

B.Sc. (I.T.) - I (CBCS Pattern) Sem II
UBITT205.2 - Elective - EC-II : Paper-V : Operation Research

P. Pages : 4

Time : Three Hours



GUG/S/18/20096

Max. Marks : 80

- Notes :
1. All questions are compulsory and carry equal marks.
 2. Draw Neat and Labeled diagram and use supporting data wherever necessary.
 3. Avoid vague answers and write specific Answer related to question.

Either:

1. a) What is Operation Research? Classified the problem in Operation Research. 8
- b) A plastic manufacturer has 1200 boxes of transparent wrap in stock at one factory and another 1200 boxes at its second factory. The manufacturer has order for this product from three different Retailers, in quantities of 1000, 700 and 500 boxes, resp. The unit shipping cost (in rupees per box) from the factories to the retailers are as follows: 8

	Retailer I	Retailer II	Retailer III
Factory A	14	13	11
Factory B	13	13	12

Determine a minimum cost shipping schedule for satisfying all demands from current inventory. LP Model Draw.

OR

- c) Use the Graphical method to solve the following LP problem. 8

$$\text{Minimize } z = 3x_1 + 2x_2$$

subject to the constraints

$$5x_1 + x_2 \geq 10$$

$$x_1 + x_2 \geq 6$$

$$x_1 + 4x_2 \geq 12$$

$$x_1, x_2 \geq 0$$

- d) A manufacturing company is engaged in Producing three types of product A, B and C. The production department produces, each day, components sufficient to make 50 units of A, 25 units of B and 30 units of C. The management is confronted with the problem of optimizing the daily production of products in assembly department where only 100 man-hours are available daily to assemble the product. The following additional information is available. 8

Type of Product	Profit contribution per unit of product (R)	Assembly Time Per Product (hr)
A	12	0.8
B	20	1.7
C	45	2.5

The company has a daily order commitment for 20 units of product A and a total of 15 units of product B and C. Formulate this problem as an LP model so as to maximize the total profit.

Either:

2. a) Explain the concept of L.P.P.? Write down different methods of LPP? 8
- b) Use the Simplex Method to solve the following LP Problem. 8
- Maximize $z = 3x_1 + 5x_2 + 4x_3$
- subject to the constraints
- $2x_1 + 3x_2 \leq 8$
- $2x_2 + 5x_3 \leq 10$
- $3x_1 + 2x_2 + 4x_3 \leq 15$
- and $x_1, x_2, x_3 \geq 0$

OR

- c) Use the Penalty (Big M) Method to solve the following LP Problem. 8
- Minimize $z = 5x_1 + 3x_2$
- subject to the constraints
- $2x_1 + 4x_2 \leq 12$
- $2x_1 + 2x_2 = 10$
- $5x_1 + 2x_2 \geq 10$
- and $x_1, x_2 \geq 0$
- d) A firm manufactures two product A and B on machine I and II as shown below. 8

Machine	Product		Available Hours
	A	B	
I	30	20	300
II	5	10	110
Profit per unit (Rs)	6	8	

The total time available is 300 hrs and 110 hrs on machine I and II, resp. Product A and B contribute Rs 6 and Rs 8 per unit, resp. Determine the optimum product mix. Write the dual of this LP problem and give its economic interpretation.

Either:

3. a) Discuss Game theory terminologies in detail. 8
- b) For the Game with Payoff Matrix: 8

Player A	Player B		
	B ₁	B ₂	B ₃
A ₁	-1	2	-2
A ₂	6	4	-6

Determine the optimal strategies for Players A and B. Also determine the value of game.

Is this game

- i) Fair ii) Strictly determinable?

OR

c) Use Graphical Method in solving the following game and find the value of the game. 8

Player A	Player B			
	B ₁	B ₂	B ₃	B ₄
A ₁	2	2	3	-2
A ₂	4	3	2	6

d) For the following payoff matrix, transform the zero sum game into an equivalent linear programming problem and solve it by using simplex method. 8

Player A	Player B		
	B ₁	B ₂	B ₃
A ₁	1	-1	3
A ₂	3	5	-3
A ₃	6	2	-2

Either

4. a) Explain the type of Assignment Problem in detail with suitable example. 8

b) Determine an initial basic feasible solution to the following transportation problem by using "NWCR". 8

SOURCE	D ₁	D ₂	D ₃	D ₄	Supply
	S ₁	21	16	15	3
S ₂	17	18	14	23	13
S ₃	32	27	18	41	19
Demand	6	10	12	15	

OR

c) Determine an initial basic feasible solution to the following transportation problem by using: 8

- a) Least Cost Method
- b) Vogel's approximation Method.

Distination

Source	D ₁	D ₂	D ₃	D ₄	Supply
	S ₁	1	2	1	4
S ₂	3	3	2	1	50
S ₃	4	2	5	9	20
Demand	20	40	30	10	

- d) A company has four machine which are to be used for three jobs. Each job can be assigned to one and only one machine. The cost of each job an each machine is given in the following table. 8

		Machine			
		W	X	Y	Z
Jobs	A	18	24	28	32
	B	8	13	17	18
	C	10	15	19	22

What are the job-assignment pair which shall minimize the cost?

5. Solve all the question.
- a) State characteristics of Operational Research. 4
 - b) Write short note on Application of Duality. 4
 - c) Explain Dominance Property. 4
 - d) State types of transportation Problem 4
