M.E. Second Semester (Production Tech. & Mgt.) (P.T.) (CBS)

13536 : Operations Research Techniques : 2 SPTM 3

P. Pages : 3 | AU - 3246

Time : Three Hours | Max. Marks : 80

Notes : 1. Answer **any three** question from Section A and **any three** question from Section B.
2. Assume suitable data wherever necessary.
3. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) What are the applications of Linear Programming. **5**

b) A person wants to decide the constituents of a diet which fulfill his daily requirements of proteins, fats & carbohydrates at the minimum cost. The choice is to be made from four different types of foods. The yields per unit of these foods are given in table. **9**

Food type	Yields per Units			Cost per Unit (Rs)
	Proteins	Fats	Carbohydrates	
1	3	2	6	45
2	4	2	4	40
3	8	7	7	85
4	6	5	4	65
Minimum Requirement	800	200	700	

Formulate linear Programming model for the problem.

2. a) Solve the problem by using simplex method. **9**

Maximize $Z = 2x_1 + x_2$

Subject to $x_1 + 2x_2 \leq 10$,

$x_1 + x_2 \leq 6$,

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$

$x_1, x_2 \geq 0$

b) Write the DUAL of the following LPP. **4**

Maximize $Z = 6x_1 - 3x_2 + 2x_3$

Subjects to $2x_1 + x_2 + x_3 \leq 18$

$3x_1 + 2x_2 + x_3 \leq 16$

$x_1 - 2x_3 \geq 8$

$x_1, x_2, x_3 \geq 0$

3. Solve the following LPP by Simplex Method. **13**

Minimize $Z = 8x_1 + 5x_2$

Subject to $20x_1 + 12x_2 \geq 200$

$8x_1 \geq 40$

$6x_2 \geq 30$

$x_1, x_2 \geq 0$

4. Solve the following integer programming problem by suitable method. **13**

Maximize $Z = x_1 + x_2$

Subject to $6x_1 + 4x_2 \leq 40$

$12x_1 + 10x_2 \leq 50$

$2x_1 + 6x_2 \leq 20$

& x_1, x_2 non – negative integers

5. a) What are the characteristics of the games. **4**

b) Reduce the following game by dominance and find the game value **9**

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

SECTION - B

6. a) Explain the four types of decision making environments. **6**

b) A newspaper boy has the following probabilities of selling a magazine **8**

No. of copies sold	Probability
10	0.10
11	0.15
12	0.20
13	0.25
14	0.30

Cost of a copy is 30 paise and sale price is 50 paise. He cannot return unsold copies. How many copies should he order?

7. a) What are the steps in Monte Carlo Simulation. **4**

b) Philips India is engaged in manufacturing different types of equipment's for various consumers. The company has two assembly lines to produce its product. The processing time for each of the assembly lines is regarded as a random variable and is described by the following distribution. **9**

Processing time (min)	Assembly X	Assembly Y
40	0.10	0.20
42	0.15	0.40
44	0.40	0.20
46	0.10	0.15
48	0.25	0.05

Find the expected processing time for the product using six simulation runs.
Assume the following sets of random nos. for the assembly x & assembly y respectively.
42, 75, 49, 12, 20, 36 &
36, 73, 43, 83, 14, 04

8. a) What are characteristics of Queueing Model. **4**

b) A repairman is to be hired to repair machines which break down at an average rate of 3 per hour. The breakdowns follow Poisson distribution non productive time of machine is considered to cost Rs. 16 per hour. The repairman have been interviewed; one is slow but cheap while the other is fast but expensive. The slow repairman charges Rs. 8 per hour and he services breakdown machines at the rate of 4 per hour. The fast repairman demands Rs. 10 per hour and he services at an average rate of 6 per hour. Which repairman should be hired? Assume an 8 hour working day. **9**

9. An oil company has 8 units of money available for exploration of three sites. If oil is present at a site, the probability of finding it depends upon the amount allocated for exploiting the site as given below. **13**

Units of money allocated

	0	1	2	3	4	5	6	7	8
Site 1	0.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.0
Site 2	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.8	1.0
Site 3	0.0	0.1	0.1	0.2	0.3	0.5	0.8	0.9	1.0

The probability that the oil exists at site 1, 2 & 3 is 0.4, 0.3 and 0.2 respectively. Find the optimal allocation of money.

10. Solve the following LPP by using revised simplex method. **13**

Maximize $Z = 2x_1 + x_2$

Subject to $3x_1 + 4x_2 \leq 6$

$6x_1 + x_2 \leq 3$

$x_1, x_2 \geq 0$

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