QP Code : 04818

(3 Hours) **[Total Marks : 100**

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **simple calculator** is **allowed**.
(4) **Graph papers** will be provided on **request**.

Section I

1. Attempt any **four** from the following :—
   (a) Find derivative of y with respect to x. **5**
   (i) $y = 4x^7 - \log x + \sqrt{x}$
   (ii) $y = (x + e^x)(\log x - 10)$
   (b) The total cost function is given by $C = x^2 + x + 10$. **5**
   Find the average cost and marginal cost when x is 20.
   (c) Examine the points of maxima and minima for the function $f(x) = x^3 - 6x^2 + 9x$. **5**
   (d) If the demand function is given by $D = 15 - 4p + p^2$. **5**
   Find the price elasticity of demand when price is 5.
   (e) The demand function of a commodity is given by $p = 18 + D - D^2$. **5**
   Find the total revenue and marginal revenue function.

2. Attempt any **four** from the following :—
   (a) A principal amounts to ₹ 11,880/- after 4 years and to ₹ 14,040/- after 7 years. **5**
   Find the principal and the rate of simple interest.
   (b) Amit keeps a fixed deposit of ₹ 25,000/- in a bank for 3 years. If the rate of interest is 10% per annum compounded annually, find the total amount he will receive at the time of maturity after 3 years. **5**
   (c) Bhavin promised to pay Ketan ₹ 3,66,025/- after 4 years. If the rate of interest is 12% per annum, find its present worth. **5**
   (d) Find the amount at the end of 1 year of an annuity of ₹ 5,000/- payable at each quarter with rate of interest 12% per annum. **5**
   (e) Rehan takes a loan of ₹ 30,000/- to be repaid in one year at 9% per annum by reducing balance interest rate . Find the Equated Monthly Instalments (EMI). **5**

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Section II

3. Attempt any **four** from the following :—

(a) Regression line of y on x is $3x - 2y - 6 = 0$ and that of x on y is $8x - 3y - 44 = 0$ Find (i) Coefficient of Correlation between x and y (ii) Mean values of x and y. **5**

(b) Calculate Spearman's Rank Correlation coefficient for following data. **5**

x	42	40	52	57	36	42
y	102	100	105	103	110	105

(c) Define Correlation and explain the method of Scatter Diagram for deciding the type of correlation. **5**

(d) Calculate Product Moment Correlation from the following data : **5**

$\sum(x - \bar{x})(y - \bar{y}) = 29; \sum(x - \bar{x})^2 = 28; \sum(y - \bar{y})^2 = 42$

(e) The following data relates the Age of husband and wife. Estimate the age of wife when husband is aged 23. **5**

	Husband	Wife
Mean Age	27 years	23 years
Std.Dev. of age	3 years	2 years

The Coefficient of Correlation r = 0.93

4. Attempt any **four** from the following :—

(a) What is Time Series ? Describe the components of a time series with suitable examples. **5**

(b) Calculate the Cost of Living Index for the year 2004 by family budget method from the following data : **5**

Group	Price in 2000	Price in 2004	Expenses on
Food	100	110	40%
House- rent	85	25	15%
Clothing	80	100	20%
Fuel	40	60	10%
Miscellaneous	50	55	15%

(c) Fit a straight line trend by the method of least squares and hence estimate the sales for 2010 from the following data : 5

Year	2005	2006	2007	2008	2009
Sales	11	15	12	13	19

(d) For the following data construct the Fisher's Price Index Number : 5

	2014		2016	
Commodity	Price in ₹	Quantity	Price in ₹	Quantity
A	4	10	5	12
B	3	8	6	10
C	2	8	3	9
D	5	4	8	5

(e) Find trend values by 4 yearly centered Moving averages method : 5

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export	15	20	25	32	40	48	56	64	70	75

5. Attempt any **four** from the following :—

(a) An unbiased coin is tossed 4 times. What is the probability of getting i) 3 heads, (ii) at least one head. 5

(b) If X is a random variable following Poisson distribution with relation $4P(X = 0) = P(X = 1)$ Obtain $P(X = 3)$. 5
(Given $e^{-4} = 0.0183$)

(c) Enumerate the important properties of Normal Distribution. 5

(d) If the weight of 10000 soldiers in a regiment is normally distribution with mean 72 kgs and standard deviation of 5 kgs. Find the percentage of soldiers with weights between 70 and 77 kgs. 5
(Given area under the standard normal curve between Z = 0 and Z =+1 is 0.3413 and between Z = 0 and Z = 0.4 is 0.1554).

(e) The average number of phone calls per minute in a call center is 4. Find the probability that during a specific minute, the number of calls is (i) only 2 (ii) less than 2. 5
(Given $e^{-4} = 0.0183$)