**Q.4. Attempt any Three of the following:** (15)

a) Using three yearly moving average determine the trend and short term fluctuations. Plot the original data and trend values on the same graph.

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| Production in (1000 units) | 121 | 120 | 123 | 125 | 124 | 122 | 125 | 126 | 125 | 126 |

b) Fit a linear trend by the method of least squares to the following closing prices of limited company listed on stock exchange for 6 months. Also estimate its price in $7^{th}$ month.

| Month | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Closing price ( Rs. In Lakhs) | 1325 | 1310 | 1340 | 1355 | 1375 | 1430 |

c) Find the missing price, if Laspeyre's price index number is equal to Paasche's price index number for the given data.

| Commodity | Base year | | Current year | |
|---|---|---|---|---|
| | Price $p_0$ | Quantity $q_0$ | Price $p_1$ | Quantity $q_1$ |
| A | 2 | 5 | 4 | 2 |
| B | 3 | 2 | - | 4 |

d) Find the chain base index number for the given data:

| Commodity | Price in Rs. | | | | Weightage (w) |
|---|---|---|---|---|---|
| | 2000 $P_0$ | 2001 $P_1$ | 2002 $P_2$ | 2003 $P_3$ | |
| A | 20 | 25 | 30 | 27 | 1 |
| B | 15 | 12 | 15 | 18 | 4 |
| C | 10 | 11 | 22 | 33 | 5 |

**Q.5. Attempt any Three of the following:**

a) Find mean and variance of a binomial distribution, if $n = 10$ & $p = 2/5$.

b) The probability that a person will react to drug is 0.001. out of 2000 individuals checked, find the probability that:

    i.    Exactly 3

    ii.    More than 2 individuals get a reaction. ( taking $e^{-2} = 0.135$)

c) The first and third quartiles of a normal distribution are 90 and 126 respectively. Find mean and standard deviation.

d) The quartile deviation of a normal distribution is 10. Its first quartile is 70. Find mean standard deviation and upper quartile.

**NOTE:** All questions are compulsory
    All questions carry equal marks
    Figures to the right indicate maximum marks allocated to the sub questions.
    Use of simple calculator is allowed
    Graph paper will be supplied on request

**Q.1. Attempt any Three of the following:** (15)

a) For the supply function $S = P^3 - 6P^2 + 75$, find the supply when the price is 5. Also find the price when supply is 75.

b) Find the break – even point & equilibrium price for the given pairs of demand & supply functions. Also state the value of the demand and supply there in.
$$D = 4 ( 1 + 1/p) , S = P + 1$$

c) Differentiate the following w.r.t. x
   i. $x^5 + x^{-3} - \sqrt{x} + e^x + 10$
   ii. $(x^2 + 1)/(x + 2)$

d) If $y = 15 + 12x - 3x^2$, find the value of x for which y is maximum.

**Q.2. Attempt any Three of the following.** (15)

a) What amount kept for simple interest for 6 years at 8%p.a will generate the simple interest same as the simple interest generate by 27,000 for 4 years at 18% p.a.

b) Find the principal, if the compound interest payable annually at 12% p.a. for 2 years is Rs. 2,544.

c) Find the amount of an annuity of Rs. 6,000 payable at the end of each quarterly for 2 years, the interest rate being 8% compounded quarterly.

d) Find the present value of an ordinary annuity of Rs. 3,000 for 1 year at 12% to be calculated monthly.

**Q.3. Attempt any three of the following:** (15)

a) Find the Karl Pearson's co-efficient of correlation, for each of the following:
$$\sum n = 16, \sum x = 12.3, \sum y = 213, \sum x.y = 183, \sum x^2 = 15.76, \sum y^2 = 3600$$

b) Find the rank correlation coefficient for the given data:

| Marks 1 | 30 | 80 | 70 | 60 | 50 | 90 |
|---------|----|----|----|----|----|----|
| Marks 2 | 70 | 61 | 87 | 45 | 40 | 57 |

c) For the given bivariate data, find:
   i. The coefficient of regression
   ii. The coefficient of correlation
   iii. The equations of the lines of regressions
   iv. The value of y when x = 1.5 and the value of x when y = 3.5

| x | 2 | 6 | 8 | 10 |
|---|---|---|---|----|
| y | 4 | 3 | 5 | 6 |

d) Two regression equations are given : $15x – 8y = 130$ and $5x – 6y + 90 = 0$
   i. Identify the regression lines & state the coefficients of regression.
   ii. Find the coefficient of correlation r.Type equation here.
   iii. The mean $\bar{x}$ and $\bar{y}$