

Code: 1G571

IV B.Tech. I Semester Supplementary Examinations November 2018

Operations Research
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)

1. Use Graphical Method to solve the following Linear programming Problem
 Max $Z = 5X_1 + 3X_2$
 subjected to the constraints
 $3X_1 + 5X_2 \leq 15$
 $5X_1 + 2X_2 \leq 10$

Where X_1 & $X_2 \geq 0$

2. Solve the following transportation problem using Vogel's Approximation Method

2	3	11	7	6
1	0	6	1	1
5	8	15	9	10
7	5	3	2	

3. The maintenance cost and the resale value per year of a machine whose purchase price is Rs. 7,000.00 are given below

Year	1	2	3	4	5	6	7	8
Resale Value	4000	2000	1200	600	500	400	400	400
Maintenance Cost	900	1200	1600	2100	2800	3700	4700	5900

When would machine be replaced.

4. Solve the following game using graphical method

		Player B		
		I	II	III
Player A	I	1	3	11
	II	8	5	2

5. A barber takes exactly 25 minutes to complete one hair cut. If customers arrive in a Poisson fashion at an average rate of one every 40 minutes, how long on an average must a customer wait for service? What is the probability that a customer need not wait for service?
6. A company has a demand of 12,000 units per year for an item and it can produce 2000 such items per month. The cost of one set up is Rs. 400 and the holding cost per unit per month is Rs. 0.015. Find the Optimum Lot Size, Maximum Inventory, Manufacturing Time and the Total Time.
7. Solve the following Linear Programming Problem using Dynamic Programming Approach

Maximize $Z = 3X_1 + 5X_2$
 Subjected to
 $X_1 \leq 4$
 $X_2 \leq 6$
 $3X_1 + 2X_2 \leq 18$
 X_1 and $X_2 \geq 0$

8. a) Explain the importance of Simulation in optimization.
 b) How do you apply Simulation technique to an inventory problem

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Finite Element Methods

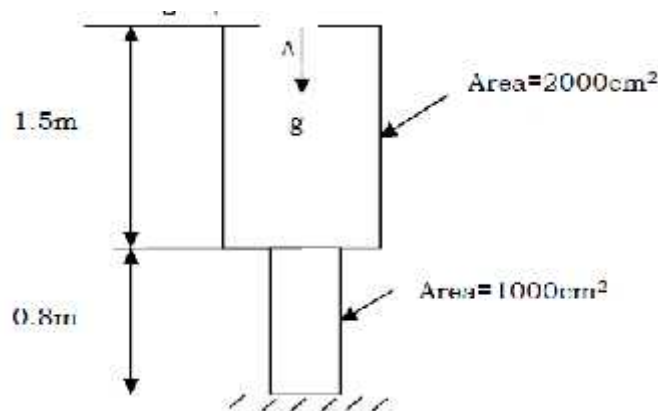
(Mechanical Engineering)

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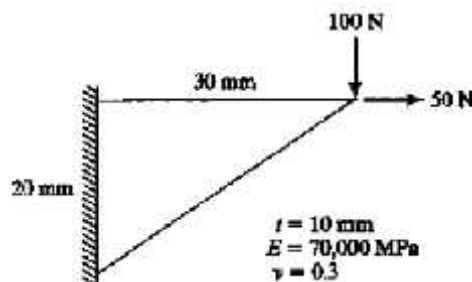
Time: 3 Hours

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1. a) What is meant by constitutive matrix, write the constitutive matrix for plan stress and plane strain problems?
b) Write the stress strain relationship for 3Dimensional element, 2dimensional plane stress and plane strain elements.
2. For the vertical bar shown in figure, find the deflection at 'A' and the stress distribution. Use $E=150\text{MPa}$ and weight per unit volume= 0.05N/cm^3 .



3. a) Derive the transformation matrix from local coordinates to global coordinates with a neat sketch.
b) The coordinates of the plane truss element is given as 1(0,0) and 2(20,35) mm has the displacement values $\{-0.03 \ 0.02 \ -0.01 \ -0.03\}^T$ mm with the material properties 200 GPa Youngs Modulus. Calculate the stiffness matrix, load vector and strain energy if the cross sectional area of the truss is 100 mm^2 .
4. Derive the stiffness matrix for the beam element using the potential approach.
5. a) For the configuration shown in Figure below. Determine the deflection at the point of load application using a one-element model



6. a) Define iso parametric, sub parametric and super parametric elements?
b) Derive the shape functions for 4 noded isoparametric quadrilateral element?
7. A metallic fin with thermal conductivity $K = 360\text{W/m}^\circ\text{C}$, 0.1 cm thick and 10cm long, extends from a plane wall whose temperature is 235°C . Determine the temperature distribution and amount of heat transferred from the fin to the air at 20°C with $h = 9\text{W/m}^2^\circ\text{C}$. take width of the fin as 1m.
8. a) Define the consistent and lumped mass?
b) Describe briefly the importance of Dynamic analysis
