20100571

QP CODE: 20100571

Reg No : ....

Name : ....

BSc DEGREE (CBCS) EXAMINATION, MARCH 2020

Sixth Semester

Choice Based Core Course - MM6CBT01 - OPERATIONS RESEARCH

B.Sc Mathematics Model I,B.Sc Mathematics Model II Computer Science

2017 Admission Onwards

E6EBE66E

Time: 3 Hours

Weightage: 80

Part A

*Answer any **ten** questions.*

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

1. Define basic feasible solution of an LP problem.
2. Use the Graphical method to solve the given LP problem.
   Maximize $Z = -x_1 + 2x_2$ subject to the constraints
   $x_1 - x_2 \leq -1, \quad -0.5x_1 + x_2 \leq 2, \quad x_1, x_2 \geq 0.$
3. Define Iso- profit (cost) function line.
4. How can you identity a key row in simplex table and Define key element .
5. Define un restricted variables.
6. State complete slackness theorem.
7. What is the indicator of an alternate optimal solution in a transportation problem?
8. Why is the enumeration method not always suitable for solving an assignment problem?
9. Find an Initial Basic Feasible Solution by North West Corner Method:

	D1	D2	D3	D4	Supply
O1	21	16	15	3	11
O2	17	18	14	23	13
O3	32	27	18	41	19
Demand	6	10	12	15	

10. Find an optimal assignment to minimize cost:

		Programmes			
		A	B	C	D
Programmers	1	2	3	4	5
	2	4	5	6	7
	3	7	8	9	8
	4	3	5	8	4

11. Explain two person zero sum game with a suitable example.

12. Define pure strategy and mixed strategy.

(10×2=20)

Part B

*Answer any **six** questions.*

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

13. A manufacturer produces two different models, X and Y of the same product. Model X makes a contribution of Rs.50 per unit and model Y , Rs.30 per unit, towards total profit. Raw materials r_1 and r_2 are required for production. At least 18 kg of r_1 and 12 kg of r_2 must be used daily. Also at most 34 hours of labour are to be utilized. A quantity of 2 kg of r_1 is needed for model X and 1 kg of r_1 for model Y . For each of X and Y , 1 kg of r_2 is required. It takes 3 hours to manufacture model X and 2 hours to manufacture model Y. Formulate this problem as an LP model.

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 $Z = x_1 + 2x_2 + 3x_3 - x_4$ subject to the constraint s

$x_1 + 2x_2 + 3x_3 = 15,$

$2x_1 + x_2 + 5x_3 = 20,$

16. Solve the following LP problem

Maximize $Z = 6x_1 + 4x_2$ subject to the constraints

$x_1 + x_2 \leq 5$, $x_2 \geq 8$, and $x_1 , x_2 \geq 0$.

17. Explain primal dual relationship in LP problem.

18. Write the dual of the following LP problem.

Minimize $Z = 2x_1 + 5x_2 + 6x_3$ subject to the constraints

$5x_1 + 6x_2 - x_3 \leq 3,$

$-2x_1 + x_2 + 4x_3 \leq 4,$

$x_1 - 5x_2 + 3x_3 \leq 1,$

$-3x_1 - 3x_2 + 7x_3 \leq 6$ and $x_1 , x_2 , x_3 \geq 0$

19. Find an Initial Basic Feasible Solution by VAM and solve the following Transportation Problem to minimize cost:

	D1	D2	D3	D4	Supply
O1	1	2	-2	3	70
O2	2	4	0	1	38
O3	1	2	-2	5	32
Demand	40	28	30	42	

20. Find an optimal assignment to minimize cost:

		Job			
		I	II	III	IV
Contractor	1	10	24	30	15
	2	16	22	28	12
	3	12	20	32	10
	4	9	26	34	16

21. Solve the game using matrix method after reducing to a 2 x 2 game,

	Player B		
Player A	B_1	B_2	B_3
A_1	1	7	2
A_2	6	2	7
A_3	5	1	6

.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. Solve using Simplex method ,

Maximize $Z = 2x_1 + 5x_2$, Subject to the constraints

$x_1 + 4x_2 \leq 24$,

$3x_1 + x_2 \leq 21$,

$x_1 + x_2 \leq 9$, $x_1, x_2 \geq 0$

23. Find an Initial Basic Feasible Solution by the North West Corner Method and proceed to solve:

	D1	D2	D3	Supply
O1	7	3	4	2
O2	2	1	3	3
O3	3	4	6	5
Demand	4	1	5	

24. Find an optimal assignment schedule to minimize loss. Also find an alternate solution if it exists:

		Territory			
		I	II	III	IV
Salesman	1	0	7	14	21
	2	12	17	22	27
	3	12	17	22	27
	4	18	22	26	30

25. Solve the zero sum game using Linear Programming method .

	Player B		
Player A	B_1	B_2	B3
A_1	1	-1	-1
A_2	-1	-1	3
A_3	-1	2	-1

(2×15=30)