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II Semester M.B.A. (Day) Degree Examination, October - 2021

MANAGEMENT

Quantitative Techniques And Operations Research

(CBCS Scheme 2014-15)

Paper : 2.6

Time : 3 Hours

Maximum Marks : 70

SECTION - A

Answer any **FIVE** questions. Each carries 5 marks.

(5×5=25)

1. What do you mean by random variables?
2. Explain the role and importance of Operations Research in managerial decisions.
3. Distinguish between systematic and unsystematic risk.
4. What is probability? Discuss the rules associated with basic probability?
5. Distinguish between PERT and CPM.
6. What are the characteristics of Transportation Problem?
7. Mention the various Components of a Queuing system.

SECTION - B

Answer any **THREE** questions. Each carries 10 marks.

(3×10=30)

8. Find the Dual of the following:

Minimize $Z = 8x_1 + 10x_2$ subject to:

$$2x_1 + 3x_2 \geq 8;$$

$$5x_1 + 6x_2 \geq 18;$$

$$x_1 + 2x_2 \geq 13;$$

$$2x_1 + 3x_2 \geq 10 \text{ and } x_1, x_2 \geq 0$$

[P.T.O.]



9. A company having a mechanical workshop has recently discontinued production of an unprofitable product. It has resulted in a considerable spare capacity. The company has decided to use this capacity to the maximum extent to produce three products which are profitable. The productivity coefficient in machine hours per unit and available machine time is given below:

Machine Type	Product 1	Product 2	Product 3	Time Available Machine Hours per week
Milling Machine	9	3	5	500
Lathe	5	4	0	350
Grinder	3	0	2	150

The Sales department has indicated that the demand for Products 1 and 2 exceeds the maximum production rate whereas sales potential for Product 3 is 20 units per week. The profits for the three products have been estimated respectively as Rs.3,500, Rs.1,400, and Rs.1,750 for the three products. The company wants to decide the optimum level of production to maximize its profit.

Formulate this problem as a Mathematical Model.

10. For the following given problem.
- Construct the Network Diagram; and
 - Determine the Critical Path and Project Duration.

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 (Days)	4	1	1	1	6	5	4	8	1	2	5	7

11. Solve the following Assignment Problem:

Jobs→ Workers↓	1	2	3
A	8	6	5
B	8	6	2
C	6	6	3



SECTION - C

Compulsory Question.

(1×15=15)

12. Case Study.

An investment of Rs.1,00,000 in a high risk venture has a 50-50 chance over next year of increasing to Rs.1,40,000 or decreasing to Rs.80,000. Thus the net return can be either Rs.40,000 or Rs.(-20,000).

- Assuming a risk-neutral investor and a utility scale from 0 to 100, determine the utility of \$0 net return on investment and associated indifference probability.
- Suppose the two investors A and B have exhibited the following indifference probabilities:

Net returns (Rs.)	Indifference probability	
	Investor A	Investor B
-2,000	1.00	1.00
-1,000	0.30	0.90
0	0.20	0.80
1,000	0.15	0.70
2,000	0.10	0.50
3,000	0.05	0.40
4,000	0.00	0.00

Graph the utility functions for investors A and B, and categorize each investor as either a risk averse person or a risk seeker.
