

## MBA II Year Examination

### MP-204 : Quantitative Techniques

**Time: 3 Hours**

**Max. Marks: 80**

**Note: The question paper is divided into three sections A, B & C. Write Answers as per the given instructions.**

#### **Section A (Very Short Answer Type Questions )**

**Note: Answers all 8 questions. As per the nature of the questions you delimit your answer in one sentence up to 50 words. Each question carries equal marks. (Marks 2x8=16)**

1. Define Quantitative Techniques.
2. Enlist the names of various operation research techniques.
3. What do you mean by Break Even Analysis.
4. Define function.
5. What do you mean by differentiation?
6. Define discontinuity and continuity series.
7. State the normal equations used to obtain the regression equation of X on Y.
8. Give properties of Coefficient of Correlation 'r'.
9. Give the names of the methods used for measuring seasonal variations.
10. How does time series analysis help in planning future operations?
11. Define Index Number.
12. What do you mean by Deflating?
13. Discuss the Axiomatic approach to probability.
14. Define poisson distribution.
15. Which distribution is most appropriate in case of rare events?
16. Define posterior analysis of decision making.
17. Discuss any two limitations of decision theory.
18. Define decision tree.
19. Differentiate between static and dynamic models.

20. Name the different types of mathematical models.
21. Define Slack variable.
22. What do you mean by dummy activity?
23. Define float.
24. What do you understand by Game Theory?

## Section B

### (Short Answer Type Questions)

**Answer any 4 questions. Each answer should not exceed 100 words. Each question carries 08 marks. (Marks 8x4 = 32)**

1. Discuss the limitations of Quantitative Techniques.
2. Explain the following functions:
  - a) Demand function
  - b) Production function
3. Find the 15th term of the A.P. 1, 6, 11, 16.....
4. Differentiate between explicit and implicit function.
5. Explain two applications of calculus in business.
6. State the procedure to calculate the adjoint of a matrix.
7. Discuss the properties of Regression Coefficient.
8. Differentiate between positive and negative correlation.
9. Explain any two preliminary adjustments required for time series analysis.
10. Discuss the merits and demerits of Moving Average Method.
11. Briefly discuss the limitations of Index Numbers.
12. Discuss the precautions to be taken while constructing the Index Numbers.
13. Explain the multiplicative law of probability.
14. The mean of binomial distribution is 20 and standard deviation is 4. Calculate n, p and q.
15. Differentiate between discrete and continuous probability function.

16. Write a short note on the Deterministic decision model.
17. Differentiate between decision making under conditions of risk and uncertainty.
18. Explain the following decision rules:
  - a) Laplace Decision Rule
  - b) HURWICZ Decision Rule
19. Write a short note on the role of computers in operations research.
20. Discuss any two applications of Operation Research techniques.
21. Explain the assumptions for linear programming problems.
22. What do you mean by unbounded solution?
23. Differentiate between PERT and CPM.
24. Discuss the assumptions of the Queuing Model.

### **Section C**

#### **(Long Answer Type Questions)**

**Answer any 2 questions. Each answer should not exceed 800 words. Each question carries 16 marks. (Marks 2x16=32)**

1. Illustrate the various Quantitative Techniques used in modern times for business decision making. Support your answer using appropriate examples.
2. Discuss the role of Quantitative Techniques as a tool for solving complex business problems.
3. The demand function for a certain product is given by

$$q = 120 - 3p$$

where  $q$  denotes the quantity demanded for the product and  $p$  the price per unit of the product. The per unit production cost is Rs. 2. Determine the profit function of the company for this product?

4. Define Matrix. Explain the different types of matrices with examples.
5. Use Cramer's Rule to solve the following equations:

$$2x+3y = 10$$

$$x+6y = 4$$

6. Describe the properties of determinants which help in computing the determinant of a matrix.
7. What do you mean by correlation? How does it differ from regression?
8. From the following data calculate coefficient of correlation between X and Y series:

X	7	8	10	11	9	5	6	2	3	6
Y	10	12	8	2	4	3	5	2	4	7

9. Define business forecasting. Explain the various methods used in business forecasting.
10. What do you understand by Time Series Analysis? Briefly explain the components of time series.
11. Define Index Number. Also explain the uses of index numbers for the management, industry and the economy as a whole.
12. From the following data, calculate the price index numbers for 2014 taking 2000 as the base year using Laspeyre's Method and Paasche's Method:

Product	2000		2014	
	Price (Rs.)	Quantity (Units)	Price (Rs.)	Quantity (Units)
Wheat	70	28	140	21
Samolina	175	35	210	17.5
Barley	140	52.5	175	52.5
Maize	70	70	70	87.5

13. Define Normal distribution. Explain the characteristics of Normal Distribution.
14. In a certain manufacturing process, 5% of the tools produced turn out to be defective. Find the probability that in sample of 40 tools, at most 2 will be defective. [Given  $e^{-2}=0.135$ ]
15. The hourly wages of 1,000 workmen are normally distributed around a mean of Rs.70 with a standard deviation of Rs.5. Estimate the number of workers whose hourly wages will be:
  - (i) Between Rs. 69 and Rs.75
  - (ii) Less than Rs. 60

16. What do you understand by Value of Perfect Information? Explain the calculation of Expected Value under Perfect Information and the Value of Perfect Information using imaginary values.
17. A businessman has three alternatives open to him which are associated with four possible events. The pay-off matrix for each combination of act and event is given below:

Pay off Table

Events	Acts		
	a1	a2	a3
E1	8	-4	14
E2	0	12	6
E3	10	18	9
E4	6	-2	8

Determine which alternative the businessman would select, if he adopts the following principles of decision making:

- a) Maximax
  - b) Maximin
  - c) Laplace
18. Discuss in detail the different criteria used in decision making under conditions of uncertainty.
19. Discuss the role and scope of Operation Research in managerial decision making.
20. Define linear programming. Explain the applications of linear programming in different areas.
21. Solve the following LPP by graphical method:

$$\text{Max. } Z = x_1 + x_2$$

$$\text{Subject to: } 5x_1 + 3x_2 \leq 1500$$

$$3x_1 + 5x_2 \leq 1500$$

$$x_1, x_2 \geq 0$$

22. An organization is manufacturing two products A and B. The profit per tonne of the two products is Rs.100 and 160 respectively. Both the products require processing on three types of machines. The following table indicates the available machine hours per week and the time required on each machine for one tonne of A and B.

Machine	Product A	Product B	Hours available per week
Machine 1	2	1	300
Machine 2	3	4	500
Machine 3	4	7	800
Profit	Rs. 100	Rs. 160	

Formulation of the linear programming model is required to maximize total profit.

23. A self service store employs one cashier at its counter. Nine customers arrive on an average every hour while the cashier can serve 10 customers in an hour. Assuming Poisson distribution for arrival rate & exponential distribution for service rate, find:

- i) Average number of customers in the system.
- ii) Average number of customers in queue or average queue length.
- iii) Average time a customer spends in the system.
- iv) Average time a customer waits before being served.

24. Given below are the different time estimates for activities of a project:

Time estimates (in weeks)

Activity	to	tm	tp
1-2	3	5	13
1-3	1	2	15
2-4	6	7	8
3-4	2	5	14
2-6	2	4	12
4-5	4	6	8
4-6	5	9	13
5-7	1	2	3
6-7	1	4	7

- (a) Draw the project diagram.
- (b) Determine the expected project length.
- (c) Calculate the standard deviation and variance of the project length.