TB256684L

Reg. No :..............................

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BACHELOR'S DEGREE (C.B.C.S) EXAMINATION, MARCH 2025

2018, 2019, 2020, 2021 ADMISSIONS SUPPLEMENTARY

SEMESTER VI - CHOICE BASED CORE (MATHEMATICS)

MT6B13AB18 - Operations Research

Time : 3 Hours **Maximum Marks : 80**

Part A

I. Answer any Ten questions. Each question carries 2 marks **(10x2=20)**

1. Define an infeasible solution. How is this condition recognized in Graphical Method
2. When will a basic solution become a degenerate basic feasible solution.
3. If any value in the X_B column of final Simplex table is negative, then the solution is ______________
4. A company makes two kind of leather belts , belt A and belt B. Belt A is a high quality belt and belt B is of lower quality. The respective profits are Rs.4 and Rs. 3 per belt. The production of each of type A requires twice as much time as a belt of type B and if all the belts were of type B the company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day(both A and B combined). Belt A requires a fancy buckle and only 400 Of these are available per day. There are only 700 buckles a day available for belt B. Formulate this problem as an LP model.
5. Define iso-profit line. How does this help us to obtain a solution to an LP problem
6. State any two advantages of duality
7. Show that an Assignment Problem is a special case of a Transportation Problem
8. State the different methods for solving an Assignment Problem
9. Explain why Vogel's approximation method provide a good initial feasible solution
10. Determine an initial basic feasible solution to the following transportation problem using least cost method

	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	

11. Define optimal strategy.
12. For what value of λ, the game with the following pay-off matrix is strictly determinable ?

	Player B		
Player A	B1	B2	B3
A1	λ	6	2
A2	-1	λ	-7
A3	-2	4	λ

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. List the characteristics of the standard form of an LPP
14. Use graphical method to solve the LPP

    Maximize Z = 3x+2y

subject to the constraints

$-2x+3y \leq 9$

$3x-2y \leq -20, \quad x, y \geq 0$

15. Solve graphically

Min $Z = 3x_1+2x_2$

subject to the constraints

$x_1-x_2 \leq 1$

$x_1+x_2 \geq 3, \quad x_1, x_2 \geq 0$

16. Use Simplex method to solve the LPP

Maximize $Z = x_1+x_2+3x_3$

subject to the constraints

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

$2x_1+x_2+2x_3 \leq 2, \quad x_1, x_2, x_3 \geq 0$

17. Prove that if the i th constraint in the primal is an equality, then the i th dual variable is unrestricted in sign
18. Obtain the Dual of the following Primal LP problem

Max $Z = x_1-2x_2+3x_3$

subject to the constraints

$-2x_1+x_2+3x_3=2$

$2x_1+3x_2+4x_3=1, \quad x_1, x_2, x_3 \geq 0$

19. Explain the difference between a Transportation Problem and an Assignment Problem
20. Determine an initial basic feasible solution to the following Transportation Problem using Vogel's approximation method

	D1	**D2**	**D3**	**Supply**
F1	3	4	6	100
F2	7	3	8	80
F3	6	4	5	90
F4	7	5	2	120
Demand	110	110	60	

21. Solve the game whose payoff matrix is given below

	Player B			
Player A	B1	B2	B3	B4
A1	3	2	4	0
A2	3	4	2	4
A3	4	2	4	0
A4	0	4	0	8

Part C

III. Answer any Two questions. Each question carries 15 marks

(2x15=30)

22. Use Big M method to solve the LPP

Minimize $Z = 4x_1+3x_2$

subject to the constraints

$2x_1+x_2 \geq 10$

$-3x_1+2x_2 \leq 6$

$x_1+x_2 \geq 6 \quad x_1 \geq 0, x_2 \geq 0$

23. National Oil Company has three refinaries and four depots. Transportation cost per ton, capacities and requirements are given below

	D1	D2	D3	D4	Capacity
R1	5	7	13	10	700
R2	8	6	14	13	400
R3	12	10	9	11	800
Requirements	200	600	700	400	

Determine optimum allocation of output

24. Solve the following transportation problem with initial solution obtained by Vogel's Approximation method

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

25. Obtain the optimal strategies for both persons and the value of the game for two-person zero-sum game whose payoff matrix is as follows:

Player B		
Player A	B1	B2
A1	1	-3
A2	3	5
A3	-1	6
A4	4	1
A5	2	2
A6	-5	0