

Enrollment No.....



Faculty of Management Studies
End Sem (Odd) Examination Dec-2022
MS3CO02 Business Mathematics and 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.

- Q.1** i. A basket contains 350 eggs. If 12% of the eggs are rotten the number of good eggs are- 1
 (a) 333 (b) 432 (c) 308 (d) None of these
- ii. The formula of General term of A.P. is- 1
 (a) $a + nd$ (b) $a + (n-1)d$
 (c) $a + 2^{nd}$ (d) None of these
- iii. If $A = \{4, 5, 8, 12\}$ $B = \{1, 4, 6, 9\}$ then value of $A \cap B$ is- 1
 (a) $\{4, 5\}$ (b) $\{4\}$ (c) $\{8, 12\}$ (d) None of these
- iv. If $A = \begin{vmatrix} x & 1 & 2 \\ 1 & 0 & 3 \\ 5 & -1 & 4 \end{vmatrix} = 0$ then value of x is- 1
 (a) 4 (b) 3 (c) -3 (d) None of these
- v. The Polygon Frequency curve is- 1
 (a) Class interval
 (b) Joining the midpoint of histogram
 (c) Discrete data
 (d) None of these
- vi. Ogive curve is- 1
 (a) Frequency curve
 (b) Cumulative frequency curve
 (c) Class interval
 (d) Frequency curve
- vii. The median of the data: 35, 20, 45, 50, 42, 55, 67 is- 1
 (a) 20 (b) 55 (c) 45 (d) None of these
- viii. The coefficient of range of the data: 8, 12, 10, 4, 2, 15, 11, 18, 7, 10 is- 1
 (a) 2 (b) 0.4 (c) 0.8 (d) None of these

[2]

- ix. The correlation coefficient lies between _____.
 (a) 0 to 1 (b) -1 to 0 (c) -1 to 1 (d) None of these

x. The regression coefficient of line Y on X is-
 (a) $b_{xy} = r \frac{\sigma_x}{\sigma_y}$ (b) $b_{yx} = r \frac{\sigma_y}{\sigma_x}$
 (c) $b_{xy} = b_{yx}$ (d) None of these

Q.2 i. In an examination 94% of the candidates passed and 114 failed how many candidates appeared in the Examination?
 ii. The first term of an A.P. is -15 and the last term is 105 if the sum of the A.P is 1710. Find the Number of terms.

OR iii. Find the sum of an G.P. of the series -
 1, 2, 4, 8, 16.....256.

Q.3 i. Define:
 (a) Union and intersection of two sets with suitable example.
 (b) Venn diagram of the set.
 ii. A class has 175 students. The following is the description showing the number of students studying one or more of the following subjects in the class- 100 studying mathematics, 70 studying physics, 46 studying chemistry, 30 studying mathematics and physics, 28 studying mathematics and chemistry, 23 studying physics and chemistry and 22 students does not studying any of the three subjects. Find how many students all the three subjects.
 OR iii. Find the inverse of the matrix-

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & 2 & -1 \\ -4 & 5 & 2 \end{bmatrix}$$

Q.4 i. Define:
 (a) Statistics and scope in economics.
 (b) Subdivided bar diagram.
 ii. Draw the less than and more than Ogive for the following data:

Marks:	0-10	10-20	20-30	30-40	40-50	50-60
Number of Students:	5	10	14	28	12	6

[3]

- | OR | iii. | Draw a Multiple bar diagram for: | 8 | | | | | | | | | | | | | | | | | | | | |
|------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|------------------------|----------------------|-------|-------|-------|---------------------------|------|-----|--------------------|----|------|-----|----|----|------|-----|----|----|--|
| | | <table border="1"> <thead> <tr> <th>Year</th><th>Sales ('000 Rs)</th><th>Gross profit ('000 Rs)</th><th>Net profit ('000 Rs)</th></tr> </thead> <tbody> <tr> <td>2007</td><td>120</td><td>40</td><td>20</td></tr> <tr> <td>2008</td><td>135</td><td>45</td><td>30</td></tr> <tr> <td>2009</td><td>140</td><td>55</td><td>35</td></tr> <tr> <td>2010</td><td>150</td><td>60</td><td>40</td></tr> </tbody> </table> | Year | Sales ('000 Rs) | Gross profit ('000 Rs) | Net profit ('000 Rs) | 2007 | 120 | 40 | 20 | 2008 | 135 | 45 | 30 | 2009 | 140 | 55 | 35 | 2010 | 150 | 60 | 40 | |
| Year | Sales ('000 Rs) | Gross profit ('000 Rs) | Net profit ('000 Rs) | | | | | | | | | | | | | | | | | | | | |
| 2007 | 120 | 40 | 20 | | | | | | | | | | | | | | | | | | | | |
| 2008 | 135 | 45 | 30 | | | | | | | | | | | | | | | | | | | | |
| 2009 | 140 | 55 | 35 | | | | | | | | | | | | | | | | | | | | |
| 2010 | 150 | 60 | 40 | | | | | | | | | | | | | | | | | | | | |
| Q.5 | i. | Define: | 2 | | | | | | | | | | | | | | | | | | | | |
| | | (a) Central tendency. | | | | | | | | | | | | | | | | | | | | | |
| | | (b) Measure of dispersion with types. | | | | | | | | | | | | | | | | | | | | | |
| ii. | | Find the median of the following data: | 8 | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Marks more than</th><th>0</th><th>10</th><th>20</th><th>30</th><th>40</th><th>50</th><th>60</th><th>70</th><th>80</th></tr> </thead> <tbody> <tr> <td>Number of students</td><td>90</td><td>82</td><td>78</td><td>68</td><td>60</td><td>50</td><td>35</td><td>25</td><td>0</td></tr> </tbody> </table> | Marks more than | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | Number of students | 90 | 82 | 78 | 68 | 60 | 50 | 35 | 25 | 0 | |
| Marks more than | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | | | | | | | | | | | | | | |
| Number of students | 90 | 82 | 78 | 68 | 60 | 50 | 35 | 25 | 0 | | | | | | | | | | | | | | |
| OR | iii. | Calculate standard deviation from the following data: | 8 | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Marks:</th><th>0-10</th><th>10-20</th><th>20-30</th><th>30-40</th><th>40-50</th><th>50-60</th></tr> </thead> <tbody> <tr> <td>Number of Students:</td><td>8</td><td>12</td><td>22</td><td>18</td><td>14</td><td>16</td></tr> </tbody> </table> | Marks: | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | Number of Students: | 8 | 12 | 22 | 18 | 14 | 16 | | | | | | | |
| Marks: | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | | | | | | | | | | | | | | | | |
| Number of Students: | 8 | 12 | 22 | 18 | 14 | 16 | | | | | | | | | | | | | | | | | |
| | | Also find coefficient of variance. | | | | | | | | | | | | | | | | | | | | | |
| Q.6 | i. | Define: | 2 | | | | | | | | | | | | | | | | | | | | |
| | | (a) Positive and negative correlation. | | | | | | | | | | | | | | | | | | | | | |
| | | (b) Linear and non linear correlation. | | | | | | | | | | | | | | | | | | | | | |
| ii. | | If the Regression line Y on X and X on Y is- | 8 | | | | | | | | | | | | | | | | | | | | |
| | | $2y-x = 5$ and $8x-y = 9$ then find, | | | | | | | | | | | | | | | | | | | | | |
| | | (a) Coefficient of regression lines b_{xy} and b_{yx} | | | | | | | | | | | | | | | | | | | | | |
| | | (b) Correlation coefficient r. | | | | | | | | | | | | | | | | | | | | | |
| | | (c) If $\sigma_x = 5$ then value of σ_y . | | | | | | | | | | | | | | | | | | | | | |
| OR | iii. | Calculate Karl Pearson's coefficient of correlation between the height of father and son- | 8 | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Height of father (in inches)</th><th>65</th><th>66</th><th>67</th><th>68</th><th>69</th><th>70</th></tr> </thead> <tbody> <tr> <th>Height of son (in inches)</th><td>67</td><td>68</td><td>66</td><td>69</td><td>72</td><td>72</td></tr> </tbody> </table> | Height of father (in inches) | 65 | 66 | 67 | 68 | 69 | 70 | Height of son (in inches) | 67 | 68 | 66 | 69 | 72 | 72 | | | | | | | |
| Height of father (in inches) | 65 | 66 | 67 | 68 | 69 | 70 | | | | | | | | | | | | | | | | | |
| Height of son (in inches) | 67 | 68 | 66 | 69 | 72 | 72 | | | | | | | | | | | | | | | | | |

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• Solution of Business Mathematics
and Statistics

MS3C002, (BBA) Ist Sem

• End Sem (odd) Examination Dec - 2022

— (MCQ) —

Marking Scheme

Q1 i) A basket contains 350 eggs. If 12% of the eggs are rotten, the No. of good eggs are -

(C) 308

ii) The formula of General Term of A.P is

(B) $a + (n-1)d$

iii) If $A = \{4, 5, 8, 12\}$, $B = \{1, 4, 6, 9\}$

Then value of $A \cap B$ is -

(B) $\{4\}$

iv) If $A = \begin{bmatrix} x & 1 & 2 \\ 1 & 0 & 3 \\ 5 & -1 & 4 \end{bmatrix} = 0$

Then value of x is

(C) -3

$$\frac{x}{h} = r \text{ by } ①$$

To

(x) The regression coefficient of Y on X
1 to 1 → ②

To

(x) The correlation coefficient lies between
-1 to 1 → ③

To

(viii) The coefficient of range of the data
8, 12, 10, 4, 2, 15, 11, 18, 7, 10, 15 → ④

To

(vii) The median of the data
35, 20, 45, 50, 42, 15, 16, 7, 15 → ⑤

To

(vi) Ogive curve is —
Cumulative frequency curve → ⑥

To

(v) Joining the mid points of histogram.

Scheme
marking

(v) The polygon Frequency curve is —

Q: 2

part - i)

In an Examination 94.1%.

Marking
Scheme

(2)

Solution:- Let Number of candidates appeared in Examination be x

given: pass percentage = 94.1.

so that fail percentage = $(100 - 94.1)\%$.
 $= 6\%$.

given that 114 candidates failed out of ~~x~~ 6%. Then

$$\Rightarrow 6\% \text{ of } x = 114$$

$$\frac{6}{100} \times x = 114$$

$$\Rightarrow 6x = 114 \times 100$$

$$\Rightarrow x = \frac{114 \times 100}{6}$$

$$\Rightarrow x = 1900$$

1900 Candidates appeared in Examination

$$\text{Ans} \quad [88 = u]$$

$$1710 = 45u \iff$$

$$1710 = \frac{9}{2} \times 90 \iff$$

$$(50 + 15) \left(-15 + 105 \right) \frac{9}{2} = 1710 \iff$$

$$105 = 45$$

$$r = 105$$

$$sl = b \quad \text{put}$$

$$(r+b) \frac{9}{2} = 45$$

- The sum of A.P.

Use formula :-

to find \rightarrow No. of terms \leftarrow sum of terms

$105 = 45 = \text{sum of terms} \Rightarrow 15$

$r = 105 = \text{last term}$

$sl = b = -15 = \text{first term}$

Soln: Given That;

The First Term of A.P. = 15
sums.

Q12 (part ii)

Method

Q. 2 part iii)

Marking Scheme

(8)

Find The sum of an n.p.

1, 2, 4, 8, 16, ..., 256

Sol:-

Given The n.p Series -

1, 2, 4, 8, 16, ..., 256

Where $q = 1$ (First Term) $r = 2$ (common ratio) $l = 256$ (last Term)Find n

Apply Formula: Last Term of n.p

$$l = qr^{n-1}$$

$$\text{put } q = 1, r = 2, l = 256$$

$$\Rightarrow 256 = 1 \times (2)^{n-1}$$

$$\Rightarrow 2^8 = 2^{n-1} \quad (\text{to compare of power on both sides})$$

$$\Rightarrow 8 = n-1 \Rightarrow \boxed{n=9}$$

$$[11S = \text{hs}]$$

$$1 - \frac{a}{b} = \text{hs} \quad \leftarrow$$

$$\frac{1}{1 - \frac{a}{b}} = \text{hs} \quad \leftarrow$$

$$\frac{a-1}{a} : (\frac{a}{b} - 1) = \text{hs} \quad \leftarrow$$

$$5 = a, 2 = b, 1 = \text{hs}$$

$$(k_1) \frac{1-a}{(1-\frac{a}{b})b} = \text{hs}$$

Apply formula :-

Find the sum of n.f.

Schemes
Marking

Q.3 (i)

Marking Scheme

(a) Union of Two sets:

02

We consider A and B are two finite sets. Then The Union of two sets denoted by \cup is element of set A or element B, The mathematically form

1/2

$$x \in (A \cup B) \Rightarrow x \in A \text{ OR } x \in B$$

Ex: if $A = \{1, 2, 4, 9, 10\}$

$$B = \{4, 9, 12\}$$

$$\Rightarrow A \cup B = \{1, 2, 4, 9, 10, 12\}$$

Intersection of Two Sets: - if A and B are two finite sets. Then intersection of two sets denoted by the symbol \cap . in which common elements of both set are allowed. The mathematically form

$$x \in (A \cap B) \Rightarrow x \in A \text{ and } x \in B$$

Ex: $A = \{a, b, c, d\}$

1/2

$$B = \{c, d, e, f\}$$

$$A \cap B = \{c, d\}$$

Venn diagram of The Set:-

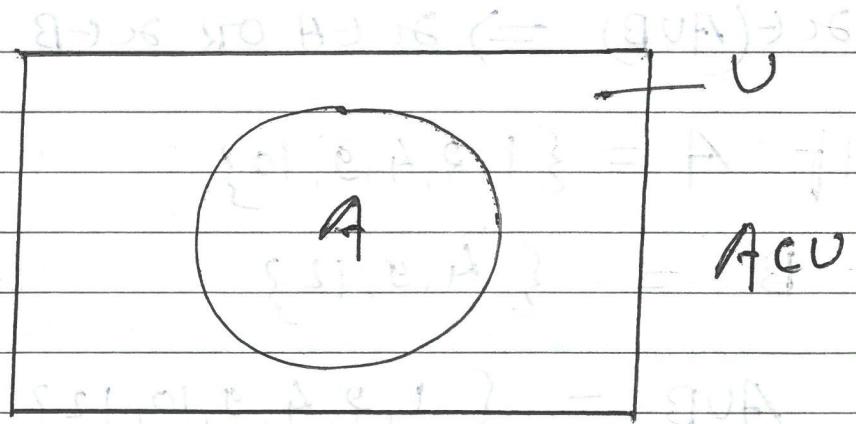
Marking Scheme

. (2)

The Venn diagram is an pictorial representation of finite number of sets. In this diagram the Universal set denoted by rectangle and the finite set or the subset of universal set denoted by circle.

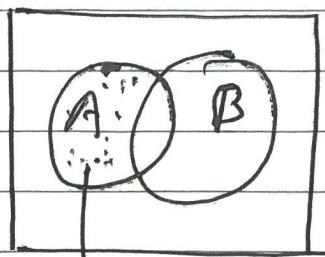
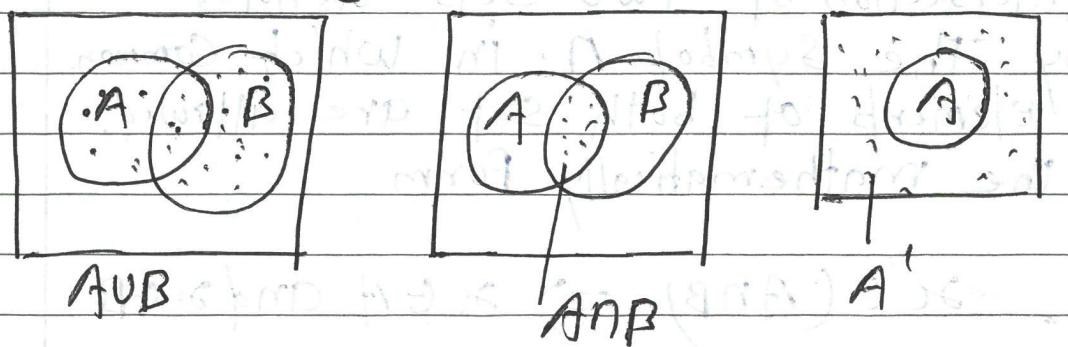
The Order of The set of A is $|A|$.

1



Ex: Venn diagram of $A \cup B$, $A \cap B$

A' , $A - B$



(Q-3 (part - ii))

Marking
schedule

A class has 175 students.....three subjects.

(8)

Sol:- Let M be the set denotes students studying Mathematics
 P be the set denotes students studying physics. and C be the set denotes students studying chemistry. (1)

$$\text{given} \rightarrow |U| = 175, |M| = 100$$

$$|P| = 70, |C| = 46, |M \cap P| = 30$$

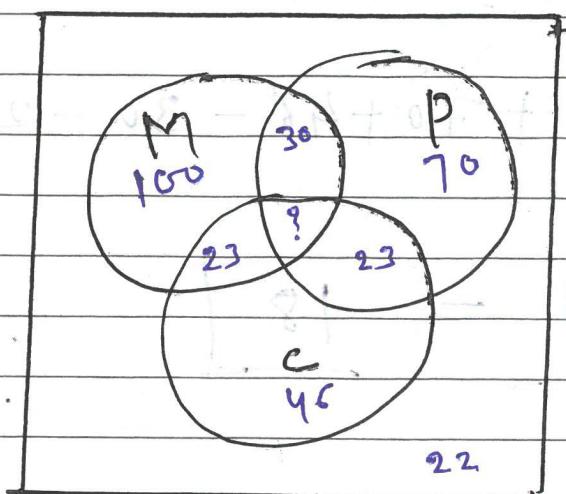
$$|M \cap C| = 28, |P \cap C| = 23$$

$$|(M \cup P \cup C)| = 22$$

$$\text{Find} \rightarrow |M \cap P \cap C|$$

The Venn - Diagram as follows

(2)



$$[\overrightarrow{8}] = [\underline{\text{Mupc}}] \Leftarrow$$

⑥ $| \text{Mupc} | + | \text{Mupc} |$

$$153 = 100 + 70 + 46 - 30 - 28 - 23 \Leftarrow$$

Putting The Values.

$$| \text{Mupc} | + | \text{Mupc} | -$$

$$| \text{Mupc} | - | \text{Mupc} | - | \text{Mupc} | - | \text{Mupc} | - | \text{Mupc} | = | \text{Mupc} | - | \text{Mupc} | .$$

①

Apply Second Principle of Inclusion-Exclusion

$$| \text{U} | = 100 - | \text{Mupc} | \Leftarrow$$

$$88 - 56 = | \text{Mupc} | \Leftarrow$$

$$| \text{Mupc} | - | \text{st} | = 28 \Leftarrow$$

②

$$| \text{U} | - | \text{st} | = | \text{Mupc} | \Leftarrow$$

$$| \text{A}_1 | = | \text{U} | - | \text{A}_1 |$$

Using Formula:

Marking
Scheme

Find The Inverse of The Matrix

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & 2 & -1 \\ -4 & 5 & 2 \end{bmatrix}$$

Sol:-

Using formula

$$A^{-1} = \frac{\text{adj} A}{|A|}$$

To find

$$|A| = 1 \cdot \begin{vmatrix} 2 & -1 & 3 \\ 5 & 2 & -4 \end{vmatrix} + 2 \cdot \begin{vmatrix} 0 & -1 & 3 \\ -4 & 2 & -4 \end{vmatrix} + 3 \cdot \begin{vmatrix} 0 & 2 & 5 \\ -4 & 5 & 2 \end{vmatrix}$$

$$= (4+5) + 2(0-4) + 3(0+8)$$

$$= 9 - 8 + 24$$

$$|A| = 25 \neq 0 \text{ (Non Singular)}$$

Now

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

$$\begin{bmatrix} 2 & 3 & 8 \\ 1 & 4 & 4 \\ 4 & 5 & 5 \end{bmatrix} = \text{AfDfD}$$

$$z = (0 - 8) = \begin{vmatrix} 2 & 0 \\ 2 & 1 \end{vmatrix} (-1) = 33$$

$$t = (0 - 1) = \begin{vmatrix} 1 & 0 \\ 1 & 1 \end{vmatrix} (-1) = 23$$

$$h = (9 - 8) = \begin{vmatrix} 1 & 8 \\ 1 & 2 \end{vmatrix} (-1) = 13$$

$$e = (8 - 5) = \begin{vmatrix} 5 & 4 \\ 2 & 1 \end{vmatrix} (-1) = 33$$

$$h_1 = (2 + 2) = \begin{vmatrix} 2 & 4 \\ 2 & 1 \end{vmatrix} (-1) = 22$$

$$g = (15 - 4) = \begin{vmatrix} 5 & 2 \\ 2 & 1 \end{vmatrix} (-1) = 11$$

$$s = (8 + 0) = \begin{vmatrix} 8 & 0 \\ 2 & 2 \end{vmatrix} (-1) = 13$$

$$h_2 = (4 - 0) = \begin{vmatrix} 2 & 4 \\ 0 & 1 \end{vmatrix} (-1) = 21$$

$$g = (4 + 5) = \begin{vmatrix} 5 & 2 \\ 1 & 1 \end{vmatrix} (-1) = 11$$

Use Formula -

$$A^{-1} = \frac{\text{adj } A}{|A|}$$

$$A^{-1} = \frac{1}{25} \begin{bmatrix} 9 & 19 & 4 \\ 4 & 14 & 1 \\ 8 & 3 & 2 \end{bmatrix}$$

Q:3 part (iii)

Q:4 part (i)

⑨ Statistics and Scope in economics

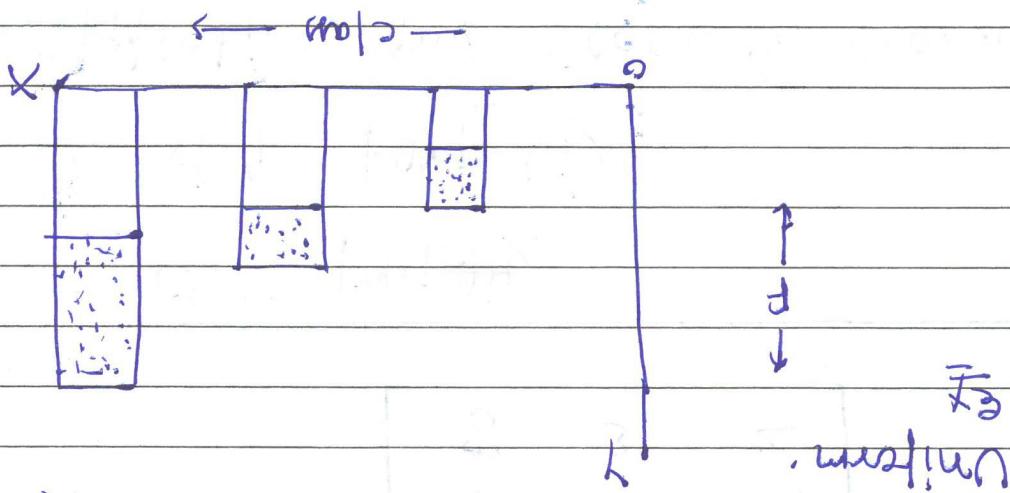
Statistics ~~may~~ may be defined as
The correction, presentation analysis
and interpretation of numerical data.

An economic policy can have no
sure basis unless it is framed on
an analysis of the facts of economic
life and a study of the results of
economic action. Statistics furnish
method of measuring and analysing
the phenomena and tracing the effect
of economic policy.

In the first class and gradually Cumulative Frequencies are plotted to below and these cumulative frequencies from above type of curves, we call these less than ogive. In this

and more than ogive

Q: 4 Part (ii) Draw The less than



Uniferm.

Bar width of each bar is kept is kept uniform and also the distance between bars is uniform. The difference between columns or shades may be different to the value given in the diagram. Part or component in proportion bar is subdivided into various parts is also called bar diagram. The

Q: 5 Subdivided Bar Diagram :-

Q: 4

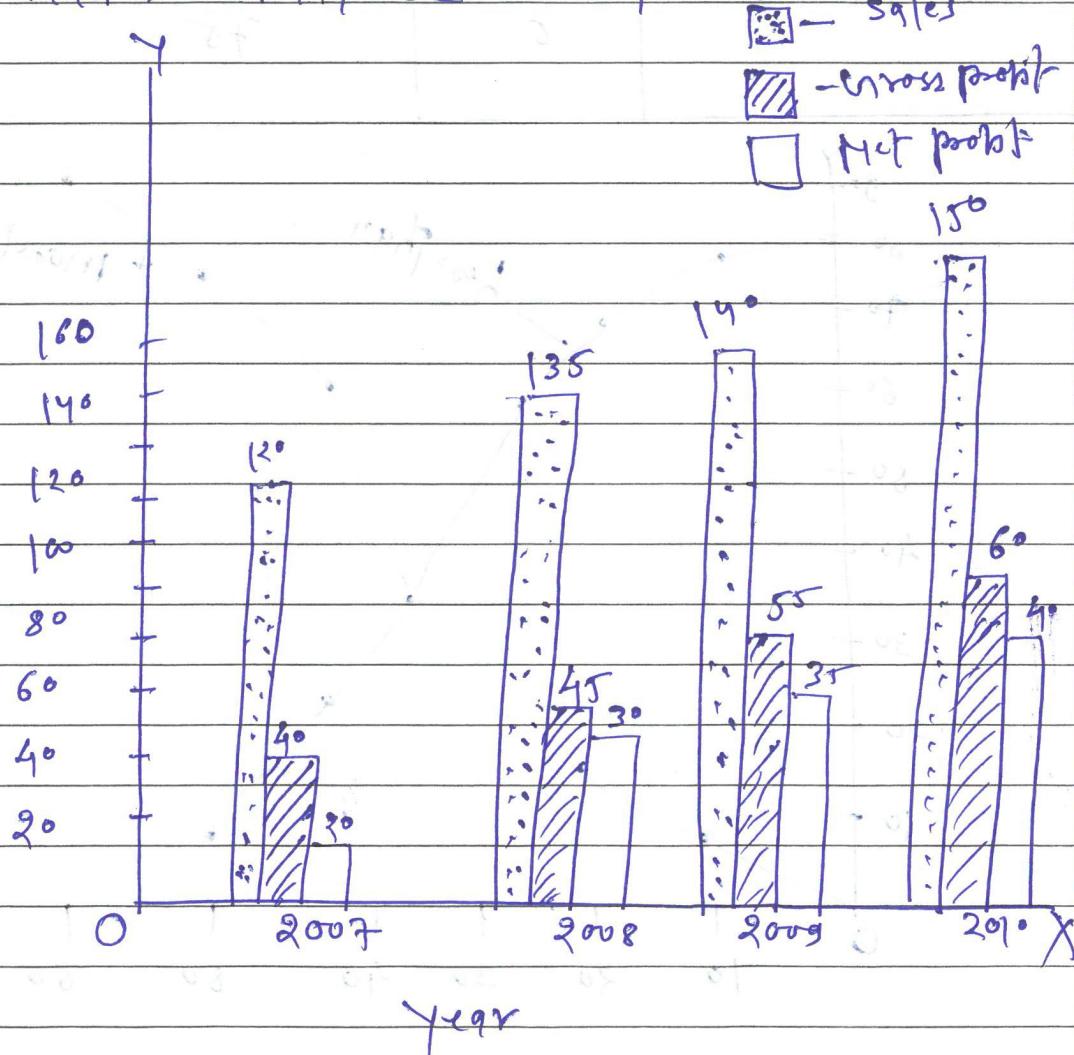
part (iii)

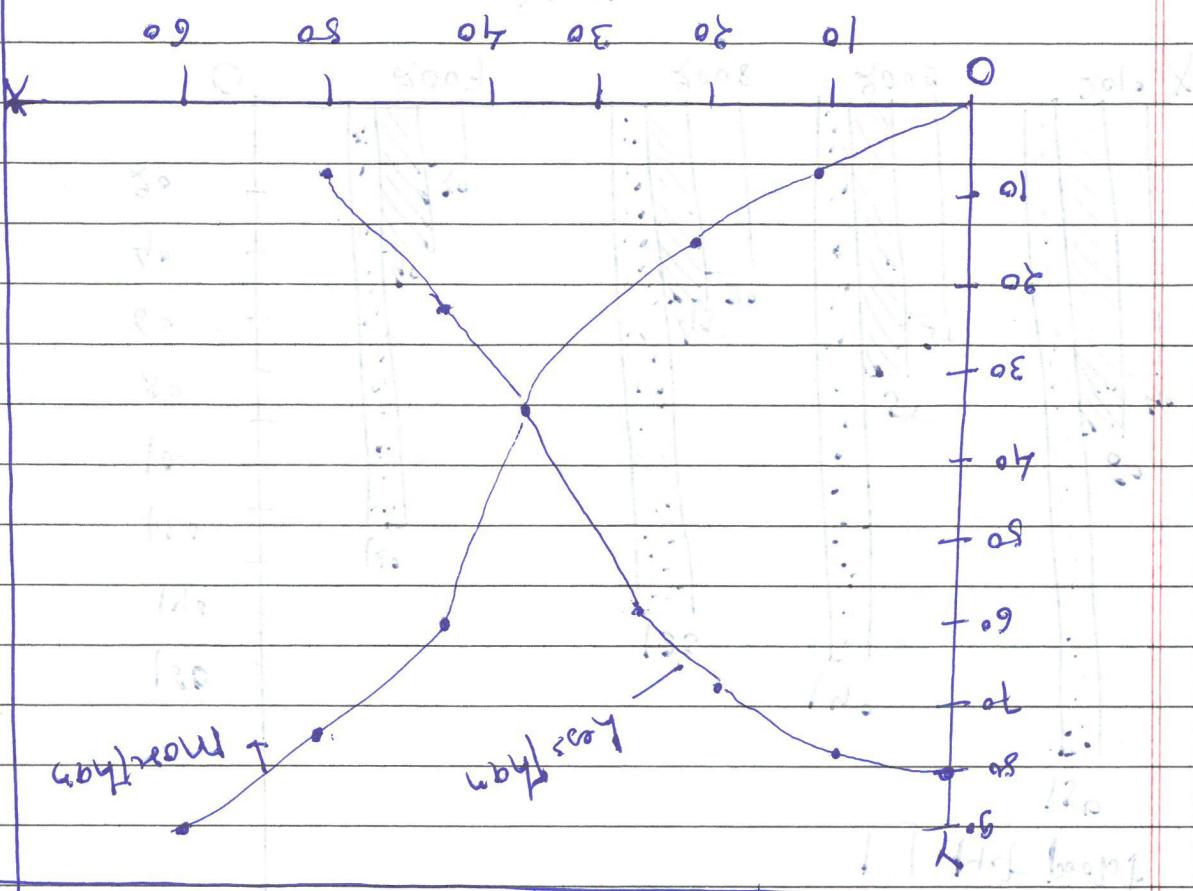
Date: / / Page no: 16

Marks

Draw a Multiple Bar diagram.

The multiple bar diagram contains two or more bars arranged side by side like the subdivided bar diagram. Multiple bar diagram helps comparison b/w two or more variables. different colours shades may be used.





Class	Frequencies (cf)			
Less Than 10	5			
Less Than 20	10			
Less Than 30	14			
Less Than 40	18			
Less Than 50	20			
Less Than 60	28			
More than 60	40			

Marks

Q: 5 (part i) Marks

(a) Central Tendency - Mean

Central tendency is the middle point of the distribution one of the most important objective of.

Statistical analysis is to get a single value that describes the characteristic of the entire mass of varied data;

The single value is called an average or central value. The average or central point always falls between two extreme values of the data i.e., lies between the minimum value and maximum value.

e.g. average life of bulb., average income, etc.

(b) Measure of dispersion with types.
The various definition of measure dispersion.

1. The term dispersion implies that degree of spread shown by the observations is a sample or a population. The variation or scattering or deviation of the different value of a variable from their average is known as dispersion. The measure used to indicate the

1/2

Q

No. of students 90 82 78 68 60 50 35 25 0

80 70 60 50 40 30 20 10 0

Mark Thaqib
Marks

(ii) Find the Median

Coefficient of dispersion

(ii) Relative dispersion

7/11

Absolute dispersion ①

Types of measure of dispersion

7/11

3. The dispersion or spread is the degree of variability about a central value.

Dispersion is the measure of the variation of the item.

Q1

measures of dispersion.

Marks

About some average is called

The scattering or variation of data

Sol:-

First we have to convert more than Series in Continuous Form
cf (given)

Marks F

0 - 10	90 - 82 = 8	90.
10 - 20	82 - 78 = 4	82
20 - 30	78 - 68 = 10	78
30 - 40	68 - 60 = 8	68
40 - 50	60 - 50 = 10	60
50 - 60	50 - 35 = 15	50] 15
60 - 70	35 - 25 = 10	35
70 - 80	25 - 0 = 25	25
	0	0
	17290	17290

Markes
⑧

where $M = cf = go(\text{even})$ Then

$$\left(\frac{M}{2}\right)^{\text{th}} = \left(\frac{90}{2}\right)^{\text{th}} = 45^{\text{th}}$$

Then 60 - 70

median class

$$l = 60, f = 15, c = 35$$

$$i = 10$$

use formula!

$$Md = l + \frac{\frac{N}{2} - cf}{f}$$

16 14 18 22 12 8 : f5-0-54

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

Calcuqate Standard deviation

Page (iii) S.O

$$md = 66.66 - 69 =$$

$$66.66 + 09 =$$

$$\frac{15}{10} + 09 =$$

$$10 \times \frac{15}{10} + 09 =$$

$$10 \times \left[\frac{15}{45-35} \right] + 09 =$$

$$10 \times \left[\frac{15}{\frac{2}{90}-35} \right] + 09 = md$$

Marks

$$\text{Sol: } A = 35 \quad I = 10$$

(mid point)

Marks

No of st (f)

$$\Sigma fd_y = n - A \mid f_y \mid F_y^2$$

0 - 10

8

5

-3

-24

$$F_y^2$$

48

10 - 20

12

15

$$-2$$

$$-24$$

9

20 - 30

22

25

$$-1$$

$$-22$$

22

30 - 40

18

$$A \circledcirc 35$$

$$0$$

$$0$$

0

40 - 50

14

45

$$1$$

$$14$$

14

50 - 60

16

55

$$2$$

$$32$$

64

$$\Sigma f = N = 90$$

$$\Sigma f_y = \Sigma f_y^2 = 220$$

$$-24$$

Apply formula of standard deviation -

Deviation -

$$S.D = \sigma = \sqrt{\frac{\Sigma f_y^2 - (\frac{\Sigma f_y}{N})^2}{N}} \times 10 \quad ①$$

$$\sigma = \sqrt{\frac{220}{90} - \left(\frac{-24}{90}\right)^2} \times 10$$

$$= \sqrt{2.44 - 0.0729} \times 10$$

$$= \sqrt{2.367} \times 10$$

$$\boxed{\sigma = 15.38}$$

2