100 MARKS

Q.1. Attempt any 4 (20)

a) Differentiate y with respect to x
   i) $Y = \log x^2 - 4.3^x - 100x + 51$
   ii) $Y = (x^2 - 1)(e^x - 10x)$

b) The demand function is $D = 70 + 9p - p^3$, find the demand when price is 2. Also find the price when demand is 70

c) The demand function p in terms of quantity demanded (D) is given by $p = 30 + 12D - 4D^2$. Find total Revenue and marginal revenue when the demand is 4 units.

d) Find MR = 30 and the elasticity of demand w.r.t. price is 3, find AR.

e) Examine the extreme values for the function $f(x) = x^3 - 6x^2 + 9x$

Q.2 Attempt any 4 (20)

a) In how much time will the simple interest on 12000 at 11% per annum will be 3960?

b) Mr. X invested Rs. 5000/- in a bank as a short term deposit for 9 months at 8% to be compounded quarterly. Find the amount due to him on maturity.

c) Find the amount of an annuity of Rs. 1500/- payable at the end of each half year for 8 years, the interest rate being 12% compounded half yearly.

d) For an ordinary annuity of Rs. 5000/- per month for 1 year at 9% to be calculated monthly, find its present value.

e) A loan of Rs. 30,000 is to be returned in 6 monthly installments at the rate of 12% p.a. compounded monthly. find the EMI using reducing balance method.

Q.3 Attempt any 4 (20)

a) Find the karl-person's coefficient of correlation for the following data.
   $\Sigma(x - \bar{x})^2 = 120$, $\Sigma(y - \bar{y})^2 = 235$, $\Sigma(x - \bar{x})(y - \bar{y}) = -139$

b) Find spearman's coefficient for the following data

R1	4	2	3	1	5
R2	2	1	4	5	2

c) Given the following information about the production and demand of a commodity. Obtain two regression lines if the correlation coefficient between the lines is 0.65.

	Production X	Demand Y
Mean	85	90
S.D.	5	6

Also estimate the production when the demand is 100.

d) In a partially destroyed laboratory record of correlation data only the following results are legible.

i) Variance of x = 9

ii) Regression lines are

$8x - 10y + 66 = 0$

$40x - 18y = 214$

Find the standard deviation of Y.

e) Describe the use of scatter diagram for ascertaining correlation between two variable

Q. 4 Attempt any 4 (20)

a) Estimate the trend values using the data given below by taking a 3 yearly moving average

Years	1990	1991	1992	1993	1994	1995	1996	1997	1998
Values	25	27	28	29	30	33	31	36	30

b) Fit a linear trend by the method of least square and estimate the trend value for 2009.

Year	2001	2002	2003	2004	2005	2006	2007
Values	290	270	260	300	320	310	280

c) Find the Fishers price index number for the following data

Commodity	Base Year P_0	Base Year Q_0	Current Year P_1	Current Year Q_1
A	90	10	70	10
B	80	4	30	25
C	70	40	60	90
D	60	30	40	30

d) Find the weighted average Relative index Number for the given data

Commodity	Prices in 2007	Prices in 2021	Weights (W)
I	36	18	2
II	22	44	1
III	8	24	1
IV	14	21	4

e) What is Time Series ? describe the components of a time series with suitable example .

Q.5 Attempt any 4 (20)

a) It is observed that out 5 T.V. programmes only one is popular. If 3 new programmes are introduced. Find the probability that
i) None is popular
ii) Atleast one is popular

b) The average no. of customers who appear at the counter of a bank in one minute is 2. find the probability that in a given minute
i) No customer appears
ii) Almost Two customers appear.

c) For a normal distribution the limits of middle 50% of the observations are 250 and 350. Find Median, S.D. and M.D.

d) The weekly wages of 10,000 workers are normally distributed with mean Rs. 770 md S.D. Rs. 70. Find the no. of workers whose wages below Rs. 700.
[Area between Z=0 and Z= 1 is 0.3413]

e) Enumerate the properties of normal distribution