



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.B.A. DEGREE EXAMINATION – BUSINESS ADMINISTRATION**

**FOURTH SEMESTER – APRIL 2022**

**16/17/18UBU4MC01 – ELEMENTS OF OPERATIONS RESEARCH**

Date: 24-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

**PART – A**

**Q. No Answer ALL questions**

**(10 \* 2 = 20 Marks)**

1. Define operation Research.
2. List any two scopes of OR.
3. Give any two advantages of LPP.
4. List any two applications of LPP.
5. What is called a surplus variable?
6. Give any two objectives of Transportation Problems.
7. What are Degenerate solutions?
8. What is the purpose of Assignment Problems?
9. Define Game theory.
10. Define Saddle point.

**PART – B**

**Answer any FOUR questions**

**(4 \* 10 = 40 Marks)**

11. Enlighten the characteristics of LPP?
12. Explain the steps involved in formulating LPP.
13. An Investor is investing in two Securities A and B, the risk and the return associated with these securities are different. Security A gives a return of 9% and has a risk factor of 5 on a scale of zero to 10. Security B gives a Return of 15 % but has a risk factor of 8. The total amount to be invested is Rs 5,00,000. The total minimum return on the investment should be 12%. The maximum combined risk should not be more than 6 Formulate LPP.
14. Solve the problem graphically.  
Min  $Z=20X + 10 Y$   
Sub to:  
 $X+2Y \leq 40$   
 $3X+ Y \geq 30,$   
 $4X + 3Y \geq 60$   
where,  $X, Y \geq 0$

15. Solve the below-mentioned Assignment Problem.

	I	II	III	IV	V
1	20	15	18	20	25
2	18	20	12	14	15
3	21	23	25	27	25
4	17	18	21	23	20
5	18	18	16	19	20

16. Solve the Transportation problems using LCM and NWCR

	D1	D2	D3	D4	Supply
S1	4	6	8	8	40
S2	6	8	6	7	60
S3	5	7	6	8	50
Demand	20	30	50	50	

17. Explain the characteristics of Games.

### PART – C

Answer any TWO questions

(2 \* 20 = 40 Marks)

18. Explain different techniques and applications of Operation Research.

19. Solve the problem Using Simplex Method:

$$\text{Max } Z = 2X_1 + X_2$$

Sub to:

$$X_1 + 2X_2 \leq 10$$

$$X_1 + X_2 \leq 6,$$

$$X_1 - X_2 \leq 2$$

$$X_1 - 2X_2 \leq 1$$

$$\text{Where, } X_1, X_2 \geq 0$$

20. Solve Using VAM method:

	D1	D2	D3	D4	Supply
S1	8	6	12	9	400
S2	7	11	10	14	500
S3	13	8	8	7	600
Demand	325	425	475	275	

21. Solve the following game by the Dominance Method.

	I	II	III	IV
I	6	8	3	13
II	4	1	5	3
III	8	10	4	12
IV	3	6	7	12

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