N.G.M.COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: JULY – 2022

M.Com.   **MAXIMUM MARKS: 70**

SEMESTER: II   **TIME: 3 HOURS**

OPERATIONS RESEARCH

SECTION – A

ANSWER THE FOLLOWING QUESTIONS   **(10 x 1 =10 MARKS)**

(MULTIPLE CHOICE QUESTIONS)   **(K1)**

1. Tell a feasible solution to a linear programming problem_____.
    a) Must satisfy all the constraints of the problem simultaneously
    b) Need not satisfy all of the constraints, only some of them
    c) Must be a corner point of the feasible region.
    d) Must optimize the value of the objective function

2. Relate a basic feasible solution if the number of non negative allocations is equal _____.
    a) $m-n+1$ b) $m-n-1$
    c) $m+n-1$ d) $m+n+1$

3. Why a game is said to be strictly determinable if_____.
    a) Maximini value is less than or equal to minimax value
    b) Maximini value is not equal to minimax value
    c) Maximini value is greater than or equal to minimax value
    d) Maximini value equal to minimax value

4. What the difference between total float and head event slack is_____.
    a) Free Float   b) Independent Float
    c) Interference Float   d) Linear Float

5. Name the operations research technique, specially used to determine the optimum strategy is_____.
    a) Decision theory   b) Simulation
    c) Game theory   d) Vogel's theory

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.   **(K2)**

6.   Indicate any two advantages of linear programming.
7.   Explain the term basic feasible solution.
8.   Interpret the game theory.
9.   Write a short note on CPM.
10. Define Simulation.

SECTION – B   **(5 x 4 = 20 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.   (K3)

11.   a)   Solve the following LPP by using Graphical Method.

Maximize $z = 2x_1 + x_2$

Subject to

$3x_1 + 2x_2 \leq 12$

$x_1 + 1.5x_2 \leq 6$

$2x_1 + x_2 \leq 10$

$x_1 + x_2 \geq 0$

(OR)

b)   A dietician wishes to mix two types of food in such a way that the Vitamin contents of the mixture contain at least 8 units of Vitamin A and 10 units of Vitamin B. Food I contains 2 units per kg of Vitamin A and 1 unit per kg of Vitamin B while the Food II contains 1 unit per kg of Vitamin A and 2units per kg of Vitamin B. It costs Rs.5 per kg to purchase food I and Rs.8 per kg to purchase food II. Apply a Mathematical Model of the problem and solve it.

12.   a)   Solve the following transportation problem whose cost matrix, availability at each plant and requirements at each warehouse are given as follows:

Plant			Warehouse		
	W1	W2	W3	W4	Availability
P1	190	300	500	100	70
P2	700	300	400	600	90
P3	400	100	600	200	180
Requirements	50	80	70	140	340

(OR)

b)   Find and Assess the optimal solution for the assignment problem with the following cost matrix.

		Area			
		W	X	Y	Z
Salesman	A	11	17	8	16
	B	9	7	12	6
	C	13	16	15	12
	D	14	10	12	11

13.   a)   Using the minimax criterion find and assess the optimal strategies for the players in the following game.

$$
\begin{array}{c}
 & & & \mathbf{B} & & \\
 & \mathbf{B_1} & \mathbf{B_2} & \mathbf{B_3} & \mathbf{B_4} & \mathbf{B_5} \\
\mathbf{A_1} & 8 & 10 & 13 & 16 & 9 \\
\mathbf{A}\quad \mathbf{A_2} & 7 & 12 & 6 & 15 & 10 \\
\mathbf{A_3} & 9 & 18 & 9 & 13 & 25 \\
\mathbf{A_4} & 4 & 9 & 8 & 20 & 6 \\
\end{array}
$$

(OR)

b)   Using the principle of Dominance solve the following game

$$\begin{bmatrix} 8 & 10 & 9 & 14 \\ 10 & 11 & 8 & 12 \\ 13 & 12 & 14 & 13 \end{bmatrix}$$

14.   a)   The following table gives the activities in a construction project and other relevant information.

Activity	P	Q	R	S	T	U	V	W	X
Immediate Predecessor	-	P	P	-	S	Q,R,T	U	T	V,W

Draw and sketch the network for the project.

(OR)

b)   The following indicates the details of the activities of a project. The duration are in days.

Activity	T_O	T_M	T_P
1-2	3	6	15
2-3	6	12	30
3-5	5	11	17
5-8	1	4	7
6-7	3	9	27
4-5	3	6	15
2-4	2	5	8
1-6	2	5	14
7-8	4	19	28

Draw the function of the network.

15.   a)   Examine what are the limitations of simulation?

(OR)

b)   Describe what are the steps to be followed in Monte-Carlo simulation?

SECTION – C   **(4 x 10=40 MARKS)**

ANSWER ANY FOUR OUT OF SIX QUESTIONS.   **(K4/K5)**

(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS)

16.   Following is the pay off matrix for player A

Player B

	B_1	B_2	B_3	B_4	B_5
A_1	2	4	3	8	4
A_2	5	6	3	7	8
A_3	6	7	9	8	7
A_4	4	2	8	4	2

PlayerA

Using dominance property, obtain the optimum strategies for both the players and determine the value of the game.

(CONTD…..4)

17.   Formulate the following LPP by solving Graphical Method.
       Maximize $z = 20x_1 + 10x_2$
         Subject to
                 $x_1 + 2x_2 \leq 40$
                 $3x_1 + 2x_2 \leq 30$
                 $4x_1 + 3x_2 \leq 60$
                 $x_1 + x_2 \geq 0$

18.   Analyse the following transportation problem by solving Vogel's Approximation
       Method.

Plant			Warehouse		
	W1	W2	W3	W4	Availability
P1	4	2	5	9	30
P2	1	2	1	4	50
P3	3	3	2	1	20
Requirements	20	40	30	10	100

19.   Construct and Solve the following game

$$\begin{bmatrix} 3 & -2 \\ -2 & 5 \end{bmatrix}$$

20.   A project is as follows

Activity	A	B	C	D	E	F	G
Duration	4	9	3	8	7	2	5
Preceding Activity	-	-	A	B	B	D	E

       Construct the network and find the project and the critical path duration.

21.   What is Simulation? and Discuss the various application of simulation.

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