

**R-13**

**Code : 13CE2204**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech II Semester**

**TRANSPORTATION 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) Briefly explain the importance of transportation in our life.  
(b) Explain the classification of road pattern with neat sketch.
2. (a) How the preparation of master plan is done?  
(b) Define alignment. Explain the controlling factors for alignment in highway engineering.

**SECTION - II**

- 3 (a) Explain the importance of geometric design in highway construction.  
(b) What is meant by sight distance? Briefly explain important of Sight Distance in geometric design of pavements.
- 4 (a) Derive an expression for overtaking sight distance.  
(b) Calculate the minimum sight distance required head on collision on two cars approaching from the opposite direction at 90 Km/h and 60 Km/h. Assume the driver reaction time of 2.5 seconds, coefficient of friction 0.7 and break efficiency 50% in both the cars.

**SECTION - III**

- 5 (a) List out the various tests performed on road aggregate and explain briefly aggregate flakiness and elongation index test.  
(b) What are the specifications to be considered in laying road with aggregate?
- 6 (a) List out the properties of Aggregates & Bitumen.  
(b) What are the different forms of bitumen?

**SECTION - IV**

- 7 (a) Explain the designing factors for highway pavement.  
(b) What are the designing methods for flexible pavement & their advantages?
- 8 (a) Define rigid Pavement. What are the advantages of Rigid pavement?  
(b) With the help of neat Sketches explain the types of joints in Roads.

## SECTION - V

- 9 (a) List out the advantages, disadvantages & maintenance of a W.B.M. road .
- (b) Explain the construction procedure of concrete roads with the help of neat sketches.
- 10 (a) What is the necessity of highway drainage system?
- (b) Explain the surface & sub surface drainage system with the help of neat sketches.

**R-13**

**Code: 13CE2201**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech II Semester**

**STRENGTH OF MATERIALS**

(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 simply supported beam of 8m span is loaded with the UDL of intensity 5kN/m upto 2m from the left support and the beam is loaded with the UDL of intensity 4kN/m and is spread upto 3m from the right support. Draw S.F.D and B.M.D and also indicate the point of inflection.
2. A beam spanning 10m including the 2m overhanging portion at the right end of the beam, carries a load of 8kN/m on the entire overhanging portion of the beam and the beam is also carrying a concentrated load of 15kN at the 4m from the left support. Draw S.F.D and B.M.D and also indicate the point of inflection.

**SECTION - II**

- 3 (a) Explain the nature of bending stresses and state the assumptions made in the theory of simple bending.  
(b) Sketch the bending stress in distribution across the cross section of a rectangular beam section 230mmx400mm subjected to 50 kNm moment.
- 4 A steel joist of I section has the following dimension: flange 20mm, 24mm thick and web of 12mm thick and an overall depth of 600mm. if the beam is loaded with the UDL of intensity 50kN/m on a span of 8m. calculate the maximum stress produced due to bending.

**SECTION - III**

- 5 (a) Mention the effective length of the various end conditions.  
(b) Write the assumptions in Euler's analysis and limitations for the use of Euler's formula.

- 6 A Masonry pier of  $2\text{m} \times 3\text{m}$  supports a vertical load of  $50\text{kN}$  as shown in Fig No.1.

Find

- (a) Stresses developed at each corner of the pier.  
(b) What additional load should be placed at the center of the pier, so that there is no tension anywhere in the pier section.

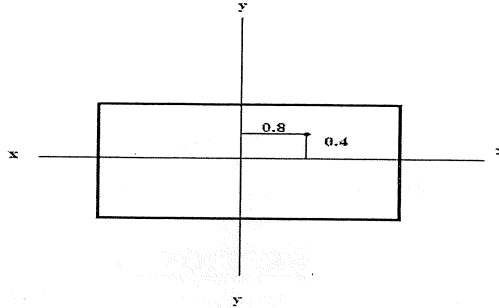


Fig.No.1

#### SECTION - IV

- 7 A Steel shaft is subjected to an end thrust of producing a stress of  $60\text{ MPa}$  and the maximum shearing stress on the surface arising from torsion is  $40\text{ MPa}$ . The yield point of the material in simple tension was found to be  $600\text{ MPa}$ . Calculate the factor of safety according to
- (a) Maximum shear stress theory  
(b) Maximum distortion energy theory.
- 8 A Close-coiled helical spring is to have a stiffness of  $900\text{ N/m}$  in compression with a maximum load of  $45\text{ N}$  and a maximum shearing stress of  $120\text{ N/mm}^2$ . The solid length of the spring (i.e. coil touching) is  $45\text{ m}$ . Find the wire diameter, mean coil radius, and number of coils. Take  $N = 40000\text{ N/mm}^2$ .

#### SECTION - V

- 9 A Cylindrical shell of  $1.2\text{ m}$  long and  $0.9\text{ m}$  in diameter is subjected to an internal pressure of  $2.8\text{ N/mm}^2$ . The thickness of the cylindrical wall is  $25\text{ mm}$ . determine longitudinal stresses, circumferential stress and maximum shear stress induced and change in diameter. Assume  $E = 2 \times 10^{11}\text{ Pa}$ , assume if any data required.
- 10 At a point with in a body subjected to two mutually perpendicular directions the stresses are  $80\text{ N/mm}^2$  tensile and  $40\text{ N/mm}^2$  tensile. Each of the above stresses is accompanied by a shear stress of  $60\text{ N/mm}^2$ . Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of  $45^\circ$  with the axis of minor tensile stress.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech II Semester****FLUID MECHANICS - II**  
(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) Derive the relation between shear stress and pressure gradient in laminar flow.  
(b) An oil of viscosity  $0.1 \text{ N/m}^2$  and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and a length of 300m .the rate of flow of fluid through the pipe is 3.5 lit/s. Find the pressure drop in a length of 300m and also shear stress at the pipe wall.
2. (a) Define the terms viscosity, kinematic viscosity, velocity gradient & velocity gradient  
(b) Calculate: (i) the pressure gradient along the flow, (ii) the average velocity & (iii) the discharge for an oil of viscosity  $0.015 \text{ Ns/m}^2$  flowing between two stationary parallel plate of 1 m wide maintained 10 mm apart. The velocity in midway between plates is 2.5 m/s .

**SECTION - II**

- 3 Obtain an expression for the velocity distribution in turbulent.
- 4 (a) Explain the procedure of hardy cross method of analysis of pipe network.  
(b) Derive the equation for flow through pipes in series or through compound pipes.

**SECTION - III**

- 5 (a) Discuss the methods adopted to prevent the boundary layer separation.  
(b) A 1.8 m wide and 5 mts long plate moves through stationary air of density  $1.22 \text{ kg/m}^3$  And viscosity  $1.8 \times 10^{-4}$  poise at a velocity of 1.5 m/s parallel to its length. Determine the drag force on one side of the plate by assuming (i) laminar flow & (ii) Turbulent flow conditions.
- 6 (a) Differentiate Drag & lift using diagram & respective equations.  
(b) Discuss the different methods adopted for boundary layer concept.

#### SECTION - IV

7. (a) A turbine develops 500kW power under a head of 100m at 200r.p.m. what would be its normal speed and output under a head of 64m.
- (b) Give the causes and effects of cavitation with respect to turbines.
8. (a) Differentiate (i) axial flow and radial flow turbines (ii) inward and outward flow turbines (iii) Kaplan and Propeller turbine.
- (b) Design a pelton wheel turbine to meet the following particulars. Overall efficiency 85%, coefficient of velocity 0.98, speed ratio 0.45, shaft power 500kW, speed 200rpm, Net Head 100 mts.

#### SECTION - V

9. The diameter & stroke length of a single acting reciprocating pump are 100 mm & 300 mm respectively. The water is lifted to a height of 20 m above the Centre of the pump. Find the maximum speed at which the pump may be run so that no separation occurs during the delivery stroke if the diameter & length of the delivery are 50mm & 20 m respectively . separation occurs if the absolute pressure head in the cylinder during delivery stroke falls below 2.50 m of water
10. (a) Explain about the operating characteristics of centrifugal pump.
- (b) A centrifugal pump is to discharge  $0.118\text{m}^3/\text{sec}$  at a speed of 1450 rpm against a head of 25m. The impeller diameter is 25mm, its width at outlet is 50mm and at outer manometric efficiency is 75%. Determine the vane angle at outer periphery of the impeller.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech II Semester****SOIL MECHANICS**

(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) Differentiate dry sieve analysis and wet sieve analysis. Explain the use of particle size distribution curves.
- (b) A sample of sand above water table was found to have a natural moisture content of 15% and unit weight of  $18.84 \text{ kN/m}^3$ . Laboratory tests on a dried sample indicated values  $e_{\min} = 0.5$  and  $e_{\max} = 0.85$  for the densest and loosest states respectively. Compute the degree of saturation and density index. Assume  $G=2.65$ .
2. (a) Write short notes on the method of determination of liquid limit of soil.
- (b) A soil sample has the following data is available from sieve analysis  
Soil passing 4.75mm sieve = 80%  
Soil passing 0.075mm sieve = 4%  
If the particle size distribution curve varies linearly, Classify the soil as per IS classification.

**SECTION - II**

- 3 (a) Explain with neat diagrams a method of locating the phreatic line in a homogeneous earth dam. Assume that there is no toe drain.
- (b) In a falling head permeability test, the initial head is 50 cm. The head drops by 2 cm in 5 min. how much time required for the head to fall to 25cm.
- 4 (a) Describe with a neat sketch how you will determine the coefficient of permeability in the field and derive expression for unconfined aquifer.
- (b) A clay stratum 8m thick is located a depth of 6m from the ground surface. The natural moisture content of the clay is 56% and  $G=2.75$ . The soil stratum between ground surface and clay consists of fine sand. The water table is located at a depth of 2m below the ground surface. The submerged unit weight of fine sand is  $10.5 \text{ kN/m}^3$ , and its moist unit weight above the water table is  $18.68 \text{ kN/m}^3$ . Calculate the effective stress at center of the clay layer. Draw the sketch.

### SECTION - III

- 5 (a) Describe briefly the effect of compaction on engineering properties of soil.
- (b) A soil in the borrow pit is at a dry density of  $17\text{kN/m}^3$  with a moisture content of 10%. The soil is excavated from this pit and compacted in embankment to a dry density of  $18\text{ kN/m}^3$  with moisture content of 15%. Compute the quantity of soil to be excavated from the borrow pit and the amount of water to be added for  $100\text{ m}^3$  of compacted soil in the embankment.
- 6 (a) Discuss the basis of the construction of Newmark's influence chart and how is it used.
- (b) Determine vertical stress at a depth of 3.5m centrally below a surface Circular footing of 2m diameter subjected to a load of 250 kN. Use Boussinesq's theory. How does the stress at the same point changes if foundation surface is square footing of size 2m x 2m.

### SECTION - IV

- 7 (a) State the assumptions made in Terzaghi's theory of one-dimensional consolidation and also limitations.
- (b) The void ratio of clay A decreased from 0.572 to 0.505 under a change in pressure from 120 to 180  $\text{kg/m}^2$ . The void ratio of clay B decreased from 0.612 to 0.597 under a change in pressure from 120 to 180  $\text{kg/m}^2$ . the thickness of sample A was 1.5 times that of B. the time required for 50% consolidation was 3 times longer for sample B than for sample A. what the ratio of coefficient of permeability of A to B .
- 8 (a) Define Pre-consolidation pressure. Describe the procedure for determining the Pre-consolidation pressure from the results of one dimensional consolidation test.
- (b) A clay bed has a thickness of 4m. The effective overburden pressure at the middle of the clay layer is  $100\text{ kN/m}^2$ . Determine the change in the thickness of clay layer, if effective overburden pressure is increased by 40% of initial overburden pressure. Assume the following data :  
Natural water content = 36% ; Liquid Limit = 60% and  $G_s = 2.68$

### SECTION - V

- 9 (a) Describe direct shear test. Discuss the merits and demerits of direct shear test over the tri axial shear test.
- (b) Following are the results of direct shear test.
- |                               |    |    |     |     |
|-------------------------------|----|----|-----|-----|
| Normal Stress (kPa)           | 25 | 75 | 150 | 250 |
| Shear Stress at failure (kPa) | 60 | 80 | 105 | 145 |
- Determine the shear strength parameters.
- 10 (a) Briefly discuss the effects of drainage conditions on the shear parameters of clay soil.
- (b) Explain the Mohr – Coulomb theory used in evaluation of shear strength of soils.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech II Semester****BUILDING PLANNING AND DRAWING**

(Civil Engineering)

Time : 3 hours

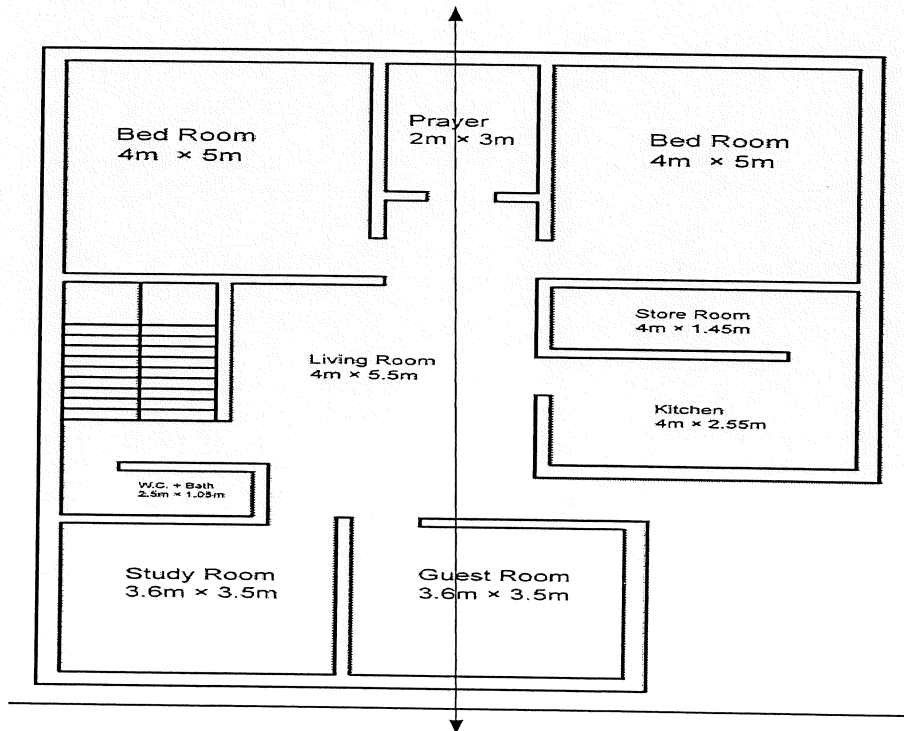
Max Marks: 60

*Note: Two full questions from Part A and Question 4 from Part B.**Assume suitable data wherever necessary**Drawing sheets should be folded to the size of answer book and fasten it severely to main answer book***PART - A**

- 1 Express various components of building as per NBC.
- 2 (a) Recall various factors considered while planning a hospital building.  
(b) Explain the factors to be considered in planning of school building.  
i) Grouping ii) Elegance iii) Flexibility iv) Prospect
- 3 Elaborate municipal bye laws and its purpose.

**PART - B**

- 4 (a) Draw the plan and elevation of one brick wall masonry.  
(b) Draw the section across right hand side and elevation of a residential building presenting following requirements





B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech II Semester****SURVEYING - II**  
(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 use of various parts of a theodolite and also explain the terms used in using theodolite.
- (b) The lengths and bearings of a closed traverse ABCD is shown below, Calculate the length of CD and bearing of DA.

Line	Length(m)	Bearing
AB	80	140°30'
BC	60	220°00'
CD	?	310°30'
DA	100	?

2. (a) Explain various methods of theodolite traversing.
- (b) Explain the instrumental errors of theodolite traversing.

**SECTION - II**

- 3 Derive the expressions for distance and elevation of point in Stadia method when the staff is held Vertical.
- 4 (a) What is tangential method of tachometry? What are its advantages and disadvantage over the stadia method?
- (b) Determine the gradient from a point A to another point B from the following observations made with a Tacheometer fitted with an anallitic lens. The constant of the instrument being 100 and the staff was held vertical.

Initial station	Staff Point	Bearings	Vertical angle	Staff Readings
P	A	134°	+10°32'	1.360,1.915,2.407
	B	224°	+5°6'	1.065,1.885,2.705

### **SECTION - III**

- 5 (a) Explain Rankine's Method for setting out of a circular curve.  
(b) What is the need of providing circular curves to the road? What are the various horizontal curves?
- 6 (a) Determine the Uses and characteristics of transition curve.  
(b) Explain different types of curves used in field and their uses with neat sketches.

### **SECTION - IV**

- 7 (a) Describe about total station and state its advantage over other methods of surveying.  
(b) State four uses and applications of GPS.
- 8 (a) Discuss about microwave and electro optical system adopted in total station.  
(b) What are the reference co-ordinate systems for GPS.

### **SECTION - V**

- 9 (a) Explain the technical terms used in aerial surveying.  
(b) Write the shorts notes on the following:  
(i) Stereoscopy  
(ii) Oblique photography  
(iii) Principal point
- 10 (a) What are the different types of photographs in survey?  
(b) How accurate are aerial surveys? What is the purpose of aerial surveys?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester****ELECTRO MECHANICAL ENERGY CONVERSION - 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 Explain Sumpner's test on a single-phase transformer with neat diagram and also list its advantages.
- 2 (a) Give the comparison of auto transformer with two winding transformer on various aspects.  
(b) A 220 V, 2.8 KVA single phase transformer has an iron loss of 120 W at 45 Hz and 70 W at 35 Hz. Find the hysteresis and eddy current losses at 50 Hz.

**SECTION - II**

- 3 Draw the connection diagrams and explain the features of Y-Y, Y- $\Delta$ ,  $\Delta$ -Y and  $\Delta$ - $\Delta$  three-phase transformer connections.
- 4 Explain the Scott connection of three phase transformer with neat diagram.

**SECTION - III**

- 5 (a) Explain how rotating magnetic field of constant amplitude is produced in 3-phase induction motor.  
(b) A 3-phase, 400 V, 50 Hz, 6-pole induction motor drawing a line current of 78 A at 0.8 p.f. Calculate synchronous speed, slip, rotor frequency and rotor speed.
- 6 (a) Derive the condition for maximum torque of a 3-phase induction motor under running condition.  
(b) A 3-phase, 50 Hz 8-pole, induction motor has full load slip of 2%. The rotor resistance and standstill rotor reactance of per phase are  $0.06 \Omega$  and  $0.3 \Omega$  respectively. Find the ratio of maximum torque to full load torque the speed at which the maximum torque occurs.

**SECTION - IV**

- 7 Draw the circle diagram of a 20HP, 400V, 50 Hz, 4 pole, 3-phase star connected induction motor from the following test data (line values): No-load: 400V; 9A;  $\cos\phi_0 = 0.2$  Blocked Rotor: 200V; 50A;  $\cos\phi_{sc} = 0.4$  From the circle diagram Find (a) Line current, P.f and full load slip (b) Starting torque and maximum torque, both in N-m (c) the slip for maximum torque (d) the maximum output and maximum input (e) Efficiency of motor.

8 Describe the starting methods of three phase induction motor.

SECTION - V

9 (a) Explain the speed control of three phase induction motor using rotor rheostat control.  
(b) Explain the speed control of three phase induction motor by pole changing method.

10 (a) Write a brief note on double cage rotor induction motor.  
(b) Write a brief note on Induction generator.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester****ENGINEERING MATHEMATICS - IV**

(Common for EEE &amp; ECE)

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) Find the real root of equation  $x^3 - x - 11 = 0$  correct two decimal places by bisection method.
- (b) Find a real root of the equation  $xe^x - \cos x = 0$  by Newton-Raphson's method correct to four decimal places.
- 2 (a) Fit a straight line for the following data

x	1	2	3	4	5	6
y	6	4	3	5	4	2

- (b) Find the rank Correlation coefficient for the following data.

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

**SECTION - II**

- 3 (a) Solve the equations  $x+y+z=6$ ;  $3x+3y+4z=20$ ;  $2x+y+3z=13$  using partial pivoting Gaussian elimination method.
- (b) Solve the equations  $10x+y+z=12$ ;  $x+10y-z=10$  and  $x-2y+z=9$  by Gauss – Jordan method
- 4 (a) Solve the following equations by Crout's method:  
 $2x-6y+8z=24$ ;  $5x+4y-3z=2$  and  $3x+y+2z=16$
- (b) Solve the system of non-linear equations  $x^2+y=11$ ;  $x+y^2=7$  by Newton-Raphson method.

**SECTION - III**

- 5 Find  $y(0.1)$  and  $y(0.2)$  using Euler's modified formula given that

$$\frac{dy}{dx} = x^2 - y, \quad y(0) = 1.$$

- 6 Use Milne's method to find  $y(0.3)$  from  $y' = x^2 + y^2$   $y(0) = 1$ . Find the initial values  $y(-0.1)$ ,  $y(0.1)$ ,  $y(0.2)$  from the Taylor's series method.

**SECTION - IV**

- 7 Using Lagrange's interpolation formula find the value of  $f(10)$  from the following table

x	5	6	9	11
y	12	13	14	16

- 8 From the following table of values of 'x' and 'y', obtain  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x=1.5$

X	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

**SECTION - V**

- 9 Let X denote the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the (i) Discrete probability distribution (ii) Expectation (iii) Variance
- 10 (a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.
- (b) The mean and standard deviation of normal variate are 8 and 4 respectively. Find  $P(5 \leq X \leq 10)$  (ii)  $P(X \geq 5)$ .



**R-13**

**Code : 13SH2202**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester**

**ECONOMICS & ACCOUNTANCY**

(Common for EEE & ECE)

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. What do you mean by Economics? What are the assumptions and limitations' of Marginal utility analysis?
2. Illustrate the various ways of measuring Elasticity of Demand.

**SECTION - II**

3. Write a short note on:  
(a) Iso-quants  
(b) Iso-costs
4. Summarize Law of returns with appropriate examples.

**SECTION - III**

5. What is Perfect competition? Narrate the perfect competition for Individual firm and the Industry.
6. Write about the Price-output determination in monopolistic competition for short run and long run.

**SECTION - IV**

7. Define Sole-trade. Write a short note on the features and suitability of Sole-trade business.
8. What are the main documents to be submitted in the formation of a company and explain them in detail?

**SECTION - V**

9. Explain profit and loss account mentioning as many items as possible.
10. Discuss the various determinants and sources of working capital.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester****PULSE & ANALOG CIRCUITS**  
(Common for EEE & ECE)

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 is high-pass filter? Derive an expression for the output of a high-pass circuit excited by a step input.
- (b) In an RC low-pass circuit  $R=2K\Omega$  and  $C=1\mu F$ . A square wave with half period of  $5\mu s$  is applied as input to this circuit. Determine the output waveform.
- 2 (a) Discuss series and shunt clipper using diode along with relevant waveforms.
- (b) State and explain the clamping circuit theorem.

**SECTION - II**

- 3 (a) Explain various transistor switching times with relevant waveforms.
- (b) Discuss Schmitt trigger circuit in detail.
- 4 (a) Draw monostable multivibrator and derive an equation for pulse width.
- (b) Write short notes on various triggering methods.

**SECTION - III**

- 5 What is meant by boot strapping? Explain the principle of operation and working of a bootstrap sweep circuit with the help of neat diagrams.
- 6 (a) Discuss the differences between Miller sweep circuit and Bootstrap sweep circuit.
- (b) What is a linear time base generator? Give its applications.

**SECTION - IV**

- 7 Describe the operation and characteristics of n – channel enhancement mode MOSFET with neat sketches.
- 8 (a) What is the importance of MOS Capacitance in a MOS Transistor?
- (b) Draw and Explain small signal model of a MOS Transistor.

**SECTION - V**

- 9 (a) Explain transformer coupled class A power amplifier with neat sketches.  
Draw the circuit diagram of Class B Complementary Symmetry Push-Pull amplifier,
- (b) Explain its working and derive its efficiency.
- 10 (a) What is the importance of Q-factor in tuned amplifier?
- (b) Explain single tuned transformer coupled amplifier.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester**

**RANDOM SIGNALS & STOCHASTIC PROCESSES**  
(Electronics & Communication 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) Define random variable and explain the concept of random variable.  
(b) Distinguish between mutually exclusive events & independent events.
- 2 (a) Define probability density function. Prove its properties.  
(b) If two dice are thrown randomly find the probability that
  - (i) sum of two numbers is greater than 10
  - (ii) Sum is between 2 and 5
  - (iii) Sum greater than or equal to 7

**SECTION - II**

- 3 (a) Define central moment, variance and skew.  
(b) Discuss about Moment Generating Function and state and prove any 3 properties.
- 4 (a) Verify the Characteristic function of a random variable is having its maximum magnitude at  $\omega=0$  and find its maximum value.  
(b) What are the properties of Jointly Gaussian Random variables?

**SECTION - III**

- 5 (a) Explain about the following random process .  
(i) Mean ergodic process (ii) Correlation ergodic process.  
(b) State and prove the cross-correlation function properties.
- 6 (a) Auto Correlation Function of a random process X(t) is  $R_{XX}(t) = 3 + 2 e^{-4T^2}$ .  
Find  
(i). Power Spectrum of X(t) (ii).What is the average power in X (t) ? and (iii). What fraction of the power lies in the frequency band  $\frac{-1}{\sqrt{2}} \leq \omega \leq \frac{1}{\sqrt{2}}$  ?  
(b) Write short notes on cross power density spectrum.

#### SECTION - IV

- 7 (a) A wide sense stationary process with mean value 5 and power spectrum  $J_{XX}(\omega) = 50\pi\delta(\omega) + 3/[1+(\omega/2)^2]$  is applied to a network with impulse response  $h(t) = 4e^{-4|t|}$ . Find (i).  $H(\omega)$  for the network. (ii). The mean  $\bar{Y}$  and the power spectrum of the response  $Y(t)$ .
- (b) Explain the concept of System evaluation using random noise.
- 8 (a) Discuss in detail the following random process: (i) Band limited. (ii) Narrow band.
- (b) Obtain an expression to find noise band width of the system.

#### SECTION - V

- 9 (a) A mixer stage has a noise figure of 20dB and this is preceded by an amplifier that has a noise figure of 9dB and an available power gain 15dB. Calculate the overall noise figure referred to the input.
- (b) Discuss about Resistive (Thermal) noise and Effective noise temperature.
- 10 (a) Explain the process Minimization of mean squared error.
- (b) Derive the mathematical description of Noise Figure of a cascaded network.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester****SWITCHING THEORY & LOGIC DESIGN**  
(Common for EEE & ECE)

Time : 3 hours

Max. Marks: 60

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

\* \* \*

**SECTION - I**

- 1 (a) Solve the following
- i)  $(446.25)_{10} = (\quad)_{16}$
  - ii)  $(1011101.001)_2 = (\quad)_8$
  - iii)  $(11C.DC)_{16} = (\quad)_2$
  - iv)  $(26.24)_8 = (\quad)_{10}$
- (b) Distinguish between weighted and non-weighted codes with examples.
- 2 (a) A 7 bit hamming code is transmitted through a noisy channel. Find the error Assuming a single error has occurred. The given message is 1010101.
- (b) State and prove Demorgan's theorems for three variables.

**SECTION - II**

- 3 (a) What is K-map? State advantages and limitations of K-map?
- (b) Simplify the following Boolean expressions using K-map and implement them using NOR gates:
- i.  $F(A, B, C, D) = AB'C' + AC + A'CD'$ .
  - ii.  $F(W, X, Y, Z) = W'X'Y'Z' + WXY'Z' + W'X'YZ + WXYZ$ .
- 4 (a) Obtain the minimal expression for  $f = \Sigma m(1, 2, 4, 6, 7)$  and implement it using universal gates.
- (b) Simplify the following Boolean function for minimal SOP form using K-map and implement using NAND gates.  $F(W, X, Y, Z) = \Sigma(1, 3, 7, 11, 15) + d(0, 2, 5)$

**SECTION - III**

- 5 (a) Implement full adder using two half adders. Give the internal logic function and truth table.
- (b) Draw and explain the block diagram of n-bit parallel adder.
- 6 (a) Implement the following Boolean function with an 8x1 multiplexer.  
 $F(A, B, C, D) = (1, 3, 4, 11, 12, 13, 14, 15)$ .
- (b) Implement 16:1 MUX Using 4:1 Multiplexers.

#### **SECTION - IV**

- 7 (a) Distinguish between combinational and sequential circuits.  
(b) Explain the operation of twisted ring counter with the help of logic diagram and its timing diagrams.
- 8 (a) Compare Synchronous and asynchronous sequential circuits.  
(b) Design mod 8 synchronous counter using T flip-flop.

#### **SECTION - V**

- 9 (a) Compare SRAM & DRAM.  
(b) Implement the following Boolean functions using PROM  
 $F_1 = \Sigma m(0,1,2,4,6,7)$   $F_2 = \Sigma m(0,1,2,4,6)$ .
- 10 Write short note on  
i) ROM ii) EPROM iii) EEPROM



**II B.Tech. II Semester****ANALOG COMMUNICATIONS**

(Electronics &amp; 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 Modulation? Discuss about need for modulation in detail.  
(b) Derive an expression for single-tone amplitude modulated wave and also draw its spectrum.
- 2 (a) Outline the Ring modulator circuit and draw its relevant waveforms.  
(b) Describe the working principle detection of SSB.

**SECTION - II**

- 3 (a) Explain with suitable diagram, how the Wide band FM signal may be generated.  
(b) Elucidate about Armstrong method of FM in detail.
- 4 (a) Describe the principle of operation of Balanced Discriminator with neat sketches.  
(b) Calculate the BW of a commercial FM transmission by assuming  $\Delta f = 75$  KHz &  $W = 15$  KHz and also calculate the modulation index.

**SECTION - III**

- 5 (a) Elaborate the generation of PPM signals.  
(b) Compare PPM and PWM.
- 6 (a) Define multiplexing: Distinguish between TDM and FDM.  
(b) With neat sketches, describe the basic principle of FDM.

**SECTION - IV**

- 7 (a) Describe the effect of noise in DSB-SC system with necessary expressions.  
(b) What is the importance of PLL and how it is useful for FM modulation and De - Modulation.
- 8 (a) Predict the Effect of transmission losses and noise in analog communication systems.  
(b) Explain about Pre-emphasis and De-emphasis.

**SECTION - V**

- 9 (a) Outline about Radio broadcast FM transmitters.  
(b) Mention the advantages of Super heterodyne receiver over TRF receiver.
- 10 (a) List out the characteristics of Radio receivers.  
(b) Distinguish between simple AGC and delayed AGC.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester****APPLIED THERMODYNAMICS - I**  
(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 large insulated vessel is divided into two chambers, one containing 5 kg of dry saturated steam at 0.2 MPa and the other 10 kg of steam, 0.8 quality at 0.5 MPa. If the partition between the chambers is removed and the steam is mixed thoroughly and allowed to settle, find the final pressure, steam quality and entropy change in the process.
- 2 a) Find the internal energy and enthalpy of unit mass of steam of a pressure of 7 bar when  
i) its quality is 0.8                      ii) it is dry saturated  
iii) Superheated the degree of superheat being 65 °C.
- b) Explain about Modified Rankine cycle with indicator diagrams.

**SECTION - II**

- 3 a) Define the following boiler mountings with suitable diagrams:  
i) Fusible plug  
ii) Water level indicator
- b) Describe Cochran boiler with diagram.
- 4 a) Explain Benson boiler with suitable diagram.
- b) Compare fire tube and Water tube boilers.

**SECTION - III**

- 5 a) In a steam nozzle steam expands from 4 bar to 1 bar. The initial velocity of steam is 60 m/s and the initial temperature is 200°C. Determine the exit velocity if the nozzle efficiency is 92%.
- b) What is meant by critical pressure ratio of a nozzle?
- 6 a) Explain the working of a surface condenser. Mention its advantages and disadvantages.
- b) Define the following :  
i) Vacuum efficiency      ii) Condenser efficiency

#### SECTION - IV

- 7 a) In a single-stage impulse turbine, the steam jet leaves the nozzles at  $20^\circ$  to the plane of the wheel at a speed of 670 m/s and it enters the moving blades at an angle of  $35^\circ$  to the drum axis. The moving blades are symmetrical in shape. Determine the blade velocity and diagram efficiency.
- b) Show the effect of friction on combined velocity triangle in Impulse turbines.
- 8 a) In a Parson reaction turbine, the angles of receiving tips are  $35^\circ$  and of discharging tips,  $20^\circ$ . The blade speed is 100 m/s. Calculate the tangential force, power developed, diagram efficiency and axial thrust of the turbine, if its steam consumption is 1 kg/min.
- b) Derive the condition for maximum efficiency and blade height of reaction turbine.

#### SECTION - V

- 9 a) Explain velocity compounding in steam turbines with neat sketch.
- b) Derive the condition for maximum efficiency of an impulse turbine.
- 10 a) What are the advantages of reheating the steam?
- b) Explain Regenerative cycle with diagram.

R-13

Code : 13CE2209

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester**

**STRENGTH OF MATERIALS**  
(Mechanical Engineering)

Time: 3 hours

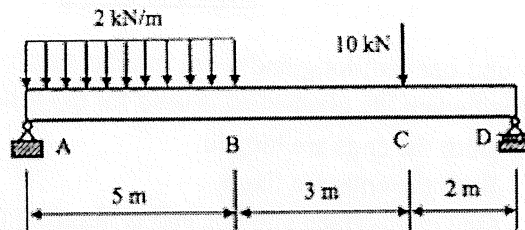
Max. Marks: 60

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

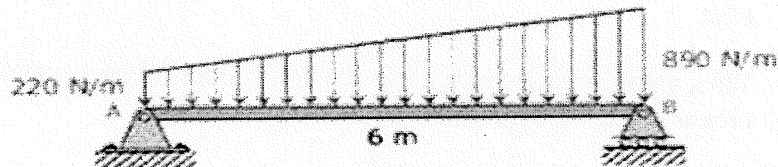
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**SECTION - I**

- 1 (a) Define point of contra flexure.  
(b) Draw the Shear force and bending moment diagram for the loaded beam as shown in Figure



- 2 Draw the Shear force and bending moment diagram for the loaded beam as shown in Fig.



**SECTION - II**

- 3 (a) Derive the section modulus for a hollow rectangular section  
(b) A beam is simply supported and carries a U.D.L of 40kN/m run over the whole span. The section of the beam is rectangular having depth as 500mm. If the maximum stress in the material of the beam is  $120\text{N/mm}^2$  and moment of inertia of the section is  $7 \times 10^8 \text{ mm}^4$ , find the span of the beam.
- 4 An I section beam 250mmx100mm has a web thickness of 10mm and a flange thickness of 20mm. If the shear force acting on the section is 50kN, find the maximum shear stress developed in the section and also sketch the variation of shear stress across the depth of the section.

**SECTION - III**

- 5 A beam of length 6 m is simply supported at the ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3 m respectively from the left support. Compute,  
i. Slope and deflection under each load.  
ii. Maximum deflection

- 6 Derive the torsion equation for a shaft of circular cross section and state the assumptions.

#### SECTION - IV

- 7 At a point in a strained material the principal stresses are  $100 \text{ N/mm}^2$  (tensile) and  $60 \text{ N/mm}^2$  (compressive). Determine normal stress, shear stress and the resultant stress on a plane inclined at  $50^\circ$  with the major principal plane. Also determine the maximum shear stress at the point..
- 8 (a) What is the significance of theories of failures? Explain any two.  
(b) The principal stresses at a critical point in a machine component made of steel with tensile yield strength of  $460 \text{ MPa}$  are as follows.  $\sigma_1 = 200 \frac{\text{N}}{\text{mm}^2}$ ,  
 $\sigma_2 = 150 \frac{\text{N}}{\text{mm}^2}$  and  $\sigma_3 = 0$ . Calculate factor of safety according to  
(i) Maximum shear stress theory and  
(ii) Maximum principal stress theory

#### SECTION - V

- 9 A solid round bar  $3 \text{ m}$  long and  $5 \text{ cm}$  in diameter is used as a sturt. Determine the crippling load when the given sturt is used for the following conditions  
(i) Both the ends are hinged  
(ii) Both the ends are fixed  
(iii) One end is fixed and one end is hinged and  
(iv) One end is fixed and one end is free.  
Take  $E = 2.1 \times 10^5 \text{ N/mm}^2$ . Also find safe load taking factor of safety as 4 in each case.
- 10 What are the stresses induced in the thin cylindrical shell subjected to internal fluid pressure? Explain and derive them.

**II B.Tech. II Semester**  
**COMPUTER ORGANIZATION**  
(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) Describe different types of Computers.  
b) Explain Number representation.
- 2 a) Describe multi processors and multi computers in detail!  
b) Explain Addressing Modes in brief.

**SECTION - II**

- 3 a) Explain Read Only Memories in brief.  
b) Write short notes on interleaving.
- 4 a) Explain static memories in brief.  
b) Describe RAID Disk arrays.

**SECTION - III**

- 5 a) Draw flowchart for signed magnitude addition and subtraction operations.  
b) Describe the One stage of a decimal arithmetic unit.
- 6 a) Explain Booth multiplication algorithm.  
b) Describe Floating point multiplication algorithm.

**SECTION - IV**

- 7 a) Draw the Single-Bus organization of the data path inside a processor.  
b) Explain USB in brief.
- 8 a) With neat sketch explain basic organization of micro programmed unit.  
b) What is DMA? Explain DMA with neat sketch.

**SECTION - V**

- 9 a) Write short notes on data hazards.  
b) Describe Data path and Control considerations.
- 10 a) Explain conditional branching in instruction hazards.  
b) Write short notes on performance consideration in Pipelining.





B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B.Tech. II Semester****DATABASE MANAGEMENT SYSTEMS**

(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 Define Data Independence. Explain the centralized architecture of DBMS with suitable diagram.
- 2 (a) Construct an ER Diagram for an university with neat diagram and Explain in detail about all Entities, Relationships.  
(b) What is a data model? What are the different types data models? Explain Relational Model in detail.

**SECTION - II**

- 3 (a) What is a relation? Differentiate between a relation schema and relation instance? What are the domain constraints?  
(b) What is the use of 'group by' and 'having' clauses in SQL?
- 4 Write queries to the following questions using Relation algebra, Tuple Relational Calculus and Domain Relational Calculus.  
EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE, ADDRESS, SEX, SALARY, #SUPERSSN, #DNO)  
DEPARTMENT (DNAME, DNUMBER, #MGRSSN, MGRSTARTDATE)  
DEPT\_LOCATIONS (#DNUMBER, DLOCATION)  
PROJECT (PNAME, PNUMBER, PLOCATION, #DNUM)  
WORKS\_ON (#ESSN, #PNO, HOURS)  
DEPENDENT (#ESSN, DEPENDENT\_NAME, SEX, BDATE, RELATIONSHIP)  
(a) Retrieve the name and address of all employees who work for the 'Research' department.  
(b) List the names of managers who have at least one dependent.

**SECTION - III**

- 5 (a) What are the differences between functional dependency and multi-valued dependency?  
(b) What is meant by Normalization? Explain 5NF.
- 6 (a) Explain 1NF and 2NF with suitable examples?  
(b) Compare and contrast BCNF and 3NF.

#### SECTION - IV

- 7 (a) What is meant by Serialization? Explain with an example.  
(b) Explain the two-phase locking with an example.
- 8 (a) How the lock manager implements lock and unlock requests? Explain.  
(b) Discuss about Multi version concurrency control techniques.

#### SECTION - V

- 9 (a) What is meant by check-point? Explain the operation of check-point.  
(b) Explain different types of errors with examples.
- 10 (a) Explain log recovery with suitable examples.  
(b) Explain about shadow paging technique.

**R-13**

**Code: 13CS2204**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**II B. Tech. II Semester**

**SOFTWARE ENGINEERING**  
(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) Define the Software Engineering. What are the challenges of Software Engineering?  
(b) Discuss about the Software Engineering Layers.
- 2 Write Short notes on i) PSP models ii) TSP Models.

**SECTION - II**

- 3 Explain about Design Modeling Principles and Coding Principles.
- 4 (a) Discuss about the Eliciting Requirements.  
(b) With an example, explain about the Usecases in Requirements Engineering.

**SECTION - III**

- 5 (a) In an Object Oriented implementation, mostly Classes are Coded. Then during design, what is the role of Dynamic Modeling using UML?  
(b) Explain design concepts in Software Engineering.
- 6 Explain in detail about Analysis Modeling approaches.

**SECTION - IV**

- 7 (a) What is the relationship between an Architecture and Module-level Design?  
(b) What is meant by Sequence Diagram? Explain with example.
- 8 (a) How to design a Conventional Components?  
(b) Explain the process of Designing Class-based Components.

**SECTION - V**

- 9 (a) What are the different levels of Testing and the goals of the different Testing levels? Explain.  
(b) Explain about White Box Testing? What is the quality or reliability of Software after Testing is completed?
- 10 Write Short notes on :  
i) Basis path testing ii) Control structure testing iii) Validation testing

