LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – **APRIL 2018**

16UBU4MC01– ELEMENTS OF OPERATIONS RESEARCH

Date: 20-04-2018   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART – A

Answer ALL the questions: **(10 X 2=20)**

1. What is operations research?
2. Explain any two features of Operations research.
3. Explain any two applications of LPP in Management.
4. What do you mean by Feasible Solution?
5. Develop a Linear programming model to determine the optimal production volume of each of the products such that the profit is maximised subject to the availability of machine hours.

Machine Type	Processing Time (Hours)		Machine Hour Available per week
	Product P1	Product P2	
Milling Machine	2	5	200
Drilling Machine	4	2	160
Profit/unit (₹)	250	400	

6. Determine the optimal strategy/strategies for Company A and Company B.

		Company B		
		1	2	3
Company A	1	20	15	22
	2	35	45	40
	3	18	20	25

7. Reduce the 3 X 3 Matrix to 2 X 2 Matrixes.

		Player B		
		1	2	3
Player A	1	20	-20	50
	2	-25	25	-25
	3	20	-50	50

8. Explain the concept Dominance property.

9. What do you mean by Assignment Problem?

10. Explain Balanced Transportation Problem.

PART – B

Answer any FOUR Questions: (4X10=40)

11. What are the advantages and limitations of LP problem?

12. A firm manufactures two types of products A and B and sells them at a profit of 4 on type A and 6 on type B. Each product is processed on two machines G and H. Type A requires 2 minutes of processing time on G and 4 minutes on H, type B requires 2 minutes on G and 2 minute on H. The machine G is available for not more than 6 hours 40 minutes while machine H is available for 10 hours during any working day. Formulate the problem as a LPP.

13. Use graphical method to solve the following LP Problem.
    Maximize Z = 3x + 5y

$$\text{Subject to} \quad x + 2y \leq 2000$$
$$x + y \leq 1500$$
$$y \leq 600$$
$$\text{and} \quad x, y \geq 0$$

14. A company has factories which supply warehouses. Unit shipping costs (in rupees) are as follows:

		Warehouse			
		W1	W2	W3	Supply
Factory	F1	16	20	12	200
	F2	14	8	18	160
	F3	26	24	16	90
	Demand	180	120	150	450

Determine the optimum distribution for this company to minimise shipping costs using Least Cost Cell Method:

15. The departmental head has four task and four subordinates to be performed. The subordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimates of the time each man would take to perform each task is given below in the matrix:

Subordinates	Tasks			
	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

16. Consider the 4X4 game which represents the payoff matrix of Player A and solve it optimally:

		Player B			
Player A		1	2	3	4
	1	3	2	4	0
	2	3	4	2	4
	3	4	2	4	1
	4	3	4	3	4

17. Consider the payoff matrix of Player A and solve it optimally using graphical method:

		Player B				
		1	2	3	4	5
Player A	1	3	0	6	-1	7
	2	-1	5	-2	2	1

Answer any TWO Questions: **(2 X 20 = 40)**

18. Briefly explain the limitations of game theory and its types.

19. Use simplex method to solve the LPP

　　　Maximize $Z = 4x1 + 10x2$

　　　Subject to 　　$2x1 + x2 \le 50$

　　　　　　　$2 x1 + 5x2 \le 100$

　　　　　　　$2x1 + 3x2 \le 90$

　　　　　　　and $x1, x2 \ge 0$

20. Certain equipment needs five repair jobs which have to be assigned to five machines. The estimated time (in hours) that each mechanic requires to complete the repair job is given in the following table:

Machines	Jobs				
	J1	J2	J3	J4	J5
M1	7	5	9	8	11
M2	9	12	7	11	10
M3	8	5	4	6	9
M4	7	3	6	9	5
M5	4	6	7	5	11

21. A company has factories which supply warehouses. Unit shipping costs (in rupees) are as follows:

Plant	Market					Supply
	M1	M2	M3	M4	M5	
P1	10	2	16	14	10	300
P2	6	18	12	13	16	500
P3	8	4	14	12	10	825
P4	14	22	20	8	18	375
Demand	350	400	250	150	400	

　　　Find the initial basic feasible solution using VAM.

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