

Subject : Mathematical & Statistical Techniques

- Note :**
- 1) All Questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 4) Graph papers will be provided on request.
 - 3) Use of non - programmable calculator is allowed.

SECTION - I

Q. 1. Attempt any Four of the following.

- a) Find derivative of y with respect to x
 - i) $y = 5e^x - x^5 + 5^5$
 - ii) $y = (4^x)(\log x)$ (5)
- b) If the total cost function is $C = 2x^2 - 10x + 125$,
Find the average cost and marginal cost when x is 4 units. (5)
- c) Find the total revenue and marginal revenue for the demand function $P = 40 + 6D + 10D^2$,
when demand D is 4. (5)
- d) The profit function of a firm is given by $\pi = -3x^2 + 48x - 30$
Find the value of x for which profit is maximum. (5)
- e) The demand function is given by $D = 20 - 2p - 3p^2$. Where D is the demand and p is the price.
Find the elasticity of demand with respect to price when price is 2. (5)

Q. 2. Attempt any Four of the following.

- a) Find the simple interest and the maturity amount for
 $P = \text{Rs. } 5,000, \quad r = 10\% \quad n = 6 \text{ months}$ (5)
- b) Find the maturity amount and the compound interest of a 2 years fixed deposit of Rs. 10,000/-
at 10% per annum, if the interest is compounded half yearly. (5)
- c) If the difference between the compound interest and simple interest for 2 years at 8% p. a. be
Rs. 102.4, find the principal. (5)
- d) Find the EMI on Rs. 10,000/- at 7% for 20 years using flat interest rate. (5)
- e) Find the present value of an annuity of Rs. 2,000/- paid at the end of each year for 4 years,
at 11% compounded annually. (5)

SECTION - II

Q. 3) Attempt any four of the following.

a) Calculate Karl Pearson's correlation coefficient for the following data

Demand	5	6	9	10	8	4
Supply	7	4	10	8	11	2

(5)

b) Find Spearman's Rank coefficient of correlation for the following data.

X	35	28	25	21	22	20	19
Y	72	69	70	64	63	62	60

(5)

c) Given $\bar{x} = 4$, $\bar{y} = 9$, $\sigma_x = 2$, $\sigma_y = 1$, $r = -1$
estimate x when y = 5

(5)

d) Given regression y on x as $x + 3y - 88 = 0$ and that x on y as $2x + y - 71 = 0$, Find

i) Mean values of x and y

ii) Correlation coefficient r

(5)

e) Explain in brief how can one identify the different types of correlation using Scatter Diagram. (5)

Q. 4) Attempt any four of the following.

a) Find the trend for the following data using 3 yearly moving averages method.

Year	2000	2001	2002	2003	2004	2005
Sales	51	54	59	54	55	60

(5)

b) Fit straight line trend by least square method and also estimate the production for the year 2017.

Year	2009	2010	2011	2012	2013	2014	2015
Production	8	8	8	9	6	8	7

(5)

(0000)

c) From the following data calculate index number by the following methods. (5)

i) Laspeyre's formula

ii) Paasche's formula

iii) Fisher's formula

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	2	20	3	30
B	4	15	5	20
C	3	40	6	50

d) Calculate the cost of living index number by family budget method. (5)

Group	Index Number	Weights
Food	300	12
Clothing	180	4
Rent	120	3
Fuel	160	1
Education	200	5

e) Explain the different components of a time series. (5)

(5)

Q. 5. Attempt any Four from the following.

- a) State any five properties of Normal Distribution. (5)
- b) The mean of Binomial distribution with 4 trials is 3. Find the probability of
- i) One success
 - ii) All successes (5)
- c) Given random variable x follow Poisson Distribution with mean 2.
Find $P(x=0)$, $P(x=1)$ $P(x=2)$
(Given $e^{-2} = 0.135$) (5)
- d) For a Binomial Distribution, mean = 9 and variance = 6,
Find the corresponding value of n , p , & q . Also find $P(x=1)$ (5)
- e) 5000 students appeared for a certain examination. The mean of the marks was 70 and the standard deviation was 10. Find (5)
- i) Proportion of students seeking more than 85 marks.
 - ii) The number of students getting marks greater than 85
(Given area under the normal curve $z=0$ and $z=1.5$ is 0.4332)

