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Roll No ....

MCA-301

MCA. III Semester

Examination, December 2017

Computer Oriented Optimization Techniques

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) What is Operation Research? Discuss the significance and scope of operation research.   7

   b) Solve the L.P.P. using Graphical method: 7

   Maximize: $Z = 25x_1 + 20x_2$

   Subject to: $16x_1 + 12x_2 \leq 100$

              $8x_1 + 16x_2 \leq 80$

   and $x_1, x_2 \geq 0$

2. a) Solve the following transportation problem and find the optimal solution: 7

		To			
		W_1	W_2	W_3	W_4	Supply
	D_1	21	16	25	13	11
From	D_2	17	18	14	23	13
	D_3	32	27	18	41	19
	Demand	6	10	12	15	

   b) Using dynamic programming solve: 7

   Minimize: $Z = y_1^2 + y_2^2 + y_3^2$

   Subject to: $y_1 + y_2 + y_3 = 10$

                $y_1, y_2, y_3 \geq 0$

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3. a) How CPM differs from PERT? Explain earliest start time, latest completion and latest start time.   7

   b) Draw the network diagram for the following activities: 7

Job	Job time (days)	Immediate predecession
A	13	-
B	8	A
C	10	B
D	9	C
E	11	B
F	10	E
G	8	D, F
H	6	E
I	7	H
J	14	G, I
K	18	J

4. a) Derive (M/M/1, N/FCFS) model.   7

   b) A super market has two girls ringing up sales at the counter. If the service time for each customer is exponential with mean 4 minutes and if people arrive in poisson fashion at the rate of 10 an hour, then calculate the: 7

   i) Probability of having to wait for service.

   ii) Expected percentages of idle time for each girl.

   iii) If a customer has to wait, what is the expected length of his waiting time.

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5. a) Enumerate various types of inventory models. What are the advantages and disadvantages of having inventory? 7

b) A backing company sells cake by kilogram weight. It makes a profit of Rs. 5.00 a kg. on every kg. sold on the day it is baked. It disposes of all cakes not sold on the date it is baked at a loss of Rs. 1.20 per kg. If demand is known to be rectangular between 2000 and 3000 kg, find the optimum daily amount baked. 7

6. a) Use branch and bound method to solve the following L.P.P.: 7

Maximize : $Z = 7x_1 + 9x_2$

Subject to:　$-x_1 + 3x_2 \leq 6$

$7x_1 + x_2 \leq 35$

$x_2 \leq 7$

$x_1, x_2 \geq 0$ and are integers

b) Use dual simplex method to solve: 7

Minimize:　$Z = 3x_1 + x_2$

Subject to:　$x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$

and　　$x_1, x_2 \geq 0$

7. a) There are 5 jobs each of which must go through to two machine A and B in the order BA. Processing time are given below: 7

Jobs	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Determine the sequence for 5 jobs that will minimize the total elapsed time and idle time for machine A and B.

b) An oil engine manufacturer purchases lubricants at the rate of Rs. 42 per piece from the vendor. The requirements of these lubricants is 1800 per year. What should be the order quantity per order, If the cost per placement of on order is Rs. 16 and the inventory carrying charges per rupee per year is only 20 paise. 7

8. Write short notes on any four: 14
   a) Steps involved in O.R. problems
   b) Bellman's principle of optimality
   c) Travelling salesman problem
   d) Total float
   e) Queuing structure

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