QP CODE: 24001061

24001061

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024

Sixth Semester

CHOICE BASED CORE COURSE - MM6CBT01 - OPERATIONS RESEARCH

Common for B.Sc Mathematics Model I & B.Sc Mathematics Model II Computer Science

2017 Admission Onwards

F12953DD

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Define basic feasible solution and Optimum basic feasible solution to an LP problem.
2. Explain briefly graphical method to find the solution of an LP problem.
3. What you mean by Redundant constraint in the graphical method of an LP problem.
4. Define basic variables and non basic variables in simplex method.
5. What is the indicator of an alternative optimal solutions in LP problem.
6. Write symmetric form of Primal LP problem and corresponding dual LP problem.
7. Define a loop in a transportation table.
8. Why is the enumeration method not always suitable for solving an assignment problem?
9. Find an Initial Basic Feasible Solution by Least Cost Method:

	D1	D2	D3	Supply
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	14
Demand	7	9	18	

10. Find an optimal assignment to minimize cost:

		Programmes			
		A	B	C	D
Programmers	1	10	12	19	11
	2	5	10	7	8
	3	12	14	13	11
	4	8	15	11	9

11. Define pure strategy and mixed strategy.

12. Explain arithmetic method to solve a game without saddle point.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Formulate the LP mathematical model of the following problem. The ABC company has been a producer of picture tubes for television sets and certain printed circuits for radius, The company has just expanded into full scale production and marketing of AM and AM-FM radios. It has built a new plant that can operate 48 hours per week . Production of an AM radio in the new plant will require 2 hours and that of AM-FM radio is 3hours . Each AM radio will contribute Rs.40 to profits , while an AM-FM radio will contribute Rs.80 to profits. The marketing department after extensive research has determined that a maximum of 15 AM radios and 10AM-FM radios can be sold each week.

14. a)Define slack variables , surplus variables and artificial variables in an LP problem.
b) Introduce the above variables using an example..

15. Use Big –M method and find first two tables , to solve the following LP problem.
Maximize Z = x1 + 2x2 + 3x3 – x4 subject to the constraint s
x1 + 2x2 + 3x3 = 15,
2x1 + x2 + 5x3 = 20,

16. Use simplex method and form the simplex tables to remove artificial variable from Basic variables, for the following LP problem.
Maximize Z = 3x + 2y + z subject to the constraints
2x + 5y + z = 12,
3x + 4y = 11, y, z ≥ 0 , and x unrestricted.

17. Write the dual of the following LP problem.

Maximize Z = 3x1 + x2 + 2x3 – x4 subject to the constraints

2x1 - x2 + 3x3 + x4 = 1 ,

x1 + x2 – x3 + x4 = 3 , x1 , x2 ≥ 0 and x3 , x4 unrestricted in sign.

18. State duality theorem and unboundedness theorem.

19. Find an Initial Basic Feasible Solution by Vogel's Approximation Method and test for optimality:

	D1	D2	D3	D4	Supply
O1	6	4	1	5	14
O2	8	9	2	7	16
O3	4	3	6	2	5
Demand	6	10	15	4	

20. Find an optimal assignment to minimize time taken(in hours):

		Job			
		I	II	III	IV
Contractor	1	2	10	9	7
	2	15	4	14	8
	3	13	14	16	11
	4	3	15	13	8

21. Define 1. Saddle point
    2. Minimax principle
    3. Maximin principle
    4. Pure strategy
    5. Optimal strategy

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. Solve using Simplex method ,

Maximize Z = 3000 x + 2000y , Subject to the constraints

$5x + 2y \leq 180$,

$3x + 3y \leq 135$, $x, y, z \geq 0$.

23. Solve the following Transportation Problem to maximize profit:

	D1	D2	D3	D4	D5	Supply
O1	10	8	6	9	12	50
O2	5	3	8	4	10	90
O3	7	9	6	10	4	60
Demand	100	80	70	40	20	

24. Find an optimal assignment to maximize profit:

		District				
		I	II	III	IV	V
Salesman	1	30	37	40	28	40
	2	40	24	27	21	36
	3	40	32	33	30	35
	4	25	38	40	36	36
	5	29	62	41	34	39

25. Solve the game between two players A and B, by Linear programming method in which the payoff of A is given as

	Player B		
Player A	B1	B2	B3
A1	9	1	4
A2	0	6	3
A3	5	2	8

(2×15=30)