

[4]

- OR iv Find standard deviation and its coefficient of variation **5** from the following data:

Class	0 - 8	8 - 16	16 - 24	24 - 32	32 - 40
f	3	5	10	12	2

- Q.6 i. What is correlation? Describe its types. Also discuss properties of correlation coefficient. **5**  
 ii. Find the coefficient of correlation between the values of x and y: **5**

x	1	3	5	7	8	10
y	8	12	15	17	18	20

- OR iii. Calculate both regression coefficients and line of regression of y on x from the following data: **5**

x	1	2	3	4	5	6	7	8
y	3	7	10	12	14	17	20	24

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Total No. of Questions: 6

Total No. of Printed Pages: 4

Enrolment No.....



Knowledge is Power

Faculty of Management Studies

End Sem Examination Dec-2024

MS3CO16 Business Mathematics & Statistics

Programme: BBA

Branch/Specialisation: Management

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Marks	BL	PO	CO	PSO
<b>1</b>	2	1	7	

- Q.1 i. The first and common difference for the A.P. 3, 1, -1, -3, .... is. **1**  
 (a) 1 and 3 (b) -1 and 3  
 (c) 3 and -2 (d) 2 and 3
- ii. If the first term of a G.P. is 2 and common ratio is 3, then fourth term is\_\_\_\_\_. **1**  
 (a) 27 (b) 54  
 (c) 162 (d) 81
- iii. If the matrix  $A = \begin{bmatrix} 2 & 1 & 3 \\ 5 & 0 & 4 \end{bmatrix}$ , then  $2A$  is equal to- **1**  
 (a)  $\begin{bmatrix} 4 & 2 & 6 \\ 10 & 0 & 4 \end{bmatrix}$   
 (b)  $\begin{bmatrix} 4 & 1 & 6 \\ 5 & 0 & 8 \end{bmatrix}$   
 (c)  $\begin{bmatrix} 4 & 2 & 6 \\ 10 & 0 & 8 \end{bmatrix}$   
 (d) None of these
- iv. If  $A = \{1, 2, 3, 4, 5\}$  and  $B = \{2, 4, 6, 8, 10\}$ , then  $A \cap B$  is- **1**  
 (a)  $\{2, 4\}$  (b)  $\{2, 4, 6\}$   
 (c)  $\{2, 3, 4\}$  (d) None of these

P.T.O.

[2]

- v. Which of the following is a branch of statistics? **1** 2 1 7  
 (a) Descriptive statistics  
 (b) Inferential statistics  
 (c) Industrial statistics  
 (d) Both (a) and (b)

vi. Which of the following statements about the statistical study is true? **1** 2 1 7  
 (a) Presentation of data is the first stage of statistical study  
 (b) Analysis of data is the first stage of statistical study  
 (c) Collection of data is the first stage of statistical study  
 (d) Organisation of data is the first stage of statistical study

vii. .... is not a measure of central tendency. **1** 2 1 7  
 (a) Mean (b) Median  
 (c) Mode (d) Range

viii. To calculate the median, all the items of a series have to be arranged in a/an - **1** 2 1 7  
 (a) Descending order  
 (b) Ascending order  
 (c) Ascending or descending order  
 (d) None of these

ix. The value of perfect positive correlation coefficient is- **1** 2 1 7  
 (a) 0 (b) 1 (c) -1 (d) None of these

x. If the regression coefficients are 0.2 and 0.8, then the correlation coefficient is - **1** 2 1 7  
 (a) 0.4 (b) 0.8  
 (c) 0.16 (d) None of these

i. Explain CAGR with example. **2** 3 2 1

ii. The 3rd and the 8th term of a G. P. are 4 and 128 respectively. Find the G. P. **3** 3 2 1

iii. A bag contains 50 p, 25 p, and 10 p coins in the ratio 2: 5: 3, amounting to Rs. 510. Find the number of coins of each type. **5** 3 2 1

[3]

- | OR    | iv.  | In an AP, the ratio of the 7th term to the 10th term is -1. If the 16th term is -15, what is the 3rd term.   | 5     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|-------|------|--|-------|----|-------|---|-------|----|-------|---|-------|----|-------|---|-------|---|-------|---|-------|---|--|--|--|--|
| Q.3   |      | Attempt any two:   |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | i.   | If $A = \{1, 2, 3, 4, 5, 6\}$ , $B = \{2, 4, 6, 8\}$ . Find $A \cap B$ , $A \cup B$ , $A - B$ , $B - A$ and $A' - B'$ .  | 5     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | ii.  | Find the inverse of the matrix $A = \begin{bmatrix} 2 & 4 & -6 \\ 7 & 3 & 5 \\ 1 & -2 & 4 \end{bmatrix}$ .   | 5     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | iii. | Solve the system of linear equations $x + y = 2$ , $x - y + z = 4$ and $x + y - z = 6$ using Cramer's rule.  | 5     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| Q.4   |      | Attempt any two:   |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | i.   | What is a frequency distribution? Write its characteristics.   | 5     | 2  | 1     | 7 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | ii.  | Explain the scope of statistics in economics, management sciences and industry.  | 5     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | iii. | Describe the graphical representation of graphs. Describe any two types of graphs with example.  | 5     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| Q.5   | i.   | Find out the median of the following data:<br>5, 3, 12, 24, 18, 16, 22, 29   | 2     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | ii.  | The mean of the following data is 20.6. Find the value of a.   | 3     | 3  | 2     | 1 |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       | iii. | <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>x</td><td>10</td><td>15</td><td>a</td><td>25</td><td>35</td></tr> <tr><td>y</td><td>3</td><td>10</td><td>25</td><td>7</td><td>5</td></tr> </table><br>Calculate the mode from the following distribution:  | x     | 10 | 15    | a | 25    | 35 | y     | 3 | 10    | 25 | 7     | 5 | 5     | 3 | 2     | 1 |       |   |  |  |  |  |
| x     | 10   | 15   | a     | 25 | 35    |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| y     | 3    | 10   | 25    | 7  | 5     |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
|       |      | <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr><th>Class</th><th>f</th></tr> </thead> <tbody> <tr><td>10-20</td><td>2</td></tr> <tr><td>20-30</td><td>10</td></tr> <tr><td>30-40</td><td>7</td></tr> <tr><td>40-50</td><td>18</td></tr> <tr><td>50-60</td><td>6</td></tr> <tr><td>60-70</td><td>5</td></tr> <tr><td>70-80</td><td>4</td></tr> <tr><td>80-90</td><td>8</td></tr> </tbody> </table> | Class | f  | 10-20 | 2 | 20-30 | 10 | 30-40 | 7 | 40-50 | 18 | 50-60 | 6 | 60-70 | 5 | 70-80 | 4 | 80-90 | 8 |  |  |  |  |
| Class | f    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 10-20 | 2    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 20-30 | 10   |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 30-40 | 7    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 40-50 | 18   |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 50-60 | 6    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 60-70 | 5    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 70-80 | 4    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |
| 80-90 | 8    |  |       |    |       |   |       |    |       |   |       |    |       |   |       |   |       |   |       |   |  |  |  |  |

# Scheme of Marking

Faculty of Management

End Sem Examination 2024

MS3 CO16

Business Mathematics and Statistics

Programme: BBA

Objective MCQs

i) c: 3 and -2      ii) b : 54

iii) c:  $\begin{bmatrix} 4 & 2 & 6 \\ 10 & 0 & 8 \end{bmatrix}$

iv) a: {2, 43}

v) d: Both a and b

vi) c: Collection of data is the first stage of statistical study

vii) d: Range

viii) c: Ascending or descending order

ix) b : 1

x) a: 0.4

## Q:2 (i) Explain CAGR:

Marks

Compound Annual growth rate (CAGR).  
is a metric that measures the average annual growth rate of an investment over a period of time. CAGR is a "smoothed" rate of return that assumes the investment grew at a steady rate of return that assumes the investment grew at a steady rate each year. It's a useful tool for comparing the growth rates of different investments.

## Q:2 (ii)

Given that 3rd and 8th Term of G.P. is 4 and 128.

$$T_3 = ar^2 = 4 \rightarrow \textcircled{1} \quad a \neq r = ?$$

$$T_8 = ar^7 = 128 \rightarrow \textcircled{2}$$

Find  $a, ar, ar^2, ar^3, \dots$

on dividing \textcircled{2} / \textcircled{1}

$$\frac{ar^3}{ar^7} = \frac{128}{4}$$

$$[r^4 = 32] = r^5 = 2^5 \rightarrow [r = 2]$$

put in eq \textcircled{1}

$$a(2^2) = 4$$

$$[a = 1]$$

M	T	W	T	F	S	S
Page No.:	3					
Date:	YOUVA					

$g, gr, gr^2, gr^3$

$1, 2, 2^2, 2^3$

$\rightarrow x$

Q: 2 (iii)

Given that

The ratio of 50p, 25p and 10p  
is 2:5:3

Then let the ratio will be

$2x, 5x$  and  $3x$

Amounting Rs 570 [1 Rs = 100 paise] 2

$$\frac{2x}{100} \times 50 + \frac{5x}{100} \times 25 + \frac{3x}{100} \times 10 = 570$$

$$= 2x + \frac{5x}{4} + \frac{3x}{10} = 570 \quad 1$$

$$\Rightarrow x = \frac{570 \times 20}{51} = 200$$

$$\boxed{x = 200}$$

Hence, The number of 50p, 25p and 10p coins are 400, 1000, 600

OR Q: 2 (iv)

Marks

Given The Ratio of 7<sup>th</sup> term and 10<sup>th</sup> term is -1 in AP

$$T_7 = a + 6d$$

$$T_{10} = a + 9d$$

$$\frac{T_7}{T_{10}} = -1 \Rightarrow \frac{a + 6d}{a + 9d} = -1$$

$$\Rightarrow a + 6d = -a - 9d$$

$$\Rightarrow 2a + 15d = 0 \quad \text{--- (1)}$$

If 10<sup>th</sup> Term in AP is -15

$$T_{10} = a + 9d = -15$$

--- (2)

Solving eq (1) & (2) we get

$$2a + 15d = 0$$

$$a + a + 9d = 0$$

From eq (2)

$$a + (-15) = 0$$

$$\boxed{a = 15}$$

put in eq ①

Marks

$$2a + 15d = 0$$

$$2 \times 15 + 15d = 0$$

$$30 + 15d = 0$$

$$\Rightarrow 15d = -30$$

$$\Rightarrow \boxed{d = -2}$$

Now, finding -

$$T_3 = a + 2d$$

$$\text{put } a = 15 \quad d = -2$$

$$T_3 = 15 + 2 \times -2$$

$$T_3 = 15 - 4$$

$$\boxed{T_3 = 11}$$



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Page No.:	6	Date:	YOUVA			

Q: 3 (i)

Marks

$$\text{if } A = \{1, 2, 3, 4, 5, 6\}$$

$$B = \{2, 4, 6, 8\}$$

$$A \cap B = \{2, 4, 6\}$$

$$A \cup B = \{1, 2, 3, 4, 5, 6, 8\}$$

$$A - B = \{1, 3, 5\}$$

$$B - A = \{8\}$$

$$A' = B' = ?$$

$$A' = B' = \{1, 2, 3, 4, 5, 6, 8\} \quad (\text{Universal set})$$

$$A' = V - A = \{8\}$$

$$B' = V - B = \{1, 3, 5\}$$

→ X →

Q(3) (ii) Find the inverse of matrix

$$A = \begin{bmatrix} 2 & 4 & -6 \\ 7 & 3 & 5 \\ 1 & -2 & 4 \end{bmatrix}$$

Marks

$$A^{-1} = \frac{\text{Adjoint}}{|A|} \quad \because |A| \neq 0$$

→ (1)

First we have to find determinant

$$A = \begin{bmatrix} 2 & 4 & -6 \\ 7 & 3 & 5 \\ 1 & -2 & 4 \end{bmatrix}$$

$$|A| = 2 \begin{vmatrix} 3 & 5 \\ -2 & 4 \end{vmatrix} - 4 \begin{vmatrix} 7 & 5 \\ 1 & 4 \end{vmatrix} - 6 \begin{vmatrix} 7 & 3 \\ 1 & -2 \end{vmatrix}$$

$$= 2(12 + 10) - 4(28 - 5) - 6(-14 - 3)$$

$$= 44 - 4 \times 23 - 6 \times -17$$

$$= 44 - 92 + 102$$

$$= 146 - 92$$

$$|A| = 54 \neq 0 \quad (\text{Not singular})$$

Adj'A =

$$\begin{bmatrix} c_{11} & c_{21} & c_{31} \\ c_{12} & c_{22} & c_{32} \\ c_{13} & c_{23} & c_{33} \end{bmatrix}$$

Marks

$$c_{11} = (-1)^{1+1} \begin{vmatrix} 3 & 5 \\ -2 & 4 \end{vmatrix} = + (12 + 10) \\ = 22$$

$$c_{12} = (-1)^{1+2} \begin{vmatrix} 7 & 5 \\ 1 & 4 \end{vmatrix} = - (28 - 5) \\ = -23$$

$$c_{13} = (-1)^{1+3} \begin{vmatrix} 7 & 3 \\ 1 & -2 \end{vmatrix} = (-14 - 3) = -17$$

$$c_{21} = (-1)^{2+1} \begin{vmatrix} 4 & -6 \\ -2 & 4 \end{vmatrix} = - (16 - 12) \\ = -4$$

$$c_{22} = (-1)^{2+2} \begin{vmatrix} 2 & -6 \\ 1 & 4 \end{vmatrix} = + (8 + 6) = 14$$

$$c_{23} = (-1)^{2+3} \begin{vmatrix} 2 & 4 \\ 1 & -2 \end{vmatrix} = - (-4 - 4) \\ = 8$$

$$c_{31} = (-1)^{3+1} \begin{vmatrix} 4 & -6 \\ 3 & 5 \end{vmatrix} = + (20 + 18) \\ = 38$$

Marks

$$C_{32} = (-1)^{3+1} \begin{vmatrix} 2 & -6 \\ 7 & 5 \end{vmatrix} = -(10 + 42) = -52$$

$$C_{33} = (-1)^{3+3} \begin{vmatrix} 2 & 4 \\ 7 & 3 \end{vmatrix} = -(8 - 28) = -22$$

$$Adj A = \begin{bmatrix} 22 & -4 & 38 \\ -23 & 14 & 52 \\ -17 & 8 & -22 \end{bmatrix}$$

$$A^{-1} = \frac{Adj A}{|A|}$$

$$= \frac{1}{54} \begin{bmatrix} 22 & -4 & 38 \\ -23 & 14 & 52 \\ -17 & 8 & -22 \end{bmatrix} \underline{\underline{Adj A}}$$



Q: 3 (iii)

Marks

$$2x + y + 0z = 2$$

$$x - y + z = 4$$

$$x + y - z = 6$$

Solve the Above linear equations  
by Cramer's rule.

The matrix form of the system  
of the equations

$$\begin{bmatrix} 1 & 1 & 0 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$$

$$AX = B$$

The Coefficient matrix

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$$

By Cramer's rule -

$$x = \frac{|\Delta_x|}{|\Delta|}, \quad y = \frac{|\Delta_y|}{|\Delta|}$$

$$z = \frac{|\Delta_z|}{|\Delta|}$$

Where  $|\Delta_x|, |\Delta_y| \text{ & } |\Delta_z|$

denoted by determinant of co-factor matrix with replacing each column by the constant matrix.

$$\Delta = \begin{vmatrix} 1 & 1 & 0 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{vmatrix}$$

$$|\Delta| = 1 \begin{vmatrix} -1 & 1 \\ 1 & -1 \end{vmatrix} - 1 \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} + 0 \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix}$$

$$= 1(1-1) - 1(-1-1)$$

$$|\Delta| = 0 + 2 = 2$$

$$\Delta_x = \begin{vmatrix} 2 & 1 & 0 \\ 4 & -1 & 1 \\ -6 & 1 & -1 \end{vmatrix}$$

Marks

$$|\mathfrak{D}_3| = 2 \begin{vmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 6 & -1 & 1 \end{vmatrix} + 0$$

$$= 2(1-1) - 1(4-6)$$

$$= 0 + 0$$

$$|\mathfrak{D}_3| = 10$$

$$\Rightarrow \mathfrak{D}_y = \begin{bmatrix} 1 & 2 & 0 \\ 1 & 4 & 1 \\ 1 & 6 & -1 \end{bmatrix}$$

$$|\mathfrak{D}_y| = 1 \begin{vmatrix} 4 & 1 & 1 \\ 6 & -1 & 1 \\ 1 & -1 & 1 \end{vmatrix} + 0$$

$$|\mathfrak{D}_y| = -4 - 6 - 2(-1-1)$$

$$|\mathfrak{D}_y| = -10 + 4 = -6$$

$$\Rightarrow \mathfrak{D}_z = \begin{bmatrix} 1 & 1 & 2 \\ 1 & -1 & 4 \\ 1 & 1 & 6 \end{bmatrix}$$

$$|\bar{D}_2| = 1 \begin{vmatrix} -1 & 4 \\ 1 & 6 \end{vmatrix} - 1 \begin{vmatrix} 1 & 4 \\ 1 & 6 \end{vmatrix} + 2 \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix}$$

Marks

$$|\bar{D}_2| = -6 - 4 - 1(6 - 4) + 2(1 + 1)$$

$$|\bar{D}_2| = -10 - 2 + 4$$

$$= -12 + 4$$

$$\boxed{|\bar{D}_2| = -8}$$

$$x = \frac{|\bar{D}_3|}{|\bar{D}_1|} = \frac{10}{2} = 5$$

$$y = \frac{|\bar{D}_4|}{|\bar{D}_1|} = \frac{-6}{2} = -3$$

$$z = \frac{|\bar{D}_2|}{|\bar{D}_1|} = \frac{-8}{2} = -4$$

— — — — —

Q: 4 (i)

Frequency distribution:- Statistical data record in an arbitrary manner after their collection from the field of enquiry are called raw data. These data will not serve any useful purpose until we classify and arrange them properly in tabular form. A classification showing the different values of a variable and their respective frequencies side by side is called a Frequency distribution.

Frequency distribution is statistics' list, table, graph or data set organized to show the frequency of occurrence of each possible outcome of a repeatable event observed many times.

For example! The list of numbers -

1, 2, 3, 4, 6, 9, 9, 8, 15, 0, 9, 7, 9

The frequency of the no. 9 is 4

Characteristics of Frequency distribution

- Measures of central tendency and location (mean, mode, median) 2
- Measures of dispersion (range, variance and standard deviation)
- The extent of symmetry / asymmetry (skewness)
- The flatness and kurtosis

Q: 4 (ii)

### Scope of Statistics in Economics - Marks

Statistics provides statistical information to answer the three basic questions in the economics i.e., what to produce, how to produce and for whom to produce. Specifically, statistics helps.

- to test the economic theories in the areas of construction, production, exchange distribution, saving, investment etc.
- to understand and study economic problems such as problem of inflation, cost of living etc.
- to frame economic planning models
- to measure national income and its components like, income, saving, investments, expenditure etc.

### In Management Science and Industry:

Statistical methods are used for exploring possibilities of advertising campaigns for adjustment of production methods and as an aid to establish standards; business activity follows a definite trend boom periods being followed by period of depression, statistical techniques determine such business cycle and help in forecasting future markets.

Q: 4 (iii)

Marks

### Graphical Representation of graphs

Graphical representation is a form of visually displaying data through various methods like graphs, diagrams, charts and plots. It helps in sorting, visualizing and presenting data in a clear manner through different types of graphs.

Statistics mainly use graphical representation to show data.

Describle Any two Types of graphs.

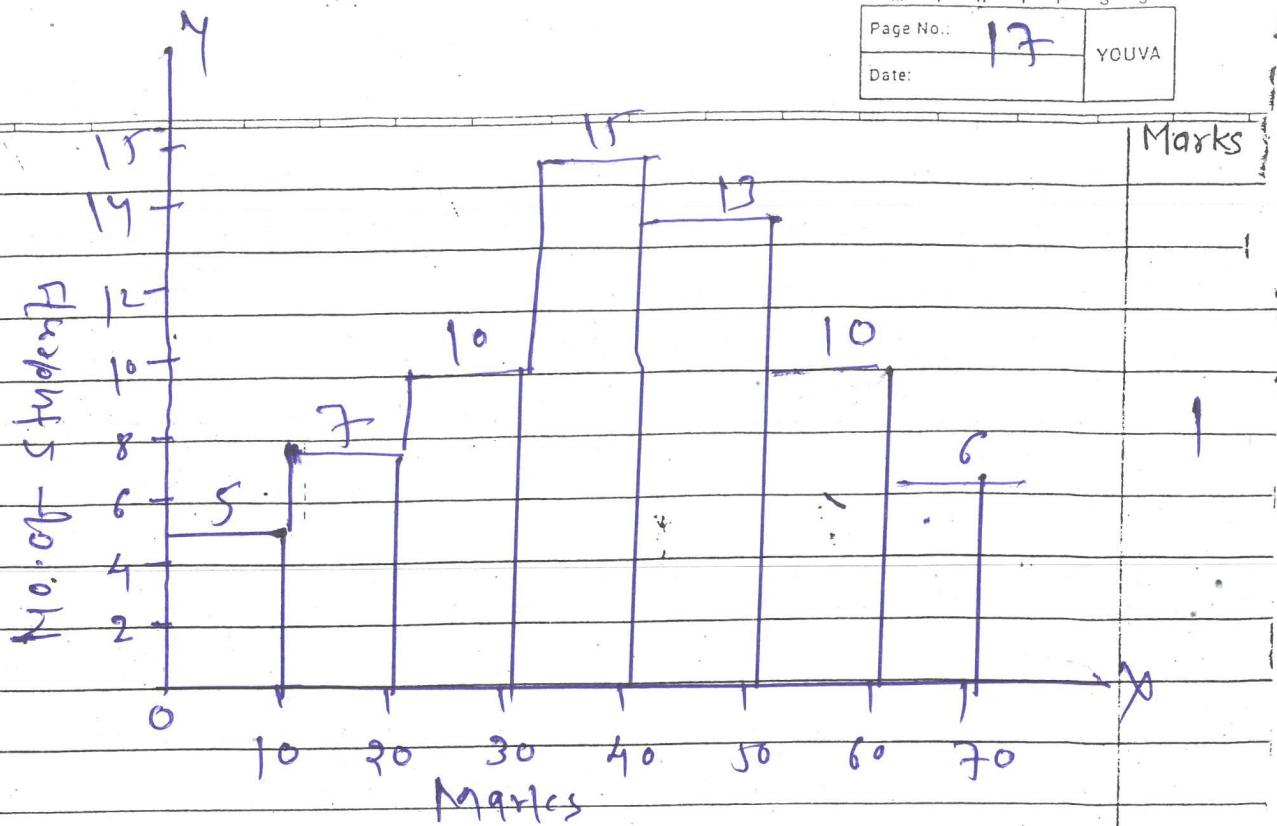
- Histogram / Bar graph :-

The histogram is a graph that represents the class frequencies in a frequency distribution by vertical adjacent rectangles. It is basically an area diagram. The class intervals are marked on the  $Ox$  axis and the frequencies on  $Oy$  axis. The area of each rectangle is equal to the frequency of the class multiplied by their class intervals. Histogram is an area diagram.

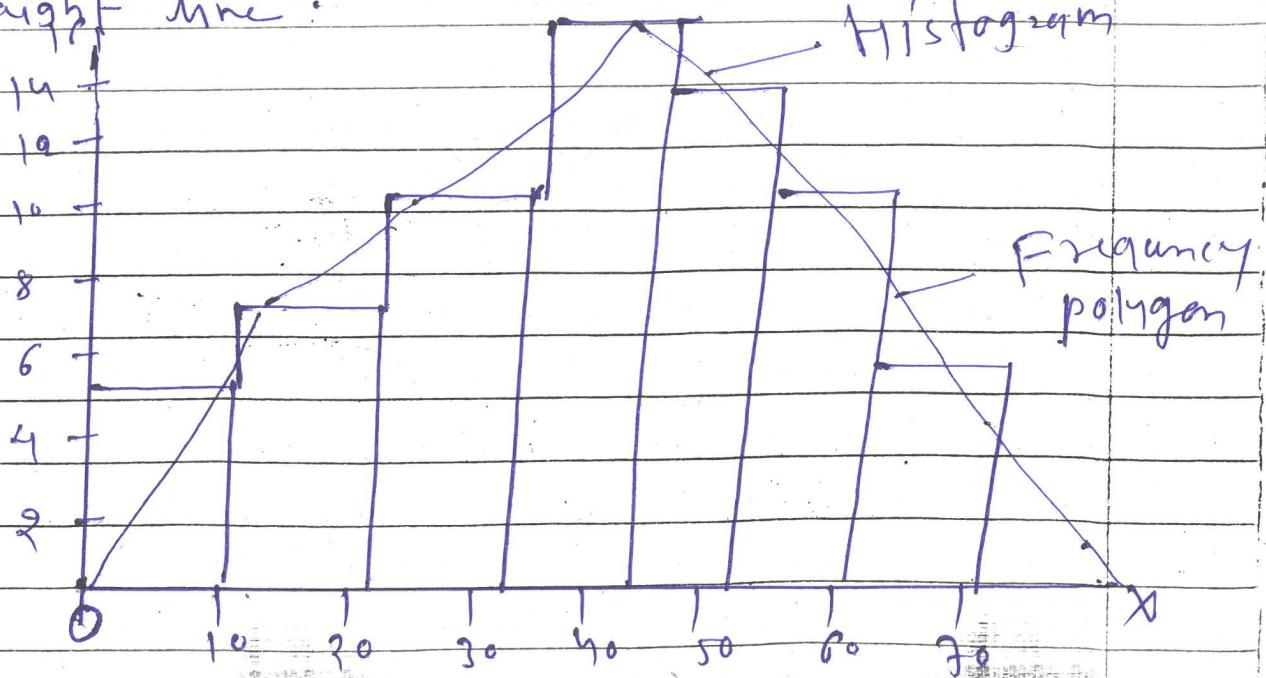
Ex: Draw a histogram

Marks : 0-10 10-20 20-30 30-40 40-50 50-60 60-70

No of st<sup>n</sup>: 5 7 10 15 13 10 6



- polygon : A Frequency polygon is a graph Frequency distinguish.  
In statistics, it means a curve representing a Frequency distribution. A Frequency polygon is obtained when the midpoint of each rectangle in the histogram is joined by a straight line.



Q: 5 (i)

Marks

Find the Median of the following data -

5, 3, 12, 24, 18, 16, 22, 29

We write in to ascending order

4<sup>th</sup> st<sup>th</sup>  
3, 5, 12, (16), (18), 22, 24, 29

n = 8 (even)

$$Md = \frac{(\frac{n}{2})^{th} + [(\frac{n}{2})^{th} + 1]^{th}}{2}$$

$$Md = \frac{(8/2)^{th} + (\frac{8}{2} + 1)^{th}}{2}$$

$$Md = \frac{4^{th} + 5^{th}}{2} = \frac{16 + 18}{2}$$

$$Md = \frac{34}{2} = 17$$

$$\boxed{Md = 17}$$

X

Marks

Q: 5 (ii)

x	F	Fx			
10	3	30	g fm		
15	10	150		$m = 20.6$	2
20	25	250			
25	7	175			
30	5	150			
		$\sum f = 50$	$\sum f_n =$		
				530 + 250	

Formula

$$m = \frac{\sum f_n}{\sum f}$$

$$20.6 = \frac{530 + 250}{50}$$

$$20.6 \times 50 = 530 + 250$$

$$1030 = 530 + 250$$

$$\boxed{9 = 20}$$

Q: 5 (iii)

Marks

Calculate mode

class	F						
10 - 20	2						
20 - 30	10						
30 - 40	7		$f_1$				2
<u>40 - 50</u>	<u>18</u>		$f_0$				
50 - 60	6		$A_i$				
60 - 70	5						
70 - 80	4						
80 - 90	8						

The highest Frequency is 18, so the  
mode class 40 - 50

$$l = 40 \quad f_1 = 7 \quad f_0 = 18 \quad f_i = 6$$

$$C = 10$$

$$M_d = l + \frac{f_0 - f_1}{2f_0 - f_1 - f_{-1}} \times i$$

$$= 40 + \frac{18 - 7}{2 \times 18 - 7 - 8} \times 10$$

Marks

$$M_d = 40 + \left[ \frac{11}{36-15} \right] \times 10$$

$$= 40 + \frac{110}{11}$$

$$= 40 + 10$$

$$\boxed{M_d = 50}$$

X

Q15 (iv)

Class	F	Mid value <u>x</u>	$dy = \frac{n-20}{810}$	$dy^2$	$\sum F dy$	$\sum dy^2$
0-8	3	4	-2	4	-6	12
8-16	5	12	-1	1	-5	5
16-24	10	A (20)	0	0	0	0
24-32	28	1	1	1	12	12
32-40	2	36	2	4	4	8
	$\sum f =$				$\sum F dy = 5$	$\sum dy^2 = 37$
	32					

$$S.D = \sigma = \sqrt{\frac{\sum F dy^2}{\sum f}} - \left( \frac{\sum F dy}{\sum f} \right)^2 \times 1$$