F.Y.B.Com Sem-II Maths   19/04/17 ②

(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   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).

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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.

   (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   5
type of correlation.

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

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

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

	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   5
examples.

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

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   5
sales for 2010 from the following data :

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,   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 $e^{-4} = 0.0183$)