B.Sc. DEGREE EXAMINATION,APRIL 2020
III Year VI Semester
Operations Research

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

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

Answer any **TEN** questions

1. Define LPP.
2. Explain the procedure for solving LPP graphically.
3. Define slack variable.
4. Write the Linear programming Problem in canonical form.
5. Define Unbalanced Transportation Problem.
6. Define Assignment Problem.
7. Define idle time.
8. What is the condition for processing of n jobs through three Machines?.
9. Define dummy activity.
10. Define Optimistic time.
11. Define Total elapsed time.
12. What is meant by degeneracy in Transportation Problem?.

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

Answer any **FIVE** questions

13. 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.
14. Use Big- M method to solve Minimize Z = 4x+3y

    Subject to 2x+y=10 ,
    -3x+2y=6,
    x+y =6
    x,y $\geq$ 0

15. Find an IBFS for the following transportation problem by Least cost method

	To				supply
From	1	2	1	4	30
	3	3	2	1	50
	4	2	5	9	20
Demand	20	40	30	10	

16. There are five jobs ,each of which is to be processed through two machines M1,M2 in the order M1M2. Processing times are given

Job :	1	2	3	4	5
M1:	3	8	5	7	4
M2:	4	10	6	5	8

determine optimal sequences that minimizes the total elapsed time.

17. A project has the following characteristics

Activity:	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration:	8	7	12	4	10	3	5	10	7	4

18. Construct the network for each project whose activities and their precedence relationships are given

Activity :	A	B	C	D	E
Immediate predecessor:	-	A	A	A	B,C,D

19. 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

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Old hens can be bought at Rs 2 each and young ones at Rs 5 each. The old hens lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth 30 paise. A hen costs Rs 1 per week to feed. A person has only Rs 80 to spend for hens . How many of each kind should he buy to give a profit of more than Rs6 per week, assuming that he cannot house more that 20 hens . Formulate this as LPP

21. Use Two-phase simplex method to solve Max Z = 5x +8y

    Subject to 3x+2y=3 ,
    x+4y = 4,
    x+y = 5
    x,y $\geq$ 0

22. Solve the transportation problem

					Supply
	21	16	25	13	11
	17	18	14	23	13
	32	27	18	41	19
Demand	6	10	12	15	

23. Solve the following sequencing problem giving an optimal solution if passing is not allowed. machines

		M1	M2	M3	M4
JOBS	A	13	8	7	14
	B	12	6	8	19
	C	9	7	8	15
	D	8	5	6	15

24. A project consists of the following activities and times estimates (days)

Activity	Least time	greatest time	most likely time
1-2	3	15	6
2-3	2	14	5
1-4	6	30	12
2-5	2	8	2
2-6	5	17	11
3-6	3	15	6
4-7	3	27	9
5-7	1	7	4
6-7	2	8	5

    a) draw the network b) what is the probability that the project will be completed in 27days?