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06ME74

Seventh Semester B.E. Degree Examination, Dec.2014/Jan.2015
Operation Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define Operations Research and explain the different phases of OR. **(05 Marks)**

b. Old hens can be bought at Rs.2 each and young ones at Rs.5 each. The Old hens lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth 30 paise. A hen (young or old) costs Re.1 per week to feed. I have only Rs.80 to spend for hens and I cannot house more than 20 hens. How many of each kind should I buy in order to maximize the profit? Formulate as LPP. **(07 Marks)**

c. Solve graphically:

Maximize, $Z = 8000x_1 + 7000x_2$

Subjected to $3x_1 + x_2 \le 66$, $x_1 + x_2 \le 45$, $x_1 \le 20$, $x_2 \le 40$ and $x_1, x_2 \ge 0$. **(08 Marks)**

2 a. What is degeneracy in simplex? How it can be resolved? **(04 Marks)**

b. Solve by using big-M method:

Maximize, $Z = -2x_1 - x_2$

Subject to $3x_1 + x_2 = 3$, $4x_1 + 3x_2 \ge 6$, $x_1 + 2x_2 \le 4$ and $x_1, x_2 \ge 0$. **(16 Marks)**

3 a. Write the differences between transportation and assignment problems. **(04 Marks)**

b. A construction company needs 3, 3, 4 and 5 million cubic feet to fill at four earthen dam-sites in Punjab. It can transfer the fill from three mounds A, B and C where 2, 6 and 7 million cubic feet of fill is available respectively. Costs of transporting one million cubic feet of fill from mounds to the four sites are given in the table. Find the optimum distribution for minimum cost. **(16 Marks)**

		To			
		I	II	III	IV
From	A	15	10	17	18
	B	16	13	12	13
	C	12	17	20	11

4 a. Find the sequence that minimizes the total elapsed time (in hours) required to complete the following jobs on 3 machines A, B and C in the order ABC. **(10 Marks)**

		Job				
		1	2	3	4	5
Machine	A	5	7	6	9	5
	B	2	1	4	5	3
	C	3	7	5	6	7

b. Use graphical method to minimize the time needed to process the following jobs on the machines shown below i.e for each machine find the job which should be done first. Also calculate the total time need to complete both the jobs. **(10 Marks)**

Job 1	Sequence of machines:	A	B	C	D	E
	Time:	2	3	4	6	2
Job 2	Sequence of machines:	C	A	D	E	B
	Time:	4	5	3	2	6

PART – B

5 a. Briefly explain the characteristics of a queuing system. **(08 Marks)**

b. A supermarket has one girl running up sales at the counters. If the service time for each customer is exponential with mean of 4 minutes and if people arrive in a Poisson fashion at the rate of 10 an hour.

i) What is the probability of having to wait for service?

ii) What is the expected percentage of idle time for the girl?

iii) If a customer has to wait, what is the expected waiting time? **(12 Marks)**

6 a. Define the following terms:

i) Activity, ii) node, iii) total float, iv) free float, v) independent float **(05 Marks)**

b. The following table lists the jobs of a network with their estimates:

Jobs	Duration (days)		
	t_o	t_m	t_p
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

i) Draw the project network.

ii) Calculate the length and variance of the critical path and

iii) What is the approximate probability that the jobs on the critical path will be completed in 41 days? **(15 Marks)**

7 a. Solve the following game by dominance rule: **(10 Marks)**

		B			
		I	II	III	IV
A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

b. Solve the game graphically: **(10 Marks)**

		I	II	III	IV
A	I	2	2	3	-1
	II	4	3	2	6

8 a. What is integer linier programming? How they are classified? **(04 Marks)**

b. Solve the following by Integer linier programming problem:

Maximize $Z = x_1 + x_2$

Subjected to $3x_1 + 2x_2 \leq 5$, $x_2 \leq 2$ and $x_1, x_2 \geq 0$ and are integers. **(16 Marks)**

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