LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Com. DEGREE EXAMINATION – **COMPUTER APPLICATIONS**

FOURTH SEMESTER – **APRIL 2022**

UCC 4301 – ELEMENTS OF OPERATIONS RESEARCH

Date: 17-06-2022 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A

Q. No **Answer ALL questions** **(10 x 2 = 20 Marks)**

1 What is an assignment problem?

2 Solve the game G with the following payoff

		Player B	
		1	**2**
Player A	**1**	6	2
	2	8	12

3 What is a saddle point?

4 Maximize, Z= 5x+7y. Extreme points: A (60,0); B (50,20); C (40,30); D (0,50). What is the Optimal solution?

5 List the applications of Operations research model.

6 Formulate the LPP model to minimize the cost of tonics.

Vitamins	**Tonics**		**Daily requirements in units**
	X	Y	
A	2	4	40
D	3	2	50
Cost per unit	5	3	

7 Explain the strategies of a game.

8 What is a degenerate solution?

9 What is an iconic model? Give example.

10 Find the total minimum cost:

		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

PART – B

Answer any FOUR questions **(4 x 10 = 40 Marks)**

11 A company has six machines which can process six jobs. The processing time (mins) of different jobs by different machines is given below. Find the optimized assignment of jobs to the machines such that the total processing time is minimized.

JOB \ MACHINES	A	B	C	D	E	F
1	10	15	12	18	14	13
2	17	14	22	16	19	20
3	12	15	13	8	12	9
4	11	16	15	22	21	18
5	13	10	17	19	15	10
6	15	8	14	25	16	18

12 Elucidate the scope and importance of Operations research with examples.

13 Find the IBFS of the Transportation Problem using:

a) Least cost method

b) Vogel's Approximation method

ORIGIN \ Destination	1	2	3	4	Available
A	7	2	5	5	30
B	4	4	6	5	15
C	5	3	3	2	10
D	4	-1	4	2	20
Requirement	20	25	15	15	

14 Maximize, $Z = 3x_1 + 2x_2$ Subject to the constraints $3x_1 + 2x_2 \leq 6$; $2x_1 + 3x_2 \leq 6$; x_1 and $x_2 \geq 0$. Solve graphically

15 Maximize, $Z = 3x1 + 2x2$ Subject to the constraints $x1 + x2 \leq 450$; $2x1 + x2 \leq 600$; $x1$ and $x2 \geq 0$. Obtain optimal solution of the LP using simplex method.

16 Consider the 4*4 game, which represents the payoff matrix of the player A. Solve it optimally.

PLAYER A \ PLAYER B	I	II	III	IV
I	3	2	4	0
II	3	4	2	4
III	4	2	4	0
IV	0	4	0	8

17 Maximize the sales revenue by assigning the sales person to the territory.

SALESMEN \ AREA OF SALE	1	2	3	4	5
A	62	78	50	101	82
B	72	84	61	73	59
C	87	92	111	71	81
D	48	64	87	77	80

PART – C

Answer any TWO question **(2 x 20 = 40 Marks)**

18 An airline that operates 7 days a week has the time table shown below. Crew must have a minimum layover of 5 hours between flights. Obtain the pairing of flights that minimizes layover time away from home assuming that the crew can be based at either of the two cities. The crew will be based at the city that results in smaller layover.

DELHI - JAIPUR			JAIPUR - DELHI		
Flight No.	**Depart**	**Arrive**	**Flight No.**	**Depart**	**Arrive**
1	7:00AM	8:00AM	101	8:00AM	9:15AM
2	8:00AM	9:00AM	102	8:30AM	9:45AM
3	1:30PM	2:30PM	103	12:00 Noon	1:15PM
4	6:30PM	7:30PM	104	5:30PM	6:45PM

19 Solve by simplex method the following LP problem:
Minimize $Z = x_1 - 3x_2 + 3x_3$,
Subject to the constraints,
$3x_1 - x_2 + 2x_3 \leq 7$,
$2x_1 + 4x_2 \geq -12$,
$-4x_1 + 3x_2 + 8x_3 \leq 10$,
$x_1, x_2, x_3 \geq 0$.

20 A machine producing either product A or B can produce A by using 2 units of chemicals and 1 unit of a compound and can produce B by using 1 unit of chemicals and 2 units of the compound. Only 800 units of chemicals and 1000 units of the compound are available. The profits available per unit of A and B arc respectively Rs. 30 and Rs. 20. Drag a suitable diagram to show the feasible region. Also, find the optimum allocation of units between A and B to maximize the total profit. Find maximum profit.

21 Solve the Transportation problem from factory to the warehouse and find the optimal solution.

	W1	**W2**	**W3**	**W4**	**Supply**
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Demand	5	8	7	14	

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