**N.B. :**

1) Solve any two questions from section -I

2) Solve any two questions from section II

3) Bracketed figures to the right indicate marks.

4) Graph papers, log tables will be provided on request.

## Section- I

**Q.1 a)** A merchant asked his agent to sell 250 hats at 2% commission and to invest the balance in purchasing ties. The agent charged $1 \frac{1}{2}$% commission on this purchase and thus cleared Rs. 520.50/- by the two transactions. Find the price for which a hat was sold.      **4**

**b)** Find the equation of the line passing through the points ( 4,–3) and perpendicular to the line joining the points (2,7) and (–5,–1)      **4**

**c)** Complete the following difference table :

| Year | Net returns | $\Delta f(x)$ | $\Delta^2 f(x)$ | $\Delta^3 f(x)$ | $\Delta^4 f(x)$ |
|------|-------------|---------------|-----------------|-----------------|-----------------|
| 1 | 34 | | | | |
| | | –6 | | | |
| 2 | * | | 20 | | |
| | | * | | | |
| 3 | * | | * | * | 46 |
| | | * | | 7 | |
| 4 | * | | * | | |
| | | * | | | |
| 5 | * | | | | |

     **2**

**Q.2 a)** A flat is sold for Rs. 4,50,000/- through an estate broker who charges $2 \frac{1}{4}$% brokerage from the buyer and 3/4 % brokerage from the seller. Find the amount paid by the buyer. Find also the amounts received by seller and the broker.      **3**

**b)** Find the equation of the line passing through (–3,8) and having positive intercepts whose sum is 7.      **4**

**c)** Diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 calories. Two foods $F_1$ and $F_2$ cost 50 paise and 80 paise per unit respectively. Each unit of food $F_1$ contains 200 units of vitamins, 1 unit of minerals and 40 calories, whereas each unit of food $F_2$ contains 100 units of vitamins, 2 units of minerals and 40 calories. Formulate this L.P. problem to minimize the cost.      **3**

**Q.3 a)** Using Netwon's interpolation formula, find f (65) if.

x    51    61    71    81    91

**b)** Solve the following L.P. problem graphically

maximize   $z = 90x + 130y$

subject to,

$$2x + 3y \leq 18$$
$$2x + y \leq 12$$
$$x \geq 0, \quad y \geq 0.$$                    **4**

**c)** Find the co-ordinates of the points on the x-axis which are at a distance of 10 units from the point (4,8 )                    **2**

**Q.4 a)** A wholesaler sold a lot of 500 articles marked at Rs. 16.50/- each to a retailer at 12% trade discount and 5% cash discount. If the purchase price of each article is Rs. 12/- find the percentage of profit gained by the wholesaler.                    **4**

**b)** Find the co-ordinates of the point dividing the segment joining the points (–4,2) and (2,11) externally in the ratio 2:5                    **3**

**c)** Using Lagrange's formula calculate f(5) for the following data -

| x    | 0 | 1 | 3  |
|------|---|---|----|
| f(x) | 1 | 2 | 10 |

                    **3**

## Section- II

**Q.5 a)** Represent the given data in a tabular form.

In 1989, out of 2000 students appearing for H.S.C. examination at Dadar centre 785 had opted for Mathematics and the remaining for Secretarial Practice. The number of girls was 1050 of whom 850 had opted for Secretarial Practice.

In 1990, the number of students with Mathematics as the optional subject was 875, of which 615 were boys while the number of students with Secretarial Practice decreased to 1185 of which 795 were girls.
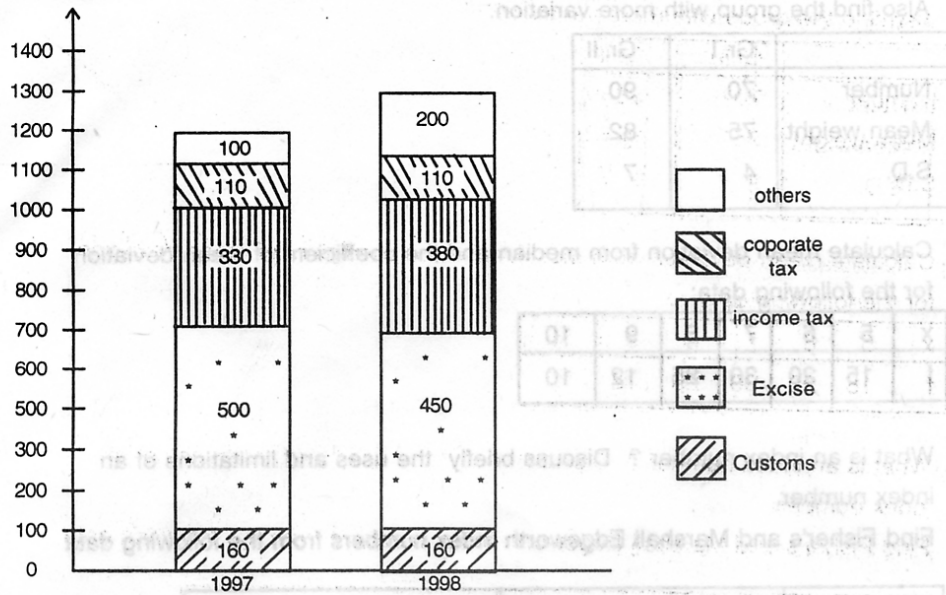
In 1991 the total number of students increased by 150 and increase in the number of boys was double the increase in the number of girls. Out of 1400 students who had opted for Secretarial Practice, 935 were girls.                    **5**

**b)** Draw 'less than' curve for the following data.

| Age in years | No. of policy holders |
|--------------|----------------------|
| 10-14        | 10                   |
| 14-18        | 13                   |
| 18-22        | 15                   |
| 22-26        | 30                   |
| 26-30        | 20                   |

c) Observe the diagram and answer the questions given below :-



i) By how much is the revenue in 1998 more than that in 1997 ?
ii) Which type gives the highest revenue in 1998?
iii) Which type shows highest increase ?
iv) Which type of revenue remains the same ?
v) Which other type of diagram could we have used here ? 5

**Q.6** a) Compare arithmetic mean, median and mode as measures of central tendency. 5

b) Find arithmetic mean and mode for the following distribution.

| class internal | 60-75 | 75-90 | 90-105 | 105-120 |
|---|---|---|---|---|
| frequency | 3 | 3 | 6 | 5 |

| Class internal | 120 -135 | 135-150 |
|---|---|---|
| frequency | 7 | 6 |

5

c) If the median marks are 29, find the number of students getting marks between 10 and 20.

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|---|
| No. of students | 4 | --- | 15 | 20 | 7 | 5 |

5

**Q.7** a) What do you mean by dispersion ? Distinguish between absolute measures and relative measures of dispersion. 5

**b)** Find combined mean and combined standard deviation.

Also find the group with more variation.

| | Gr. I | Gr. II |
|---|---|---|
| Number | 70 | 90 |
| Mean weight | 75 | 82 |
| S.D. | 4 | 7 |

**5**

**c)** Calculate mean deviation from median and the coefficient of mean deviation for the following data:

| x | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|
| f | 15 | 20 | 30 | 25 | 12 | 10 |

**5**

**Q.8 a)** What is an index number ? Discuss briefly the uses and limitations of an index number.

**5**

**b)** Find Fisher's and Marshall Edgeworth index numbers from the following data

| | Price in Rs. | | Quantity | |
|---|---|---|---|---|
| Commodity | Base yr. | Current yr. | Base yr. | Current yr. |
| A | 5 | 7 | 40 | 45 |
| B | 6 | 8 | 60 | 55 |
| C | 4 | 6 | 50 | 60 |
| D | 10 | 12 | 70 | 60 |
| E | 9 | 10 | 70 | 70 |

**6**

**c)** Construct the cost of living index number.

| Group | Group index | Weight |
|---|---|---|
| Food | 160 | 24 |
| Fuel & lighting | 120 | 6 |
| Clothing | 125 | 4 |
| Rent | 120 | 7 |
| Miscellaneous | 130 | 9 |

**4**

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