![SGU]

Sanjay Ghodawat University, Kolhapur   2018-19

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Year and Program:2018-19   **School of Technology**   **Department of Civil Engg. (M. Tech)**

Course Code: CEM 5091   **Course Title: Structural Optimization**   Semester – I

Day and Date Friday   **End Semester Examination (ESE)**   **Time:**   **Max Marks: 100**
31/05/2019   3 Hrs.

2.30 to 5.30 pm.

Instructions: 1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

		Marks	Bloom's Level	CO
Q.1	**Solve the following questions.**			
a)	Solve following problem by trial and error method	10	L_3	CO1

Maximize $Z = 3X_1 + 4X_2$

Subject to $X_1 + X_2 \le 450$

$2X_1 + X_2 \le 600$

Where $X_1, X_2 \ge 0$

OR

		Marks	Bloom's Level	CO
a)	Explain Elements and Assumption in Optimization. Also state applications of optimization in engineering.	10	L_3	CO1
Q.2	**Solve the following questions**			
a)	Solve following Linear Programming Problem by Graphical Method	10	L_3	CO2

Maximize $Z = 5X_1 + 4X_2$

Subject to $2X_1 + X_2 \le 100$

$X_1 + 3X_2 \le 90$

Where $X_1, X_2 \ge 0$

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Q.3 **Solve the following questions**

a) Consider the transportation problem below Find IBFS by   10 L_3 CO3

    1) N-W Corner Cell Method

    2) Least Cost Cell Method

						Supply
	10	2	16	14	10	300
	6	18	12	13	16	500
	8	4	1	12	10	825
	14	22	20	8	18	375
Demand	350	400	250	150	400	

Q.4 **Solve the following questions**

a) Solve following nonlinear programming using Lagrangean Method   10 L_3 CO4

Maximize $Z = 4X_1 - 0.02X_1^2 + X_2 - 0.02 X_2^2$

Subject to $X_1 + X_2 = 120$

Where $X_1, X_2 \geq 0$

<div align="center">OR.</div>

c) Solve Following nonlinear programming using Kuhn-tucker method.   10 L_3 CO4

Maximize $Z = 3X_1^2 + 14 X_1X_2 - 8X_2^2$

Subject to $3X_1 + 6X_2 \leq 72$

Where $X_1, X_2 \geq 0$

Q.5 **Solve the following questions**

a) What is mean by Simulation? State advantages and disadvantages of   05 L_2 CO5
Simulation

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b) A construction site keeps records for daily demand of steel   15 L_5 CO5

Daily Demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Given set of random numbers

48,78,09,51,56,77,15,14,68 and 09

1) Using the sequence , simulate the demand for next 10 days
2) Find stock situation if company supply 30 tonne /day

Also find avg. daily demand on basis of simulated data.

c) Explain Dynamic programing with their application and characteristics   10 L_4 CO5

OR

c) Explain concept of decision tree with suitable example   10 L_4 CO5

Q.6 **Solve the following questions**

a) A RMC company manufactures 30 cum per day The sale of these concrete depends upon demand which has the following distribution   20   L5   CO6

Sales	27	28	29	30	31	32
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sale price per Rs 4000 and Rs 5000 respectively. Any unsold concrete is to disposed of at a loss of Rs 1500 per unit There is a penalty of Rs- 500 per cum if the demand is not met. Using following random numbers estimate total profit / loss for the company for next 10 days

10,99,65,99,95,01,79,11,16,20

If the company decided to produce 29 cum per day what is advantages or disadvantages to company

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b) Find dimensions of rectangle beam having area 10 sqm whose perimeter is as small as possible   10 L_4 CO6

OR

b) A 500 m compound wire is cut into two parts and used for two square plots .what is minimum possible sum of area two plots.   10 L_4 CO6

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