working of a strain gauge torsion meter and electrical torsion meter.

SECTION - IV

- 7 What do you understand by vibrations? What are the reasons for vibrations in machines? What is its effect and how can you avoid the vibrations?
- 8 What are the various methods used for measurement of acceleration? Explain how Seismic accelerometer differs from piezoelectric accelerometer?

SECTION - V

- 9 (a) Distinguish between the open loop and closed loop control systems.
(b) Explain briefly the concept of control in engineering with simple example.
- 10 (a) Describe the construction and principle of operation of dead weight piston gauge.
(b) The piston and the platform of a dead weight tester weigh of 20N and the piston diameter is 1.25cm. What weight must be added to the platform to produce a pressure of 17 kPa?

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester
PRINCIPLES OF MACHINE DESIGN
(Mechanical Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section

All Questions carry equal marks

* * *

SECTION-I

- 1 a) Explain the concept of Design and phases of Design.
b) Explain the term Factor of safety and selection of factor of safety in design.
- 2 A propeller shaft of 200mm external diameter and 100 mm internal diameter has to transmit 1360 kW power at 80 rpm. In addition, it is subjected to a BM of 10 KN-m and an end thrust of 100 KN. Find
 - i) The principal stresses and their planes
 - ii) The maximum shear stress and its plane

SECTION-II

- 3 a) Define stress concentration
b) A shaft is to be designed to transmit torques varying between 800N-m to 1600N-m. Assume factor of safety as 2 and stress concentration factor of 1.2. Ultimate tensile strength of material is 600N/mm^2 and yield stress is 450N/mm^2 . Determine the diameter of the shaft
- 4 A hot rolled steel shaft is subjected to a torsional moment that varies from 330 N-m clockwise to 110 N-m counterclockwise and an applied bending moment at a critical section varies from 440 N-m to - 220 N-m. The shaft is of uniform cross-section and no keyway is present at the critical section. Determine the required shaft diameter. The material has an ultimate strength of 550MN/m^2 and yield strength of 410MN/m^2 . Take the endurance limit as half the ultimate strength, factor of safety of 2, size factor of 0.85 and a surface finish factor of 0.62.

SECTION-III

- 5 a) What is the difference between set screw and cap screw?
b) A steam engine cylinder has an effective diameter of 350 mm and the maximum steam pressure acting on the cylinder cover is 1.25N/mm^2 . Calculate the number and size of studs required to fix the cylinder cover, assuming the permissible stress in the studs as 33 MPa.
- 6 a) Explain bolts of uniform strength
b) Explain eccentric loading design of bolts
 - i) Load acting perpendicular to axis of bolt
 - ii) Load acting parallel to axis of bolt.

SECTION - VI

- 7 a) Explain various stresses developed in welded joints
- b) A plate 12cm wide and 1.5 cm thick is to be welded to another plate by means of single transverse weld and double parallel welds. The maximum axial load along the center axis is 100 KN. Determine the length of the weld in each case if the joint is subjected to
- i) Static load and ii) Variable load. Take tensile stress = 70 N/mm^2 and Shear stress = 50 N/mm^2
- 8 a) Write short notes on (i) welding symbols (ii) weld inspection
- b) Derive an expression for strength of single transverse and double fillet weld

SECTION-V

- 9 Design a cotter joint to connect two mild steel rods subjected to an axial load of 100 KN. Take Tensile strength= 70 N/mm^2 Shear strength= 50 N/mm^2 Crushing strength= 100 N/mm^2
- 10 A shaft supported at the ends in ball bearings carries a straight tooth spur gear at its mid span and is to transmit 7.5 kW at 300 r.p.m. The pitch circle diameter of the gear is 150 mm. The distances between the centre line of bearings and gear are 100 mm each. If the shaft is made of steel and the allowable shear stress is 45 MPa, determine the diameter of the shaft. Show in a sketch how the gear will be mounted on the shaft; also indicate the ends where the bearings will be mounted? The pressure angle of the gear may be taken as 20° .

III B.Tech. II Semester

**COMPOSITE MATERIALS
(Mechanical Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION - I

- 1 (a) Describe Nature made composites with an industrial application
(b) Explain the Polymer Matrix composites in detail with neat sketch
- 2 (a) Compare Thermoplastic and Thermo setting plastics polymers
(b) How CMC will differ from CCC, Explain in detail

SECTION - II

- 3 (a) What is Kevlar? Explain its properties and applications
(b) Mention applications of E-glass and Boron fiber
- 4 (a) Classify types of fibers and mention any two applications
(b) Distinguish between aramid and carbon fiber

SECTION - III

- 5 (a) With the help of neat sketch pultrusion process
(b) Explain with sketch any two processing techniques of MMCs.
- 6 (a) Explain the processing of Compression molding with neat sketch
(b) What is stir casting? Explain in detail

SECTION - IV

- 7 (a) Write about Interfacial reactions of matrix-reinforcing components on composite.
(b) Volume and weight fractions used for evaluation of properties explain.
- 8 (a) How strength analysis is carried for new composite materials?
(b) What are the principles of protective coatings used in composites ?

SECTION - V

- 9 (a) What are the problems need to overcome to build a composite Boeing 777 aircraft.?
(b) Mention the applications of Civil Engineering applications
- 10 (a) Explain packing and house hold industry applications in composites.
(b) What are the components used in automobile composite structures ?

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

MICROPROCESSORS & INTERFACING
(Common for EEE, ECE, & CSE)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION - I

- 1 (a) Explain types of microprocessors.
(b) What are the various registers present in 8085? Explain function of each register in detail.
- 2 (a) Briefly explain the function of 8085 pins.
(b) Draw the timing diagram for the STA instruction.

SECTION - II

- 3 (a) Explain hardware and software interrupts of 8085
(b) Explain the memory interfacing of 8085.
- 4 (a) Write an 8085 ALP for finding smallest number from a given series of N-8-bit numbers.
(b) Explain 8085 addressing modes with an example.

SECTION - III

- 5 (a) Draw the 8086 minimum mode system bus structure and explain.
(b) Explain the stages of software development.
- 6 (a) Write an 8086 ALP for arranging the N-8-bit numbers in ascending order.
(b) What is the use of 8086 addressing mode? Explain them with an example.

SECTION - IV

- 7 (a) Explain data transfer schemes.
(b) Draw the internal block diagram of 8251 and briefly explain.
- 8 (a) Briefly explain modes of 8253 timer.
(b) Draw the internal block diagram of 8257 and explain each block briefly.

SECTION - V

- 9 (a) Draw the interfacing diagram of ADC (0808) with 8086 using 8255 and write an ALP.
(b) Explain the operating modes of 8255.
- 10 (a) Write an ALP for rotating stepper motor 4 steps clock wise and 4 steps anti clock wise.
(b) Explain the different types of RAM and ROM.

Code : 13EC3202

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

MICROWAVE TECHNIQUES

(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

** * **

SECTION-I

1. (a) What are the limitations of conventional tubes at microwave frequencies? Explain how these can be overcome?
(b) Explain velocity modulation process in two-cavity klystron?
2. (a) Explain Pi-mode operation of magnetron?
(b) Explain the construction and working of reflex klystron ?

SECTION-II

3. (a) Explain how a Esaki diode can be used as an amplifier and as an oscillator with the necessary circuit diagram?
(b) Discuss the construction details, equivalent circuit and figure of merit of varactor diode?
4. (a) Explain Gunn effect using two valley theory?
(b) Discuss the principle of MASERS?

SECTION-III

5. (a) A TE₁₁ mode is propagating through a circular wave guide having an air dielectric and radius of 5cm, calculate the cut-off frequency, guide wavelength and wave impedance?
(b) Describe in detail the operation of a 2 hole direction coupler?
6. (a) What are ferrites? why these are useful in microwaves and mention their properties?
(b) Explain how magic tee act as mixer and duplexer with a neat sketches?

SECTION-IV

7. (a) What is the need of double minimum method for measurement of VSWR and explain this method?
(b) Describe the various techniques of measuring unknown frequency of a microwave generator?
8. (a) Describe how an ordinary voltmeter can be calibrated to read VSWR directly. What are the drawbacks of such a VSWR meter?
(b) Describe how power of a microwave generator can be measured?

SECTION-V

9. (a) Explain the antennas suitable for microwave communications?
(b) What are the advantages and disadvantages of micro strip lines?
10. (a) Discuss various feeds used for a parabolic reflector?
(b) Explain about LENS antenna?

Code: 13EC3203

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B Tech II Semester

OPTICAL COMMUNICATION
(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

SECTION - I

- 1 (a) What is a fiber bend loss? What are their types? Describe with necessary equations how to estimate them. Explain what is critical bending radius of the fiber?
- (b) A multimode graded index fiber has refractive index at the core axis of 1.46 with a cladding refractive index of 1.45. The critical radius of curvature which allows large bending losses to occur is $84 \mu\text{m}$ when the fiber is transmitting light of a particular wavelength. Determine the wavelength of the transmitted light.
- 2 (a) What is the difference between inter-modal and intra-modal dispersion? Derive an equation for estimation of inter-modal dispersion in multimode fibers.
- (b) An 11 km optical fiber link consisting of optimum near parabolic profile graded index fiber exhibits rms inter-modal pulse broadening of 346 ps over its length. If the fiber has a relative refractive index of 1.5% , estimate the core refractive index. Hence determine the numerical aperture for the fiber?

SECTION - II

- 3 (a) Compare and contrast Light Emitting Diodes (LED) and Laser Diodes (LDs). Derive an equation for internal quantum efficiency of an LED.
- (b) A double hetero junction InGaAsP LED emitting at a peak wavelength of 1310 nm has radiative and non radiative recombination times of 25 and 90 ns , respectively. The drive current is 35 mA . (i) Find the bulk recombination life time, internal quantum efficiency and internal power level? (ii) If the refractive index of the light source material is $n = 3.5$, find the power emitted from the device.
- 4 (a) Describe the principle of working of a Laser Diode (LD). Derive an equation for number of photons resulting from stimulated emission using laser diode rate equations.
- (b) A GaAs laser emitting at 800 nm has a $400 \mu\text{m}$ cavity length with a refractive index $n = 3.6$. If the gain g exceeds the total loss α_t through out the range $750 \text{ nm} < \lambda < 850 \text{ nm}$, how many modes will exist in this laser?

SECTION - III

- 5 (a) Describe principle of operation of *pin* photodetector. Derive an equation for its responsivity.
- (b) In a 100 ns pulse, 6×10^6 photons at a wavelength of 1300 nm fall on InGaAs photodetector. On the average, 5.4×10^6 electron-hole (e-h) pairs are generated. Find the quantum efficiency? Find its responsivity for a wavelength range $1300 \text{ nm} < \lambda < 1600 \text{ nm}$.
- 6 (a) Describe in detail about Avalanche multiplication noise. Derive an equation for excess noise factor.
- (b) An InGaAs *pin* photodiode has the following parameters at a wavelength of 1300 nm: $I_D = 4 \text{ nA}$, $\eta = 0.90$, $R_L = 1000 \Omega$, and the surface leakage current is negligible. The incident optical power is 300 mW (-35 dBm), and the receiver bandwidth is 20 MHz. Find the various noise terms of the receiver.

SECTION - IV

- 7 (a) Describe in detail about Semiconductor amplifiers.
- (b) Consider an In GaAsP semiconductor amplifier with $w = 5 \text{ } \Omega\text{m}$ and $d = 0.5 \text{ } \Omega\text{m}$. Given that $v_g = 2 \times 10^8 \text{ m/s}$, if a 1.0 mW optical signal at 1550 nm enters the device. (i) What is the photon density? (ii) If a 100 mA bias current is applied to the device, then what is the pumping rate? (iii) Find the zero signal gain.
- 8 (a) What is Erbium Doped Fiber Amplifier (EDFA)? Give its architecture, describe in detail.
- (b) Describe EDFA power conversion efficiency and Gain.

SECTION - V

- 9 What are the components of optical communication systems? Describe each block in detail.
- 10 What is the difference between active and passive sensing? Describe in detail.

Code : 13EC3204

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

DIGITAL DESIGN

(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

** * **

SECTION - I

- 1 (a) Explain Common Source amplifier with resistive load.
(b) Define and derive expression for CMRR.
- 2 (a) Explain briefly about basic current mirrors.
(b) Compare cascode and active current mirrors.

SECTION - II

- 3 (a) Explain two-input CMOS-NOR gate with a neat circuit diagram.
(b) Explain TTL NAND gate with totem pole output with the help of a neat circuit diagram.
- 4 (a) Write about the advantages and classification of ICs.
(b) Compare various characteristics of different logic families.

SECTION - III

- 5 (a) Discuss the steps in VHDL design flow.
(b) Write a structural VHDL program for a prime number detector.
- 6 (a) Explain data flow design elements.
(b) Explain the use of packages. Give the syntax and structure of a package in VHDL.

SECTION - IV

- 7 (a) Explain priority encoder 74x148 with logic diagram and truth table.
(b) Write a VHDL program for 74x148 priority encoder.

- 8 (a) Write a VHDL program for 4-bit Binary to excess-3 code converter.
(b) Write a VHDL program for 74x151.

SECTION - V

- 9 (a) Write a short notes on registers.
(b) Explain ring counter and write a program for its implementation.
- 10 (a) Explain the conversion of SR flip-flop to JK flip-flop.
(b) Explain the functioning of 74x109 and write a VHDL program for its realization.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

COMPUTER ORGANIZATION

(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section

All Questions carry equal marks

** * **

SECTION - I

- 1 (a) Explain the terms computer architecture, and computer organization in a detailed fashion.
- (b) What are Register Transfer logic languages? Explain few RTL statement for branching with their actual functioning?
- 2 (a) Explain Instruction cycle with flow chart.
- (b) Explain 4- bit binary Adder & Subtractor.

SECTION - II

- 3 (a) Distinguish between high level and low level languages? What are the requirements for a good programming language?
- (b) Hardwired control unit is faster than micro programmed control unit. Justify this statement.
- 4 (a) Explain the variety of techniques available for address sequencing of microinstructions
- (b) What is assembler? Need of assembler in assemble language programming?

SECTION - III

- 5 (a) Explain about stack organization used in processors.
- (b) Explain how $X = (A+B) / (A-B)$ is evaluated in a stack based computer.
- 6 (a) What is pipeline? Explain space –time diagram for Pipeline.
- (b) Explain different types of addressing modes.

SECTION - IV

- 7 (a) What is Direct Memory Access? Explain the working of DMA.
- (b) Explain the Asynchronous Serial data transfer.
- 8 (a) Explain the following
 - (i) Isolated Vs Memory mapped I/O
 - (ii) I/O Bus Vs Memory Bus
 - (iii) I/O interface

SECTION - V

- 9 (a) Give the detailed picture of Memory Hierachy.
- (b) What are the different types of Mapping Techniques used in the usage of cache Memory? Explain
- 10 (a) Explain about inter processor communication used in multiprocessors.
- (b) Explain virtual memory concept in detail.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

**NEURAL NETWORKS & FUZZY LOGIC
(Electronics & Communication Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION - I

- 1 Distinguish between the feedforward and feedback neural networks. Compare their input-output mapping.
- 2 Write in detail about hebbian and perception learning rules

SECTION - II

- 3 Draw a single layer network with continuous perceptions and present the delta learning rule.
- 4 Explain what do you mean by the terms ADALINE and MADALINE.

SECTION - III

- 5 (a) Explain briefly about the counter propagation training algorithm
(b) Explain the various applications of counter propagation.
- 6 (a) Explain the neural network applications in Control applications.
(b) Explain how plant inverse learning is used in process identification.

SECTION - IV

- 7 (a) Define Union, intersection, complement and composition of fuzzy relations.
(b) Define cartesian product of crisp relations.
- 8 Let $X = \{1, 2, 3, \dots, 10\}$. Determine the cardinalities and relative cardinalities of the following fuzzy sets
(a) $\bar{A} = \{(3, 10), (4, 0.2), (5, 0.3), (6, 0.4), (7, 0.6), (8, 0.8), (10, 1), (12, 0.8), (14, 0.6)\}$
(b) $\bar{B} = \{(2, 0.4), (3, 0.6), (4, 0.8), (5, 1.0), (6, 0.8), (7, 0.6), (8, 0.4)\}$
(c) $\bar{C} = \{(2, 0.4), (4, 0.8), (5, 1.0), (7, 0.6)\}$

SECTION - V

- 9 List the various defuzzification techniques. Explain each of them in detail
- 10 Describe the design of fuzzy logic control with an Air conditioner controller as an example.

III B.Tech. II Semester
COMPUTER GRAPHICS
(Computer Science & Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) Explain the midpoint circle drawing algorithm.
(b) Plot the intermediate points of the line starting from (3,4) to (15,14) using bresenhams midpoint line drawing algorithm for +ve quadrant.
- 2 (a) Explain in detail the Cohen-Sutherland line clipping algorithm.
(b) Consider a clipping window P (0,0) Q(30,0) R (30,20) S (0,20) .Find the visible portion of line segment for joining points A (10,30) B (40,0) using Cohen Sutherland Algorithm?

SECTION - II

- 3 List different Types of clipping and viewing in computer graphics and explain in detail?
- 4 (a) Explain Coordinate Free Geometry in brief?
(b) Discuss line clipping with help of polygon clipping?

SECTION - III

- 5 Discuss the following
(i) Methods to draw 3D objects (ii) Basic OPENGL operations.
- 6 Discuss in detail RGB and HSV color models.

SECTION - IV

- 7 What is surface rendering? And explain in detail about the various visible surface detection algorithms?
- 8 (a) What are Fractals? Explain in Detail about its fields and types?
(b) Differentiate Flat shading and smooth shading?

SECTION - V

- 9 Explain in detail about below terms
(a) General Computer animation Functions (b) Raster Animation
- 10 What is animation? Discuss in detail its Techniques?

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

**CRYPTOGRAPHY & NETWORK SECURITY
(Computer Science & Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION - I

- 1 Describe the working principle of Simple DES with an example.
- 2 Using play fair cipher algorithm, encrypt the message using the key "MONARCHY" and explain

SECTION - II

- 3 Demonstrate encryption and decryption for the RSA algorithm parameters : $P=3$, $q=11$, $e=7$, $d=3$, $M=5$
- 4 Discuss the discrete logarithm and explain Diffie –Hellman Key Exchange algorithm with its merits and demerits.

SECTION - III

- 5 Explain about Chinese Remainder theorem in detail.
- 6 Explain in detail about the security of Hash functions and MACs.

SECTION - IV

- 7 Write the algorithm of MD5 and explain.
- 8 Describe in detail about the Kerberos.

SECTION - V

- 9 List out the participants of SET system and Explain in detail.
- 10 Explain the various types of firewalls.

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

**FREE & OPEN SOURCE SOFTWARE
(Computer Science & Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION – I

- 1 (a) What is open source? Explain about source code availability and zero price software.
(b) How do open source developers support themselves?
- 2 (a) Discuss about open source history.
(b) Write about open source licenses.

SECTION – II

- 3 (a) What are the differences between DOS and UNIX operating systems?
(b) Explain the salient features of LINUX.
- 4 (a) Write about Vi editor.
(b) Explain about redirection operators.

SECTION – III

- 5 Explain the following commands with examples
(i) grep (ii) cut (iii) join
- 6 Explain various Back up commands with examples

SECTION – IV

- 7 (a) Write the installation procedure of Ubuntu operating system.
(b) How to use Libre office in Ubuntu operating system.
- 8 Explain the following
(a)Virtual Box (b) Network Simulator (c) Media-wiki

SECTION - V

- 9 (a) Distinguish free versus open source.
(b) What are projects needs? Explain the mailing lists.
- 10 Explain in detail about open source developments.

Code: 13CS3204

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

**COMPILER DESIGN
(Computer Science & Engineering)**

Time: 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

SECTION - I

- 1 Give a detailed account of various phases in "Analysis of the Source program" with example.
- 2 Explain about the role of Lexical analyzer. List out the issues in Lexical Analysis.

SECTION - II

- 3 Describe "Context-free grammar" with an example.
- 4 Explain about stack implementation of shift reduce parsing.

SECTION - III

- 5 Write a short note on
 - a) Synthesized attributes
 - b) Inherited attributes
 - c) Dependency graphs
- 6
 - a) Describe "Type conversions" with an example.
 - b) Write about Type expressions.

SECTION - IV

- 7 Discuss in detail about storage organization in Fortran, Pascal and C.
- 8
 - a) How to produce three address codes for assignment statements by using S-attribute definitions.
 - b) Write short note on "Declarations".

SECTION - V

- 9 Write short note on
 - a) Run-time storage management
 - b) Basic blocks & Flow graphs.
- 10
 - a) Explain about "Code generation algorithm".
 - b) Briefly discuss about "The Principle Sources of Optimization".

B.TECH. DEGREE EXAMINATION, APRIL 2019

III B.Tech. II Semester

MOBILE COMPUTING
(Computer Science & Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 What is mobile Computing? Explain about Antennas with the help of a diagram.
- 2 Explain the following in detail :
(i) SDMA (ii) TDMA

SECTION - II

- 3 (a) Briefly explain about Handover in GSM
(b) Explain about different types of mobile services in GSM.
- 4 Describe about DECT and its architecture.

SECTION - III

- 5 (a) Explain Tunnelling and encapsulation in Mobile IP.
(b) Discuss about IP packet delivery.
- 6 Explain about Dynamic Host Configuration Protocol.

SECTION - IV

- 7 (a) Explain about transaction oriented TCP.
(b) What are the advantages and disadvantages of Mobile TCP?
- 8 (a) What is Selective re-transmission? Explain.
(b) Explain about TCP over 2.5G/3G wireless networks.

SECTION - V

- 9 Explain the component of WAP architecture with neat diagram.
- 10 (a) Discuss about wireless session protocol.
(b) Explain about wireless telephony services.

