



[2]



**Q.2** i. Write short notes on types of statistics  
ii. Define population and it's type.

OR

- iii. Define pie diagram and subdivided pie diagram
- iv. Draw a histogram and frequency polygon for the following data:

Class interval	frequency
0-10	2
10-20	4
20-30	10
30-40	4
40-50	3
50-60	8
60-70	1
70-80	5
80-90	11
90-100	2

**1**      1      1      1  
**1**      1      1      1  
**1**      1      1      1  
**1**      1      1      1

**1**      1      1      1

<b>2</b>	1	1	1
<b>3</b>	1	1	1
<b>5</b>	1	1	1
<b>5</b>	2	1	1

[3]

- Q.3 i. Find the median of 8,6,10,16,4,3.  
ii. Find the mode from following table

Marks	Number of students
0-10	5
10-20	18
20-30	30
30-40	45
40-50	40
50-60	15
60-70	10

OR    iii. Find the standard deviation for the following frequency distribution by short-cut method:

Class -interval	Frequency
0-5	8
5-10	16
10-15	25
15-20	14
20-25	7

Q.4 i. Define positive and negative correlation.

- ii. Find coefficient of correlation between the value of X and Y.

X: 1 3 5 7 8 10

Y: 8 12 15 17 18 20

OR iii. Height of father and son are given in inches:

3 2 1 1

7 2 1 1

7 2 1 1

3 1 1 1

7 2 1 1

OR iii. Height of father and son are given in inches:

Height of father	Height of son
65	67
66	68
67	64
67	68
68	72
69	70
71	69
73	70

Form the two lines of regression and calculate the expected average height of son when the height of the father is 67.5 inches.

①

Faculty of Commerce  
 CM3CO19 Business Statistics  
 End-Sem Exam (Dec-2024) Solution.

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

Programme :- B.Com (Hons).

Marks

(Q1) MCQ's

- |  |   |
|--|---|
| 1) (C) Simple Random                                 | 1 |
| 2) (b) Continuous Discrete Variables                 | 1 |
| 3) (a) 8   | 1 |
| 4) (b) $\left(\frac{n+1}{2}\right)^{\text{th}}$ term | 1 |
| 5) (b) $R = 0$                                       | 1 |
| 6) (a) $\pm 1$                                       | 1 |
| 7) (b) Cyclical Variation                            | 1 |
| 8) (C) May be positive & negative                    | 1 |
| 9) (C) Percentages                                   | 1 |
| 10) (b) 100  | 1 |

(Q2) (i)

Descriptive Statistics :-

Descriptive Statistics deals with Collecting, Summarising & Simplifying the data, in a Manner that the meaningful Conclusions Can be drawn from them.

Inferential Statistics :- It Consists of method + that are used for drawing Inferences about a totality of observations on the basis of knowledge about a part thereof.

(ii) It includes all the elements from the data set & measurable characteristics of the population such as a mean & Standard deviation are known as parameters.

Ex - All people living in India indicates population of India.

## # Types

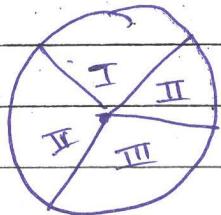
Marks

- 1) finite Population :- The population can be counted is known as finite or countable population. + ①
- 2) Infinite Population :- The infinite population is known as uncountable population in which the counting of units in the population is not possible. + ①

Q (iii)

### a) Pie diagram :-

A pie diagram is a type of graph that displays data in a circular graph. The pieces of the graph are proportional to the fraction of the whole in each category. 2½



The entire pie represent 100% of a whole, while pie slice represent portions to the whole.

It is also known as angular circle diagram.

### b) Subdivided Pie diagram :-

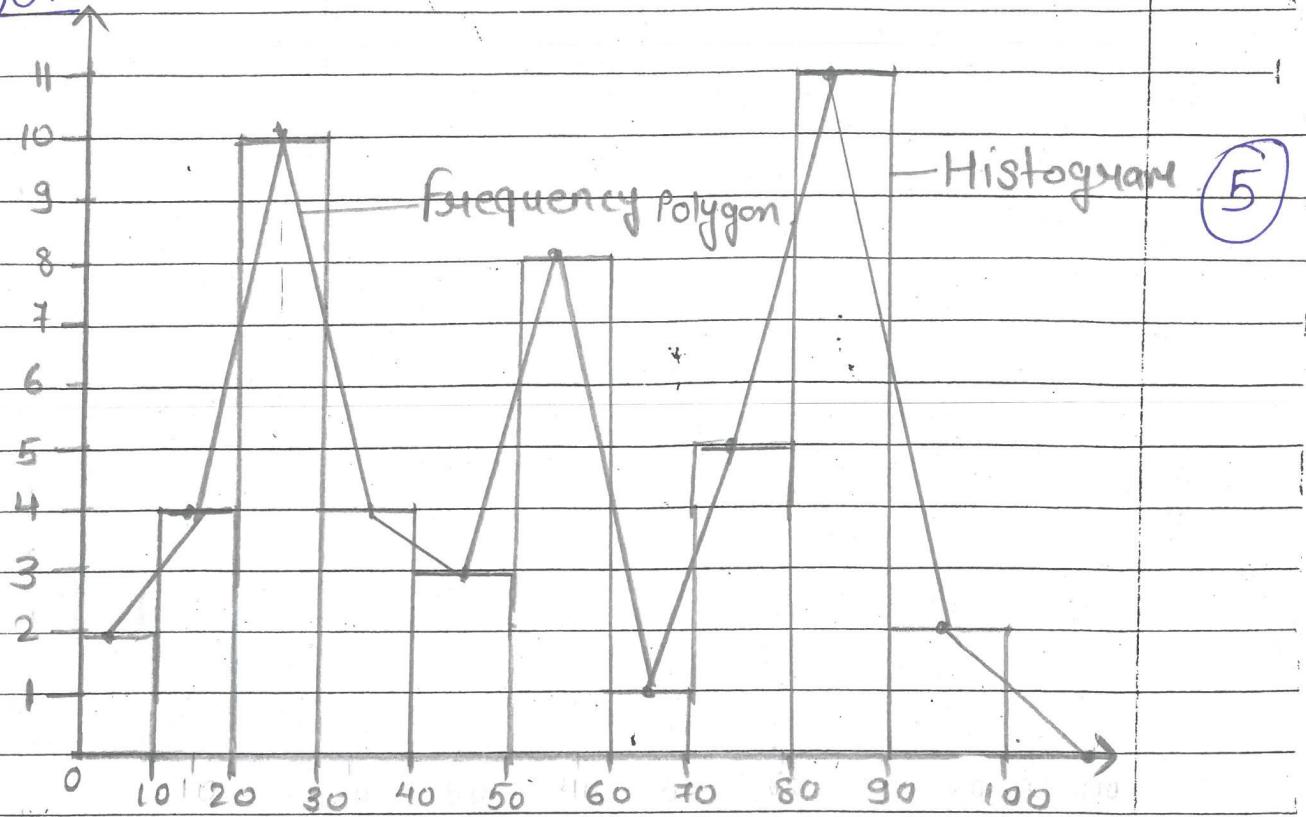
A subdivided bar diagram, also known as a Component bar chart. 2½

A diagram that shows how a total magnitude is divided into different components. It's used to represent data that has two or more components.

LBB

Q2(iv) OR

Marks



Q3(i) 8, 6, 10, 16, 4, 3

Arrange the data from least to greatest (1)

3, 4, 6, 8, 10, 16

+1

$$\text{Median} = \frac{6+8}{2}$$

$$= \frac{14}{2}$$

$\boxed{\text{Median} = 7}}$

+1

Q3(ii)

Marks

Marks	No. of students	
0-10	5	2
10-20	18	
20-30	30	
30-40	45	Modal class
40-50	40	
50-60	15	
60-70	10	

$$l_1 = 30, l_2 = 40, f_0 = 30, f_1 = 45, f_2 = 40, h = 10$$

+1

$$Z = l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 30 + \frac{45 - 30}{2 \times 45 - 30 - 40} \times 10$$

+1

$$= 30 + \frac{5}{90 - 70} \times 10$$

+1

$$= 30 + \frac{5}{20} \times 10$$

+1

$$\Rightarrow 30 + 2.5$$

$$\boxed{Z \Rightarrow 32.5}$$

+1

Q3(iii) OR

Marks

C.I	f	M.P(x <sub>i</sub> )	f <sub>i</sub> x <sub>i</sub>	(x - $\bar{x}$ )	(x - $\bar{x}$ ) <sup>2</sup>	f(x - $\bar{x}$ ) <sup>2</sup>	
0-5	8	2.5	20	-9.7	94.28	754.28	
5-10	16	7.5	120	-4.7	22.28	356.58	2
10-15	25	12.5	312.5	0.28	0.0816	356.57	
15-20	14	17.5	245	5.2	27.91	390.78	
20-25	7	22.5	157.5	10.2	105.78	740.49	
	70		855			2244.179	

$$\bar{x} = \frac{\sum f_i x_i}{\sum f} = \frac{855}{70}$$

+1

$$\bar{x} = 12.21$$

$$S.D (o) = \sqrt{\frac{f(x - \bar{x})^2}{\sum f}}$$

+1

$$= \sqrt{\frac{2244.179}{70}}$$

+1

$$= \sqrt{32.06}$$

+1

$$S.D = 5.66 \quad \underline{\text{Any}}$$

+1

Q4(i)

Marks

### Positive Correlation :-

The Correlation is said to be positive when the increase (decrease) in the value of one variable is accompanied by increase (decrease) in the value of the other variable.

Ex → Correlation between Rainfall & Yield of Crop.

(1.5)

### Negative Correlation :- The Correlation is

said to be negative, if an increase (decrease) in the value of one variable is accompanied by a decrease (increase) in the value of the other.

Ex → Correlat<sup>n</sup> between Price & demand of Commodity.

(1.5)

Q4(ii)

X	Y	$X^2$	$Y^2$	XY	
1	8	1	64	8	
3	12	9	144	36	
5	15	25	225	75	
7	17	49	289	119	
8	18	64	324	144	
10	20	100	400	200	
34	90	1156	8100	3060	2

$$R = \frac{n \sum xy - \bar{x} \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}} + 1$$

$$H = \frac{6 \times 582 - 34 \times 90}{\sqrt{6 \times 048 - (34)^2} \sqrt{6 \times 1446 - (90)^2}}$$

Marks

+1

$$= \frac{3496 - 3060}{\sqrt{1488 - 1156} \sqrt{8676 - 8100}}$$

+1

$$= \frac{432}{\sqrt{332} \times \sqrt{576}}$$

+1

$$= \frac{432}{437.61}$$

+1

$$\boxed{H = 0.987}$$

Q4(iii) OR

X	Y	$X^2$	$Y^2$	XY
65	67	4225	4489	4355
66	68	4356	4624	4488
67	64	4489	4096	4288
67	68	4489	4624	4556
68	72	4624	5184	4896
69	70	4761	4900	4830
71	69	5041	4761	4899
73	70	5329	4900	5110
546	548	37,314	37,578	37,422

2

$$\bar{X} = \frac{\sum X}{N} = \frac{546}{8} = 68.25$$

+1

$$\bar{Y} = \frac{\sum Y}{N} = \frac{548}{8} = 68.05$$

+1

$$b_{xy} = \frac{n \sum xy - \sum x \sum y}{n \sum y^2 - (\sum y)^2}$$

$$= \frac{8 \times 37422 - 546 \times 548}{8 \times 37578 - (548)^2}$$

$$b_{xy} = 0.525$$

$$b_{yx} = 0.42$$

Regression eq<sup>n</sup> Y on X.

+1

$$(Y - \bar{Y}) = b_{yx} (X - \bar{X})$$

$$(Y - 68.5) = 0.42(X - 68.25)$$

$$(Y - 68.5) = 0.42X - 28.665$$

$$Y = 0.42X - 28.665 + 68.5$$

$$\boxed{Y = 0.42X + 39.835}$$

(20)

Regression eq<sup>n</sup> X on Y

$$(X - \bar{X}) = b_{xy} (Y - \bar{Y})$$

$$(X - 68.25) = 0.52 (Y - 68.5)$$

+1

$$X - 68.25 = 0.52Y - 35.62$$

$$X = 0.52Y - 35.62 + 68.25$$

$$\boxed{X = 0.52Y + 32.63}$$

II<sup>nd</sup> part.

If  $X = 67.5$  then.

$$Y = 0.42 \times 67.5 + 39.835$$

$$Y = 68.19$$

Avg

(Q5(i))

- 1) This method is Very Simple & easy to us. + 1
- 2) It is very useful in Case of Series is having periodic variation. + 1
- 3) This method is independent of personal bias. + 1

(Q5(ii))

Time Series :- A time Series is a set of statistical observations arranged in Chronological Order.

Components of Time Series

- 1) Secular Trend :- It is the matter of common sense that there might be violent variation in a time series during a short span of time, however in a long run, it has tendency either to rise or fall. This tendency or trend of variation may be either upward or downward set on over a long time period.

### (1) Seasonal Trend :-

Marks

Generally Seasonal Variations are occurs due to changes in weather + Condition, customers, traditions, fashion etc.

Seasonal Variation represent a periodic movement where the period is not longer than one year.

Ex → Sale of Woollen go up in winter

### (2) Cyclical Variation :-

Cyclical Variation are another type of periodic movement, with a period more than one year. Such movements are fairly regular & oscillatory in nature. One Complete period is called a 'cycle'. Cyclical Variations are not as regular as Seasonal Variation, but the Sequence of change, marked by prosperity, decline, depression & recovery remains more or less regular.

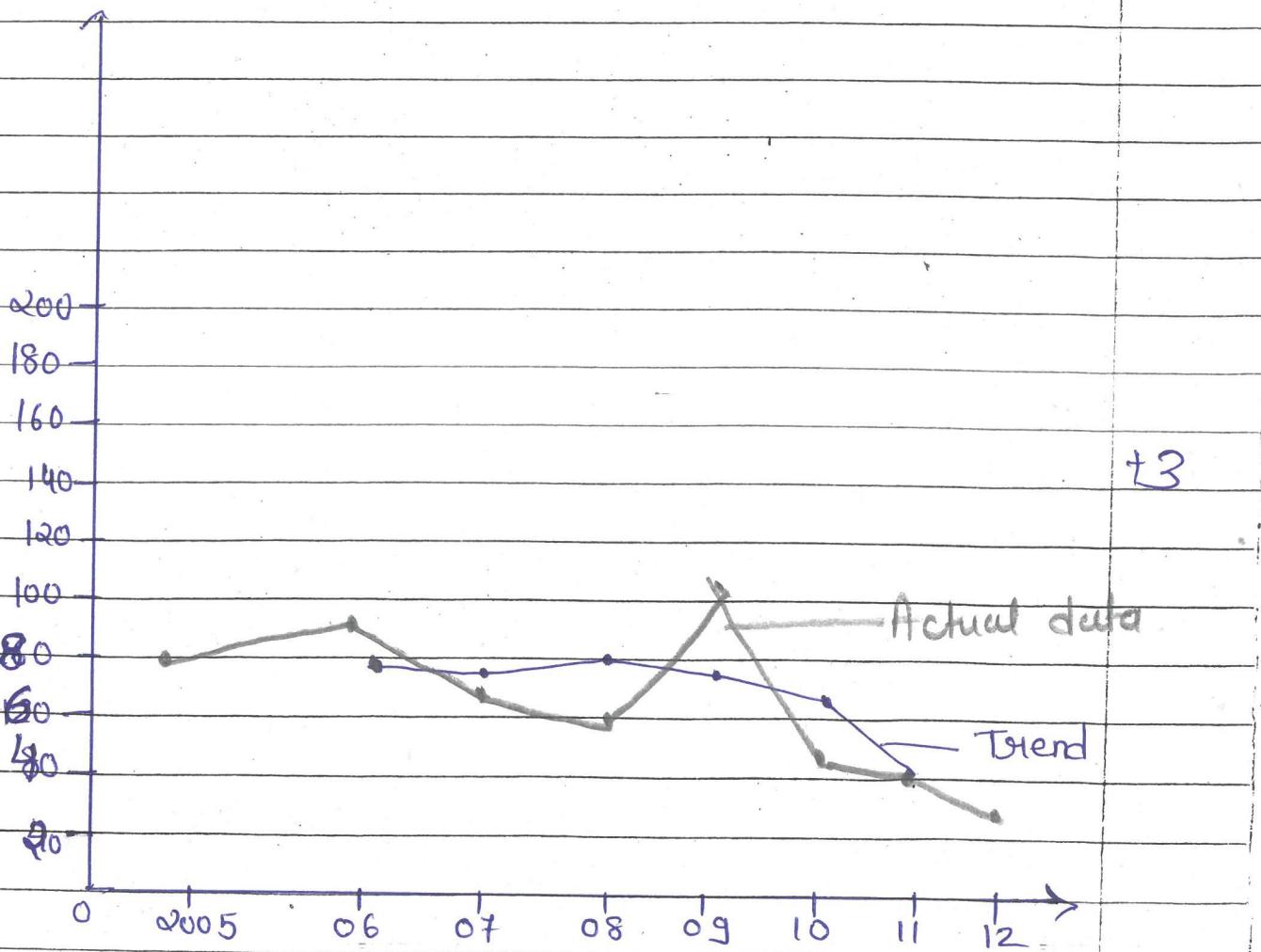
### (3) Irregular or Random Variation :-

Irregular or Random Variation are such Variation which are completely unpredictable in character. These are caused by factors which are either wholly unaccountable or caused by such unforeseen events like Earthquakes, flood, epidemic etc & some man-made situation like strikes, lock-out, wars etc.

Q5(iii) OR

Marks

Year	Earnings (Lakhs)	3-yearly moving total	3-yearly moving average (Trend)	
2005	80	—	—	
2006	90	240	80	
2007	70	220	73.3	4
2008	60	240	80	
2009	110	220	73.3	
2010	50	200	66.67	
2011	40	120	40.	
2012	30	—	—	



Q6(i)

Marks

Year	Price of Commodity X	Index No. (1995 = 100)	
1995	4	100	
1996	5	$\frac{5}{4} \times 100 = 125$	(5)
1997	6	$\frac{6}{4} \times 100 = 150$	
1998	7	$\frac{7}{4} \times 100 = 175$	
1999	8	$\frac{8}{4} \times 100 = 200$	
2000	10	$\frac{10}{4} \times 100 = 250$	
2001	9	$\frac{9}{4} \times 100 = 225$	
2002	10	$\frac{10}{4} \times 100 = 250$	
2003	11	$\frac{11}{4} \times 100 = 275$	

Q6(ii)

1) Since index numbers are generally based on a Sample, it is not possible to take into account each & every item in the construct<sup>n</sup> of the index.

2) It is often difficult to take into account changes in the quality of products. +1

3) A large number of methods are designed for constructing index number & different method of computation give different result. +1

- Ques. 4 Just like other statistical tools, index numbers can also be misused in such a manner as to draw the desired conclusion. +1
- Ques. 5 Since in the construction of index numbers a large number of factual questions are involved, lack of adequate & accurate data often becomes a serious limitation of the index itself. +1

### Ques. 6 (iii)

Cost of living numbers also known as Consumer Price Index Numbers measure the relative amount of money necessary to desire equal satisfaction during two periods of time, after taking into consideration the fluctuation of the retail prices of consumer goods during three two periods.

Method of construct :-

- First step is the decision about the class of people whom for index number meant. It is also necessary to decide geographical area. +1

- ① To Conduct family budget enquiry Marks  
 (a) Food (b) Clothing (c) fuel & light f1  
 (d) Housing (e) Miscellaneous.
- ③ To Collect retail price of items from the market.
- ④ After the collection of retail price we will find average price of each item. +1
- ⑤ As the relative importance of various items for different classes of people is not same. price of price relative are always weighted therefore Cost of living index is always a weight index.

$$\text{Cost of living Index} = \frac{\sum (P_i \times 100) \times P_0 Q_0}{\sum P_0 Q_0}$$