B.Com(BIM) DEGREE EXAMINATION,APRIL 2020
I Year II Semester
Elements of Operations Research

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What is Operation Research?.
2. What is Simplex method?
3. Define LPP.
4. What are the basic assumptions for formulating LPP?.
5. Write down the canonical form of LPP.
6. Define slack variable.
7. Define Basic feasible solution in transportation problem.
8. What is meant by non-degenerate solution?.
9. Define Assignment problem.
10. Define saddle point.
11. What is meant by fair game?.
12. What is unbalanced assignment problem.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Explain the phases of OR.
14. A firm manufactures two types of products A and B and sells them at a profit of Rs 2/- on type A and Rs 3/- on type B.Each product is processed on two machines

    M1 and M2 . Type A requires 1 minute of processing time on M1 and 2 minutes on M2, type B requires 1 minute on M1 and 1 minute on M2. Machine M1 is available for not more than 6 hours 40 minutes while machine B is available for 10 hours during any working day .Formulate the problem as LPP.
15. Solve graphically $Max\ Z = 3x + 4y$
    $subject\ to\ x + y \leq 450$
    $2x + y \leq 600$
    $x, y \geq 0$

16. Determine IBFS by using north west corner rule

						Supply
	2	11	10	3	7	4
	1	4	7	2	1	8
	3	9	4	8	12	9
Demand	3	3	4	5	6	

17. Solve the game

Player B

Player A $\begin{bmatrix} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{bmatrix}$

18. The processing time hours for the jobs when allocated to different machines are indicated below.Assign the machines for the jobs so that the total processing time is minimum.

	MACHINES				
	M1	M2	M3	M4	M5
J1	9	22	58	11	19
J2	43	78	72	50	63
J3	41	28	91	37	45
J4	74	42	27	49	39
J5	36	11	57	22	25

19. Solve the given LPP graphically $Max\ Z = 5x + 3$
$Subject\ to\ 4x + 5y \leq 1000$,
$5x + 2y \leq 1000$,
$3x + 8y \leq 1200$
$x, y \geq 0$

Section C $(2 \times 15 = 30)$ Marks

Answer any **TWO** questions

20. A firm produces three products. Three products are processed on three different machines. The time required to manufacture one unit of each of the three products and the daily capacity of the three machines are given below

Machine	time / unit Products			machine capacity
	1	2	3	
M1	2	3	2	440
M2	4	-	3	470
M3	2	5	-	430

It is required to determine the number of units to be manufactured for each product daily. The profit per unit for product 1,2,and 3 are Rs 4 ,Rs3 and Rs6 respectively.

Formulate this problem as LPP.

21. Solve the following LPP by simplex method

$Max\ Z = x_1 + x_2 + x_3$
$subject\ to\ 3x_1 + 2x_2 + x_3 \leq 3$
$2x_1 + x_2 + 2x_3 \leq 2$
$x_1, x_2, x_3 \geq 0$

22. Find the initial basic feasible solution for the following transportation problem by VAM rule

	a	b	c	d	capacity
	11	13	17	14	250
	16	18	14	10	300
	21	24	13	10	400
Requirements	200	225	275	250	

23. solve the following 2x2 game

Player B

Player A $\begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix}$