B.Sc. DEGREE EXAMINATION,NOVEMBER 2018
III Year VI Semester
Core Elective - Paper III
OPERATIONS RESEARCH

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

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

Answer any **TEN** questions

1. What is O.R?
2. State the limitations of the graphical method of solving a LPP.
3. What is the canonical form of a LPP.
4. Explain the use of artificial variables in LPP.
5. What do you mean by transportation model?
6. Define an unbalanced assignment problem.
7. What is a sequencing problem?
8. Define total elapsed time and idle time on machines.
9. What are the three main phases of a Project?
10. What is critical path in PERT/CPM? Explain its importance.
11. Write short notes on (a) total float (b) free float.
12. Define Feasible solution of LPP.

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

Answer any **FIVE** questions

13. What are the characteristics of a good model?
14. Apply the simplex method to solve the problem.
Maximize $Z = 100x_1 + 200x_2 + 50x_3$
Subject to $5x_1 + 5x_2 + 10x_3 \leq 1000$
$10x_1 + 8x_2 + 5x_3 \leq 2000$
$10x_1 + 5x_2 \leq 500$
$x_1, x_2, x_3 \geq 0$
15. Solve the assignment problem

Operators

Machines	I	II	III	IV
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

16. Find the sequence that minimises the total elapsed time required to complete the following tasks on machines $M_1$and M_2 in the order M_1,M_2. Also find the minimum total elapsed time

Task	A	B	C	D	E	F	G	H	I
M_1	2	5	4	9	6	8	7	5	4
M_2	6	8	7	4	3	9	3	8	11

17. Write the difference between PERT and CPM.

18. A project schedule has the following characteristics:

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7

Construct PERT network and find the critical path.

19. 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 Rs. 6 per week, assuming that he cannot house more than 20 hens. Formulate this as a LPP.

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

Answer any **THREE** questions

20. Apply graphical method to solve the LPP:
Maximise $z = x_1 - x_2$
Subject to $-x_1 + x_2 \leq 1$
$0 \leq x_1 \leq 5$
$2 \leq x_2 \leq 4$

21. Use two-phase simplex method to solve
Maximise $z = 5x_1 + 8x_2$
Subject to $3x_1 + 2x_2 \geq 3$
$x_1 + 4x_2 \geq 4$
$x_1 + x_2 \leq 5$
$x_1, x_2 \geq 0$

22. Solve the following transportation problem to maximize profit

Profits (RS)/ Unit

	Destination				
	A	B	C	D	Supply
1	40	25	22	33	100
2	44	35	30	30	30
3	38	38	28	30	70
demand	40	20	60	30	

Source

23. Solve the following sequencing problem:

		Machines			
		M_1	M_2	M_3	M_4
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 time estimates:

Activity	1-2	1-3	1-4	2-5	2-6	3-6	4-7	5-7	6-7
Least time(days)	3	2	6	2	5	3	3	1	2
Greatest time(days)	15	14	30	8	17	15	27	7	8
Most likely(days)	6	5	12	5	11	6	9	4	5

(a). Draw the network

(b). What is the probability that the project will be completed in 27 days?

(c). What due date has about 95% chance of being met?