Q.M - 1
15/10/10

JKXACJ

**TIME : 2 hours** **MARKS : 60**

**Note :** 1) All questions are compulsory.
2) Simple Calculators are allowed.
3) Draw graph on Separate graph paper.

**Q. 1 a)** Define : (4)

i) Mean for discrete frequency distribution.

ii) Median for continuous frequency distribution.

**b)** Draw (on same graph paper) L. T. C. F. & M. T. C. F. ogives and hence locate the median (5)

| Marks | No. of Students |
|---|---|
| 10-20 | 7 |
| 20-30 | 10 |
| 30-40 | 12 |
| 40-50 | 15 |
| 50-60 | 5 |
| 60-70 | 3 |

**c)** Read the data carefully and tabulate the information (6)

The number of students in a college in the year 1981 was 510 of these 480 were boys. In 1991, the number of boys increased by 100% and that of girls by 300% as compared to 1981. In 2001, the total number of students in the college was 1,200 with the number of boys being double the number of girls.

**OR**

**Q. 1 a)** Write the merits of mean and median (4)

**b)** Find the missing frequency if average travelling time is 55 minutes (6)

| Travelling time in minutes | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 |
|---|---|---|---|---|---|
| No. of employees | 5 | 20 | .. | 21 | 17 |

**c)** Define weighted arithmatic mean for the data with $x_1$, $x_2$, $x_3$, and corresponding weights as $w_1$, $w_2$, $w_3$. (5)

Find weighted arithmatic mean for 100, 125 & 150 if corresponding weights are 20,22,24.

**Q. 2 a)** If $Q_3 - Q_1 = 80$ and $Q_3 + Q_1 = 160$ then find Q1, Q3 and co-efficient of quartile deviation. (4)

**b)** Calculate co-efficient of correlation for the following data (i. e. 'r') (5)

| | | | | | | |
|---|---|---|---|---|---|---|
| X : | 3 | 5 | 4 | 6 | 3 | 2 |
| Y : | 12 | 4 | 6 | 3 | 14 | 18 |

**c)** Find the missing values :- (6)

| | **Group I** | **Group II** | **Group III** |
|---|---|---|---|
| Number | 100 | 200 | -- |
| Average | 40 | 43 | -- |
| Variance | 25 | 16 | -- |

**OR**

**Q. 2 a)** If 2 regession lines are (4)

$5x - 6y + 90 = 0$

& $15x - 8y - 130 = 0$

then find $x$, $y$ and 'r'

**b)** Following data gives the marks obtained by students in Test I and Test II (6)

| **Marks in Test I** | | | | **Marks in Test II** | | | |
|---|---|---|---|---|---|---|---|
| 5 | 15 | 16 | 14 | 17 | 9 | 24 | 8 |
| 14 | 8 | 14 | 22 | 16 | 13 | 28 | 9 |
| 9 | 9 | 27 | 22 | 18 | 27 | 7 | 6 |
| 22 | 27 | 6 | 11 | 21 | 14 | 9 | 21 |
| 6 | 23 | 12 | 12 | 23 | 6 | 11 | 18 |
| 7 | 13 | 13 | 27 | 8 | 7 | 11 | 16 |

Prepare a bivariate frequency distribution taking class intervals as 5-10, 10-15 for both the variables Hence find.

i) No. of students who got 10-15 marks in Test I

ii) No. of students who got 5-10 marks in Test II

**c)** Given the following distribution find the mean deviation from mode. (5)

| **Profit (in '000 Rs.)** | **No. of Companies** |
|---|---|
| 10-14 | 4 |
| 14-18 | 6 |
| 18-22 | 10 |
| 22-26 | 7 |
| 26-30 | 3 |

**Q. 3 a)** Write down the formula for (4)

i) Finding slope of segment joining 2 points

ii) Addition theorm on probability.

**b)** Calculate Rank Correlation Co-efficient (6)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X | : | 100 | 97 | 96 | 95 | 87 | 81 | 80 | 75 |
| Y | : | 90 | 92 | 99 | 100 | 78 | 75 | 80 | 95 |

**c)** Sketch the curve $x^2 = 4y$ and name it (5)

**OR**

**Q. 3 a)** Given below are equations where X: Price, Y Quantity
Find the equilibrium price and quantity (4)

i) Demand : $3x + 5y = 15$

Supply : $2x - 4y = 18$

ii) Demand : $2x + y = 12$

Supply : $x - y = 100$

**b)** Show that (-9, 6), (-2, 14) and (-1,1) are the vertices of a right angled triangle. (5)

**c)** Find $\frac{dy}{dx}$ if (6)

i) $y = (3x^2 + 2x)(2x + 3)$

ii) $y = e^x (2x + 1)$

**Q. 4 a)** Fill in the blanks (4)

i) Median of 0.2, 0.3, 1.2, 1.6, 1 is _____

ii) If a coin is tossed 2 times then sample space will contain _____ (number of ) entries.

iii) To minimise the cost, the derivative of first order must be _____

iv) $P(A) + P(B) - P(A \cap B) =$ _____

**b)** An agent sold goods worth Rs. 5,000 on an average per month for the entire year. At the end of the year he paid Rs. 48,000 to his employer. Find his rate of commission. (5)

**c)** If a deposit value earned simple interest as Rs. 160 and Rs. 220 at the end of 1994 & 1997 then find the interest earned at the end of 1995 & 1999 (Assume linearity) (6)

**OR**

**Q. 4 a)** Find mean and variance of $x$ for the following probability distribution. (6)

| Demand : | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Probability : | 0.1 | 0.15 | 0.2 | 0.25 | 0.2 | $k$ |

**b)** Mr. Patel owns a resort. He has received an offer to operate the resort for the tourist season for amount of Rs. 2,25,000. If he operates the resort himself then his profits will depend upon whether the season is good, medium or slack. If season is good he will make prafit worth Rs. 4,00,000. If season is medium then profit will be Rs. 2,50,000 & if it is slack then profit will be Rs. 1,50,000. The probabilities of occurence of three are 0.4, 0.3 and 0.2 respectively. (5)

Draw the decision tree and find whether he should run the resort himsetf or accept the offer.

**c)** The total output Q as a function of input $x$ is given by (4)

$$Q = 20 + 60x + \frac{7x^2}{2} - \frac{x^3}{3}$$

Find the input for which total output is maximum.

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