(DME 311)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Third Year)

MECHANICAL ENGINEERING

Paper - I : Operation Research

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 compulsory ***(15)***

Answer ONE question from each unit ***(4 × 15 = 60)***

1) Write brief note on :

a) Scope of operation research.

b) Slack and surplus variable

c) Vogel's approximation for transportation problem.

d) Characteristics of queing system.

e) Two person zero – sum game.

UNIT – I

2) Solve by simplex method

Maximize $Z = 5x_1 - 4x_2 + 3x_3$

Subject to $2x_1 + x_2 - 6x_3 = 20$

$6x_1 + 5x_2 + 10x_3 < 76$

$8x_1 - 3x_2 + 6x_3 \leq 50$

$x_1, x_2, x_3 > 0$

OR

3) a) Write a short note on degeneracy.

b) Using dual simplex method solve the following problem

Minimize $Z = 2x_1 + 2x_2 + 4x_3$

Subject to $2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 \leq 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

$x_1, x_2, x_3, x_4 \geq 0$

UNIT - II

4) a) Problem solve the following transportation problem.

Destination

		A	B	C		
Source	I	21	16	25	13	11
	II	17	18	14	23	13
	III	33	27	18	41	19
		6	10	12	15	43

Availability

Requirement

OR

b) Given the matrix of set-up cost show how to sequence the production so as to minimize the set up cost per cycle.

		A_1	A_2	A_3	A_4	A_5
From	A_1	∞	2	5	7	1
	A_2	6	∞	3	8	2
	A_3	8	7	∞	4	7
	A_4	12	4	6	∞	5
	A_5	1	3	2	8	∞

UNIT - III

5) Derive the economic lot size formula for the optimum production quantity q per cycle of a single product so as to minimize the total average cost per unit time.

OR

6) A man is engaged in buying and selling identical items. He operates from a ware house that can hold 500 items each month he can sell any quantity that he chooses upto the stock at the beginning of the month. Each month he can buy as much as he wishes for delivery at the end of the month so long as his stock does not exceed 500 items. For the four months. He has the following error – free forecasts of cost sales prices.

Month	i	1	2	3	4
Cost	ci	27	24	26	28
Sale price	pi	28	25	25	27

UNIT - IV

7) The following table list the Jobs of network with their estimates.

	Duration		
Job	Optimistic to	Most likely tm	Pessimistic
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
6-7	3	9	27
5-8	1	4	7
7-8	4	19	28

a) Draw the project network.

b) Calculate the length and variance of the critical path.

c) What is the approximate probability that the Jobs on critical path will be completed in 41 days.

OR

8) Explain the forward pass and back ward pass competations for critical path method.

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