

- 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 5  
 is 10% per annum compounded annually, find the total amount he will receive at  
 the time of maturity after 3 years.  
 (c) Bhavin promised to pay Ketan ₹ 3,66,025/- after 4 years. If the rate of interest is 5  
 12% per annum, find its present worth.  
 (d) Find the amount at the end of 1 year of an annuity of ₹ 5,000/- payable at each 5  
 quarter with rate of interest 12% per annum.  
 (e) Rehan takes a loan of ₹ 30,000/- to be repaid in one year at 9% per annum by 5  
 reducing balance interest rate. Find the Equated Monthly Instalments (EMI).

$$(1.0075)^{12} = 1.0938$$

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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  $8x - 3y - 44 = 0$  5  
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

<b>x</b>	42	40	52	57	36	42
<b>y</b>	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%

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- (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

Commodity	2014		2016	
	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, 5  
(ii) at least one head.
- (b) If X is a random variable following Poisson distribution with relation 5  
 $4P(X = 0) = P(X = 1)$  Obtain  $P(X = 3)$ .  
(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 5  
72 kgs and standard deviation of 5 kgs. Find the percentage of soldiers with weights between 70 and 77 kgs.  
(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 5  
probability that during a specific minute, the number of calls is (i) only 2  
(ii) less than 2.  
(Given  $e^{-4} = 0.0183$ )