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

Q1 Attempt **any 4** from the following:

(a) Find derivative of y with respect to x: (5)
    i. $y = x - e^x + 29$
    ii. $y = x^5 (2x + 4)$

(b) If total cost function is $C = x^3 + 3x + 4$ find the marginal cost when x is 10 units. Also find the average cost function.   (5)

(c) Examine the points of maxima and minima for the function $f(x) = x^3 - 9x^2 + 24x + 7$.   (5)

(d) Find the total revenue and marginal revenue for the demand function $p = 40 + 6D + 10D^2$ when demand (D) is 4.   (5)

(e) The demand function is given by $D = 44 - 4p - p^2$ where D is the demand and p is the price. Find the elasticity of demand with respect to price when price is 2.   (5)

Q2 Attempt **any 4** from the following:

(a) In how many years will Rs 6400 amount to Rs 7168 at 4% per annum simple interest?   (5)

(b) Find the maturity amount of a 2 years fixed deposit of Rs10000 at 10% per annum if the interest is compounded half yearly.   (5)

(c) Aniket estimates that after 3 years he would require Rs500000 for his new business. He wishes to put aside some money now, invested in an instrument giving 7% per annum compound interest to meet his requirements then. How much money should he invest presently?   (5)

(d) Find the accumulated value after 4 years of an immediate annuity of Rs 20000 per annum with interest compounded at 6% per annum.   (5)

(e) A loan of Rs 80000 is to be returned in 3 monthly instalments at the rate of 12% per annum compounded monthly. Find the EMI (Equated Monthly Instalment) using reducing balance method.   (5)

SECTION II

Q3 Attempt **any 4** from the following:

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

(b) Calculate by Karl Pearson method the coefficient of correlation for the following data.   (5)

Demand	8	12	11	10	9	13	8
Price	6	10	8	11	7	10	13

(c) Find Spearman's Rank coefficient of correlation for the following data.   (5)

X	45	73	52	30	85	45
Y	38	66	48	39	60	48

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(d) For a group of Men & Women workers in an organisation the following data of wages (in Rs) per day was given

	Men (X)	Women(Y)
Mean	75	60
Standard Deviation	2.6	1.5
Coefficient of Correlation (r) = 0.65		

Find the regression equation of x on y and hence estimate the daily wage of men when wage of a woman was 65 Rs. (5)

(e) The two regression equations are x+3y-88=0 and 2x+y-71=0. Find mean values of x and y. Also find correlation coefficient. (5)

Q4 Attempt **any 4** from the following:

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

(b) Find the trend for the following data using 5 yearly moving average method. (5)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sales	56	65	50	73	82	95	102	103	110

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(c) Fit a straight line trend by the method of least square for the following time series. Find the trend values and hence estimate the trend for the year 2015 (5)

Year	2010	2011	2012	2013	2014
No. of Workers	56	65	50	73	82

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(d) For the following data calculate index number by the following methods (5)
  (i)   Laspyre's Formula
  (ii)   Paasche's Formula
  (iii)   Fisher's Formula

	Year 2010		Year 2015	
Commodity	Price	Quantity	Price	Quantity
Rice	25	6	40	7
Dal	45	2	65	3
Sugar	35	4	42	5
Oil	62	3	78	4

(e) Calculate the cost of living index number by family budget method for the following data (5)

Group	Price in 2005	Price in 2010	Weights
Food	8500	9000	35
Clothing	600	650	20
Fuel	350	400	25
Rent	7500	8500	15
Miscellaneous	4000	5000	05

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Q5 Attempt **any 4** from the following:

   (a) State any five properties of Normal Distribution. (5)

   (b) If an unbiased coin is tossed 5 times, find the probability that the number of heads is
      (i) only one (ii) at-least 4 . (Use Binomial Distribution) (5)

   (c) The possibility that a student will pass a test is 60%. If 4 students appearing for the exam are selected at random, find the probability that (i) all 4 pass (ii) at-most 1 pass. (5)

   (d) It is observed that 1% typing error is committed by a typist. Find the probability that in 100 pages, number of typing error is (i) only 1 (ii) less than 2. (Given $e^{-1}= 0.3679$). (5)

   (e) One thousand students appeared for a competitive examination, the mean score were 59 and the standard deviation of the score was 5. Assuming the distribution of scores to be Normal, find
      (i) the number of students securing scores between 61 and 69
      (ii) the percentage of students with scores below 54

(Area under the normal curve z=0 and z=1 is 0.3413, Area under the normal curve z=0 and z=2 is 0.4772, area under the normal curve z=0 and z=0.4 is 0.1554). (5)

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