CBCS SCHEME

USN | | | | | | | | | |

15CS653

Sixth Semester B.E. Degree Examination, July/August 2022
Operation Research

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. "OR is the art of winning wars without actually fighting them". Discuss. **(02 Marks)**

b. Discuss the scope and limitation of OR. **(06 Marks)**

c. A firm uses lathes, milling machines and grinding machines to produce two machine parts. Table 1(c) represents the machining times required for each part, the machining times available on different machines and the profit on each machine part.

Table 1(c)

Type of Machine	Machining time required for the machine part (minutes)		Maximum time available per week (minutes)
	I	II	
Lathes	12	6	3,000
Milling machines	4	10	2,000
Grinding machines	2	3	900
Profit per unit	Rs.40	Rs.100	

Find the number of parts I and II to be manufactured per week to maximize the profit. **(08 Marks)**

OR

2 a. Discuss the various phases in solving an OR problem. **(08 Marks)**

b. Solve the LPP by Graphical method

Maximize $Z = 100x_1 + 40x_2$

Subject to $5x_1 + 2x_2 \leq 1000$

$3x_1 + 2x_2 \leq 900$

$x_1 + 2x_2 \leq 500$

where $x_1, x_2 \geq 0$. **(08 Marks)**

Module-2

3 a. Explain the concept of degeneracy in simplex method. How it is resolved? **(08 Marks)**

b. Solve the following LPP by Big-M method

Maximize $Z = 4x_1 + x_2$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$ and

$x_1, x_2 \geq 0$. **(08 Marks)**

OR

4 a. Explain how to set up the simplex method with an example. **(08 Marks)**

b. Solve the following LPP in Tabular form:

Maximize $Z = 3x_1 + 2x_2$

Subject to $4x_1 + 3x_2 \leq 12$

$4x_1 + x_2 \leq 8$

$4x_1 - x_2 \leq 8$ and

$x_1, x_2 \geq 0$. **(08 Marks)**

Module-3

5 a. Explain the essence of duality theory and primal dual relationship in simplex method. **(08 Marks)**

b. Use duality to solve

Minimize $Z = 3x_1 + x_2$

Subject to $x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$

where $x_1, x_2 \geq 0$ **(08 Marks)**

OR

6 a. Explain the Iterative procedure of the dual simplex method. **(08 Marks)**

b. Use dual simplex method to solve the following LPP:

Maximize $Z = 3x_1 - x_2$

Subject to $x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$

where $x_1, x_2 \geq 0$ **(08 Marks)**

Module-4

7 a. Explain Hungarian Algorithm with example. **(08 Marks)**

b. Priyanka iron and steel company has 3 open hearth furnaces and 5 rolling mills. Transportation cost (Rs. per quintal) for transporting steel from furnaces to rolling mills is shown in the Table 7(b) below.

Table 7(b)

		Rolling Mills					
		M_1	M_2	M_3	M_4	M_5	Capacity
Furnaces	F_1	4	2	3	2	6	8
	F_2	5	4	5	2	1	12
	F_3	6	5	4	7	3	14
Requirement		4	4	6	8	8	

What is the optimal schedule? **(08 Marks)**

OR

8 a. What do you understand by a balanced and an unbalanced transportation problem? How an unbalanced transportation problem is tackled? **(08 Marks)**

b. Solve the transportation cost for minimization

		Godowns				
		1	2	3	4	Supply
Factories	1	40	29	21	19	1200
	2	35	28	27	24	4800
	3	36	30	26	18	3000
	4	30	25	20	15	700
	Demand	5000	2500	1200	1000	

(08 Marks)

Module-5

9 a. Explain the simulated annealing and genetic algorithm in the context of metaheuristics. **(08 Marks)**

b. Solve the following 2 × 5 game by graphical method

		Player B				
		1	2	3	4	5
Player A	1	-5	5	0	-1	8
	2	8	-4	-1	6	-5

(08 Marks)

OR

10 a. Explain maxmin, minmax principle and two persons, zero sum games in the theory of game. **(08 Marks)**

b. Explain the characteristics of games. **(08 Marks)**

* * * * *