

Time: 3 Hrs.

Max Marks: 100

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

## SECTION I

Q.1) Attempt **any four** from the followingA) Find the derivative of  $y$  w.r.t.  $x$ :

i)  $y = 5\log x + 3x^2 - 7$

ii)  $y = (4x^2 + 3) / (\log x - 5)$

B) Find the total revenue function if the demand  $D = 300p - p^2$ , where  $p$  is the price. Also find the total revenue when the price is Rs 5 per unit. (5)C) The total cost of  $x$  items of commodity is given by  $C = x^2 + 20x + 9$ . Find Marginal Cost and Average Cost when  $x = 3$ . (5)D) If the demand  $D$  is given by  $D = 12 + 4p - p^2$ . Find the elasticity of demand when  $p = 3$  (5)E) The total cost of producing  $x$  articles is given by  $C = 20 + 4x$  and the total revenue from  $x$  articles is given by  $R = 30x - x^2$ . Find the number of articles ( $x$ ) which maximizes the profit. (5)Q.2) Attempt **any four** from the following:

A) At what rate will the simple interest on Rs 15000 for 4 years be equal to the simple interest on Rs 16000 for 3 years at 10% p.a.? (5)

B) Find the amount on maturity at the end of 2 years of Rs 30000 deposited at 10% p.a. compounded half yearly. (5)

C) Find the present value of Rs 50000 required after 3 years at 6% p.a. compounded annually. (5)

D) What amount would be accumulated at the end of 3 years if an annuity of Rs 20000/- is deposited at the end of each year? The rate of interest is 10% p.a. compounded yearly. (5)

E) Manoj takes a loan of Rs 80000 to be repaid in 4 EMI's at 12% p.a. by reducing balance interest rate.

Find the Equated Monthly Instalments (EMI) (5)

**SECTION II**

Q.3 Attempt **any four** from the following

A) Find correlation coefficient between X and Y, given that,  $n=25$ ,  $\sum x=75$ ,  $\sum y=100$ ,  $\sum x^2=250$ ,  $\sum y^2=500$ ,  $\sum xy = 325$  (5)

B) Six participants in a music competition were assigned score by two judges X and Y as follows: (5)

|   |    |    |    |    |    |    |
|---|----|----|----|----|----|----|
| X | 54 | 61 | 44 | 32 | 24 | 12 |
| Y | 64 | 25 | 15 | 36 | 40 | 56 |

Compute Spearman's rank correlation coefficient between X and Y.

C) From the following data, obtain the yield when the rainfall is 30 inches. The correlation coefficient between rain and yield is 0.8 (5)

|                    | Rainfall(inches) | Yield (per acre) |
|--------------------|------------------|------------------|
| Mean               | 27               | 40               |
| Standard Deviation | 3                | 6                |

D) It is known that the two regression equations are  $2x+3y-66=0$  and  $2x+y-38=0$ . Find the mean value of x and y. Also find the correlation coefficient between X and Y. (5)

E) Write a short note on Scatter diagram. (5)

Q.4 Attempt **any four** from the following

A) Calculate Fisher's price index number from the following data: (5)

| Commodity | $p_0$ | $q_0$ | $p_1$ | $q_1$ |
|-----------|-------|-------|-------|-------|
| A         | 9     | 5     | 15    | 5     |
| B         | 8     | 10    | 12    | 11    |
| C         | 4     | 6     | 5     | 6     |
| D         | 1     | 4     | 2     | 8     |

B) Find three yearly moving averages for the following data: (5)

| Year            | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------|------|------|------|------|------|------|------|
| Sales (Lakh Rs) | 15   | 17   | 22   | 30   | 25   | 27   | 35   |

C) Find Cost of living index number for the year 2017 using Family Budget method. (5)

| Commodity  | Price (Rs/Kg) (2015) | Price (Rs/Kg) (2017) | Weightage |
|------------|----------------------|----------------------|-----------|
| Wheat      | 32                   | 40                   | 20        |
| Rice       | 25                   | 30                   | 10        |
| Dal        | 40                   | 55                   | 5         |
| Salt       | 3                    | 4                    | 7         |
| Vegetables | 8                    | 14                   | 8         |

D) Fit a trend line by method of least square. (5)

| Years               | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------------------|------|------|------|------|------|------|------|
| Sales(in thousands) | 12   | 30   | 56   | 15   | 24   | 34   | 40   |

E) Explain components of time series. (5)

Q.5 Attempt **any four** from the following

- (A) 30% of the students in the class are girls. Find the probability that a randomly selected group of 5 students include 3 girls. (5)
- (B) A random variable X follows poisson distribution with mean=2. Find the probability of  
 i) 0 success ii) at most 2 successes ( $e^{-2}=0.135$ ) (5)
- (C) State the properties of normal distribution. (5)
- (D) The probability that a student is a swimmer is  $\frac{4}{5}$ . Out of 5 students selected find the probability that i) 4 are swimmers ii) 1 or less are swimmers (5)
- (E) The weekly wages of 8000 workers are normally distributed with mean Rs 770 and S.D. Rs 70. Find the no. of workers whose wages below Rs700 (area between  $z=0$  and  $z=1$  is 0.3413) (5)

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