

January 2016

Master of Business Administration (MBA) Examination

I Semester

**Mathematics and Statistics for Managers**

Time : 3 Hours ]

[ Max. Marks : 80

**Note :** Attempt any five questions with a minimum of two questions from each section. All questions carry equal marks.

**Section A**

1. (a) A function  $f(x)$  is defined as follows:

$$\begin{aligned} f(x) &= \frac{9x}{x+2} & \text{for } x < 1 \\ &= 3 & \text{for } x = 1 \\ &= \frac{x+3}{x} & \text{for } x > 1 \end{aligned}$$

Examine the continuity of  $f(x)$  in the interval  $(-3, 3)$

- (b) If  $f(x)$  is defined as under:

$$\begin{aligned} f(x) &= x^2 & \text{when } x > 1 \\ &= 2 & \text{when } x = 1 \\ &= x & \text{when } x < 1. \end{aligned}$$

determine  $\lim_{x \rightarrow 1} f(x)$ .

2. (a) If  $y = \sqrt{25-3x}$ , find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 3$ .

- (b) If  $p = \frac{150}{q^2+2} - 4$  represents the demand function for a product where  $p$  is the price per unit for  $q$  units. Determine the marginal revenue function.

3. (a) The cost function and revenue function are given as:

$$c(x) = 20x + \frac{x^2}{40} + 200, R(x) = 3x.$$

Determine the maximum profit and the number of items produced for this profit.

- (b) The value of the marginal revenue function (given in thousands of rupees) for a particular commodity is  $R(x) = 4 + xp(-0.03x)$ , where

$x$  denotes the number of units sold. Determine the total revenue from the sale of 100 units of the commodity. (Given  $\exp(-3) = 0.05$ ).

4. (a) If  $X = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ ,  $Y = \begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$ ,  $Z = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$  Find  $XYZ$ .

- (b) Find  $X_{2 \times 2}$  such that:

$$\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix} X_{2 \times 2} = \begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}.$$

**Section B**

5. (a) Given the definition of Statistics and discuss the role of Statistics in management decisions.  
 (b) In a certain town 20% of the population is literate, and assume that 200 investigators take a sample of 10 individuals each to see whether they are literate. How many investigators would you expect to report that 3 people or less are literate in the sample.
6. (a) Write a note on Curve Fitting using least squares method.  
 (b) Find the most likely price in Mumbai corresponding to the price of Rs. 70 at Kolkata from the following.

	Kolkata	Mumbai
Average Price	65	67
Standard Deviation	2.5	3.5

Given the correlation coefficient between the prices of commodities in these two cities is 0.8.

7. Write notes on the measurement of :  
 (a) Seasonal Fluctuations  
 (b) Cyclic Variations.
8. (a) Write a note on the working of statistical decision theory.  
 (b) What do you mean by regression? Why there are only two regression lines? Discuss the properties of the regression coefficients.

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