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

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

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

Answer any **TEN** questions

1. What is meant by Operation Research?

2. Bring out any two limitation of Operation Research.

3. What is LPP?

4. Explain the meaning of Decision Theory.

5. A dietician wishes to mix two types of food in such a way that the vitamin contents of the mixture contains at least 8 units of vitamin A and 10 units of vitamin B. Food I contains 2 units per kg of vitamin A and 1 unit per kg of vitamin B while the food II contains 1 unit per kg of vitamin A and 2 units per kg of vitamin B. it costs Rs.5 per kg to purchase food I and Rs. 8 per kg to purchase food II. Prepare a mathematical model of the problem stated above.

6. Calculate the feasible solution and find out the maximisation profit from the graphical method:

   $z = 22x_1 + 18x_2$
   O (0, 0), A (16, 0), B (8, 12) and C (0, 20)

7. Obtain an initial basic feasible solution to the following transportation problem by North West Corner Method.

			Capacity
8	7	3	60
3	8	9	70
11	3	5	80

   Demand 50 80 80

8. Solve the following assignment problem:

	I	II	III
A	8	7	6
B	5	7	8
C	6	8	7

9. Construct the network diagram from the following information:

Activity	1-2	2-3	2-4	2-5	4-5	4-7	5-6	3-6	6-7
Duration	4	5	7	6	0	8	9	10	3

10. Find the critical path and project duration from the given network diagram:
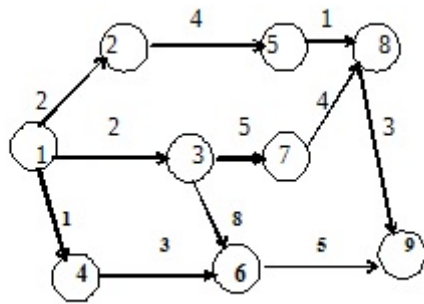
11. R1: 0.5; R2:0.2; R3: 0.1

    The matrix of pay-off between the decision and the results is indicated below:

	R1	R2	R3
D1	14	9	10
D2	11	10	8

12. Explain the maximin principle with the following pay-of matrix for player A.

    Player B

	20	12	15
Player A	11	10	12
	15	11	10

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

Answer any **FIVE** questions

13. State the importance of Operation Research.

14. Solve the following problem using simplex method.

    Maximise $Z = 21x_1 + 15x_2$

    Subject to the constraints $-x_1 - 2x_2 \geq -6$

    $4x_1 + 3x_2 \leq 12$

    $x_1 \geq 0, x_2 \geq 0$

15. Solve the transportation using VAM method:

			a_i
5	4	3	6
4	7	6	8
2	5	8	12
8	6	7	4

    b_j 8   10   12

16. Briefly explain about Network Analysis with suitable example.

17. The following table gives the activities of a construction project and duration (in days)

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration	20	25	10	12	6	10

a) Construct the network diagram

b) Find the critical path and the project duration.

18. A Growfast company is evaluating four alternative single-period investment opportunities whose returns are based on the state of the economy. The possible states of the economy and the associated probability distribution is as follows:

State	Fair	Good	Great
Probability	0.2	0.5	0.3

The return for each investment opportunity and each state of the economy are as follows:

State of Economy

Alternative	Fair	Good	Great
	Rs.	Rs.	Rs.
W	1,000	3,000	6,000
X	500	4,500	6,800
Y	0	5,000	8,000
Z	-4,000	6,000	8,500

Using the decision-tree approach, determine the expected return for each alternative. Which alternative investment proposal would you recommend if the expected monetary value criterion is to be employed?

19. Solve the following game

3	-2
-2	5

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

Answer any **TWO** questions

20. Enumerate the different types of models in Operation Research.

21. Solve the LPP by using graphical method:

Maximise $z = 30x_1 + 20x_2$

Subject to the constraints

$2x_1 + x_2 \leq 800$
$x_1 + 2x_2 \leq 1000$
$x_1 + x_2 \geq 0$

22. A project work consists of four major jobs for which four major contractors have submitted tenders. The tender documents quoted in thousands of Rupees are given with the matrix as

		Jobs
		J1	J2	J3	J4
	C1	15	27	35	20
	C2	21	29	33	17
Contractors	C3	17	25	37	15
	C4	14	31	39	21

Find the assignment which minimises the total of the project cost. Each contractor has to be assigned one job.

23. The activities of a project have the following PERT time estimates.

Job	Optimistic time	Most likely time	Pessimistic time
1-2	3	6	15
7-8	4	19	28
2-3	6	12	30
3-5	5	11	17
5-8	1	4	7
6-7	3	9	27
4-5	3	6	15
2-4	2	5	8
1-6	2	5	14

a) Draw the network diagram and determine the critical path.
b) Find the project completion time and its variance.