# <ঞ্জি>বঞ্জিসিবঞ্জি>বঞ্জি>বঞ্জিসিবঞ্জিসিবঞ্জিসিবঞ্জিসিবঞ্জিসিবঞ্জিসিবঞ্জিসিবঞ্জিসিধিজিসিধ

## **Courses of Studies:**

## UNIT – I

# Statistical Data and Descriptive Statistics (With the use of Excel and Other Statistical Software)

**Nature and Classification of data:** Univariate, Bivariate and Multivariate data; time-series and cross-sectional data.

## Measure of Central Tendency:

- 1. Mathematical averages including Arithmetic mean, Geometric mean and Harmonic mean, Properties and applications.
- Positional Averages
   More and Median and other partition values including Quartiles, Deciles and Percentiles.

## UNIT – II

## Measures of Variation (With the use of Excel and Other Statistical Software)

Absolute and relative, Range, Quartile Deviation, Mean Deviation, Standard Deviation, and their coefficients, Properties of Standard Deviation/Variance

**Skewness:** Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis.

## UNIT – III

# Simple Correlation and Regression Analysis (With the use of Excel and Other Latest Software)

**Correlation Analysis:** Meaning of Correlation: Simple, multiple and partial; linear and nonlinear correlation and Causation; Scatter diagram, Peasons's coefficient of Correlation, calculation and properties (proofs not required) Correlation and Probable error, Rank Correlation.

**Regression Analysis:** Principle of least square and Regression lines, Regression equations and estimation, Properties of regression coefficients, Relationship between Correlation and Regression coefficient, Standard error of estimate.

## UNIT – IV

## Index Numbers (With use of Excel and Other Latest Software)

Meaning and uses of index number. Construction of index numbers: fixed and chain base; univariate and composite, Aggregative and average of relatives – simple and weighted.

Test of adequacy of index numbers. Base shifting, splicing and deflating, Problems in the construction of index numbers.

Construction of consumer price indices, important share price indices.

## Time Series Analysis (With use of Excel and Other Latest Software)

Components of time series, Additive and multiplicative models, Trend analysis. Fitting of trend ( line using the principle of least squares - linear, second degree parabola and exponential. Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa. Moving averages, Seasonal variation – Calculation of Seasonal Indices using Simple averages, Ratio-totrend, and Ratio-to-moving average methods. Uses of seasonal indices.

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#### **LONG QUESTIONS OF 7 Marks each**

#### **Questions of 7 Marks each:**

- 1. What do you mean by Statistics? Discuss the essential characteristics of Statistics.
- 2. Discuss the importance and limitations of Statistics.
- 3. Explain with illustrations the uses of statistics in economics and planning.
- 4. What do you mean by Primary Date? Discuss the important method of collections of Primary Date.
- 5. Distinguish between Primary Data and Secondary Data.
- 6. What do you mean by Secondary Data? What are the various sources of collecting the secondary data?
- 7. What do you mean by editing of data? What are the factors to be taken into account of edition of Primary data?
- 8. State and prove the relationship between A. M., G. M. and H. M.
- 9. What do you mean by Average? Discuss the characteristics of an ideal average.
- 10. What do you mean by Arithmetic Mean? How is it calculated? Discuss the advantages and disadvantages of Arithmetic Mean.
- 11. Define Harmonic Mean and discuss its merits and demerits. Under what situations would you recommend its use?
- 12. Briefly explain the role of grouping and analysis table in calculation of mode.

#### **PRACTICAL PROBLEMS:**

## UNIT – I

#### EXERCISE – A (Mean)

1. The following are the daily salaries in rupee of 30 employees of a firm:

91,	139,	126,	119,	100,	87,	65,	77,	99,	95,	108,	127,	86,	148,	116,
76,	69,	88,	112,	118,	89,	116,	97,	105,	95,	80.	86,	106,	93,	135,

The firm gave bonus of Rs 10, 15, 20, 25, 30, 35, 40, 45 and 50 to employees in the respective salary group exceeding Rs 60 but not exceeding 70, exceeding Rs 70 but not exceeding 80 and so on up to exceeding 140 but not exceeding 150. Construct a frequency distribution and find out the total daily bonus paid per employee.

Ans: Average daily bonus = Rs 27.50
The management of a college decides to given scholarship to the students who have scored marks 70 and above 70 in Business Statistics. The following are the marks scored by 20 B. Com. Students:

71	73	74	85	86	88	91	94	96	99
74	74	76	93	91	94	96	98	88	94

The scholarship payable is given below:

Marks	• • •	70 – 75	75 - 80	80 - 85	85 – 90	90 - 95	95 -
							100
Scholarship	amount	100	200	300	400	500	600
(Rs)							

Estimate the total scholarship payable and the average scholarship payable.

3. Certain number of salesmen were appointed in different territories and the following data were compiled from their sales reports:

Sales('000 Rs)	4 – 8	8 - 12	12 - 16	16 - 20	20 - 24	24 - 28	28 - 32	32 - 36	36 - 40
No. of salesmen	11	13	16	14		9	17	6	4

If the average sales is believed to be Rs 19,920, find the missing information.

**Ans: Missing Frequency = 10** 

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The mean of the following frequency distribution is 50. But the frequencies  $f_1$  and  $f_2$  in 4. classes 20 – 40 and 60 – 80 are missing. Find the missing frequencies:

Class :	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	
Frequency:	17	$f_1$	32	$f_2$	19	Total 12

#### Ans: $f_1 = 28$ , $f_2 = 24$

20

5. 100 students appeared for an examination. The result of those who failed are given below:

	Marks	5	10	15	20	25	30	Total
Ì	No. of students	4	6	8	7	3	2	30

If the average marks of all students were 68.6, find out average marks of those who passed.

#### Ans: 91.21

6. Out of 50 examinees, those passing the examination are shown below. If the average mark of all the examinees is 5.16, what would be the average marks of examinees having failed in it?

Marks obtained	4	5	6	7	8	9
No. of students passing the Exam.	8	10	9	6	4	3

Ans: 2.1

7. Define a 'weighted mean'. Under what circumstances would you prefer it to an unweighted mean?

Calculate the weighted mean price of a table from the following data, assuming that weights are proportional to the number of tables sold:

Price per table (Rs)	3,600	4,000	4,400	4,800
No. of tables sold	14	11	9	6

No. of tables sold

## Ans: Rs 4,070

#### 8. 26. Compute the weighted arithmetic mean of the index number from the data below:

	Group								
	Food	Clothing	Fuel and Light	House Rent	Miscellaneous				
Index No.	125	133	141	173	182				
Weights	7	5	4	1	3				

#### Ans: 141.15

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9. The following table gives the distribution of 100 accidents during seven days of the week of a given month. During the particular month there are 5 Mondays, Tuesday s and Wednesday s and only four each of the other days. Calculate the average number of accidents per day:

Days	No. of Accidents	Days	No. of Accidents
Sunday	26	Thursday	8
Monday	16	Friday	10
Tuesday	12	Saturday	18
Wednesday	10		

Ans: 14.13 = 14

10. To produce a scooter of a certain make, labour of different kinds is required in quantities as follows:

Skilled labour	:	50 hours
Semi-skilled labour	:	100 hours
Unskilled labour	:	300 hours

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If hourly wage rates for these three kinds of labour are Rs 100, Rs 70 and Rs 20 respectively, what is the average labour cost per hour in producing the scooter? Hints: Use weighted arithmetic mean

#### Ans: Rs 40 per hour

V

A candidate obtained the following percentage of marks in different subjects in the Half-11. Yearly Examination:

English	Statistics	Cost Accountancy	Economics	Income Tax
46%	67%	72%	58%	53%

It is agreed to give double weights to marks in English and Statistics as compared to other subjects. What is the simple and weighted arithmetic mean?

## Ans: Simple A.M. = 59.2%; Weighted A.M. = 58.43%

12. Calculate simple and weighted arithmetic averages from the following data and comment on them:

Designation	Daily salary (in Rs)	Strength of the cadre
Class I Officer	1,500	10
Class II Officer	800	20
Subordinate staff	500	70
Clerical staff	250	100
Lower staff	100	150

## Ans: Simple A.M. = Rs 630; Weighted A.M. = Rs 302.86

Comment on the performance of the students of three Universities given blow using an 13. appropriate average:

University		А			В		С
Courses	% of	No. c	of %	of	No. of students	% of Pass	No. of studen
of Study	Pass	students i	n Pas	SS	in hundred		in hundred
		hundred					
M.A.	81	2		82	2	71	3
M. Com.	76	3.5		76	3	83	4
M.Sc.	73	2		60	7	66	3
B. Com.	58	2		76	7	74	2
B. Sc.	70	7		65	3	65	3
B.A.	74	4.5		73	6	73	5
Hov (72	wever, on	the basis of	weigł	ited a	tudents in the th verage of pass p niversity A (72.	percentage,	University C
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2	Examinatio		Colle	ege A		College	
M.A		60			50 2	00	160
M. Com.		100			90 2	40	190
B.A.		400			300 2	00	140
B. Com.		240			150 1	60	100
Total		000			F00 0	00	500

Name of Examination	Colle	ege A	Colle	ege B
M.A	60	50	200	160
M. Com.	100	90	240	190
B.A.	400	300	200	140
B. Com.	240	150	160	100
Total	800	590	800	590

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Hints and Ans: Find the weighted average of percentage of passed students (X), the corresponding weights (W) being the number of students appeared. Both the colleges have the same average i.e. 73.75%.

15. A travelling salesman made five trips in two months. The record of sales is given below:

The sales manager criticized the salesman's performance as not very good since his mean daily sales were only Rs 54,000 (2,70,000/5). The salesman called this an unfair statement for his daily mean sales were as high as Rs 55,200 (13,80,000/25). What does each average mean here? Which average seems to be more appropriate?

Trip	No. of	Value of	Sales per day
	days	sales(in'00 Rs)	(in'00 Rs)
1	5	3,000	600
2	4	1,600	400
3	3	1,500	500
4	7	3,500	500
5	6	4,200	700
	25	13,800	2,700

Ans: The Manager obtained the simple arithmetic mean of the sales per day, while the salesman obtained the weighted arithmetic mean. The latter (weighted average) seems to be more appropriate.

#### **Exercise B (Partition Values)**

1. Fir	nd the med	ian of the	e followin	g two ser	ies:				
(i)	38	34	39	35	32	31	37	30	41
(ii)	30	31	36	33	29	28	35	36	

Ans: (i) 35 (ii) 32

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2. Following are the marks obtained by a batch of 10 students in a certain class test in Statistics (X) and Accountancy (Y).

Roll No.	1	2	3	4	5	6	7	8	9	10
Х	63	64	62	32	30	60	47	46	35	28
Y	68	66	35	42	26	85	44	80	33	72

In which subject is the level of knowledge of the students is higher?

Ans: Med (X) = 46.5; Med (Y) = 55. Level of knowledge of students is higher in Accountancy.

## 3. Find mean and median from the data given below:

Marks obtained	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of students	12	18	27	20	17	6

Ans: Mean = 28; Median = 27.41

4. Calculate arithmetic mean and median from the following series:

Income (Rs)	0 – 5	5 - 10	10 - 15	15 – 20	20 – 25	25 - 30
Frequency	5	7	10	8	6	4

#### [C.S. (Foundation) Dec. 2000]

#### Ans: Arithmetic mean = 14.375; Median = 14

5. From the data given below, find the missing frequency, if the Arithmetic Mean is Rs 33. Also find the median of the series:

Loss per shop (Rs)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of shops	10	15	30		25	20

[C.A. (Foundation) Nov. 2000]

## Ans: Missing frequency = 25; Median = 33

#### 6. Given below is the distribution of marks obtained by 140 students in an examination:

Marks	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of students	7	15	18	25	30	20	16	7	2

Find the median of the distribution.

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35 – 44		10.45						Total	<u>43.7</u>	<u>'2</u>	
45 - 54		9.47									
					•						
	-			quartile (	iii) 7 <sup>th</sup> (	decile, a	nd (	(iv) 60 <sup>th</sup>	<sup>h</sup> perc	centile,	, fo
				60 60	) 70	70 0	20	00 0	0 0	0 10	10
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NO. OI Persons	1	-								-	
16. 20. Draw an o	give for t						-				
	•	-	-								
Class Interval:					15	- 20	20	- 25	25 -	- 30	
						8	-	7			
					.3.5 (ai	-	: Bv	formu			3.3
17. Draw a 'less tł	nan ogive										
quartile:	5			U							
Class Interval :	0 – 5	5 -	10	10 - 20	20	- 30	30	- 40	40 -	- 50	
Frequency :	5			15				8			
¥									An	s: Q1 =	= 1
18. The frequency	distribut	tion of hei	ghts o	of 100 col	lege stı	ıdents i	s as	follows		•-	
Height (cms.) : 1	41 - 150	151 – 1	.60	161 – 17	0 171	l – 180	18	31 - 190	)	Total	
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Draw an ogive (i) the first qua <b>Ans: Q<sub>1</sub> = 161</b> 19. The monthly s below: Monthly Salary (R	artile (ii) <b>2 cms. (</b> salary dis	the media $Q_3 = 170.1$ stribution No. of Fam	an (iii) <b>1 cms</b> 1 of 2	) the third <b>Median</b> 50 famili Mont More	l quarti = <b>165.</b> es in a <u>thly Sal</u> than 2,0	ile, and 7 <b>cms I</b> . certair ary (Rs 000	(iv) <b>Q. R</b> 1 loc	Inter-q <b>ange =</b> cality ir	uarti 8.9 c Agr <u>f Fam</u> 55	le rang c <b>ms.</b> a is gi	ge
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Ans: $D_2 = 31.94$ years $D_4 = 40.38$ years, $P_{90} = 67.98$ years $P_{60} = 52.87$ years15. Find the (i) Lower quartile (ii) Upper quartile (iii) 7th decile, and (iv) 60th percentile, for the following frequency distribution:Wages (Rs)30 - 4040 - 5050 - 6060 - 7070 - 8080 - 9090 - 100No. of Persons13112143329Ans: (i) Rs 67.14 (ii) Rs 83.44 (iii) Rs 81.56 (iv) Rs 78.3716. 20. Draw an ogive for the data given below and show how can the value of median be read off from this graph. Verify you result.Class Interval : $0-5$ $5-10$ $10-15$ $15-20$ $20-25$ $25-30$ Frequency : $5$ 10 $15$ $8$ 7 $5$ Ans: Median = 13.5 (approx.); By formula, Md. = 13.3317. Draw a 'less than ogive' from the following data and hence find out the value of lower quartile:Class Interval : $0-5$ $5-10$ $10-20$ $20-30$ $30-40$ $40-50$ Frequency : $5$ $10$ $15$ $20$ Ans: $Q_1 = 12$ 18. The frequency distribution of heights of 100 college students is as follows:Height (cms.) :141 - 150151 - 160161 - 270To a sole is the origo of this distribution and form the ogive find:(i) the median (iii) the third quartile, and (iv) Inter-quartile rangeAns: $Q_1 = 170.1$ cms Median = 165.7 cms I.Q. Range = 8.9 cms.1											
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Frequency		150	72	5	<i>0</i>	28		12		8		5
						An	s; Me	edian	from	ogiv	e = 1.	1 (aprox
			data, find:									
			6 of items;									
D <sub>6</sub> ; (iv	) Graphic	cally wit	h the help			ve, the	e valı	ies of	$Q_1, Q_2$			$P_{40}$ and $D_{0}$
Class Interva	ıl 1	0 - 14	15 – 19	20 -	- 24	25 -	29	30 -	34	35 -	- 39	Total
Frequencies		5	10		5	20		1				65
-	i) Q <sub>3</sub> – Q	$Q_1 = 29.1$	19 - 19.92	2 = 9.2	27; (ii)	Md.	= Q <sub>2</sub>	$_{2} = 25$	.13 (	iii) P	40 = 2	23.17, $D_6$
26.75												
22. One h			-	ts app	peared	for a	certa	ain te	st an	d the	follov	wing mar
distrib	ution wa	as obtair									-	
Marks :		0 - 2	20	20 – 4	0		- 60		60 -		8	0 - 100
Students :		10		30		3	6		30			14
Find:	(i) The	limits of	marks of	middl	e 30%	of the	e stuc	lents.				
		-	age of stu		-							
			er of stude									
Ans: (	i) P <sub>35</sub> = 4	1.1; P <sub>65</sub>	; = 61.3 (ii	i) $\frac{100}{120}$	$\left \left(\frac{30}{20}\times \frac{1}{2}\right)\right $	5)+:	14 =	17.9	% (ii	i) 10	$+\frac{15}{20}>$	< <b>30 = 3</b> 2
				1201			-				20	= 3
23. The ex	penditur	e of 1,0	00 families	s is giv	/en as ı	inder	:					
Expenditu			-0 - 59		- 79		) - 99	) 1	- 00	119	120	) – 139
No. of fam	ilies		50		?		500		?			50
The m	edian for	• the dist	ribution is	s Rs 82	7. Calcı	late t	the m	nissing	g freq	uenci	es.	
												= 263, 13
24. An inc	omplete	frequen	cv distribı	ition i	s given	as fo	llows			,		,
Variable	10 - 20	20 – 3			40 - 50		- 60		- 70	70	- 80	Total
Frequency	12	30	?	-	65		?		25		19	230
	e given t	hat med	ian value i	s 46.						-		
					e missi	ng fre	equer	ncies.				
(b) Cal	lculate th	e Arithr	netic Mear	۰ ۱ of th	e comp	leted	l tabl	e.				
					-				Ans	: (a)	64, 4	5 (b) 45.9
25. An inc	omplete	distribu	tion is give	en bel	ow:							
Variable :	0 -	- 10	10 - 20	20 -	30	30 - 4	10	40 - 5	50	50 -	60	60 - 70
Frequency :	: 10		20	?		40		?		25		15
(i) You	ı are give	en that t	he median	value	is 35.	Find	out n	nissing	g freq	uenc	y (giv	en the to
freque	ncy = 17	0)										
(ii) Cal	lculate th	e arithn	netic mean	of the	e comp	leted	table	<b>e</b> .				
					1				Ans	s: (i) :	35, 2	5 (ii) 35.8
26.												
The data in	the adj	oining	table rep	resent	t T	rip	Day	s Ex	pens	es	Expe	nses per
travel expens	es (othe	er than	transport	ation)	)	-	5		- (D-)		da	y (Rs)
for 7 trips	made di	uring N	lovember	by a	ı 🔔				(KS)			-
salesman for a	small fir	rm:		-		1	0.5		13.50	)		27
		_	ormula, fill netic Mean <u>tion is give</u> <u>10 – 20</u> 20 he median netic mean table rept transport lovember e expense ided by 7 erage is on and that i			2	20		12 በበ	,		6
An auditor	criticized	d these	e expens	es as	5	-	2.0		12.00	,		U
excessive, ass	erting th	at the a	iverage ex	pense	è	3	3.5		17.50	)		5
per day is Rs	: 10 (Rs	70 div	ided by 7	). The	è	4	1.0		9.00			9
salesman repl	ied that	the ave	erage is or	nly Rs	5	-	0.0		27.00			2
4.20 (Rs 105	divided	by 25)	and that i	in any	7	5	9.0		27.00	)		3
					(8)							

event the median is the appropriate measure and is only Rs 3. The auditor rejoined that the arithmetic mean is the appropriate measure, but that the median is Rs 6.

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6	0.5	9.00	18
7	8.5	17.00	2
Total	25.0	105.00	70

**v** 

You are required to:

(i) Explain the proper interpretation of each of the four averages mentioned.

- (ii) What average seems appropriate to you?
- 27. For a certain class of workers, numbering 700, hourly wages vary between Rs 30 and Rs 75. 12% of the workers are earning less than Rs 35 while 13% are getting equal to or more than Rs 60, out of which 6% are earning between Rs 70 and Rs 75. The first quartile and median wages are, respectively, Rs 40 and Rs 47. The 40<sup>th</sup> and 65<sup>th</sup> percentiles are Rs 43 and Rs 53 respectively. You are required to put the above information in the form of a frequency distribution and estimate the mean wages of the workers.

Ans:	Hourly wages (Rs)	30 - 35	35 -	40 -	43 -	47-	53 -	60 -
	No. of workers	84	91	105	70	105	91 $\overline{X}$	49 = Rs 48.33

28. For a certain group of saree weavers of Varanasi, the median and quartile earning per hour are Rs 44.3 and Rs 43.0 and 45.9 respectively. The earnings for the group ranges between 40 and Rs 50. Ten per cent of the group earn under Rs 42; 13% earn Rs 47 and over, and 6% Rs 48 and over. Put these data in the form of a frequency distribution and obtain the value of the mean wage.

Ans:	Hourly wages (Rs)	40 - 42	42 -	43 -	44.3 -	45.9 -	47 -	48 - 50
	No. of workers	10	15	25	25	12	7	6

## **Exercise C (Mode)**

1. The Bharat Ball Bearing Ltd. has collected the following data:

12, 19, 21, 30, 13, 19, 22, 31, 17, 20, 24, 31, 18, 21, 27, 31

(i) Compute the arithmetic mean, the median and the mode using the sixteen observations given.

(ii) Why is mode said to be an erratic measure of central tendency?

(iii) Why is median called a position average?

Ans: A.M. = 22.25, Md. = 21, Mo = 31

2. Calculate mean, median and mode from the following data of the heights in inches of a group of students:

61, 62, 63, 61, 63, 64, 64, 60, 65, 63, 64, 65, 66, 64

Now suppose that a group of students whose heights are 60, 66, 59, 68, 67 and 70 inches, is added to the original group. Find the mean, median and mode of the combined group.

 Ans:
 First group
 M = 63.2
 Md. = 63.5
 Mo. = 64

 Combine group
 M = 63.75
 Md. = 64
 Mo. = 64

3. Atul gets a pocket money allowance of Rs 12 per day. Thinking that this was rather less, he asked his friends about their allowances and obtained the following data which includes his allowance also – (amounts in Rs):

12, 18, 10, 5, 25, 20, 20, 22, 15, 10, 10, 15, 13, 20, 18 10, 15, 10, 18, 15, 12, 15, 10, 5, 10, 12, 18, 20, 5, 8.

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He presented these data to his father and asked for an increase in his allowance as he was getting less than average amount. His father, a statistician, countered pointing out that Atul's allowance was actually more than the average account. Reconcile these statements.

## Ans: Atul computed A.M. and his father computed Mode.

4. The number of fully formed apples on 100 plants were counted with following results:											
No. of apples	0	1	2	3	4	5	6	7	8	9	10
No. of plants	2	5	7	11	18	24	12	8	6	4	3

(i) How many apples were there in all?

(ii) What was the average of number of apples per plant?

(iii) What was the modal number of apples?

## Ans: (i) 486 (ii) $\overline{X}$ = 4.86 (iii) Mo = 5

5. Given below is the frequency distribution of marks obtained by 90 students. Compute the arithmetic mean, median and mode:

Marks	No. of students	Marks	No. of students
15 – 19	6	45 – 49	9
20 - 24	14	50 – 54	10
25 – 29	12	55 – 59	5
30 - 34	10	60 - 64	4
35 - 39	10	65 - 69	1
40 - 44	9		

Ans: Mean = 37.17; Md. = 36; mo. = 23.5

6. Find out the median and mode from the following table:

		0	
No. of days absent	No. of students	No. of days absent	No. of students
Less than 5	29	Less than 30	644
Less than 10	224	Less than 35	650
Less than 15	465	Less than 40	653
Less than 20	582	Less than 45	655
Less than 25	634		

## Ans: Md. = 12.75; Mo. = 23.5

7. Find out the Mean, Median and the Mode in the following series:

Size (below)	5	10	15	20	25	30	35	
Frequency	1	3	13	17	27	36	38	

## Ans: Md. = 12.75; Mo. = 11.35

8. In 500 small scale industrial units, the return on investment ranged from 0 to 30%, no unit sustaining any loss. 5% of industrial units had returns exceeding 0% but not exceeding 5%, 15% of units had returns exceeding 5% but not exceeding 10%. Median and upper quartiles ate of return was 15% and 20% respectively. The uppermost layer of return exceeding 25% but not exceeding 30% was earned by 25%. Present the information in the form of frequency table with intervals as follows:

Exceeding 0% but not exceeding 5% Exceeding 10% but not exceeding 15% Exceeding 20% but not exceeding 25%

Exceeding 5% but not exceeding 10% Exceeding 15% but not exceeding 20% Exceeding 25% but not exceeding 30%

Use N/4, 2N/4, 3N/4 as ranks of lower, middle and upper quartiles respectively. Find the rate of return around which there is maximum concentration of units.

1113						
<b>Return in %</b>	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30
No. of units	25	75	150	125	0	125

Mode = 13.75, Rate of return around which there is maximum concentration of units is 13.75%.

9. Calculate the arithmetic mean and the median of the frequency distribution given blow. Hence calculate the mode using the empirical relation between the three.

 Class limits :
 130 - 134 135 - 139 140 - 144 145 - 149 150 - 154 155 - 159 160 - 164

 Frequency :
 5
 15
 28
 24
 17
 10
 1

 Ans: M = 145.35; Md. = 144.92; Mo. = 144.06

10. (a) Briefly explain the role of grouping and analysis table in calculation of mode.(b) From the following data of weight of 122 persons, determine the modal weight by the method of grouping:

)		u or grou	Jing.							
	Weight (in lbs.)	100 -	110 -	120 –	130 -	140 -	150 –	160 -	170 -	
)		110	120	130	140	150	160	170	180	
,	No. of persons	4	6	20	32	33	17	8	2	

Hints: Method of grouping gives two modal classes 130 - 140 and 140 - 150 i.e. the distribution is bimodal. Locate the value of mode by using the empirical relation Mo = 3Md - 2M.

Ans: Man (M) = 139.51; Median (Md.) = 139.69; Mode (Md.) = 140.05
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11. Calculate the Mode, Median and Arithmetic average from the following data:

	f	Class	f	Class
(	45	25 - 30	8	0 - 2
(	60	30 - 40	12	2 - 4
	20	40 - 50	20	4 - 10
(	13	50 - 60	10	10 – 15
(	15	60 - 80	16	15 – 20
	4	80 - 100	25	20 – 25
. (				

Hints: Rewrite the frequency distribution with classes of equal magnitude 10.

Ans: Mo. = 28.15; Md. = 28.29; Mean = 30.08

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12. In the following data, two class frequencies are missing:

Class	Frequency	Class	Frequency	(
100 - 110	4	150 - 160	?	(
110 - 120	7	160 – 170	16	
120 - 130	15	170 - 180	10	(
130 - 140	?	180 – 190	6	(
140 - 150	40	190 - 200	3	

However, it was possible to ascertain that the total number of frequencies was 150 and that the median has been correctly found to be 146.25

You are required to find out with the help of the information given:

(i) Two missing frequencies.

(ii) Having found the missing frequencies, calculate the arithmetic mean.

(iii) Without using the direct formula, find the value of mode.

## Ans: (i) 24, 25 (ii) $\overline{X}$ = 147.33 (iii) Mode = 144.08

13. The median and mode of the following hourly wage distribution are known to be Rs 33.5 and Rs 34 respectively. Three frequency values form the table, however, missing. You are required to find out those values.

	Wages in Rs	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 – 70	Total
3	No. of persons	4	16	?	?	?	6	4	230

Ans: 60, 100, 40.

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14. You are given the following incomplete frequency distribution. It is known that the total frequency is 1000 and that the median is 413.11. Estimate by calculation the missing frequencies and find the value of the mode.

Value (X)	Frequency (f)	Value (X)	Frequency (f)	
300 - 325	5	400 - 425	326	
325 - 350	17	425 - 450	?	
350 - 375	80	450 - 475	88	
375 - 400	?	475 - 500	9	

Ans: Missing frequencies are 227 and 248 respectively. Mo. = 413.98 V A 15. "Hari put the jar of water and the packet of sweets on the ground and sat down in the shade of the tree and waited". Prepare a frequency distribution for the words in the above sentence taking the number of letters in words as the variable. Calculate the mean, median and mode. Ans: Mean = 3.56, Median = Mode = 3 16. Treating the number of letters in each word in the following passage as the variable X, prepare the frequency distribution table and obtain its mean, median, mode. "The reliability of data must always be examined before any attempt is made to base conclusion upon them. This is true of all data, but particularly so of numerical data, which do not carry their quality written large on them. It is a waste of time to apply the refined theoretical methods of Statistics to data which are suspect from the beginning." Ans: Mean = 4.565 Median = 4Mode = 317. The frequency distribution of marks obtained by 60 students of a class in a college is given below: 55 - 59 Marks 30 - 34 35 - 39 40 - 44 45 - 49 50 - 54 60 - 64 No. of Students : 3 5 12 18 14 2 6 (i) Draw a Histogram for this distribution and find the modal value. (ii) Draw a cumulative frequency curve and find the marks limits of the middle 50% students. Ans: (i) Mode = 47.5 marks (ii) Q<sub>1</sub> = 42.5 marks **Q**<sub>3</sub> = 52 marks 18. Determine the value of Median and Mode of the following distribution graphically. Verify V A the results by actual calculations. After verifying, calculate the value of Mean and sketch a curve indicating the general shape of the distribution and comment. 10 - 19 20 - 29 30 - 39 40 - 49 50 - 59 60 - 69 70 - 79 80 - 89 90 - 99 Size Frequency 11 19 21 8 16 10 6 3 1 V A Hint: Change classes into class boundaries for Md. and Mode. Use Ogive for Md. And Histogram for Mode graphically. *Use Formaul: Md. = 37.83, Mo. = 32.35, Mean = [(3Md. – Mo.)/2] = 40.57*  $M > Md. > Mo. \Rightarrow$  Distribution is positively skewed. **Exercise D** (Geometric Mean and Harmonic Mean) 1. Compute the geometric mean of the following data: 35657 32.5 0.897 0.05403 6754 431 4.17 0.00678 Ans: 16.14 2. Compute the geometric mean of the following data: 0.7894 0.0563 0.0041 0.6465 0.0003 0.0854 0.0975 Ans: 0.04349 3. Compute the geometric mean of the following data: 100 150 360 200 500 450 750 800 900 5000 Ans: 480.5

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18.	Calcul	ate arithm	letic mea	n and	geometi	ic mea	n of t	the follow	ving dis	tribu	ution:	
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5	5057	0754	TJ 1	52	· · · ·	r.1/	0	.077	0.0540	5		s: 16.14
21.	Comp	ute the geo	ometric n	nean d	of the fo	llowing	g data	L <b>:</b>				
		-		0041	0.64		0.0003		075 0	.085	54	
		I	I								Ans:	0.0434
22.	Comp	ute the geo	ometric n	nean o	of the fol	llowing	g data	:				
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23.	From	the follow									7	
			f Expendi	iture	Index	Numb	ers	W	veight		_	
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24.	Comp	ute the geo	ometric n	nean o	of the fol	llowing	g serie	es:				_
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		ute the Ge					-					6 40
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110.	Ans:			1		- ~	10	1 12	10		~	
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26.		students	8					58	124		84	
26.		students	8			22 L4)		58	124		84	

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-			~~~		<i>~</i>			00_		s: 36.5
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6	Frequency	2	3		5	Ì	2	,	?	(
	Ans: 2.03 or 2									
28.	. Find the combin	ed Geometr	ic Mean	of the :	following	:				Ę
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A 200									An	s: 8.84
× 29.	. Determine the G		ean of th	ne follo	wing stoc	ek pric	es:			
Sto	ock Price (in Rs)	60 - 79.9	80 -	99.9	100 - 11	9.9	120 -	ļ	140 - 15	9.9
Fr	requency	7		6	8		32	2	20	
2 A									Ans: 1	21.31
<u>30.</u>	. Calculate the Ha				-				· · ·	
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4									Ans: (	).0108
» 31.	. Compute the We	<u> </u>			-					
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Ľ	Weights 8	15	2	15	10		20	10	5	
200			.1 . 0 . 11		1.				Ans: (	).0414 🖗
32.	. Find the Harmon									- 6
V A	Marks	0-10	10 - 20			$\frac{1-40}{1-7}$		- 50	50 - 60	_
v v	No. of Students	7	11	1	6	17	4	25	30	
27. 28. 29. 510 Fr. 30. X: 31. 32. 33.	<b>F</b> (1 1 / 1	1 1	1 1 /	.1					Ans:	24.33
× 33.	. From the data gi						24 2	<u> </u>	40 44	Т
27 V	Output No. of workers		$\frac{-19}{6}$ 20	$\frac{0-24}{7}$	$\frac{25-29}{12}$	<u> </u>		$\frac{5-39}{5}$	40-44 3	- 6
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34	. Find the missing	frequency	of the fo	llowing	series it	f its ha	armon	ic mea		
y V	Marks	10	20		30	1	40		50	e e
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27 V				UNIT	r – II					ę
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2.	5	=	dard De	viation	2 Distingu	ush b	etwee	n Mear	n Deviatio	n and
≥× ∧ ∩	Standard Deviati		of C+	nd D	lation''	h a!	abla -			ę
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∑7 V	with examples.									ę
PRAC	TICAL PROBLEMS	5:								ę
Å										
27 V		EXE	RCISE – J	A (Ran	ge and IQ	(R)				é
34. Long 1. 2. 3. 4. PRAC	From the monthl	v income of	10 famil	ies give	n below a	calcula	ate:			ę
<u> </u>	(a) the median (b	-		-						
39 V		5 the geome			e coefficie		unge			ę
				(15)						ę

S. No.		1	2	\$><\$	3	4	5		6	-	7	8	9	~	10	$\overline{]}$
Income	in Rs	145	5 36	7 26	68	73	18	5	619	28	30 2	115	87	70	315	1
Ans	: (a) M	ld = Rs	274 (	b) G = 1	Rs 2	52.4	- (c) Co	oeffi	cient	of R	ange	= 0.8	84			J
			-	ices of							-			giver	ı year	aı
as u	nder:															
Months:	Jan.	Feb.	Mar.	April	Μ	ay	June	July	/ Au	g.	Sept.	0	ct.	Nov	. De	c.
$I_1$	188	178	173	164	12	72	183	184	ł 18	5	211	2	17	232	24	0
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Calc	ulate r	ange fo	or each	share.	Her	nce, d	liscuss	whi	ch sha	re d	lo you	con	sider	' mor	e	
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Age in yea	ars (le	ss than	)	25		30	35		40		45		50		55	
No. of em	ployee	S		10		25	75		130		170		189		200	
		A	ns: Q1	= 33.5	yea	rs		<b>Q</b> 3 =	= 43 y	ear	s		$Q_3 - \overline{Q_1}$	<sup>L</sup> = 4	.75 ye	aı
4. Find	the n	10de. n	nedian	, lower	aua	artile	e (01) a	-	-				4			
		ollowin			1				1 Г	1	- (				-	
Wages:			-	- 10		10 -	20	2	0 - 30		30	- 40		40	- 50	
No. of wo	rkers:		2	22		38	3		46		3	35			20	
Ans	: Mode	e = 24.2	21; Me	dian =	24.	46 Q	2 <sub>1</sub> = 14	.803	$Q_3 = 2$	24.2	21 Coe	eff. o	of Q. I	D. =	0.396	
				of Qua												
Size	4 - 8	3 8	-	12 –	16	- 20	) 20	) –	24	_	28	-	32	2 –	36 -	4(
		12	2	16			2	4	28	3	32	2	3	6		
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				inge (ii						, an	d (iii)	Coe	fficie	nt of	quart	ile
	ation f			wing fr			1									
Marks		10 -	- 4	20 -		0 -	40		50 -	-	60 -	-	70		80 -	
No of Church		20		30		10	50		60		70		80		90	
No. of Stuc		60		45 7 <b>5 (iii)</b>		20	25		90		80		12	0	60	
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-			20	)	30		40		50		60		70		80	
No. of wor	kers	20		45	6	35	16	0	70		55		35	5	30	
		A	Ans: (i)	(a) 32	2.49	6 (b)	68.4%	6 (ii	) $Q_1 =$	27.	06 Q <sub>3</sub>	= 49	9.29	Q.D.	= 11.	11
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ð .	2. Calo	rulate t	he me	an dev	viation	about	medi	an of th	e serie		15. A	.191. – 1	1.07,	, MI. D	- 0.7
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				-			-	-		Ans: N	M.D. (	(about	med	lian) = 2	2.22
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	Heigh	t in inc	hes	N	o. of st	udent	S	Heig	ght in ii	nches		No.	of stu	dents	
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\$	59 20 64 22 6 60 20 67 10														
		60			32				65				10		A
V	Ans: Quartile range = 4; Percentile Range = 8; Coefficient of Q.D. = 0.25EXERCISE B (Mean Deviation & Standard Deviation)1. Calculate the mean deviation about A.M. from the following: $Value (X)$ 10111213Frequency (f)3121812Ans: A.M. = 11.87; M. D. = 0.72. Calculate the mean deviation about median of the series: $X$ 2.53.54.55.56.57.58.59.510.5f2356646414Ans: M.D. (about median) = 2.223. Compute the quartile deviation and mean deviation from median for the following data:Height in inchesNo. of studentsHeight in inchesNo. of students581563226032651061356686233Ans: Q.D. = 1.5; M.D. (about median) = 1.73														
\$ _	62 33 Ans: O.D. = 1.5: M.D. (about median) = 1.73														
A 3	<ul> <li>Ans: Q.D. = 1.5; M.D. (about median) = 1.73</li> <li>4. With median as base, calculate the mean deviation and compare the variability of two</li> </ul>								1./3						
V A		es A an		Dase,	calcula		mea	II UEVIA	tion al		npar	e the v	allac	Jinty OI	two 🎙
* • [	Series		3484	4,	572	4124		3682	5624	. 4	4388	36	80	4308	6
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	Series A:       3484       4572       4124       3682       5624       4388       3680       4308         Series B:       487       508       620       382       408       266       186       218         Ans:       Series A: Md. = 4216 ; M.D. = 490.25; Coefficient of M.D. = 0.116														
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	berres	D.		is: S	eries A Series A	: Md. A: Md.	= 42 . = 39	382 16 ; M.I 95 ; M.D	0. = 49 0. = 121	0.25; 1.38;	Coef	ficient	t of M of M	I.D. = 0. .D. = 0.3	.116 307.
	501103	<u>D</u> .		is: S	eries A Series A	: Md. A: Md	= 42 . = 39	382 16 ; M.I 95 ; M.D	0. = 49 0. = 121	0.25; 1.38;	Coef	ficient	of M	I.D. = 0. D. = 0.3 re varia	307.
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	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
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	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
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	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.3 re varia	307. ible. (
	E Con	anara	An	icnorci	Series A	A: Md	. = 39	95 ; M.D	= 121	1.38;	Coeff Seri	ficient ies B is	of M s moi fficion	.D. = 0.: re varia nt of n 4 Tot 7/2 5/2 M.D. at s) = 0.0 60 - 7 3 May 19 eries: 16 1 5/2 eries: 16 1	307. ible. (

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Class interval	Frequency	Class interval	Frequency
20 - 25	6	50 - 55	10
25 - 30	12	55 - 60	8
30 - 40	17	60 - 70	5
40 - 45	30	70 - 80	5
45 - 50	10		

Also calculate the coefficient of mean deviation

## Ans: 8.75; 0.206

10. The following distribution gives the difference in age between husband and wife in a particulars community:

	Difference in years	0 – 5	5 - 10	10 -	15 –	20 -	25 –	30 -	35 –
þ				15	20	25	30	35	40
Ş	Frequency	449	705	507	281	109	52	16	4

Calculate the mean deviation about median from these data. What light does it throw on the social conditions of a community?

## Ans: M.D. about median = 5.24

9 V A

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11. Find the median and mean deviation of the following data:

Frequency         7         12         18         25         16         14         8	Size	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
	Frequency	7	12	18	25	16		8

## Ans: Median = 35.2; M.D. = 13.148

12. Calculate the value of coefficient of mean deviation (from median) of the following data:

		•	,
Marks	No. of Students	Marks	No. of Students
10 – 20	2	50 - 60	25
20 – 30	6	60 - 70	20
30 - 40	12	70 - 80	10
40 - 50	18	80 - 90	7

# Ans: Median = 54.8; M.D about median = 12.95; Coefficient of M.D. = 0.236 13. Compute the mean deviation from median and from mean for the following distribution of the scores of college students:

01 the 5	cores or cone	ge students.				
Scores	140 – 150	150 – 160	160 – 170	170 – 180	180 – 190	190 - 200
Frequency	4	6	10	10	9	3

## Ans: 10.24; 10.56

14. Calculate the Mean Deviation from Median from the following data:

Wages in Rs (Mid value)	125	175	225	275	325
No. of persons	3	8	21	8	2

Ans: Median = 221.43; M.D. (Median) = 31.607

15. Calculate standard deviation of the following marks obtained by 5 students in a tutorial group:

15,

22

Marks obtained: 8, 12, 13,

## Ans: 4.6

## 16. Compute the standard deviation of the following series;

Daily wages of	No. of	Daily wages of	No. of	Daily wages of	No. of
Workers (in	Workers	Workers (in	Workers	Workers (in	Workers
Rs)		Rs)		Rs)	
100 - 105	200	120 - 125	350	140 - 145	280
105 - 110	210	125 - 130	520	145 - 150	210
110 – 115	230	130 - 135	410	150 - 155	160
115 – 120	320	135 - 140	320	155 - 160	90

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							Ans: S.D	. = 14.24
17. Find the mean and	standard	d deviati	on of the	followin	ıg data:			
Age under (years)	10	20	30	40	50	60	70	80
No. of persons dying	15	30	53	7	100	110	115	125

No. of persons dying	15	30	53	7	100	110	115	125	
				Ans	: Mean =	= 35.16;	S.D. = 19	<b>).76 yea</b>	rs
10 In the following dat	ta truca al	and from	ion aioa a		n a.				

18. In the following data, two class frequencies are missing:

Class Interval	Frequency	Class Interval	Frequency
100 - 110	4	150 - 160	?
110 - 120	7	160 - 170	16
120 - 130	15	170 - 180	10
130 - 140	?	180 - 190	6
140 - 150	40	190 - 200	3

However, it was possible to ascertain that the total number of frequencies was 150 and that the median has been correctly found out as 146.25. you are required to find with the help of information given:

(i) The two missing frequencies;

(ii) Having found the missing frequencies, calculate the Arithmetic Mean and Standard Deviation

- (iii) Without using the direct formula, find the value of mode.
- Ans: (i) 24, 25 (ii) A.M. = 147.33; S.D. = 19.2 (iii) Mode = 144.09 19. The following table gives the distribution of income of household based on hypothetical data:

Income	Percentage of	Income	Percentage of
(Rs)	households	(Rs)	households
Under 100	7.2	500 - 599	14.9
100 – 199	11.7	600 - 699	10.4
200 – 299	12.1	700 – 999	9.0
300 - 399	14.8	1,000 and above	4.0
400 - 499	15.9		

(i) What are the problems involved computing standard deviation from the above data? (ii) Compute a suitable measure of dispersion

Ans: (ii) Compute Quartile Deviation; Q. D. = 169.425; Co-efficient of Q.D. = 0.404 **EXERCISE C (Skewness)** 

From the following distribution of marks, find the Karl Pearson's skewness and its 1. coefficient:

D-ll N-	1001	1002	1002	1004	1005	1000
Roll No.	1001	1002	1003	1004	1005	1006
Marks	4	6	20	10	7	3

- Ans: SK(p) = 5.49; Coefficient of SK(p) = 0.97
- V A 2. From the following frequency distribution, find out Karl Pearson's skewness and its coefficient:

			Ans: SK(n)	= -38.00	officient of	SK(n) = -0	13
No. of workers	3	7	10	20	6	4	
Wages in Rs	10	20	30	40	50	60	

				Alls. SK	(P) <b>-</b> - 5.0	, coefficie	III OI SIN	P) = - 0.50
3. From t	he followii	ng distribu	tion, find c	out Karl Pea	arson's coe	efficient of	skewness	5:
Group	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
F:	5	10	12	14	30	18	9	2

Ans: SK(p) = -0.32

V A

From the following data, find Bowley's skewness and its coefficient 4.

Size   1   5   12   22   17   9   4

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		-					f Karl Pea ) = 0.23;			) = :	S: Coof	ficier	nt of	SK(n) -	-
	0.43	51(D) -	,	Jennere	iit oi	JN(D)	<b>j - 0.2</b> 3,	1113	. Six(p	J	, coch		it oi	5 <b>K</b> (p) -	-
5.	From	1	owing		-	1	ution, fir	1	-	1		r		1	
X: F:		70 8		80 20	9 3		100 40		110 32		120 25		30 .8	140	)
		1				•			SK(B) =		; Coeff	icien	t of	SK(B) =	
6.				-			f marks			-		of st	tude	nts, fino	d th
Mai		ness, an	0-1		ent by )-20	20-3	nethod gi 30 30-		бу воу 40-5(	<u> </u>	: 50-60	60-	.70	above	70
	of Stu	dents	8		20	35	4(	0	32		25	1	8	22	
7.	From	the foll	owin	a data f	ind K	ally's a	<b>Ans: S</b> l skewnes							K(B) = -	
7.		those of			mu K	eny s s	SKEWHES	s and		enn	Jent. A	150 CC	mpa		1
X:		3	10	30	)	40	47	5	0	55	6	0	70	) 75	5
	Sŀ	K(K) = -	18.8	; Coeffi	cient	of SK	(B) = - 0	).27;	SK(B)	) = -	9.5; Co	oeffic	cient	t of SK(I	-
8.	Find	out Kell	ev's s	kewnes	s, and	l its co	oefficient	fror	n the f	ماام	ving di	strib	utior	n:	0.2
X	1 1114		4		6 6		10		20			7		3	
F:		() = 9; C	3		10		0		40		4	47		50	
						U	NIT – I		(K) = 1	.06;	Coeffi	cient	t of S	5 5K(B) =	0.08
1. 2. 3. 4.	Disc Disc Wha assu	uss diffe uss the it do you imption	erent vario 1 mea s of re	method us prop in by Re egressio	ls of r erties gress on ana	tion? E neasur s of cor sion Ar alysis.	<b>NIT – 1</b> Explain d ring the o rrelation nalysis? 1	SK( III iffere corre is coe Discu	ent typ elation efficier 1ss the	oes c of t nt w ess	of corre wo var ith suit ential fo	latior iables able e	ı. 5. exam	ples.	0.0
2. 3. 4. 5.	Disc Disc Wha assu Dist	uss diffe uss the it do you imption	erent vario 1 mea s of re betwo	method us prop in by Re egressic een cor	ls of r erties gress on ana	tion? E neasur s of cor sion Ar alysis.	<b>NIT – 1</b> Explain d ring the o	SK( III iffere corre is coe Discu	ent typ elation efficier 1ss the	oes c of t nt w ess	of corre wo var ith suit ential fo	latior iables able e	ı. 5. exam	ples.	 0.0
2. 3. 4. 5.	Disc Disc Wha assu Dist	uss diffe uss the at do you imption inguish	erent vario 1 mea s of re betwo	method us prop in by Re egressic een cor	ls of r erties gress on ana relatio	cion? E neasur s of cor sion Ar alysis. on ana	<b>NIT – 1</b> Explain d ring the o rrelation nalysis? 1	SK( III iffere corre is coe Discu d reg	ent typ elation efficien iss the ression	oes c of t nt w esso n an	of corre wo var ith suit ential fo alysis.	latior iables able e	ı. 5. exam	ples.	 0.0
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2. 3. 4. 5.	Disc Disc Wha assu Dist ractica The the	uss diffe uss the at do you inguish al <b>Prob</b> l	erent variou u mea s of re betwo ems:	method us prop in by Re egressic een corr <b>CC</b> anager o	ls of r erties gress on ana relation <b>DRR</b>	cion? E neasur s of cor sion Ar alysis. on ana ELA EXE ompan	NIT – I Explain d ring the o rrelation nalysis? I alysis and <b>TION</b>	SK( III iffere corre is coe Discu d reg AN E – _ ins t	ent typ elation efficier uss the cression ALY A hat the	oes co of t nt w esso n an <b>SIS</b> flow	of corre wo var ith suit ential fo alysis.	latior iables able e eatur	n. 5. exam es ar	nples. nd ?), depen	ıds c
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(*000 Blind Z Y 10. 1	Hints: Hints: Hints: Hints: Hints: Hints: Hints: Hint: Hint: Fints: Hint: Fints: Hint: Fints: Hint: Fints:	follov follov follov etween	10     10       0     5       5     5       shall find     15       67     67       ving data     67       Area in a     67	0 - 20         60         40         follow         follow         asity of         square         150         180         100         60         120         80         Density	$\frac{20 - 40}{40}$ $\frac{40}{25}$ $\frac{25}{100}$	30       30         30       30         4       4         1ation co       6         111       111         s, calcula       111         s, calcula       111         s, calcula       111         so, calcula       111         so, calcula       111         so, calcula       111         so, calcula       111         ation and       111         Pop       111         ulation and       111         Area       111	and L	$   \begin{array}{r}     40 - 50 \\     24 \\     36 \\     ent betwee \\     \hline     45 \\     150 \\     e coeffice \\     leath rate \\     n (in '00 \\     30 \\     90 \\     40 \\     42 \\     72 \\     24 \\     Death Rate $	$\frac{50 - 11}{22}$ een age $\frac{55}{200}$ cient of $\frac{55}{200}$ N $\frac{55}{200}$ cient of $\frac{55}{200}$	(X)	60 - 6 18 and 1 65 300 relati 560 840 224 312	< <b>100</b>	70 - 80 3 15 <i>f blinds</i> 75 500 <b>r = 0.8</b> 7 Pearso
(*000 Blind Z Y 10. 1	Hints: Hi Jakh (Y) d With the method b Cities A B C D E F	follov follov follov etween	10     10       0     5       5     5       shall find     15       67     67       ving data     67       Area in a     67	0 - 20         60         40         follow         follow         asity of         square         150         180         100         60         120         80         Density	$\frac{20 - 40}{40}$ $\frac{40}{25}$ $\frac{25}{100}$	30       30         30       30         4       4         1ation co       6         111       111         s, calcula       111         s, calcula       111         s, calcula       111         so, calcula       111         so, calcula       111         so, calcula       111         so, calcula       111         ation and       111         Pop       111         ulation and       111         Area       111	and L	$   \begin{array}{r}     40 - 50 \\     24 \\     36 \\     ent betwee \\     \hline     45 \\     150 \\     e coeffice \\     leath rate \\     n (in '00 \\     30 \\     90 \\     40 \\     42 \\     72 \\     24 \\     Death Rate $	$\frac{50 - 11}{22}$ een age $\frac{55}{200}$ cient of $\frac{55}{200}$ N $\frac{55}{200}$ cient of $\frac{55}{200}$	(X)	60 - 6 18 and 1 65 300 relati 560 840 224 312	< <b>100</b>	70 - 80 3 15 <i>f blinds</i> 75 500 <b>r = 0.8</b> 7 Pearso
('000 Blind Z Y 10. 1	Hints: Hints: Hints: Hints: Hints: Hints: Hints: Hint: Hint: Fints: Hint: Fints: Hint: Fints: Hint: Fints:	follov the co	10     10       0     5       5     5       shall find     15       67     67       ving data     67       Area in a     67	0 - 20         60         40         follow         follow         asity of         square         150         180         100         60         120         80         Density	$\frac{20 - 40}{40}$ $\frac{40}{25}$ $\frac{25}{100}$	30       30         30       30         4       4         1ation co       6         111       111         s, calcula       111         s, calcula       111         s, calcula       111         so, calcula       111         so, calcula       111         so, calcula       111         so, calcula       111         ation and       111         Pop       111         ulation and       111         Area       111	ate the culation	$   \begin{array}{r}     40 - 50 \\     24 \\     36 \\     ent betwee \\     \hline     45 \\     150 \\     e coeffice \\     leath rate \\     n (in '00 \\     30 \\     90 \\     40 \\     42 \\     72 \\     24 \\     Death Rate $	$\frac{50 - 11}{22}$ een age $\frac{55}{200}$ cient of $\frac{55}{200}$ N $\frac{55}{200}$ cient of $\frac{55}{200}$	(X)	60 - 6 18 and 1 65 300 relati 560 840 224 312	< <b>100</b>	70 - 80 3 15 <i>f blinds</i> 75 500 <b>r = 0.8</b> 7 Pearso
(*000 Blind Z Y 10. 7 10. 7 10. 7 10. 7	Hints: Hi	follov the co	10     10       0     5       5     5       shall find     15       67     67       ving data     67       Area in a     67	0 - 20         60         40         follow         follow         asity of         square         150         180         100         60         120         80         Density	$\frac{20 - 40}{40}$ $\frac{40}{25}$ $\frac{25}{100}$ $\frac{25}{100}$ $\frac{6}{5}$ cities find the second seco	30       30         30       30         4       31         1       4         1       4         1       35         1       11         s, calculation and       111         s, calculation and       Pop         ulation       Pop         ulation       From the	ate the culation of the culati	40 - 50 24 36 ent betwo 45 150 e coeffic leath rate on (in '00 30 90 40 42 72 24 Death Rate ving data	$\frac{50 - 11}{22}$ een age $\frac{55}{200}$ cient of $\frac{55}{200}$ N $\frac{55}{200}$ cient of $\frac{55}{200}$	60 (X) (X) Jo. cor 14 5 5 6 12 5 12 5 12 5 12 5 12 5 12 5 12	60 - 6 18 and 1 65 300 relati 560 840 224 312	< 100 Ans:	70 - 80 3 15 <i>f blinds</i> 75 500 <b>r = 0.8</b> 7 Pearso
('000 Blind X Y 10. 1 11. 0 X	Hints: Hi	follov the co	10     10       0     5       shall find     15       67     67       ving date     15       a the der     15       Area in a     15       tween, h     15       rrelation     9	0 - 20         60         40         follow         follow         asity of         square         150         180         100         60         120         80         Density	$20 - 40$ $40$ $25$ $100$ $6 \text{ cities}$ $f \text{ popula}$ $miles$ $y = \frac{Popula}{A}$ $F \text{ citient f}$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ate the culation of the culati	40 - 50 24 36 ent betwo 45 150 e coeffic leath rate n (in '00 30 90 40 42 72 24 Death Rate ving data 11	$\frac{50 - 11}{22}$ een age $\frac{55}{200}$ cient of $\frac{55}{200}$ N $\frac{55}{200}$ cient of $\frac{55}{200}$	60 (X) (X) Jo. co 12 5 5 6 12 5 12 5 12 5 12 5 12 5 12 5	60 - 6 18 and 1 65 300 relati 560 840 224 312	< 100 Ans: < 100 Ans: 7	70 - 80 3 15 <i>f blinds</i> 75 500 <b>r = 0.8</b> 7 Pearso
('000 Blind X Y 10. 1 11. 0 X	Hints: Hi	follov the co	10     10       0     5       shall find     15       67     67       ving date     15       a the der     15       Area in a     15       tween, h     15       rrelation     9	0 - 20         60         40         follow         follow         asity of         square         150         180         100         60         120         80         Density	$20 - 40$ $40$ $25$ $100$ $6 \text{ cities}$ $f \text{ popula}$ $miles$ $y = \frac{Popula}{A}$ $F \text{ citient f}$	30       30         30       30         4       4         lation co       ble         35       111         s, calcula       ation and         Pop       Pop         ulation       Pop         from the       1	ate the culation of the culati	40 - 50 24 36 ent betwo 45 150 e coeffic leath rate n (in '00 30 90 40 42 72 24 Death Rate ving data 11	$\frac{50 - 11}{22}$ een age $\frac{55}{200}$ cient of $\frac{55}{200}$ N $\frac{55}{200}$ cient of $\frac{55}{200}$	60 (X) (X) Jo. co 12 5 5 6 12 5 12 5 12 5 12 5 12 5 12 5	60 - 6 18 and 1 65 300 relati 560 840 224 312	< 100 Ans: < 100 Ans: 7	70 - 80 3 15 <i>f blinds</i> 75 500 <b>r = 0.8</b> 7 Pearso

	Let now each	value of X be n 3 and subtract 2 X and Y?	nultiplied by	2 and the	n 6 be ac	lded to it.	Similarl	y multipl	y each
						[C. A.	Founda	tion, May	y <b>1997</b> ]
								$(\mathbf{X},\mathbf{Y}) =$	
13.	18. Given:∑	$X = 125, \sum Y =$	$100, \sum X^2 =$	650, ∑ <i>Y</i>	$^{2} = 436,$	$\sum XY = 5$	20 and n	1 = 25, ob	tain the
	value of Karl	Pearson's corre	lation coeffic	eient r (X	,Y)				
								Ar	ns: 0.67
14.	You are given observations:	the following i	nformation r	elating to	a freque	ncy distri	ibution c	omprising	g of 10
	$\overline{X} = 5.5, \overline{Y} = 4$	4.0, $\sum X^2 = 385$ ,	$\Sigma Y^2 = 192$ .	$\Sigma(X + Y)$	$()^2 = 947$				
	Find $r_{xy}$	···, <b>_</b> ···,	<b>_</b> ,		,				
	xy						Ans:	r (X,Y) :	= 0.681
15.	A computer w	hile calculating	the correlati	on coeffi	cient het	ween the			
10.	-	ollowing results					vur luo iet	, ii uiid i	
		$120, \sum X^2 = 600$		$\nabla V^2 - 25$	$\nabla \mathbf{v} \mathbf{v}$	- 356			
							oniad day	un turo n	oire of
	observations a	er, later discove			cking tha		opieu uo	wii two p	
_		N				V		V	
_	X 8	$\frac{1}{10}$ Wh	ila tha aarraa	t voluos r	uara	<u>X</u> 8		Y 12	
	8 12	10 WII	ile the correc	t values v	vere,	8 10		8	
	1	rect value of th	e correlation	coefficie	nt hetwe	-		0	
	Ans: $\mathbf{r} = 0.05$		e correlation	coefficie		C.W.A. I		m 20031	
16			www.w.V.and	V fam 20	-				at of V
16.		correlation bet							
		d deviations are	-					-	
	27, Y = 30)	was wrongly	-					-	
			taken as (X	i = 17, i	Y = 35)	. Find th	ie correc	et coeffic	ient of
	27, $Y = 30$ ) correlation.	was wrongly	taken as (X Ans	= 17, °	Y = 35	. Find th <b>f correla</b>	ne correct tion coef	et coeffic	ient of <b>0.515</b> 3
17.	<ul><li>27, Y = 30)</li><li>correlation.</li><li>In order to find</li></ul>	was wrongly	taken as (X Ans tion coefficie	= 17, <b>Correct</b>	Y = 35) t <b>value o</b> een varia	. Find th <b>f correla</b>	ne correct tion coef	et coeffic	ient of <b>0.515</b> 3
17.	<ul><li>27, Y = 30) correlation.</li><li>In order to fit observations,</li></ul>	was wrongly ind the correla the following ca	taken as (X Ans tion coefficie alculations w	= 17, <b>Correct</b> ent betwe ere made	Y = 35) t <b>value o</b> een varia :	. Find th <b>f correla</b>	ne correct tion coef	et coeffic	ient of <b>0.515</b> 3
17.	<ul><li>27, Y = 30) correlation.</li><li>In order to fit observations,</li></ul>	was wrongly	taken as (X Ans tion coefficie alculations w	= 17, <b>Correct</b> ent betwe ere made	Y = 35) t <b>value o</b> een varia :	. Find th <b>f correla</b>	ne correct tion coef	et coeffic	ient of <b>0.515</b> 3
17.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$	was wrongly ind the correla the following ca	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$	$= 17, \mathbf{Y}$ <b>: Correct</b> ent betwee ere made $5, \sum XY =$	Y = 35) t <b>value o</b> een varia : = 334	. Find th <b>f correla</b> ıbles X a	ne correc <b>tion coef</b> and Y fr	et coeffic fficient = rom 12 p	ient of <b>0.5153</b> pairs of
17.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the j	Y = 35) t <b>value o</b> een varia : = 334 pair (X =	. Find th <b>f correla</b> ables X a = 11, Y =	tion coef and Y fr 4) was	t coeffic ficient = from 12 p copied w	ient of 0.5153 pairs of rongly
17.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the j	Y = 35) t <b>value o</b> een varia : = 334 pair (X =	. Find th <b>f correla</b> ables X a = 11, Y =	tion coef and Y fr 4) was	et coeffic ficient = rom 12 p copied w coefficie	ient of <b>0.5153</b> pairs of rongly nt.
17.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct values	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found 10, Y = 14). I	= 17, $\sum$ <b>:</b> Correct ent between ere made 5, $\sum XY =$ that the p Find the c	Y = 35) t value o een varia : = 334 pair (X = orrect va	Find the formation of t	tion coef and Y fr 4) was rrelation	et coeffic ficient = rom 12 p copied w coefficient Ar	ient of 0.5153 pairs of rongly nt. as: 0.78
	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct values	was wrongly ind the correla the following ca $f = 5, \sum X^2 = 67$ at verification, in lue being (X = 1)	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found 10, Y = 14). I	= 17, $\sum$ <b>:</b> Correct ent between ere made 5, $\sum XY =$ that the p Find the c	Y = 35) t <b>value o</b> een varia : = 334 pair (X = orrect va probable	Find the formation of t	tion coef and Y fr 4) was rrelation	et coeffic ficient = rom 12 p copied w coefficient Ar	ient of 0.5153 pairs of rongly nt. as: 0.78
	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct value Calculate the o	was wrongly ind the correla the following ca $f = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found (0, Y = 14). In correlation and	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c	Y = 35) t <b>value o</b> een varia : = 334 pair (X = porrect va probable	Find the formal of the formal	tion coef and Y fr 4) was rrelation m the fol	et coeffic ficient = rom 12 p copied w coefficient Ar	ient of 0.5153 pairs of rongly nt. as: 0.78
	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct value Calculate the of X: 7	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found 10, Y = 14). If prrelation and 5	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4	Y = 35) t value o een varia = 334 pair (X = orrect va probable	Find the formula $f$ correlates $X$ and $f$ the formula $f$ and $f$ a	tion coef and Y fr 4) was rrelation m the fol 2 6	et coeffic fficient = com 12 p copied w coefficient Ar lowing da 1	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata:
	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct value Calculate the of X: 7 Y 18	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found (0, Y = 14). If correlation and 5 14	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12	Y = 35) t value o een varia = 334 pair (X = orrect va probable	Find the formula $f$ correlated by $f$ correlated by $f$ and f and $f$ and $f$ and $f$ and	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b>	et coeffic ficient = com 12 p copied w coefficient Ar lowing da 1 8 P.E. $(\mathbf{r}) =$	ient of 0.5153 pairs of rongly nt. as: 0.78 ata: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct value Calculate the of X: 7 Y 18	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, is lue being (X = 1) coefficient of co 6 16	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found (0, Y = 14). If correlation and 5 14	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12	Y = 35) t value o een varia = 334 pair (X = orrect va probable	Find the formula $f$ correlated by $f$ correlated by $f$ and f and $f$ and $f$ and $f$ and	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b>	et coeffic ficient = com 12 p copied w coefficient Ar lowing da 1 8 P.E. $(\mathbf{r}) =$	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct value Calculate the of X: 7 Y 18 Find Karl Pea	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, is lue being (X = 1) coefficient of co 6 16	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found (0, Y = 14). If correlation and 5 14	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12	Y = 35) t value o een varia = 334 pair (X = orrect va probable	Find the formula $f$ correlated by $f$ correlated by $f$ and f and $f$ and $f$ and $f$ and	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b>	et coeffic ficient = com 12 p copied w coefficient Ar lowing da 1 8 P.E. $(\mathbf{r}) =$	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct value Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found (0, Y = 14). If the prelation and 5 14 ion coefficient 15 250	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200	Y = 35) t value o een varia = 334 pair (X = probable probable An en age an 17 150	Find the f correlation obles X at ables At ables X at ables At At At At At At At At At At At At At A	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>0.9643; H</b> g habits 19 100	et coeffic ficient = com 12 p copied w coefficie Ar lowing da 1 8 P.E. (r) = of the fol 20 80	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct values Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regular	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts ar players	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). If the prrelation and 5 14 tion coefficient 15 250 200	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200 150	Y = 35) t value of een varia = 334 pair (X = orrect va probable probable An en age an 17 150 90	. Find the f correlation ables X at ables At At At At At At At At At At	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b> g habits 19 100 30	et coeffic ficient = com 12 p copied w coefficie Ar lowing da 1 8 P.E. $(\mathbf{r}) =$ of the fol 20	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct values Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regular	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). If the prrelation and 5 14 tion coefficient 15 250 200	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200 150	Y = 35) t value of een varia = 334 pair (X = orrect va probable probable An en age an 17 150 90	. Find the f correlation ables X at ables At At At At At At At At At At	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b> g habits 19 100 30	et coeffic ficient = rom 12 p copied w coefficies Ar lowing da 1 $\mathbf{P}$ .E. (r) = of the fol 20 80 12	ient of 0.5153 pairs of rongly nt. hs: 0.78 hta: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct values Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regular	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts ar players	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). If the prrelation and 5 14 tion coefficient 15 250 200	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200 150	Y = 35) t value of een varia = 334 pair (X = orrect va probable probable An en age an 17 150 90	. Find the f correlation ables X at ables At At At At At At At At At At	tion coef and Y fr (= 4) was rrelation m the fol 2 6 <b>0.9643; H</b> g habits 19 100 30	et coeffic ficient = rom 12 p copied w coefficies Ar lowing da 1 $\mathbf{P}$ .E. (r) = of the fol 20 80 12	ient of 0.5153 pairs of rongly nt. hs: 0.78 hta: 0.0179
18.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct val Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regulate <i>Hint: Find r b</i>	was wrongly ind the correla the following ca $x = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts ar players	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). Horrelation and 5 14 tion coefficient 15 250 200 ) and percent	= 17, <b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200 150 tage of rec 17 17 17 17 17 17 16 17 17 17 17 17 17 17 17 17 17	Y = 35) t value of een varia = 334 pair (X = probable probable Mn en age an 17 150 90 egular pla	Find the f correlation of correlation of correlation x = 11, Y = 0 (10) (10) (11) (11) (12) (12) (13) (14) (14) (15) (15) (15) (15) (15) (15) (15) (15	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b> g habits 19 100 30	et coeffic ficient = rom 12 p copied w coefficies Ar lowing da 1 $\mathbf{P}$ .E. (r) = of the fol 20 80 12	ient of 0.5153 pairs of rongly nt. hs: 0.78 hta: 0.0179
18. 19. 20.	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct val Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regulate <i>Hint: Find r b</i>	was wrongly ind the correla the following ca $f = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts ar players between age (X)	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). Horrelation and 5 14 tion coefficient 15 250 200 ) and percent	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200 150 tage of recommended trelation free	Y = 35) t value of een varia = 334 pair (X = probable probable Mn en age an 17 150 90 egular pla	Find the f correlation ables X and the f correlation f correlation f correction f correct	tion coef and Y fr 4) was rrelation m the fol 2 6 <b>).9643; H</b> g habits 19 100 30	et coeffic ficient = rom 12 p copied w coefficies Ar lowing da 1 $\mathbf{P}$ .E. (r) = of the fol 20 80 12	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179 llowing 0.9912
18. 19. 20. Prio	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct values Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regulation <i>Hint: Find r let</i>	was wrongly ind the correla the following ca $f = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts ar players between age (X) 1 Pearson's coefficient	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). If the prelation and 5 14 ion coefficient 15 250 200 ) and percent fficient of con	= 17, <b>: Correct</b> ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 at betwee 16 200 150 tage of recommended trelation free	Y = 35) $t value of een varia = 334 pair (X =orrect value)probableAnden age and1715090egular platefor the for$	Find the f correlation ables X and the f correlation f correlation f correction f correct	tion coef and Y fr (= 4) was rrelation m the fol 2 6 <b>0.9643; I</b> g habits 19 100 30 <b>Ans</b> : series: - 114	et coeffic ficient = com 12 p copied w coefficient Ar lowing da 1 P.E. (r) = of the fol 20 80 12 : $\mathbf{r}_{xy} = -$	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179 llowing 0.9912
<ul> <li>18.</li> <li>19.</li> <li>20.</li> <li>Price</li> <li>Der</li> <li>Price</li> </ul>	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct val Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regulat <i>Hint: Find r b</i> Calculate Kar ce (in Rs) mand (in Kg.) ce (in Rs)	was wrongly ind the correla the following ca $f = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts in players between age (X) 1 Pearson's coefficient 10 - 111 600 116 - 117	taken as (X Ans tion coefficient alculations w $0, \sum Y^2 = 28$ it was found 10, Y = 14). H correlation and 5 14 tion coefficient 15 250 200 ) and percent fficient of con 111 - 11 640 117 - 11	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 nt betwee 16 200 150 tage of rec crelation f 2 11 8 11	Y = 35) t value of een varia = 334 pair (X = probable probable An en age an 17 150 90 egular pla for the fo 2 - 113 640 8 - 119	Find the f correlation ables X and the form $X = 11, Y = 10$ and $Y = 10, Y = 10$ and $Y = 10, Y = 10$ and $X = 10, Y = 10, Y = 10$ and $X = 10, Y = 10$ and $X = 10, Y = 10$ and $X = 10, Y = 10$ an	tion coef and Y fr (= 4) was rrelation m the fol 2 6 <b>0.9643; I</b> g habits 19 100 30 <b>Ans</b> : series: - 114	et coeffic ficient = rom 12 p copied w coefficient a copied w coefficient a $\mathbf{Ar}$ lowing da 1 $\mathbf{R}$ P.E. (r) = of the foll 20 80 12 : $\mathbf{r}_{xy} = -$ 114 - 1	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179 llowing 0.9912
<ul> <li>18.</li> <li>19.</li> <li>20.</li> <li>Price</li> <li>Der</li> <li>Price</li> </ul>	27, Y = 30) correlation. In order to fit observations, $\sum X = 30, \sum Y$ On subsequent the correct val Calculate the of X: 7 Y 18 Find Karl Peat students: Age (Years) No. of student No. of Regulat <i>Hint: Find r l</i> Calculate Karl ce (in Rs) mand (in Kg.)	was wrongly ind the correla the following ca $f = 5, \sum X^2 = 67$ at verification, in lue being (X = 1) coefficient of co 6 16 arson's correlation ts ar players between age (X) 1 Pearson's coefficient 110 - 111 600	taken as (X Ans tion coefficient alculations w $(0, \sum Y^2 = 28)$ it was found $(0, \sum Y^2 = 28)$ it was found (10, Y = 14). However, (10, Y = 14). However, (11, Y = 14). However, (11	<b>:</b> Correct ent betwee ere made $5, \sum XY =$ that the p Find the c 1 find its p 4 12 nt betwee 16 200 150 tage of rec crelation f 2 11 8 11	Y = 35) $t value of een varia = 334 pair (X =probableprobableAnen age an1715090egular plafor the fo2 - 113640$	Find the f correlation ables X and the form $X = 11, Y = 10$ and $Y = 10, Y = 10$ and $Y = 10, Y = 10$ and $X = 10, Y = 10, Y = 10$ and $X = 10, Y = 10$ and $X = 10, Y = 10$ and $X = 10, Y = 10$ an	tion coef and Y fr (= 4) was rrelation m the fol 2 6 <b>0.9643; I</b> g habits 19 100 30 <b>Ans</b> : series: - 114	et coeffic ficient = rom 12 p copied w coefficient a copied w coefficient a $\mathbf{Ar}$ lowing da 1 $\mathbf{R}$ P.E. (r) = of the foll 20 80 12 : $\mathbf{r}_{xy} = -$ 114 - 1	ient of 0.5153 pairs of rongly nt. ns: 0.78 ata: 0.0179 llowing 0.9912

<	<u> %&gt;&lt;%&gt;&lt;%&gt;&lt;</u>	) > < () > >	<\$>><	\$} > <\$}:	> <	<\$}>	<\$ <b>\$</b> ><\$	<u> </u>	<u>&gt; &lt; 6</u>	) > < (j)	> < 🎲 >	<\$\$><\$\$>
	Also calculate t	he prob	able erro	or of the	correl	ation	coeffici	ent. F	rom y	ou resi	ult can	you assert 💡
Y	that the demand	l is corre	elated w	ith price	e?							
				I I				Ance	r – 0 (	0651.1	PF (r)	= 0.0154
N AL											<b>F.E.</b> (f)	= 0.0154
<b>A</b> 21.	The deviations	from the	e respect	tive mea	ins of 2	X and	Y series	s are g	given b	below:		S
V	x -4	- 3	-2	- 1	1	0	1		2	-	3	4
	y 3	- 3	-4	0		4	1		2	_	2	-1 (
V	Calculate Karl	Pearson <sup>3</sup>	's coeffi	cient of	correl	ation f	rom the	abov	e data			
											<b>A</b>	
v			_		_				_			$\mathbf{x}(\mathbf{x},\mathbf{y}) = 0$
<b>A</b> 22.	Calculate the co	pefficien	nt of cor	relation	betwee	en X a	nd Y se	ries fr	om th	e follo	wing da	ata:
V						X Se	ries	Y	Serie	s		
	No	of obse	rvations			1:	5		15			8
V		thmetic				2:			18			Ì
		ndard de				5			5			S
V						5			5			
	$\sum (X - 25)(Y -$	- 18) =	125									8
V											Ans:	$r_{xy} = 0.33$
A 23.	Given $n = 10$ S	X = 10	$0.\Sigma(X -$	$(-10)^2 =$	= 600 \	Y =	150. Σ	(Y -	$(15)^2$	= 2.5		Å
v 25.	23. Given $n = 10$ , $\sum X = 100$ , $\sum (X - 10)^2 = 600 \sum Y = 150$ , $\sum (Y - 15)^2 = 25$ , $\sum (X - 10)(Y - 15) = 60$											
	$\nabla(v - 10)(t - 10)$	- 12) =	00								_	A
v										Ans: r	$r = 2\sqrt{5}$	= 0.8944
A 24.	The following 1	esults a	re obtair	ned hetw	veen tv	vo seri	es. Con	npute	the co	efficie	nt of co	rrelation.
v		55 or 65 m					20. 001	-	Series		Series	
	Number - f'	-						Λ		I		Å
V	Number of ite								/		/	
	Arithmetic me								4		8	e
V	Sum of square								28		76	Ì
	Summation of p	products	of devi	ations of	f X an	d Y se	ries from	n thei	r resp	ective	means :	= 46
V											A	ns: 0.997
		T		• <b>D</b> (	Dan		malat	<b>.</b> )				8
V		E	xercis	e - B (	Ran	KCO	rrelat	.10N)				
<b>A</b> 1.	Ranking of 10	trainees	at the b	eginnin	g (X)	and at	the en	d(Y)	of a c	ertain	course	are given
V	below:			-	-							
												8
v	Trainees	Α	В	С	D	E	F	G	Η	Ι	J	Ì
	X:	1	6	3	9	5	2	7	10	8	4	8
V	Y:	6	8	3	7	2	1	5	9	4	10	Ì
🐣 Calcul	ate Spearman's r	ank corr				C W A	Inter	June	19951			A
V	or openition of										Amar	D = 0.204
					_					_		R = 0.394
2.	The rank of sar	ne 16 sti	udents i	n Mathe	ematics	and F	hysics	are as	follow	ws. Tw	o num	per within
	brackets denote	the ran	ks of the	e student	ts in M	lathem	atics ar	nd Phy	vsics.			A
V										<b>_</b> .	<b>A</b>	, 14) (14, <sub>g</sub> natics
	(1, 1) (2, 10) (3,		) (5, 5)	(6, 7) (7	7, 2) (8	8, 6) (9	9, 8) (10	), 11)	(11, 1	5) (12	, 9) (13	, 14) (14,
V	12) (15, 16) (16,	13)										
	Calculate the ran	nk corre	lation	oefficie	ent for	nrofi	riencies	of th	is gro	un in l	Mather	natics
V						Prom	licites	, or th	10 510	սթու	induitu	
	and Physics.											
V											An	s: R = 0.8
A 3.	Two judges in	a beaut	v comn	etition r	rank tl	ne 12 e	entries	as fol	lows:			
N S.	- ) <u>0</u> 00 m		P			'		01				6
📕 X		3	4	5	6	7	8		9	10	11	12
💟 Y	: 12 9	6	10	3	5	4	7		8	2	11	1
🧸 What	degree of agreer	nent is f		etween	the tw	o jude	ges.					a.
No. Contract	-0					- ,	,				Ange D	= - 0.454
What							-		_			
<b>¥</b> 4.	Ten competito	rs in a b	beauty o	ontest a	are rai	nked b	y three	e judg	es in t	the fol	lowing	order:
		1	-	4	0	0	~	10	-	~	~	
30	1 <sup>st</sup> Judge	1	5	4	8	9	6	10	7	3		e
V	2 <sup>nd</sup> Judge	4	8	7	6	5	9	10	3	2		
V A	0 1 7 1	6	7	8	1	5	10	9	2	3	4	ę
	3 <sup>rd</sup> Judge											
	3 <sup>rd</sup> Judge											
	3 <sup>rd</sup> Judge											ବ
> < \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	3 <sup>rd</sup> Judge				(23)							ę
	3 <sup>rd</sup> Judge				(23)							ę

বিটাবঞ্চিাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাবঞ্চিচাব বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহ বিটাহিদ্যাল বিটাহ বিটাহিদ্যাল বিটাহি বিটাহিদ্যাল বিটাহ বিটাহিদ্যাল বিটা বিটাহিদ্যাল বিটাহ বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহ বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটা বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ্যাল বিটা বিটাহিদ্যাল বিটাহিদ্যাল বিটাহিদ

												$_{23} = 0.733$
	-										ion taste	es in beaut
5.	For the follo	•						nk Co		tion:		
X			)1	99	71		61		81		70	59
Y	123	1	35	154	110	)	105		134		121	106 D - 0.057
6.	The followir	ng ara t	ho marl	ze obtair	and by a	aro	in of c	tudor	nte in	twon	anore C	$\mathbf{R} = 0.952$
0.	rank coeffici	-			leu by a	i gi u	ip or s	luuei	115 111	twop	apers. C	alculate th
	onomics:	78	36	98 01	25	75	82		92	62	65 25	39
Sta	itistics:	84	51	91	69	68	62	č	36	58	35 Ans	49 <b>R = 0.612</b>
7.	Calculate Sp	earmai	n's coef	ficient c	of rank	corre	latior	n for t	he fo	llowin		
/.	psychology									nown	ig uutu v	51 500105 1
						-					Ŧ	Ŧ
Chil X:	d A 105	В 104	C 102	D 101	E 10		F 99	( 9		Н 96	I 93	J 92
Y:	103	104	102	98	95		99 96	10		90 92	93 97	92 94
		200	100	,0			20	1				R = 0
8.	Compute the	e Coeffi	cient of	Rank Co	orrelati	on be	etweer	n X an	d Y fr	om th	e data g	
X :	8 10		.5 3	20	21	5	10	14	8	16	-	19 6
Y :	3 12	8 1	.3 20	9	14	11	4	16	15	10		23 25
												R = 0.035
9.	Given the fo	-	-	de and I.	Q. scor	es fo	r a gro	oup of	stude	ents. F	ind the	coefficient
	of rank corr						_					
-	otitude Score	ć	57	58	59 05	5		60 120	6		60	64 110
1.0	). Score		97	108	95	10	6	120	12	26	113 Ans	110 <b>R = 0.702</b>
10.	The followin	no data	relate	to the r	narks o	htair	ned hv	7 10 s	tuder	nts of		
10.	and Costing	•	Telute	to the f		btun	icu by	10 5	cuuci	105 01	a clubb	in blatisti
Mark	s in Statistics		38	28	27	7	28	23	30	33	3 28	35
	s in Costing	29			29		20	29	18	22		
	Obtain the r	ank cor	relatio	n coeffic	ient.							
												: R= 0.351
11.	Find the coe											
	and those in		ics (Y)	by 10 sti	udents	of a c	ertain	class	out o	of a tot	al mark	s of 50 in
	each subject											
	Student No.		2	3	4	5		6	7	8	9	10
	X Y		18 15	32 28	18 16	2 2		24 22	25 28	40 36		22 19
	I	. 10	13	20	10	Z	T .	<i>L L</i>	20	30		ns: R = 0.9
12.	From the fol	lowing	data. c	alculate	the coe	fficie	nt of r	ank c	orrela	ation <sup>k</sup>		
X:	32	35	49	60	43		37	43		49	10	20
Y:	40	30	70	20	30		50	72		60	45	25
											Ans: R	k = -0.075
		EX	ERCI	SEC(	REGR	ESS	ION A	ANA	LYSI	<b>S</b> )		
1.	Given the fol	llowing	values	of X and	Y:							
	X:	3		5	6		8			9	11	
	Y:	2		3	4		6	5		5	8	
	equation of	•										
(i	) Y on X and	(ii) X o	on Y									

	0	btain the ed	quations	or the	twon	nes or	regres	551011 1	or un	/ uui			••		
	X:	1	2		3	4		5		6		7	8		9
	Y:	9	8		10	12		11		13	1	4	16		15
									Ans:	<b>Y</b> =	= 0.95X	X + 7.2	5; X =	0.95	SY + 7.
3.	Fr	om the fol	lowing o	lata of	the ag	e of hu	isband	d and t	he ag	e of	f wife,	form tv	vo regi	essi	on line
	ar	nd calculate	e the hus	band's	s age w	when th	e wife	è's age	e is 10	5:					
	Hus	band's age:		36	23	27	28			29	30	31	33		35
	Wife	e's age:		29	18	20	22	2 2	-	21	29	27	29		28
											usban	0			0
					•••						.5, X =				
4.		nd the regr		quatio	n Y on	n X wh	ere Y	and x	are t	ne m	narks o	btained	i by 10	stuc	lents as
		ven below:										0.0	10		= 0
	$\frac{Y}{Y}$	20	60	55		45	75		35		25	90	10		50
	X:	20	45	65		40 105. V	55	-	35		15 [C.A.	80 (Four	25		50
5.	T	he followin				-					-				•
5.		ven by nun	• •		-				-	1018	anu til	en per	ormall	UC 17	aungs i
Γ	Opera	-		300 <b>u</b> p			2	3	s.		5	6	7		8
_	-	rience (in y	vears) (X	0	16		2	18	4		3	10	5		12
		rmance Ra			87		38	89	68		78	80	75		83
L		alculate the	<b>U</b>		e of pe	erform	ance r	ratings	on e	kper	rience a	and esti	imate t	he pi	robable
		arearate the													
		erformance	-		has 7	years'	exper	ience.							
	pe	erformance	if an op	erator	-	-	exper	rience.							
6.	pe A	erformance ns: Y = 69	if an op <b>.97 + 1.</b>	erator 133X;	77.601	ĺ	-		es. O	otaiı	n the tv	vo regr	ession	equa	ations b
6.	pe A Y	erformance ns: Y = 69 ou are give	if an op <b>.97 + 1.</b> on the da	erator 133X; ta rela	<b>77.60</b> 1 ting to	l purcha	ases a	and sal				-		-	
	pe A Y	erformance ns: Y = 69 ou are give e method c	if an op <b>.97 + 1.</b> on the da	erator 133X; ta rela	<b>77.60</b> 1 ting to	l purcha stimate	ases a	and sal		when		-		al 10	
]	pe A Y th	erformance <b>ns: Y = 69</b> ou are give e method c mases:	if an op .97 + 1. on the dates of least s	erator 133X; ta rela quares	<b>77.60</b> 1 ting to and each 98	urcha burcha stimate 8	ases a e the li	nd sal ikely s	ales	when 5	n the p	urchas	es equa	al 10	0:
_	pe A Y th Purch	erformance ns: Y = 69 ou are give e method conserved ases:	if an op .97 + 1. on the data of least s 62	erator <b>133X;</b> ta rela quares 72 124	<b>77.60</b> ting to and es 98 13	urcha purcha stimate 8 31 1	ases a e the li 76 17	ind sal ikely s 81 132	ales v 56 96	when 5	n the p 76 120	urchase 92 136	es equa 88 97	al 10	0: 49 85
	pe A Ye th <u>Purch</u> Sales: Tl	erformance ns: Y = 69 ou are give e method co ases: Ans: P he height o	if an op .97 + 1. on the data of least s 62 112 <b>Purchase</b> f fathers	erator <b>133X;</b> ta rela quares 72 124 es X; S and s	<b>77.60</b> ting to and es 98 13 <b>Sales Y</b> ons is	purchastimate $8$ $\overline{31}$ $1$ $\mathbf{X} = 3$ given i	ases a e the li 76 17 <b>0.651</b> in the	and sal ikely s 81 132 5Y + 0 follow	ales v 56 96 0.077 ving t	when 5 5; <b>Y</b> able	n the p 76 120 7 = 0.78 e. Find	urchase 92 136 825X + the two	es equa 88 97 - <b>56.31</b> o lines	al 10 25; 2	0: 49 85 <b>134.56</b> egressi
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7. <u>He</u> 8. <u>Ag</u>	pe A Y th Purch Sales: Tl ar in eight eight t t ge (Y) pood P	erformance ns: $Y = 69$ ou are give e method c bases: Ans: P he height o nd estimate ches: of father (in of sons (in he followin ressure (Y)	if an op .97 + 1. in the data of least standard 62 112 Purchase f fathers inches) n inches n inches n inches n $14$	erator 133X; ta rela quares 72 124 es $X; S$ a and so pected ) 4 gives t 5 4 7 1	<b>77.60</b> ting to and es <b>98</b> <b>13</b> <b>Sales Y</b> ons is avera <b>65</b> <b>67</b> <b>Ans: Y</b> he age <b>42</b> <b>25</b>	$ \begin{array}{c c} \mathbf{I} \\ \text{purchastimate} \\ \hline \mathbf{Stimate} \\ $	ases a e the li 76 17 0.651 in the ght of 242X blood 47 128	and sal ikely s 81 132 5Y + 0 follow f the s 67 64 + 39.5 pressu 49 14		when $5$ $5$ ; $Y$ able then $X = 10 \text{ y}$	$\begin{array}{c} n \text{ the p} \\ \hline 76 \\ 120 \\ \hline 2 \\ \hline 3 \\ \hline 4 \\ \hline 6 \\ \hline 7 \\ \hline 7 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline 6 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline $	urchase         92         136 $825X + 1$ the two         eight co         69         70 $Y + 32$ 0       7	es equa 88 97 - 56.31 o lines f the f 7 69 .2875; 2	al 10 <b>25;</b> 2 of refathe 1 <b>68.1</b>	0: 49 85 134.56 egressi r is 67 73 70 18 inch
7. <u>He</u> 8. <u>Ag</u>	$pe \\ A \\ Y \\ th \\ Purch \\ Sales: \\ Tl \\ ar \\ in \\ eight \\ eight \\ ce (Y) \\ pood P \\ (i)$	erformance ns: $Y = 69$ ou are give e method co ases: Ans: P he height o nd estimate ches: of father (in of sons (in he followin ressure (Y) ) Find the c	if an op .97 + 1. an the data of least s 62 112 Purchase f fathers a the exp inches inches 50 14 correlation	erator 133X; ta rela quares 72 124 es X; S and so pected ) f gives t 5 4 7 1 6 4 7 1 1 1 1 24 1 24 1 24 1 24 1 24 1 24 1 24 1 1 24 1 24 1 24 1 24 1 24 1 24 1 24 1 24 1 1 1 1 1 24 1 1 1 1 1 1 1 1	<b>77.60</b> ting to and es and es <b>98</b> <b>13</b> <b>Sales Y</b> ons is avera <b>65</b> 67 <b>Ans: Y</b> he age <b>42</b> 25 fficient	$\begin{array}{c c} \mathbf{I} \\ \text{purchastimate} \\ \hline \mathbf{S}1 & \mathbf{I} \\ \hline \mathbf{S}1 & \mathbf{I} \\ \hline \mathbf{S}1 & \mathbf{I} \\ \hline \mathbf{S}2 & \mathbf{I} \\ \hline \mathbf{S}3 & \mathbf{I} \\ \hline \mathbf{S}3 & \mathbf{I} \\ \hline \mathbf{S}4 & \mathbf{S}4 \\ \hline \hline \mathbf{S}6 & \mathbf{I} \\ \hline \mathbf{S}6 & \mathbf{I} \\ \hline \hline \mathbf{S}6 & \mathbf{I} \\ \hline S$	ases a the line 17 0.651 in the ght of 242X blood 47 128 cen X	and sal ikely s 81 132 5Y + 0 follow f the s 67 64 + 39.5 pressu 49 14 and Y	$ \begin{array}{c c}                                    $	when $5$ , $\mathbf{Y}$ able then $\mathbf{X} = \frac{10 \text{ y}}{42}$	$\begin{array}{c} n \text{ the p} \\ \hline 76 \\ 120 \\ \hline 2 \\ \hline 3 \\ \hline 4 \\ \hline 6 \\ \hline 7 \\ \hline 7 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline 6 \\ \hline 6 \\ \hline 7 \\ \hline 6 \\ \hline $	urchase         92         136 $825X + 1$ the two         eight co         69         70 $Y + 32$ 0       7	es equa 88 97 - 56.31 o lines f the f 7 69 .2875; 2	al 10 25; 2 of ro fathe 1 63	0: 49 85 <b>134.56</b> egressi r is 67 73 70 <b>18 inch</b> 55
7. <u>He</u> 8. <u>Ag</u>	pe A Ye th Purch Sales: Tl ar in eight eight eight (i) ge (Y) pood P (i) (ii)	erformance ns: $Y = 69$ ou are give e method co asses: Ans: P he height o nd estimate ches: of father (in of sons (in he following ressure (Y) ) Find the co i) Determine	if an op .97 + 1. an the data of least s 62 112 Purchase f fathers e the exp n inches inches) n table 50 14 correlation inche least	erator <b>133X;</b> ta rela quares 72 124 es <b>X; S</b> and so pected 0 6 7 1 0 6 7 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1	77.601ting toand ex9813Sales Yons isavera $65$ $67$ Ans: Yhe age:4225fficientare reg	$ \begin{array}{c c} \mathbf{I} \\ \text{purchastimate} \\ \hline \mathbf{S} \\ \hline \mathbf$	ases a the li <u>76</u> <u>17</u> <b>0.651</b> in the ght of <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u>	and sal ikely s 81 132 5Y + 0 follow f the s 67 64 + 39.5 pressu 49 14 and Y ation Y	ales       56       96       96       96       0.077       ving t       son w       67       68       5484;       7       5       7       7       7       7       7       7       7       7       7       7       7       7       8       7       7       7       8	when $5$ ; $\mathbf{Y}$ able then $\mathbf{X} = \frac{10 \text{ v}}{42}$ 140 X.	$\frac{n \text{ the p}}{76}$ $\frac{120}{4 = 0.78}$ $\frac{68}{72}$ $\frac{68}{72}$ $\frac{60}{153}$	urchase         92         136 $825X + 1$ the two         eight co         69         70 $Y + 32$ 0       7         5       10	es equa 88 97 - 56.31 o lines f the f 7 69 .2875; 2	al 10 25; 2 of ro fathe 1 63	0: 49 85 <b>134.56</b> egressi r is 67 73 70 <b>18 inch</b> 55
7. <u>He</u> 8. <u>Ag</u>	pe A Ye th Purch Sales: Tl ar in eight eight eight (i) ge (Y) pood P (i) (ii)	erformance ns: $Y = 69$ ou are give e method co ases: Ans: P he height o nd estimate ches: of father (in of sons (in he followin ressure (Y) ) Find the c	if an op .97 + 1. an the data of least s 62 112 Purchase f fathers e the exp n inches inches) n table 50 14 correlation inche least	erator 133X; ta rela quares 72 124 es X; S and so pected ) 4 gives t 5 4 7 1 1 1 1 1 1 1 1	<b>77.60</b> ting to and es and es <b>98</b> <b>13</b> <b>Sales Y</b> ons is avera <b>65</b> <b>67</b> <b>Ans: Y</b> he ages <b>13</b> <b>5</b> <b>67</b> <b>Ans: Y</b> fficient are reg ssure c	purchastimate stimate 8   7 31   1 $7$ ; $\mathbf{X} =$ given i ge heig 66 68 7 = 0.42 s and t 36 118 t betwee gressio of a wo	asses a 2 the life 76 17 0.651 in the ght of 242X 128 47 128 2en X n equal organ v	and sal ikely s 81 132 5Y + 0 follow f the s 67 64 + 39.5 pressu 49 14 and Y ation Y whose	sales     50       90     90       90     90       90     90       90     90       90     90       90     90       90     90       90     90       90     90       90     90       67     68       68     68       68     68       68     68       68     68       67     68       68     68       68     68       67     68       68     68       68     68       68     68       67     68       68     68       68     68       67     68       68     68       67     68       67     68       67     68       67     68       67     68       67     68       67     68       67     68       67     68       67     68       67     68       68     68       69     68       69     68       69     68       7 <td>when 5 5; Y able hen <math>\mathbf{X} = \frac{10 \text{ y}}{42}</math> 140 X. s 45</td> <td><math display="block">\frac{n \text{ the p}}{76}</math> <math display="block">\frac{120}{72}</math> <math display="block">\frac{7}{7} = 0.78</math> <math display="block">\frac{68}{72}</math> <math display="block">\frac{68}{72} = 0.525</math> women <math display="block">\frac{60}{15}</math> <math display="block">\frac{60}{75}</math> <math display="block">\frac{60}{75}</math> <math display="block">\frac{60}{75}</math> <math display="block">\frac{60}{75}</math></td> <td>urchase         92         136         <b>825X</b> +         the two         eight c         69         70         <math>Y + 32</math>         5         10         75</td> <td>es equa 88 97 - 56.31 o lines f the f 7 69 .2875; 2 50 1</td> <td>1 10 25; 1 of ro fathe 63 49</td> <td>0: 49 85 134.56 egressi r is 67 73 70 18 inch 55 150</td>	when 5 5; Y able hen $\mathbf{X} = \frac{10 \text{ y}}{42}$ 140 X. s 45	$\frac{n \text{ the p}}{76}$ $\frac{120}{72}$ $\frac{7}{7} = 0.78$ $\frac{68}{72}$ $\frac{68}{72} = 0.525$ women $\frac{60}{15}$ $\frac{60}{75}$ $\frac{60}{75}$ $\frac{60}{75}$ $\frac{60}{75}$	urchase         92         136 <b>825X</b> +         the two         eight c         69         70 $Y + 32$ 5         10         75	es equa 88 97 - 56.31 o lines f the f 7 69 .2875; 2 50 1	1 10 25; 1 of ro fathe 63 49	0: 49 85 134.56 egressi r is 67 73 70 18 inch 55 150
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re of 55 7 4 on 2 age i 3.758	when 5 5; Y able then $10 \times 42$ 140 X. s 45 + 1	$\frac{n \text{ the p}}{76}$ $\frac{120}{120}$ $\frac{2}{72} = 0.73$ $\frac{68}{72}$ $\frac{68}{72}$ $\frac{60}{153}$ $\frac{60}{153}$ $\frac{60}{153}$ $\frac{60}{153}$ $\frac{60}{153}$	urchase         92         136 $825X + 1$ the two         eight co         69         70         Y + 32         5         10         75         10         75         10         75         10         75         10         75         10         75         10         75         10         70         70         70         Y + 32         70         Y + 32         10         75         10         70         Y + 32         10         75         10         Y + 32         Y + 32 <t< td=""><td>es equa 88 97 - <b>56.31</b> o lines f the f 7 69 .2875; 2 2 50 1 hen X =</td><td><math display="block">\frac{1100}{25; 2}</math> of roof a father <math>\frac{1}{63}</math> <math>\frac{63}{49}</math> = 45,</td><td>0: 49 85 <b>134.56</b> egressi r is 67 73 70 <b>18 inch</b> 55 150 , <math>Y = 1</math></td></t<>	es equa 88 97 - <b>56.31</b> o lines f the f 7 69 .2875; 2 2 50 1 hen X =	$\frac{1100}{25; 2}$ of roof a father $\frac{1}{63}$ $\frac{63}{49}$ = 45,	0: 49 85 <b>134.56</b> egressi r is 67 73 70 <b>18 inch</b> 55 150 , $Y = 1$
7. $He$ $8.$ $Ag$ $Blo$	pe $A$ $Y$ $th$ Purch Sales: $TI$ ar in eight eight $TI$ $ge (Y)$ pood P (i) (ii) (iii)	erformance ns: $Y = 69$ ou are give e method co asses: Ans: P he height o nd estimate ches: of father (in of sons (in he followin ressure (Y) ) Find the c i) Determini ii) Estimate panel of ty	if an op .97 + 1. an the data of least s 62 112 Purchase f fathers a the exp n inches inches) 14 correlation the the lease the blo wo judge	erator 133X; ta rela quaress 72 124 es X; S and so pected ) f gives t 6 4 7 1 on coef ast squ od pres An es P an	<b>77.60</b> ting to and es <b>98</b> <b>13</b> <b>5ales Y</b> ons is average <b>65</b> <b>67</b> <b>Ans: Y</b> he ages <b>42</b> <b>25</b> fficient are reg ssure co <b>ns: (i)</b> I d Q gr	$ \begin{array}{c c} \mathbf{I} \\ \text{purchastimate} \\ \hline \mathbf{Stimate} \\ $	ases a the li <u>76</u> <u>17</u> <b>0.651</b> in the ght of <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u>242X</u> <u></u>	and sal ikely s 81 132 5Y + 0 follow f the s 67 64 + 39.5 pressu 49 14 and Y ation Y whose Y = 8	ales v 56 96 96 96 96 96 96 56 57 68 5484; 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	Age in months	0	2	3	5	9
	Weight in lbs.	5	7	8	10	12
	Estimate the w		at the age of	4 monuns.		
11	Ans: 9.2982 lb		1-4			
11.	You are given	the following c	lata:	V	N/	
	A	ia Maan		X 36	Y	
	Arithmeti				<u>85</u>	
	Correlation coe	Deviation	an X and V –	11	0	
	(i) Find two reg			b.00 (i) Estimate the va	lue of X when	V - 75
	(I) Find two reg					
12.	34 A survey u			0.48X + 67.72; X		
12.	-		-	elationship betwe	-	
	(X) and expend	inture on 100d a	and entertainr	nent (Y) and the t	-	
	Expanditura	on accommodat	ion	Mea Rs 17		S. D. 63.15
	•	on food and ent		Rs 17 Rs 47		22.98
	·	correlation = -		13 47	•••	/0
				X on Y and esti-	mate the expen	diture on food
		-	-	modation is Rs 2	-	
		1				$Y_{X=200} = Rs 53$
13.	Find out the re	gression coeffi	cients Y on X	and X on Y on		
		-		350, Variance of 2		-
	$\Delta X = 50, X = 5$	5, 21 = 00, 1	$=0, \angle AI = 0$			$b_{x} = 1.25, b_{xy} = 0$
14.	In order to fin	d the correlation	on coefficient	between two va	•	
14.	observations, the					1 nom 12 pans
		-		$X^2 = 285, \sum XY =$	214	
						Z = 4) was com
	-			vered that the particular $V_{1}$		-
			-	Y = 14). After m		y correction, find
	-			two regression eq	uations;	
	(c) the correlat				X 0 425 X	<b>X</b> 7 <b>X</b> 7 0.000
	Ans: (a) $D_{yx}$	= 0.694; D <sub>xy</sub> =	0.898 (D) : 1	Yon X: $Y = 0.694$		
					1.294 (c) r	(x,y) = 0.7894 = 0
			UNIT	Γ – IV		
	5.0					, ,
4				essential charact		
1. ว	what are th		bers? Discuss	the different pr	oblems that w	e laced in the
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2.		on of an index		is of index numb	hers	
2. 3.	Discuss the	e importance a	nd limitation	ıs of index numb dex numbers? D		hods for
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Index Numbers:

## **EXERCISE A (General Price Index)**

1. On the basis of figures of production of generators given below, construct:

(a) Quantity index; and (b) Price index (using 1990 as base)

Year	199	0	1991		1992	1	993	1994
Units Produced (in thousands)	24		30		32		38	44
Value of Output (in Rs Million)	192	2	255		272		361	451
Ans:								
Year	1990	1	1991	1	992	199	3 3	1994
Price Index	100	1	06.25	10	)6.25	118.7	75 1	28.12
Quantity Index	100		125	13	<b>33.33</b>	158.3	33 1	83.33

2. What is the difference between Laspeyre's and Paasche's system of weights in compiling a price index? Calculate both Laspeyre's and Paasche's aggregative price indices for the year 2000 from the following data:

Commodities	Quai	ntity	Price Per	Unit (Rs)
	1999	2000	1999	2000
A	3	5	20	25
В	4	6	25	30
С	2	3	30	25
D	1	2	10	7.50

## Ans: 109.78; 109.72

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3. From the data given below compute Laspeyr's and Paasche's index numbers:

Pr	ice	Quantity		
1995	2001	1995	2001	
4	10	50	40	
3	9	10	2	
2	4	5	2	
		Price           1995         2001           4         10           3         9           2         4	<u>1995</u> 2001 1995	

(Price and Quantity figures are in appropriate units)

## Ans: 254.16; 250.58

4. The geometric mean of index number of Laspeyre and Paasche is 229.5648 while the sum of Laspeyre's and Paasche's index number is 480. Find out Laspeyre's and Paasche's indices.

## Ans: 310; 170

5. Using Paasche's formula, compute the quantity index and the price index number of 2000 with 1996 as base year:

Commodities	Quantit	y Units	Value i	n (Rs)
	1999	2000	1999	2000
А	100	150	500	900
В	80	100	320	500
С	60	72	150	360
D	30	33	360	297

(b) For the above problem also compute price index by

(i) Marshall Edgeworth formula; (ii) Fisher's formula (iii) Dorbish-Bowley formula; (iv) Walsch formula

Ans: (a) P<sub>01</sub> = 119.2; Q<sub>01</sub> = 131.09 (b) (i) 118.68 (ii) 118.62 (iii) 118.6225 (iv) 118.64

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"Marshall-Edgeworth index number is a good approximation to the Fisher's Ideal Index 6. Number" – Verify the truth of this statement from the following data:

Year	Rice		Wh	leat	Jowar		
	Price	Quantity	Price	Quantity	Price	Quantity	
1970	9.3	100	6.4	11	5.1	5	
1977	4.5	90	3.7	10	2.7	3	

## Ans: 49.135 : 49.134

7. A company spent Rs 50, Rs 48, Rs 18 and Rs 42 during 1998. The company increased the expenditure to Rs 100, Rs 98, Rs 60 and Rs 102 respectively on four commodities. If the units of four commodities purchased during 1998 and 1999 are identical i.e. 5, 2, 6 and 17, compute the price index for 1999 by the most suitable method.

## Ans: Simple Aggregative method 227.85

200 × < 8. From the data given below construct an index number of the group of four commodities using:

(i) Simple Aggregative Method and (ii) Fisher's Ideal Formula.

Commodities	Base Yea	r (1996)	Current Year (1997)		
	Price per unit	Expenditure	Price per unit	Expenditure (Rs)	
		(Rs)			
1	2	40	5	75	
2	4	16	8	40	
3	1	10	2	24	
4	5	25	10	60	

## Ans: (i) 208.33 (ii) 219.13

9 V A

9. 1Using Fisher's Ideal Formula, compute price and quantity index numbers for 11984 with 1982 as base year, given the following information:

Year	Com	modity A Commodity B Commod		Commodity B		nodity C
	Price	Quantity(kg)	Price	Quantity(kg)	Price	Quantity(kg)
	(Rs)		(Rs)		(Rs)	
1982	5	10	8	6	6	3
1984	4	12	7	7	3	4

## Ans: $P_{01} = 83.59$ ; $Q_{01} = 120.6$

10. On the basis of the following information, calculate the Fisher's Ideal Index Number:

Commodities	Base	Year	Current Year		
	Price Quantity		Price	Quantity	
А	2	40	6	50	
В	4	50	8	40	
С	6	20	9	30	
D	8	10	6	20	
E	10	10	5	20	

Ans: P<sub>01</sub> = 149.15

## 11. Calculate Fisher's Ideal Index from the following data:

Commodities	Base Year		Current Year		
	Quantity Price		Quantity	Price	
А	15	4	10	6	
В	20	3	25	4	
С	10	6	20	5	
D	30	5	25	5	

## Ans: $P_{01} = 149.15$

12. Find Laspeyre's, Paasche's and Fisher's price and quantity index numbers from the following data:

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<%><%><%>> Commodities	Base	e Year	Currer	nt Year	
	Price (Rs)	Quantity (kg)	Price (Rs)	Quantity (kg)	
А	5	25	6	30	
В	10	5	15	4	
С	3	40	2	50	
D	6	30	8	35	
	[(	C.A. Foundation, Ma	ay 2007]	•	
	-	1117.74; 112.73; 1		79; 113.76; 114	
13. Given that '		$q_0 = 150$ . Paasche's			
		45, find out (i) Fi			
-	geworth's Index Ni			and and	
Mai Shah-Eu	geworth s muex m	uniber.		Ama: 144.0.145	
				Ans: 144.9, 145	
14. From the following data, construct a price index number of the group of four					
commodities	s by using Fisher's	Ideal Formula:			
Base Year Current Year			nt Year		
Commodities	Price per unit	Expenditure Rs	Price per unit	Expenditure R	
A	2	40	5	75	
B		16	8	40	
C	1	10	2	24	
D	5	25	10	60	
-			±۷	Ans: P <sub>01</sub> = 21	
~ )	ner's ideal index nu				
		Rs)/unit	Total Va	llue (Rs)	
			Total Va Year I	llue (Rs) Year II	
	Price (	Rs)/unit			
Commodities	Price (I Year I	Rs)/unit Year II	Year I	Year II	
Commodities	Price (I Year I 35	Rs)/unit Year II 36	Year I 700	Year II 756	
Commodities A B	Price (1 Year I 35 31	Rs)/unit Year II 36 40	Year I 700 465 240 40	Year II 756 480 320 44	
Commodities A B C	Price (1 Year I 35 31 30	Rs)/unit Year II 36 40 32	Year I 700 465 240 40	Year II 756 480 320 44	
Commodities A B C	Price (1 Year I 35 31 30	Rs)/unit Year II 36 40 32	Year I 700 465 240 40	Year II 756 480 320 44 (Inter) June 20	
Commodities A B C D	Price (1 Year I 35 31 30 20	Rs)/unit Year II 36 40 32	Year I 700 465 240 40 <b>[I.C.W.A</b>	Year II 756 480 320 44 (Inter) June 20	
Commodities A B C D 16. From the fol	Price (1 Year I 35 31 30 20 lowing data, constr	Rs)/unit Year II 36 40 32 22	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by:	Year II 756 480 320 44 (Inter) June 20	
Commodities A B C D 16. From the fol	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and	Rs)/unit Year II 36 40 32 22 ruct Quantity Index	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method	Year II 756 480 320	
Commodities A B C D 16. From the fol	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method Currer	Year II 756 480 320 44 (Inter) June 20 Ans: P <sub>01</sub> = 111	
Commodities A B C D 16. From the fol (i) Fi	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method	Year II 756 480 320 44 (Inter) June 20 Ans: P <sub>01</sub> = 111	
Commodities A B C D 16. From the fol (i) Fi	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs)	Year II 756 480 320 44 (Inter) June 20 Ans: P <sub>01</sub> = 111	
Commodities A B C D 16. From the fol (i) Fi Commodities	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs) 2,000	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50	
Commodities A B C D 16. From the fol (i) Fi Commodities A B	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs) 2,000 1,200	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30	
Commodities A B C D 16. From the fol (i) Fi Commodities A B C	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs) 2,000 1,200 1,320	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44	
Commodities A B C D 16. From the fol (i) Fi Commodities A B C D D	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs) 2,000 1,200 1,320 1,350	Year II         756         480         320         44         (Inter) June 200         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45	
Commodities A B C D 16. From the fol (i) Fi Commodities A B C	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Currer</u> Expenditure (Rs) 2,000 1,200 1,320 1,350 630	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15	
Commodities A B C D 16. From the fol (i) Fi Commodities A B C D E	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 30	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs) 2,000 1,200 1,200 1,320 1,350 630 <b>Ans: (i)</b>	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134	
Commodities A B C D 16. From the fol (i) Fi Commodities A B C D E	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method <u>Curren</u> Expenditure (Rs) 2,000 1,200 1,200 1,320 1,350 630 <b>Ans: (i)</b>	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134	
Commodities          A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         E         17. From the data	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18 ta given below, cale	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 30	Year I 700 465 240 40 <b>[I.C.W.A</b> Number by: worth's Method Curren Expenditure (Rs) 2,000 1,200 1,200 1,320 1,350 630 <b>Ans: (i)</b> ex number for the y	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134	
Commodities          A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         E         17. From the data	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18 ta given below, cale 's (ii) Paasche's an	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 30	Year I           700           465           240           40           [I.C.W.A           Number by:           worth's Method           Currer           Expenditure           (Rs)           2,000           1,320           1,350           630           Ans: (i)           ex number for the y	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134	
Commodities          A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         E         17. From the data	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18 ta given below, cale 's (ii) Paasche's an	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 18 16 40 30	Year I           700           465           240           40           [I.C.W.A           Number by:           worth's Method           Currer           Expenditure           (Rs)           2,000           1,320           1,350           630           Ans: (i)           ex number for the y	Year II         756         480         320         44         (Inter) June 20         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134         rear 2000 by usir	
Commodities          A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         E         17. From the date         (i) Laspeyre	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18 ta given below, calo 's (ii) Paasche's an Year	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 18 16 40 30 culate quantity inde d (iii) Fisher's form	Year I           700           465           240           40           [I.C.W.A           Number by:           worth's Method           Currer           Expenditure           (Rs)           2,000           1,320           1,350           630           Ans: (i)           ex number for the y           ulae	Year II         756         480         320         44         (Inter) June 200         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134         rear 2000 by usin         2,000	
Commodities          A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         17. From the dat         (i) Laspeyre         Commodities         A         B         C         D         E         17. From the dat         (i) Laspeyre         Commodities         A	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18 ta given below, calo 's (ii) Paasche's an Year Price 10	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 18 16 40 30 culate quantity inder d (iii) Fisher's form 1999 Value 70	Year I           700           465           240           40 <b>[I.C.W.A</b> Number by:           worth's Method           Currer           Expenditure           (Rs)           2,000           1,200           1,320           1,350           630           Ans: (i)           ex number for the y           ulae           Year           Price           11	Year II         756         480         320         44         (Inter) June 200         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15         136.85 (ii) 134         rear 2000 by usin         2,000         Value         115.5	
Commodities          A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         16. From the fol         (i) Fi         Commodities         A         B         C         D         E         17. From the data         (i) Laspeyre         Commodities	Price (1 Year I 35 31 30 20 lowing data, constr sher's Method, and Base Price (Rs) 25 22 54 20 18 ta given below, calo 's (ii) Paasche's an Year Price	Rs)/unit Year II 36 40 32 22 ruct Quantity Index d (ii) Marshall-Edge e Year Quantity (kgs) 40 18 16 40 18 16 40 30 culate quantity inder d (iii) Fisher's form 1999 Value	Year I           700           465           240           40 <b>[I.C.W.A</b> Number by:           worth's Method           Currer           Expenditure           (Rs)           2,000           1,200           1,350           630           Ans: (i)           ex number for the y           ulae           Year           Price	Year II         756         480         320         44         (Inter) June 200         Ans: $P_{01} = 111$ nt Year         Quantity (kgs)         50         30         44         45         15 <b>136.85 (ii) 134</b> rear 2000 by usin         2,000         Value	

## [C.A. Foundation, May 2007]

## Ans: P<sub>01</sub> = 1117.74; 112.73; 113.73; Q<sub>01</sub> = 115.79; 113.76; 114.77

## Ans: 144.9, 145.26

ſ		Base	Year	Current Year		
	Commodities	Price per unit	Expenditure Rs	Price per unit	Expenditure Rs	
	А	2	40	5	75	
	В	4	16	8	40	
	С	1	10	2	24	
	D	5	25	10	60	

## Ans: P<sub>01</sub> = 219.1

Commodities	Price (Rs)/unit		Total Value (Rs)		
	Year I	Year II	Year I	Year II	
А	35	36	700	756	
В	31	40	465	480	
С	30	32	240	320	
D	20	22	40	44	

## [I.C.W.A (Inter) June 2001]

## Ans: P<sub>01</sub> = 111.34

	Base	Year	Current Year		
Commodities	Price (Rs)	Quantity (kgs)	Expenditure	Quantity (kgs)	
			(Rs)		
A	25	40	2,000	50	
В	22	18	1,200	30	
С	54	16	1,320	44	
D	20	40	1,350	45	
Е	18	30	630	15	

## Ans: (i) 136.85 (ii) 134.94

	Year 1999		Year 2,000		
Commodities	Price	Value	Price	Value	
А	10	70	11	115.5	
В	5	45	10	45	
С	6	30	5	45	

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<			
>		Ans: (i	) 125.17 (ii) 107.03 (iii) 115.75 🔮
	18. Calculate the index num	ber by using geometric mean:	
>	Commodity	Base Year Price	Current Year Price
	А	2	7

2
4

В

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## Ans: 209.17

19. The following are the prices of commodities in 1998 and 1999. Calculate a price index based on price-relatives, using geometric mean:

Year	commodity					
	А	В	С	D	Е	F
1998	45	60	20	50	85	120
1999	60	70	30	75	90	130

## Ans: 126

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20. The price quotations for four different commodities for 1990 and 1995 are given below. Calculate the index number for 1995 with 1990 as base by using (i) simple average of price-relatives, (ii) weighted average of price-relatives

Commodition	Waighta	Price in	Rupees
Commodities	Weights	1995	1990
А	5	4.50	2.00
В	7	3.20	2.50
С	6	4.50	3.00
D	2	1.80	1.00

## Ans: (i) 170.75 (ii) 164.05

21. Calculate price index of the following data by taking Base 1995 = 100, by weighted average of relative method:

Commodities	1995	Quantity	1996
	Price (Rs)		Price (Rs)
А	20	2	25
В	10	3	12
С	12	5	18
D	16	4	16
Е	5	7	4

## Ans: 110.48

22. Calculate the index number for 1998 with 1990 as base using the Weighted Average or Price Relatives Method for the following data:

Commodition	Commodities Weights		Rupees
Commodities	weights	1995	1990
А	2	12	24
В	8	8	12
С	4	15	27
D	5	6	18
Е	1	10	12

## Ans: 197

23. Compute the Weighted Index Numbers for 1997 and 1999 (Based on 1996) by relative method from the following data. Also interpret the computed index numbers.

Years		Commodities			
		А	В	С	D
1996	Price	6	8	9	12
	Weight	5	3	1	1

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<	<u>}&gt;&lt;</u> }><	<u>}&gt;&lt;</u> }><	<u>}&gt;&lt;\$}&gt;&lt;\$}&gt;&lt;</u>	<u>&gt;&lt;@&gt;&lt;@&gt;&lt;@</u> >	> <\$}> <\$}> <\$}	> <\$}> <\$}> <\$}>
R .	1997	Price	9	10	6	10
	1998	Price	12	12	9	15
9	1999	Price	15	14	12	20

Ans: Base 19	Ans: Base 1996 = 100; Price I No. for 1997 = 127.50; Price I No. for 1999 = 207.50 $\epsilon$												
24. 3The price rela	24. 3The price relatives and weights of a set of commodities are given in the following table:												
Commodity	Commodity A B C D												
_					10								

Com	modity	А	В	С	D
Price	Relatives	125	120	127	119
W	eights	$W_1$	$2W_1$	$W_2$	W <sub>2</sub> + 3

If the sum of the weights is 40 and the index for the set is 122, find the values of  $W_1$  and  $W_2$ 

#### Ans: $W_1 = 7$ and $W_2 = 8$

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25. Given below are the prices and weights of given commodities for the year 1990, 1991 and 1992:

Commodity	Weights	Price in Rupees		
		1990	1991	1992
A	20	12.00	18.00	24.00
В	15	3.00	6.00	15.00
С	10	12.50	18.75	25.00
D	40	10.00	30.00	50.00
E	15	4.50	9.00	13.50

Using either aggregative method or relative method, calculate the weighted price index numbers for 1991 and 1992, taking 1990 as base year.

Ans: Price indices based on Price Relatives are: for 1991 225, for 1992 380

## Exercise B (Test of Index Number Formulae)

1. From the following data find the index numbers for the current year and the base year based on each other and show that the Geometric Mean makes it reversible but the Arithmetic Mean does not.

Commodity	Prices					
	Base Year	<b>Current Year</b>				
А	25	55				
В	30	45				
	(0)0) 404 (( )					

	В		30	45							
Ans: $P_{01}$ (AM) = 185 $P_{01}$ (GM) = 181.66; $P_{10}$ (AM) = 56.06; $P_{10}$ (GM) = 55.05											
	$P_{01}$ × $P_{10}$ (AM) ≠	1; P <sub>01</sub> × P10(GM	) = 1								
2. Comp	oute Fisher's index	number on the ba	sis of the followi	ing data:	ę						
	B	ase Year		Current Year							
Commodity	Price (in'00	Expenditure(in	i'00 Price (i	in'00 Expend	diture(in'00						
	Rs)	Rs)	Rs	)	Rs)						
А	3	25	10	)	60						
В	1	10	2		24						
С	4	16	8		40						
D	2	40	5		75						

Also apply Factor Reversal Test to the above index number.

## Ans: P<sub>01</sub> = 219.12

3. Using the following data, show whether the time reversal test is satisfied by Fisher's price index

Commodity	$\mathbf{p}_0$	$\mathbf{q}_0$	$p_1$	<b>q</b> <sub>1</sub>
А	12	30	14	20
В	10	20	15	16

Ans: Yes

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rouoror	al test an	wing da				-isn	ier s	iaea	Inde	x sati	snes	both	the	time	
reversa	ai test an				est:						·	ant Va			
Commodity	Dr	rice	Base		uantity	7			Pri		Jurre	ent Ye		ntitu	
А		6		Ų	<u>uantity</u> 50	/			1(			Quantity 60			
B		2	10				2							20	
C		4			60				6					50	
6		-			00				0			Ar		$P_{01} = 1$	43.0
5. Follow	ing are t	he valu	ies:												
$\sum p_0 q_0$	-		$\sum p_1 q$	$1_0 = 50$	)5		Σ	$\mathbf{n}_10_1$	ı=530			Σn	0 <b>0</b> 1 =	= 470	
	hat Fish	er's me		-		d N					ier s		-		rsal
	do not s						iui si		neene	u citi		atisiy	um		i sui
	'isher's	-					ster N	lars	hall-l	Fdoes	vort	h me	thor	l satio	fie
	Reversal									-					mea
i inte r	level sal		-										iesi	.3.	
			rcise									-			
1. From t	he fixed							find	out c	hain ł	base	index	nur		
Year	199		199			998			1999			00		200	
Index No.	200	)	220	)	2	40			250			30		300	
- ·	_								; 220	•	40;	250	•	280;	3
2. 4.	Conver			<u> </u>				-							
Year :		990	1991		992		993		994	19		199		199	
Index No.	1	100	110	1	125	1	.33	1	149	13	9	15	0	165	5
<b>A</b>	100	110	4	<b>2 F</b>	400		14	0	10	0	4 24	•	4.0	_	
Ans:	100	110		25	133		14		13		150		165		
3. Conver	t the foll	lowing				pri									_
Year			1995		1996	_	199		19			999		2000	
Link Rela			120		150		180		22			270		324	
4. From t	ne fixed	base II													_
Year	l		1993			_	1995		19			<u>997</u>	-	1998	_
Index Nui Ans:	<b>150</b>	18	150	12	180	1'	120 120 120 80		20 80 96		96				
	he chain							nra		fivod		a inda	v ni	mhor	c.
Year		199			13 give			, pro 1996	-					1998	3.
Index No.		90			110	-		115	,		1997 120			130	
muez No.			, Ans:		<u>90,</u>		99,		113.8			136.6	52		177
6. From t	he chain			umbo	•	n h	•						•		
Year		199	-		13 give			. pro 1993			.994			1995	
Index No.		199			160	_		140	)		<u>.994</u> 100			1595	
mucz NO.			Ans:		<u>100</u> 110	).			246.		100	49	2.8,		739
7. Prepar	e fixed b			nhero		•					imh		•		
Year			1991		1992		199			94		995		1996	•
Index Nu	mher		92		1992	+	199		9			103	+	1996	$\dashv$
macrita		Ans:	74	92,		.84	k, 9				5.64,		98.5		<u>99.</u>
8. From t	he follov		nual a												
	ain inde	-		-	-				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	annes	5100		upe	les pe	ull
		x nume 199			998		1	1999	<u>,                                     </u>	1	2000	<u> </u>		2001	
Commoditi X	C2	<u>199</u> 8	' /	1	10			12	,		<u>15</u>			<u>2001</u> 12	
X Y		8 10	)		10 12			12 15			15 18			12 20	
		6	,		9			13 12			15			20 18	
	1	0			-			<b></b>							
Z		Aı	ns: 1	<b>00</b> .	131.	67.		1	66.05	5,	2	04.79	)	2	12.3
Z	ing that			1 <b>00,</b> can b	<b>131.</b> e assig	•			66.05 eight:	•		<b>04.7</b> 9 e the c			12.3

	\$><\$><	<u> </u>	< 🛞 >	<\$}><\$}><\$		<u> </u>	\$\$><\$\$><\$\$>
<b>\$</b> \$			rico	Relative = -	urrent Year's	$\frac{Price}{100} \times 100$	(
V A			Tile	Retutive = -	Last Year's Pi	rice 700	
<b>₽</b>		Goods A		Goods B	Goods C	Goods D	Goods E
	1996	100		100	100	100	100 133 125 140
V A	1997	90		125	134	118	133
<b>\$</b> \$	1998	89		61	60	115	125
Å	1999	112		200	80	93	
<b>9</b> 7 ▼	2000	122		66	150	86	86
A \$77					Ans: 100		
V A	-					-	r and 130 in 1998
<u> </u>			-				99 over 1998 and
٨	decrease	d by 10% in	200	over 1999. It	further decrea	ased by 10% in	n 2001 over 2000.
252 V	Obtain th	e chain base	indic	es of crude pr	rices of 2001 ov	er 1995.	,
<b>\$</b> \$	Hints: Ch	ain Indices – (	Chain	ed to Base 19	95		(
V A	Year	1955 1	997	1998	1999	2000	2001
\$7 ∨	Chain Index			<sup>130</sup> × 120	$\frac{100+20}{1000} \times 156$	$\frac{100-10}{100}$ ×	$100-10 \times 100.40$
A 33	Chained to Ba	100	120	$\frac{130}{100} \times 120$	1000	$100 \\ 187.20 =$	$\frac{100-10}{100} \times 168.48$
V	1995 = 100			=156	=187.20	168.48	$\frac{100-10}{100} \times 168.48$ = 151.63
<u>3</u> 3	11. 1 Calcula	te the Chain I	Base i	index number	s from the data		(
⋽⊻⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽⋎⋏⋽					of Commodities	•	
997 V	Commodity	1991		1992	1993	1994	1995
	А	2		3	4	2	7
V A	В	3		6	9	4	3
\$ V	С	4		12	20	8	16
A 83	D	5		7	18	11	22
V	10 Cala lat			1			6, 170.70, 352.07
<b>\$</b> \$	12. Calculate	e the chain ba	se in		from the data g		
	year	۸		B B	of Commodities	(in Ks) D	E
V	1996	A 10		20	12	40	100
	1997	10		20	12	45	110
V A	1998	11		25	18	49	
\$\$ ▼	1999	14		28	10	43	102
<b>^</b>	2000	15		23	9	42	101
<ul> <li></li> <li>&lt;</li></ul>					Ans: 100,	113.82, 122.7	106 102 <u>101</u> <b>4, 117.54, 111.88</b>
\$ > V			]	Exercise D	) (Base Shif	ting)	(
A Ba	1. The follo	wing are pric	e ind	ex numbers (1	Base 1985 = 10	0)	
V A	Year 1985	0 1		1988 1989		,	3 1994 1995
🔊 I	ndex No. 100	120 12	22	116 120	120 137	136 149	9 156 137
Å				recast the ind			
57 V	Ans: 8	33.33, 100, 1	01.6'	7, 96.67, 100	, 100, 114.17,	113.33, 124.1	7, 130.00, 114.17
\$ }	2. The follo	wings are the	e inde	ex number of	wholesale price	ces of a certain	commodity based
V A	on 1992:						commodity based 2016 210
\$\$ <b>∨</b>	Year	2012		2013	2014	2015	2016
A	Index No.	100	-	108	120	150	210
V A	Shift the	base to 2014	and o	obtain new in	dex numbers.		
\$\$ V				, .			<b>90, 100, 125, 175</b>
A		•				from 2010 to 20	013:
2 V	Year Index No		2011		2013 2014		2016 2017 <sup>1</sup>
\$ <b>3</b>	Index No.	100	105	110	125 135		195 205 08 144 156 164
V A					AIIS: 80,	04, 00, 100, 1	2016 2017 195 205 <b>08, 144, 156, 164</b>
\$ V							(
٨				(3	3)		

#### *େ*ଞ୍ଜିଚାବଞ୍ଜିଚାବଞ୍ଜିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚି

4. The following are the index number of price based on 2007. Shift the base from 2007 to 2011:

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Index No.	100	140	260	340	400	450	500	260	240
			(D	0044	40000			40 80 41	

Ans: (Base 2011 = 100) 25, 35, 65, 85, 100,112.50, 125, 65, 60

>< ()> > <

5. Given below are two sets of indices one with 1995 as base and the other with 2002 as base:

(a) Year	Index No.	(b) Year	Index No.	
1995	100	2002	100	
1996	115	2003	105	
1997	122	2004	118	
1998	150	2005	98	
1999	200	2006	102	
2000	220	2007	105	
2001	240	2008	120	
2002	250	2009	125	

The index number (a) with 1995 base was discontinued in 2002. It is desired to splice the second index number (b) with 2002 base to the first index number for the sake of continuity. How will it be done so that the combined series has a common base of 1995?

1995 1996 ----- 2002 2003 2004 2005 2006 2007 2008 2009 Ans: 100 115 ----250 262.5 295 245 255 262.5 300 312.5 6. Given below are two sets of indices. For the purpose of continuity of records, you are required to construct a combing series with the year 2013 as the base:

1	8	
Year	I set – Price Relatives	II set – Link Relatives
2010	100	
2011	120	
2012	125	
2013	150	
2014		110
2015		120
2016		95
2017		105

Ans: I No.'s from 2010 to 2017 (Base 2013 = 100) are: 66.7, 80, 83.3, 100, 110, 120, 95, 105.

7. Combine the two series of index numbers given below to obtain a new series with:(i) 2013 = 100; (ii) 2010 = 100

WHOLESALE PRICE INDEX									
Year	Old Series 2008 = 100	Revised Series 2013 = 100							
2010	111								
2011	113								
2012	115								
2013	119	100							
2014	134	112							
2015		122							

State the assumptions underlying your calculations.

Ans: (i) 93.27, 94.25, 96.63, 100, 112, 122

(ii) 100, 101.80, 103.60, 107.21, 120.72, 131.50\* [(\*):  $\frac{134 \times 122}{112} \times \frac{100}{111} = 131.50$ ]

8. Given below are two inde	ex number s	eries. Splic	ce them on	the base 2	014 = 100.		
Year	2010	2011	2012	2013	2014	2015	ę
Old Price Index for Steel (Base 2005 = 100)	141.5	163.7	158.2	156.8	157.1		Ę
New Price Index				99.8	100.0	102.3	Ę
		(34)					

	2014 = 100)							
Ans	s: Year I. No.	201 90.0			2012 00.69	2013 99.80	2014 100	2015 102.3
9.				-				n movements
			-			-		n the base yea
	=	dex series bas		-	-			=
	2010	2011	201		2013	2014		015
	120.3	122.1	126	.4	125.2	127.0	13	31.6
	In 20	)15, the inde	x was cor	npletely 1	evised to	take into	o account	a change in th
	type of mate	erials used. '	The new	index, ba	sed on 2	015 = 10	0, showe	d the followin
	values:							
		2015		2016		2017		
		100		106.3	1: (6	109.4 (;;;)		- ] d : d 4 - 4]
				ola, i.e. sp	lice forw	ard; (11) :	splice the	old index to th
Anc	new, i.e. splic (i) 2016	ce backward <b>2017</b>	(ii)	2010	2011	201	2 201	13 2014
Ans:	139.9		(II)	2010 91.4	92.8			
10.			e shifting					a spliced serie
		bers with 20	-				-1	- F
	Years	2008	2009	2010	2011	2012	2013	2014
	Index A	100	120	135				
	Index B			100	115	125	145	
	Index C						100	110
_					~ ~ ~ ~			
Ans:	Year Splicing l	Indiana A	2008	2009	2010	2011	2012 2	2013 2014
	and B to		51.08	61.30	68.97	79.31	<b>36.21</b>	100 110
	2013)	U (Duse	51.00	01.30	00.97	/9.31 0		100 110
11.		-	51.00	01.30	00.97	79.31	50.21	100 110
11. Year	<b>2013)</b> . Given the fol	lowing data:	2016	2017	2018	3 201	9 202	20 2021
Year Mon	<b>2013)</b> . Given the fol thly Pay (Rs)	lowing data: 2015 10,500	2016 11,000	2017 11,500	2018 12,50	8 201 0 13,50	9 202 00 14,0	20 2021 00 14,500
Year Mon	2013) . Given the fol 	lowing data: 2015 10,500 115	2016 11,000 120	2017 11,500 130	2018 12,50 138	3 201 0 13,50 144	9 202 00 14,0	20 2021 00 14,500
Year Mon	2013) . Given the fol thly Pay (Rs) e Index (i) Ca	lowing data: 2015 10,500 115 alculate the r	2016 11,000 120 eal month	2017 11,500 130 Ily pay for	2018 12,50 138 reach yea	8 201 0 13,50 144 r.	9 202 00 14,0 150	2020210014,5000160
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20 2021 00 14,500 0 160 power?
Year Mon Price	2013) Given the fol thly Pay (Rs) e Index (i) Ca (ii) In	lowing data: 2015 10,500 115 alculate the r n which year	2016 11,000 120 eal month die the er	2017 11,500 130 Ily pay for nployees	2018 12,50 138 each yea have the l	201 0 13,50 144 r. nighest pu	9 202 00 14,0 150 110	20       2021         00       14,500         0       160         power?       2021 is required         2021 is required       his highest ref         2020       2021         3.33       9062.5         n is the year       00 = 3.448%

ଏ ଏ ାବଞ୍ଚୋବଞ୍ଚେଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚା

workers during the ye Base (2000 = 100) are				P-100			- J - 22 - 77 - 77 - 77 - 77 - 77 - 77 -
14. (a) Determine the Rea			kers duri	ng the ve	ar 2010	0-2021 -	as compared
with their wages in 20		the wor	Kers uuri	ing the ye	ui 2010	0 2021 (	is compared
Year 2010 2011 20 Average		2014 2	015 201	6 2017	2018	2019	2020 2021
wage of 1.19 1.33 1.4 workers	44 1.57	1.75 1	1.84 1.8	9 1.94	1.97	2.13	2.28 2.45
Consumer 100 107.6 100 orice index	6.6 107.6	116.2 1	18.8 119	.8 120.2	119.9	121.7	125.9 129.3
(b) Determine the pu	rchasing p	ower of	the Rupe	e for 202	1 as co	mpared	to the year
2010. What is the sign	ificance of	this resul	lt?				
Ans: (a) Real wages (	in Rs) for 2	2010 to 2	2021:				
1.19, 1.24, 1.35,	1.46, 1.	51, 1.5	5, 1.58,	1.61,	1.64,	1.75,	1.81,
1.89							
(b) Re 0.77							
15. The following data rela	ate to the a	verage w	eekly inco	ome of wo	orkers a	ind the p	rice index:
Years	2015	2016					2020
Weekly Income (Rs)	800	819	825	876			924
Price Index (2015	= 100	105	110	120	1.	25	135
100) Calculate the real inco	mo of work	ore durir	ng tha yaa	r 2015 to	2020		
Ans: Real Income (Rs			•		2020		
16. The following data re	-				Conoral	Indoxo	f Dricos of s
•			-	-			
certain region. Calcula with 2013 as base	ate : (I) Re	ai mcom	e (RS) an	a (ii) ina	ex Null	iber of i	Real Income
	2013	2014	2015	2016	2017	2018	2019
Year Income (in '00 Rs.)	800	2014 819	2015 825	2016 876	2017 920	2018 938	924
General Price Index		105	110	120	125	140	140
Number							
Ans:							
Year	2013	2014	2015	2016	2017		
Real Wages (in '00 Rs.) Index Number of Rea	800 l 100	780 97.5	750 93.75	730 91.25	736 92	670 83.7	
Wages	1 100	97.J	93.75	91.23	92	05.7.	J 02.J
17. Given the following da	ta:						
Year	2010		2011	2	012	2	2013
Monthly Pay (Rs)	22,500		23,500		,000		4,500
Price Index	142		148	1	55		162
(i) Calculate the real m	-		-				
(ii) Calculate the index	of rear wa	ges for e	ach year v	vith 2010	as base	e year.	
Ans: (i) Real Wages (	in Rs) :	15,	845	15,878	3	15,484	5,123
(ii) Indices of Real wa		) = 10):	100.0	)	100.2	1	
	.44						
18. The employees of an A			-			-	
of their contention the	-				ent. Do	ollar amo	ounts shown
represent the average	-	-	-	• •			
Year :	2013	201		2015		2016	
Pay : Index :	240 120	250 150		260 160		280 200	
(i) Compute the real w		150	J	100	4	200	
(1) compute the real w							
		(36)	)				

		unt of pay nee	eaea	in 2016	to pr	ovide so tha	it the bi	iying power
-	hat enjoyed i			2014		201 F	2016	
Ans: (i) Year	/ages (Dolla	2013 rs) 200		2014 166.67		2015 62.50	2016 140	
2 040		-		100.07	4	02.30	140	
120	200 = 400 Do							
19. The follow		ves the average		-			_	
price dur	ing 2010-17.	Prepare the in	dex n	umber t	o sho	w that chang	ge in the	real income
of the tea	cher and com	nment on price	incre	ease.				
Year :	2010	2011 2012		2013	2014		2016	2017
Income :	-	4,400 4,800		,200	5,600		6,400	6,800
Index :	100	130 160		220	270	330	400	490
Ans: Rea		lices (Base 20		-	-			
100.00,		75.00, 59.09	•	-		-		
1. Find the		<b>Exercise E (</b> index for the for			-	Indexj		
19. The follow price dur of the tea Year : Income : Index : <b>Ans: Rea</b> <b>100.00</b> , 1. Find the <u>Group</u> <u>Group Index</u> Weights	Food	Clothing		ent		and lighting	Mice	ellaneous
Group Index	180	150		.00	ruel	110 11ghting	5 11130	80
Weights	140	42		49		56		63
Ans: 136				-			1	
2. In the cor	nstruction of	a certain Cost	of Li	ving Ind	ex Nu	mber, the fo	llowing	group index
numbers		Calculate the Co						0 1
(i) The w		metic mean; an		-			•	
Group	Food	Fuel and light	1	Clothi		House Ren		cellaneous
Index	352	200	8	230	<u> </u>	160	0 1110	190
Number								
Weights	140	10		8		12		15
Ans: (i) 2	74.26 (ii) 20	51.1						
3. A worker	earned Rs 9	00 per month	in 20	10. The	cost c	of living inde	ex increa	sed by 70%
Ans: 136 2. In the connumbers (i) The works Group Index Number Weights Ans: (i) 2 3. A worker between	2010 and 20	013. How mucl	h ext	ra incon	ne sho	ould the wo	rker hav	e earned in
	hat he could	buy the same q	uanti	ities as in	n 2010	)?		
Ans: Rs 1	$2 \times \left[ \left( \frac{170}{100} \times 9 \right) \right]$	900) - 900] =	Rs 7,	,560				
4. During a	2 (200	d the cost of liv			mher (	toes un fron	110 to	200 and the
salary of		is also increase	-					
gain and		much in real te			25 10	10 550. 200		orker really
	s of Rs 90.90							
5. 13. Follov		tion relating to	worl	zers in a	n indu	strial town	is given	
Items of co	-	Consume				Proportic	-	enditure
	isumption	Gonsund	202			-	the iten	
3		(20	10 = 010					
(i) Food, drinks	s and tobacco	•	225	-			52%	
(ii) Clothing			175				8%	
(iii) Fuel and L	ighting		155				10%	
(iv) Housing			250				14% 16%	
(v) Miscellanec		per month in	150 2010		s 2 M	0 What sh	16% Juld be	the average
wage per worker per month in 2020 in that town so that the standard of living of the workers does not fall below the 2010 level?								
4. During a salary of gain, and <b>Ans: Loss</b> 5. 13. Follow Items of con (i) Food, drinks (ii) Clothing (iii) Fuel and Li (iv) Housing (v) Miscellaneo Ar wage per workers of <b>Ans: Rs 4</b> 6. The adjoining ta numbers for			ieve					
AIIS: KS 4	,110.							
6. The adjoining to	hla giyaa tha	cost of living	ndav	<u> </u>	0115	Cast	of livring	Moicht
The adjoining ta numbers for	•	•	their	Gr	oup		of living dex	Weight
	anierent gi	Sups with		L			uca	
			1 < /	)				
3			(37)	)				

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respective weights	for the	year 2012 (Base	Foo	d	525	40	
Year: 2002). Calculate	e the ove	rall Cost of Living					
Index Number.				hing	325	16	8
Mr. Bose got a		f Rs 550 in 2002.	Ligh	nting & Fuel	240	15	
Determine how much			Ren	t	180	20	
living as in 2002.	alary in 2012 to maintain his standard of			ers	200	9	{{{c}}}
Index Number. Mr. Bose got a Determine how much as salary in 2012 to living as in 2002.				I.C.W.A	(Intermedi	iate) Dec. 199	61
Ans: 352: Rs 1	Ans: 352; Rs 1,936				- (		~1 (g
7.	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						e e
The adjoining inform	action vo	lating to montrong		Items of	Consumer	Proportion	Ĭ
The adjoining inform		ating to workers		nsumption	price	of	8
in an industrial town	0	th in 2010 in Dr			index	Expenditure	
Average wage	-	ith in 2010 is Rs				on them	5
2,000. What should			Foo	d	132	40	g
expressed as % of w	-		<b>C</b> 1	thing	154	16	
average wage per wo	-			0			Ø
that town so that		_		l & Lighting	147	15	g
workers does not fall	below th	e 2010 level?	Hou	ising	178	20	
The adjoining inform in an industrial town Average wage 2,000. What should expressed as % of w average wage per wo that town so that workers does not fall			Mis	cellaneous	158	9	ی د د Rs
Ans: CPI in 2015 = 141.76; The pay of worker in 2015 should be: $\left(\frac{2,000 \times 141.76}{100}\right)$ = Rs							
2,835.20					(	100 /	Ĭ
LA ·	1 0/	c 2,835.20-2	2,000				હ
D.A. expresse	d as % o	$f wages = \frac{2,835.20-2}{2,000}$	)	$\times 100 = 41.2$	/6%		
8. 1Incomplete ii	nformatio	on obtained from a	a pai	rtially destro	yed record	on cost of livi	ng 🎽
analysis is give	en below:						Ś
Group		Group Index		Percent (%	) of Total Exp	penditure	
Food Food		268			60*		ę
Clothing		280		N	ot available		e e
Housing		210			20*		Ĭ
Fuel and Electri Miscellaneous	city	240 260		N	5 Not available		
	ving inde		total			was found to	he
255.8 Estimate	e the mis	x with percent of sing weights.	cotai	enpenareur			20 8
		sing weights.		Ans: Clo	thing: 10: N	liscellaneous	. 5 🖗
9 The monthly in	icome of	a nerson is Rs 10 5	500 T	t is given the	t the cost of	living index fo	ra i
narticulars mo	nth is 13	6. Find out the amo	nint •	spent hy that	nerson.	in the mack to	
	(i) On fo	od and (ii) On clot	thing	Spent by that	Person		S.
255.8. Estimate 9. The monthly in particulars mo Item Expenditure (Rs) Index 10. A textile worked January, 2016, on (i) Food and Group (i) Food (ii) Clothing (iii) Rent (iv) Fuel and Lig (v) Miscellaneou	Ecod			hing E.	uol and <sup>1</sup>	Miscollanaoua	٦ľ
Item	r00d	Kent	CIOTI	ung רע ח	lei alla l	viiscellaneous	8
Expanditure (Da)	່ ງ	1470	n	Р , -	0WEI 1600	1000	
Expenditure (Rs)	( 100	1470 100	: 1⊏	:0	110 110	00 1920	e e
	100	100	13	Anc. F	nod: 4 200.	Clothing 1 74	」 50
10 A textile work	er in the	city of Ahmedahad	l earr	ns Rs 750 n n	n The cost o	f living indev t	for
	is given	as 180 Heing the	follor	wing data fir	nd out the ar	nount he snor	de
an (i) Food and	d (ii) Don	t	101101	wing uata, ill	ia out the di	nount ne spen	us g
Crown	a (ii) Kell	r Evnondituro (Da	-)	C	roup Index		ľ
(i) Food		2 Provincial Contraction of the second se	<b>)</b>	U.	190 190		S
(ii) Clothing		125			181		
(iii) Rent		?			140		g
(iv) Fuel and Lig	ghting	100			118		S
(v) Miscellaneo	us	75			101		Ĭ
					Ans: (i) Rs	: 300 (ii) Rs 1	50 🐇

#### Ans: 352; Rs 1,936

Items of	Consumer	Proportion
Consumption	price	of
	index	Expenditure
		on them
Food	132	40
Clothing	154	16
Fuel & Lighting	147	15
Housing	178	20
Miscellaneous	158	9

D.A. expressed as % of wages = 
$$\frac{2,835.20-2,000}{2,000} \times 100 = 41.76\%$$

	•	
Group	Group Index	Percent (%) of Total Expenditure
Food	268	60*
Clothing	280	Not available
Housing	210	20*
Fuel and Electricity	240	5
Miscellaneous	260	Not available

(i) On food; and (ii) On clothing						
Item Food Rent Clothing Fuel and Miscellaneous						
	Power					
Expenditure (Rs)	?	1470	?	1680	1890	
Index	180	100	150	110	80	

#### Ans: Food: 4,200; Clothing: 1,260.

Group	Expenditure (Rs)	Group Index	
(i) Food	?	190	6
(ii) Clothing	125	181	e
(iii) Rent	?	140	, in the second s
(iv) Fuel and Lighting	100	118	ę
(v) Miscellaneous	75	101	
		Ans: (i) Rs 300 (ii) Rs	150

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11. In calculating the cost of living index the following weights were used: Food 8  $\frac{1}{2}$ ; Rent 2; Clothing  $2\frac{1}{2}$ ; Fuel and Light 1; Miscellaneous 11. Calculate the index number for a data when the percentage increase in prices of the various items over prices of July, 2018 = 100 were 31, 57, 90, 75 and 88 respectively.

#### Ans: 152.2

12. In calculating a certain cost of living index number, the following weights were used. Food 15, Clothing 3, Rent 4, Fuel and Light 2, Miscellaneous 11. Calculate the index for a date when the average percentage increases in price of item in the various groups of the base period were 32, 54, 47, 78 and 58 respectively.

Suppose a business executive was earning Rs 2,050 in the base period. What should be his salary in the current period if his standard of living is to remain the same?

#### Ans: 141.76; Rs 2,906.08

13. The cost of living index uses the following weights:

Food 40, Rent 15, Clothing 10, Fuel 10, Miscellaneous 15. During the period 2010 – 15, the cost of living index raised from 100 to 205.83. Over the same period the percentage rise in prices were:

Rent 60, Clothing 180, Fuel 75 and Miscellaneous 165. What is the percentage of change in the price of food?

#### Ans: 90

14. The relative importance of the following eight groups of family expenditure we found to be – Food 348, Rent 88, Clothing 97, Fuel and Light 65, House durable goods 71, Miscellaneous goods 35, Services 79, Drink and tobacco 217. The corresponding % increase in price for Oct. 2015 gave the following values – 25, 1, 22, 18, 14, 13, ?and 4. Calculate the percentage increase in group – services, if the percentage increase for whole group is 15.278.

#### Ans: 11

V A

15. From some given data, the retail price index based on five items, viz. Food, Rent and Rates, Fuel and Light, Clothing and Miscellaneous was calculated as 205. Percentage increases in prices over the base period are given below:

Rent and Rates 60, Clothing 210, Fuel and Light 120, Miscellaneous 130 Calculate the percentage increase in the Food Group, given that the weights of different items are as follows:

Food 60, Rent and Rates 16, Fuel and Light 8, Clothing 12, Miscellaneous 4, All items 100.

#### Ans: 92.3% increase in food group

16. Calculate the cost of living index number form the following data:

Group/Commodities	Weights	Group/Commodity Index Number
	W	
Food	71	370
Clothing	3	423
Fuel, etc.	9	469
House Rent	7	110
Miscellaneous	10	279

#### [C.A. (Foundation), Nov. 2001]

Ans: 353.20

17. The subgroup indices of the consumer price index number of workers of an industrial town for the year 2013 (with base 2008) were:

		,		
Food	Cloth	Fuel and Light	House Rent	Miscellaneous
180	140	125	200	150

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18. The weights of the various subgroups are 50, 9, 6, 15 and 20 respectively. It is proposed to fix industrial dearness allowance such that the employees are compensated fully for the rise in prices of food and house rent but only to the extent of 50% of increase in the prices of the rest of the sub-groups. What should be the dearness allowance expressed as percentage of wages?

Hint: Since the employees are compensated fully for the rise in price of food and bouse rent but only to the extent of 50% of increased in the prices of the rest of the subgroups, for clouting the C.O.L. Index (for giving compensation) were will take the index of cloth, fuel and light, and miscellaneous items as:

 $100 + \frac{40}{2} = 120$ ,  $100 + \frac{25}{2} = 112.5$  and  $100 + \frac{50}{2} = 125$ , respectively. C.O.L. Index = 162.5

Hence, the dearness allowance to be given to employees should be 62.55% of their wages in 2008.

19. The group indices and the corresponding weights for the working class cost of living index numbers in an industrial city for the years 2016 and 2020 are given below:

Group	Weight	Group	Index
Group	Weight	2016	2020
Food	71	370	380
Clothing	3	423	504
Fuel, etc.	9	469	336
House Rent	7	110	116
Miscellaneous	10	279	283

obtained

(a) Compute the cost of living indices for the two year 2016 and 2020.

(b) If a worker was getting Rs 3,000 per month in 2016, do you think that he should be given some extra allowance so that he can maintain his 2016 standard of living? If so, what should be the minimum amount of this extra allowance?

Ans: (a) 353.20; 351.58 (b) No extra allowance should be given 20. Labour and capital are used in two different proportions to products A and B, but the price of each input is equal for both products. On the basis of the information given in the attached table, prepare, for the year 2020 separate price indices for labour and capital:

	Product A	Product B	
Weight for labour	60	70	
Weight for capital	40	30	
Cost of Production Index for 2020			
(Base Year 2010 = 100)	340	330	
	Ans: P <sub>01</sub> (Labour	) = 300; P <sub>01</sub> (Capital) =	400

21. An enquiry into the budgets of the middle class families in a certain city in India gave the following information:

Expenses on	Food	Fuel	Clothing	Rent	Misc.
	35%	10%	20%	15%	20%
Price in 2015 (Rs)	150	25	75	30	40
Price in 2016 (Rs)	145	23	65	30	45
<b>X 4 X</b> 1	c1	1 600		1 1.1 .1 .	6004 50

What is the cost of living index number of 2016 as compared with that of 2015?

#### Ans: 102.86

22. Using the formula Ix =  $\frac{\sum q_0 p_1}{\sum q_0 p_0} \times 100$ , and find the consumer price index for 2020 with 2009 as base with the help of the following data. Interpret the Index Number so

obtained.			
Item No.	Quantity consumed in	Price per unit in	Price per unit in
	2009 (q <sub>0</sub> )	2009	2009
		(p <sub>0</sub> )	(p <sub>1</sub> )

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	1	75	3.4	9.6	\$ ();
	2	16	2.5	8.5	۷ ۸
	3	15	7.6	12.6	<u>چ</u>
	4	22	4.5	7.5	\$
	5	13	7.0	11.0	V
	6	3	2.0	4.0	÷

#### Ans: 225.61

23. Construct the consumer price index numbers for 2019 and 2020 from the indices given below:

Year	Food	R	ent Clot	hing Fue	l Misc.
2018	100	1	.00 10	00 100	) 100
2019	102	1	.00 10	03 100	) 97
2020	106	1	.02 10	05 101	98
	Assume the	following we	eights for differe	nt groups:	
Fo	od	Rent	Clothing	Fuel	Misc.
6	0	16	12	8	4

#### Ans: For 2016: 101.44; For 2020: 104.52

24. Index of Industrial Production covers thre groups of industries. The index increased from 106.4 to 150.2 form one point of time to another. The index number of individual three groups of industries, over the same period, changed as follows: Mining and Quarrying form 102.0 to 144.1; Manufacturing from 106.5 to 146.6; Electricity from 110.4 to 189.9

Determine the weights for the individual groups of industries.

#### Ans: (9.9, 81.2, 8.9) = (10, 81, 9)

- 25. If the Consumer Price Index (for the same class of people and with same base year) is higher for Delhi than that for Mumbai, does it necessarily mean that Delhi is more expensive (for this class of people) than Mumbai. Give reasons in support of your answer.
- 26. Owing to change in prices, the consumer price index of the working class in a certain area roles in a month by one quarter of what it was before, to 225. The index of food became 252 from 198, that of clothing from 185 to 2015, that of fuel and lighting from 175 to 195, and that of miscellaneous from 138 to 212. The index of rent, however, remained unchanged at 15. It was known that weight of clothing, rent, and fuel and lighting were the same. Find out the exact weight weights of all the groups.

Hints: Let  $I_1$  and  $I_2$  be the index number in the beginning of the month and at the end of the month respectively.

So 
$$I_2 = 225$$
 and  $I_1 = \left(1 + \frac{1}{4}\right)I_1 = \frac{5}{4}I_1 \Longrightarrow I_1 = \frac{4}{5} \times 225 = 180$ 

By forming and solving the two equations i.e. one at the beginning and one at the end, the following weights will be found:

#### Food: 54, Clothing: 10, Fuel and Lighting: 10, Rent: 10, Miscellaneous: 16

27. In a working class consumer price index number of a particular town the weights corresponding to different groups of items were as follows:

Food – 55, Fuel – 15, Clothing – 10, Rent – 8 and Miscellaneous – 12

In Oct. 2020, the DA was fixed by a mill of that town at 182 per cent for the workers which fully compensated for the rise in prices of food and rent but did not compensate for anything else. Another mill of the same town paid D.A. of 46.5 per cent which compensated for the rise in fuel and miscellaneous groups. It is known that rise in food is double than that of fuel and the rise in miscellaneous group is double than that of rent.

Find the rise in food, fuel, rent and miscellaneous groups.

(41)

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20 TI											ıs: 189.2
	e estimate										
for 1972-7					every	India	n was,	there	etore	e, 10ti	mes mor
prosperou	s than in 1	931-32.	Comme	ent.							
		Tiı	me Se	eries	Ana	lysis					
			Ex	ercis	se F						
1. Discuss the	e relative i	merits an	ıd dem	erits c	of 'fre	e-hand	curve'	meth	od o	f study	ving trend
1. Discuss the What point	t will you ŀ	keep in m	ind in	drawii	ng su	ch a tre	end curv	ve?			
With the hel	p of graph	i paper, o	btain t	he tre	nd cu	rve:					
Year : 1	.992	1993	199-	4	199	5	1996	1	1997	,	1998
	64	82	97		71		78		112		115
Year : 1	999	2000	200	1	200	2	2003	2	2004	ł	
Value : 1	131	88	100	)	146	5	150		120		
With the help of graph paper, obtain the trend curve:         Year       1992       1993       1994       1995       1996       1997       1998         Value       64       82       97       71       78       112       115         Year       1999       2000       2001       2002       2003       2004         Value       131       88       100       146       150       120         2.       Compute the values by the method of semi-averages from the data given below:       100       146       150       120											
Year	ne values l	2012	2013	201 201		ages In 2015	2016	uata g 202	-	2018	
No. of sheep (in la	i akhs)	2012 56	2013 55	201 51		47	42	20.		2018 35	2019 32
1 (	nd values							-	-		
	Taraco	( minit	.,		20	0 4	ul		, 50,		37, 35, 3
3. The sales of	of a comm	odity in	tones	variad	from	Ianua	ry 2000	) to D	acan		
following r		iouity iii	tones	varicu	nom	Janua	1y 200.	/ to D	ccen		
280	300		280		2	80		270		2	40
230	230		220			00		210			00
Find a tren		nethod of	-	averag						_	
	l line form			-		semi-a	average	meth	nod:		
Year	:	2013						7	2018		
Profit (in '000 la	khs) :	100	12		14		150 130				200
Ans	: By joinin	g the po	ints (2	.014, 1	120) a	and (2	017, 16	50), w	ve ge	t the t	rend line
5. Fit a straig	ght line tr	end to th	he follo	owing	data	using	the me	thod	of le	east sq	uares an
calculate th	he product	tion for th	ie year	2021:	:						
Year	:	2	016	20	)17	20	)18	202	19	2	020
Production ('(	,		83		92		'4	90			.66
Ans: Y =	101 + 16.	4X; (X -	Origin	= 199	98); E	stimat	ed pro	ducti	on fo	or 202	4 . 4 .
					Ans: Y = 101 + 16.4X; (X – Origin = 1998); Estimated production for 2021 is 150.2						
							-			('0	1 is 150. 00 tones
6. Fit a straig	ht line trei	nd to the	followi	ing dat	ta by i	Least S	-	/letho	d:	('0	
6. Fit a straig Year :	ht line trei 2011	nd to the	followi 2013	ing dat		Least S )15	quare N	/letho 2017	d:	-	
Year : Production :	2011 18		2013 21		2(	)15 23	quare N	2017 27		20	00 tones
Year : Production : Specify the	2011 18 e year of or	rigin. Esti	2013 21 mate p	product	20 20 tion f	)15 23 or the y	quare N	2017 27 18 an		20	0 <b>00 tones</b>
Year : Production : Specify the Ans: Y = 21	2011 18 e year of or 1 + 0.1X [0	rigin. Esti rigin X : 2	2013 21 mate p 2015];	oroduct (Y) <sub>201</sub>	$\frac{20}{2}$ tion f	015 23 or the y 1.3; (Y)	quare N 2 2 2 2020 = 2	2017 27 18 and 21.5	d 20	20 20.	00 tones
Year : Production : Specify the Ans: Y = 21 7. Fit a straig	2011 18 e year of or 1 + 0.1X [O ght line tre	rigin. Esti rigin X : 2	2013 21 mate p 2015];	oroduct (Y) <sub>201</sub>	$\frac{20}{2}$ tion f	015 23 or the y 1.3; (Y)	quare N 2 2 2 2020 = 2	2017 27 18 and 21.5	d 20	20 20.	00 tones
Year : Production : Specify the Ans: Y = 21	2011 18 e year of or 1 + 0.1X [O ght line tre	rigin. Esti rigin X : 2	2013 21 mate p 2015];	oroduct (Y) <sub>201</sub>	$\frac{20}{2}$ tion f	015 23 or the y 1.3; (Y)	quare N 2 2 2 2020 = 2	2017 27 18 and 21.5	d 20	20 20.	00 tones
Year : Production : Specify the Ans: Y = 21 7. Fit a straig year 2017: Year	2011 18 e year of or 1 + 0.1X [O ght line tre : : 20	rigin. Esti rigin X : 2 end to th	2013 21 mate p 2015];	oroduct (Y) <sub>201</sub>	$\frac{20}{2}$ tion f $_8 = 22$ data a	015 23 or the y 1.3; (Y)	quare N year 20 $2_{020} = 2$ imate t	2017 27 18 and 21.5	d 20 lue d	20 20.	00 tones
Year : Production : Specify the Ans: Y = 21 7. Fit a straig year 2017: Year : Production of st	2011 18 e year of or 1 + 0.1X [O ght line tre : 20 eel:	rigin. Esti rigin X : 2 end to th 07 2	2013 21 mate p 2015]; ae follov	product $(Y)_{201}$ wing c	$\frac{20}{2}$ tion f $_8 = 22$ data a	015 23 or the y 1.3; (Y) and est 2010	quare N year 20 2020 = 2 imate t	2017 27 18 and 21.5 he va 11	d 20 lue d 20	2( 20. 20. 012	000 tones
Year : Production : Specify the Ans: Y = 21 7. Fit a straig year 2017: Year Production of st (in million tons)	2011 18 e year of or 1 + 0.1X [O ght line tre : 20 eel: 6	rigin. Esti rigin X : 2 end to th 07 2 0	2013 21 mate p 2015]; ae follow 2008 72	200 75	$\frac{20}{2}$ tion f $_8 = 22$ data a	015 23 or the y 1.3; (Y) and est 2010 65	quare N year 20 2020 = 2 imate t 20 8	2017 27 18 and 21.5 he va 11 0	d 20 lue d 20	20 20. 012 35	$\frac{000 \text{ tones}}{16}$ $\frac{019}{16}$ $\frac{019}{16}$ $\frac{019}{16}$ $\frac{019}{16}$
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(v) I	Do the figur	res sho	w a risi	ng tren	d or a f	alling	trend	?					
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	mber 6		5.3	4.3	6.1	5.6		7.9	5.8	6.	
	Fit a strai	-	-			-					
	your resu	It to es		-			-		-		
4.6	· . 1	<b>c</b> .				X; X = 2(t)		-			
16.	In a stud	-	ts sales,	a motor	company	y obtaine	d the fo	ollowing	least	square	trenc
	equations			0040 W							
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	The comp	-			-		-		-		
	that it is r	easona	able to as	sume tha	t at least	for the n	ext deca	de the ti	ena wi	li conti	nue as
	before.	a tha c		nnualina	roogo in t	honumh	on of uni	ta aald?			
	(a) What i (b) By wł		-						ite pro	cont n	hycica
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	How muc					nhysical	anacity	is this o	stimato	d value	2
	Ans: (a) 2				-		1 0				
17.	Convert t			-	-						
	trend equ		o		ia oquuu	011 101 00		01 0 00			
			Y = 162 +	15.8X (O	rigin: 20	15; Scale:	1 units o	of $X = 1$	vear)		
	Forecast t			-	•				-	ts.	
	<b>Ans: Y =</b> 1		-		-	-	-	-			les)
18.	The trend									-	-
	following										-
	$Y_{c} = 12 + 0$	).7X: ((	Origin: 20	010; X un	it = 1 yea	r and Y u	nit = Ani	nual pro	ductior	1)	
	Step the e	equation	on down	to a mor	nth to me	onth basi	s and sł	nift the	origin t	to 1 <sup>st</sup> Ja	anuary
	2010.										
				Ans: Y <sub>c</sub>	$=1+\frac{0.7}{144}$	X; (Origi	n: 1 <sup>st</sup> Ju	ly 2010	; X unit	t = 1 m	onth)
						9712 + 0					
19.			ion for ce	ertain pro					-		_
エフィ	The trend	equal		_		-					10 am
17.	The trend Y	-	ual produ	iction in	thousand	i tons: t:	i iiiie wi		i, the y		to and
17.		= Ann		action in	thousanc	tons: t:	i iiie wi		i, ene y		to and
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17.	Y unit = 1 ye	= Ann ear	ual produ			for Septe		)14.	-		
1).	Y unit = 1 ye	= Ann ear the tre	ual produ nd value	of the pro	oduction	for Septe	mber, 2(	)14.	-		
20.	Y unit = 1 ye Estimate t Hints: Mo	= Ann ear the tre nthly t	ual produ nd value crend equ	of the pro ation is g	oduction	for Septe [J	mber, 2( <b>.C.W.A (</b>	)14. [ <b>Interm</b>	ediate]	) June,	2000]
	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} + $	= Annu ear the tre nthly t $\frac{288}{144}$ t =	ual produ nd value crend equ = 300 + 2t	of the pro ation is g :: Origin:	oduction tiven by: 1st July, 2	for Septe [I 010; t: Ur	mber, 2( . <b>C.W.A (</b> nit 1 mor	)14. [ <b>Interm</b> nth; Y: M	ediate) Ionthly	) June,	2000]
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20.	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated	= Annue ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a	of the pro ation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3	oduction tiven by: 1 <sup>st</sup> July, 2 ember, 20 300 + 2 × <b>Exercis</b> determir	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 Se G ne the tre	mber, 2( <b>.C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s	014. ( <b>Interm</b> hth; Y: M .5 = 50.1 and ton	ediate] Ionthly 5 s.	<b>) June,</b> produ	<b>2000</b> ] ction
20. 1.	Y unit = 1 ye Estimate t Hints: Mo Y = $\frac{3,600}{12}$ + For Septe Estimated	= Annue ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ	ual produ nd value rend equ 300 + 2t 2014 i.e. 1 uction for moving a rend valu	of the pro ation is g :: Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the	oduction (iven by: 1 <sup>st</sup> July, 2 ember, 20 800 + 2 × Exercis determir same gra	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 Se G ne the tre aph paper	mber, 20 . <b>C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s	014. (Interm hth; Y: M .5 = 50.1 and ton short-te	ediate] Ionthly 5 s. rm fluc	<b>) June,</b> produ	<b>2000</b> ] ction ns. Plot
20. 1. 1	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated	= Annue ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200	of the pro ation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009	oduction (iven by: 1 <sup>st</sup> July, 2 ember, 20 800 + 2 × Exercis determir same gra	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 Se G ne the tre	mber, 20 . <b>C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s :: .2 2013	014. (Interm hth; Y: M .5 = 50.1 and ton short-te	ediate] Ionthly 5 s. rm fluc	<b>) June,</b> produ	<b>2000</b> ] ction ns. Plot
20. 1. Year Produ	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated Using three the original	= Anni ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 unes) 21	of the pro- ation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009 1 22	oduction viven by: 1 <sup>st</sup> July, 2 ember, 20 300 + 2 × <b>Exercis</b> determir same gra 2010 2	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 <b>Se G</b> ne the tre aph paper 2011 201 25 24	mber, 20 . <b>C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s :: .2 2013	014. (Interm hth; Y: M 5 = 50. and ton short-te 2014 25	ediate] Ionthly 5 s. rm fluc 2015	) June, productuation 2016	<b>2000</b> ] ction ns. Plot 2017
20. 1. Year Produ	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated Using three the original	= Anni ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ e-year and tr 00 ton l (3 ye	ual produ nd value rend equ 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 unes) 21 <b>arly M.A</b>	of the pro- lation is g :: Origin: $15^{th}$ Septe 2014 = 3 loverages, es on the 08 2009 1 22 .):	iven by: 1 <sup>st</sup> July, 2 mber, 20 300 + 2 × Exercis determin same gra 2010 2 23 22 2	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 <b>Se G</b> ne the tre aph paper 2011 201 25 24 <b>3.3 24</b>	mber, 20 . <b>C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s : 2 2013 22 23.7	014. (Interm hth; Y: M .5 = 50.1 and ton short-te 2014 25 23.7	ediate Ionthly 5 s. rm fluc 2015 26 24.3	) June, produ- tuatior 2016 27 26	<b>2000</b> ] ction ns. Plot 2017 26 <b>26.3</b>
20. 1. Year Produ	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated Using three the original action (in '0 <b>Ans: Trend</b>	= Annu ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ -year and tr 00 ton l (3 ye tive m	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 unes) 2 arly M.A uodel, sho	of the pro- lation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009 1 22 -): ort-term	oduction viven by: 1 <sup>st</sup> July, 2 ember, 20 800 + 2 × Exercis determin same gra 2010 2 23 22 2 fluctuat	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 Se G ne the tre 2011 201 25 24 3.3 24 ions are:	mber, 20 . <b>C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s : 2 2013 - 22 23.7 <b>0, -0.3,</b>	014. (Interm 1.5 = 50.1 and ton short-te 2014 25 23.7 1.0, 0.3	ediate] [onthly 5 s. 2015 26 24.3 , -1.7, (	) June, productuation 2016 27 26 ).7, 0, (	2000] ction 1s. Plot 2017 26 26.3 ).7
20. 1. Year Produ	Y unit = 1 ye Estimate the Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated Using three the original action (in '0 <b>Ans: Trend</b> <b>Using addi</b>	= Anni ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ e-year and tr 00 ton l (3 ye tive m an addi	ual produ nd value rend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 unes) 21 <b>arly M.A</b> uodel, sho	of the pro- lation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009 1 22 -): ort-term	oduction viven by: 1 <sup>st</sup> July, 2 ember, 20 800 + 2 × Exercis determin same gra 2010 2 23 22 2 fluctuat	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 Se G ne the tre 2011 201 25 24 3.3 24 ions are:	mber, 20 . <b>C.W.A (</b> nit 1 mor × 12 + 2 )1 thous nd and s : 2 2013 - 22 23.7 <b>0, -0.3,</b>	014. (Interm 1.5 = 50.1 and ton short-te 2014 25 23.7 1.0, 0.3	ediate] [onthly 5 s. 2015 26 24.3 , -1.7, (	) June, productuation 2016 27 26 ).7, 0, (	2000] ction 1s. Plot 2017 26 26.3 ).7
20. 1. Year Produce 2. Year	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated Using three the original action (in '0 <b>Ans: Trend</b> <b>Using addi</b> Assuming a for years 2 t	= Anni ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ and tr 00 ton l (3 ye tive m in addi to 6:	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 anes) 2 arly M.A itive mod	of the pro- lation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009 1 22 .): ort-term lel, apply 2	boduction fiven by: $1^{st}$ July, 2 ember, 20 $300 + 2 \times$ <b>Exercis</b> determine same graves 2010 2 23 22 2 <b>fluctuat</b> 3 year m	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 <b>Se G</b> The the tre aph paper 2011 201 25 24 <b>3.3 24</b> <b>ions are:</b> avoing avoing avoing a set of the second	mber, 20 .C.W.A ( .it 1 more × 12 + 2 )1 thous nd and served 2 2013 - 22 23.7 0, -0.3, erage to 5	014. (Interm hth; Y: M 5 = 50.1 and ton short-te 2014 25 23.7 1.0, 0.3 obtain 6	ediate) Ionthly 5 s. rm fluc 2015 26 24.3 , -1.7, 0 the tren 7	) June, produ- tuatior 2016 27 26 ).7, 0, ( nd-free	2000] ction ns. Plot 2017 26 26.3 0.7 series 8
20. 1. Year Produce 2. Year	Y unit = 1 ye Estimate the Hints: Mo $Y = \frac{3,600}{12} + $ For Septer Estimated Using three the original action (in '0 <b>Ans: Trend</b> <b>Using addi</b> Assuming a	= Anni ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ and tr 00 ton l (3 ye tive m in addi to 6:	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 unes) 2 <b>arly M.A</b> itive mod	of the pro- lation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009 1 22 -): ort-term lel, apply	iven by: 1 <sup>st</sup> July, 2 ember, 20 300 + 2 × Exercis determin same gra 2010 2 23 22 2: fluctuat 3 year m 34 13	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 <b>Se G</b> The the tre aph paper 2011 201 25 24 <b>3.3 24</b> <b>ions are:</b> avoing avoing avoing a set of the second	mber, 20 .C.W.A ( .it 1 more × 12 + 2 )1 thous nd and served 2 2013 - 22 23.7 0, -0.3, erage to 5	014. (Interm hth; Y: M 5 = 50.1 and ton short-te 2014 25 23.7 1.0, 0.3 obtain	ediate] [onthly 5 s. 2015 26 24.3 , -1.7, 0 the tren	) June, produ- tuatior 2016 27 26 ).7, 0, ( nd-free	2000] ction 1s. Plot 2017 26 26.3 0.7 series
20. 1. Year Produ 2. Year	Y unit = 1 ye Estimate t Hints: Mo $Y = \frac{3,600}{12} +$ For Septe Estimated Using three the original action (in '0 <b>Ans: Trend</b> <b>Using addi</b> Assuming a for years 2 t	= Anni ear the tre nthly t $\frac{288}{144}$ t = mber 2 l produ and tr 00 ton l (3 ye tive m in addi to 6:	ual produ nd value crend equ = 300 + 2t 2014 i.e. 1 uction for moving a rend valu 200 anes) 2 arly M.A itive mod	of the pro- lation is g : Origin: 15 <sup>th</sup> Septe 2014 = 3 verages, es on the 08 2009 1 22 .): ort-term lel, apply 2	boduction fiven by: $1^{st}$ July, 2 ember, 20 $300 + 2 \times$ <b>Exercis</b> determine same graves 2010 2 23 22 2 <b>fluctuat</b> 3 year m	for Septe [1 010; t: Ur 014: t = 4 50.5 = 40 <b>Se G</b> The the tre aph paper 2011 201 25 24 <b>3.3 24</b> <b>ions are:</b> avoing avoing avoing a set of the second	mber, 20 .C.W.A ( .it 1 more × 12 + 2 )1 thous nd and served 2 2013 - 22 23.7 0, -0.3, erage to 5	014. (Interm hth; Y: M 5 = 50.1 and ton short-te 2014 25 23.7 1.0, 0.3 obtain 6	ediate) [onthly 5 s. rm fluc 2015 26 24.3 , -1.7, 0 the tren 7	) June, produ- tuatior 2016 27 26 ).7, 0, ( nd-free	2000] ction ns. Plot 2017 26 26.3 0.7 series 8

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Ans: Year	_	1	1	2	34		5		6	,	7 152	8	ę
M.A. Value Trend free			_	131 - 1	13	6	14	· L	147 - 2		153 2		
	he following	, data c	alcula	-	∎ rend	values	u izusi	, ng faur-	_	rlv m	_	verage <sup>.</sup>	6
3. From t Year	-	2010	2011		12	2013		2014	ī	015	201		7
Values		620	1036		73	588		696		116	738		
8	I.A. Values												Q
793.87					ſ		5		-	,		-,	6
	ing a four-ye	ear cycle	e. calc	ulate th	ie tre	end by	the	method	of n	novin	g aver	age from	the
followi	ng data rela	-				-					0		ę
4. Assum followi Year Production	_		-		2014	1			017	201	8 20	19 202	0 8
Production					467	502			557	57			
ò		I						I.C.W.A	(Int	erme	ediate	) Dec' 19	99]
Ans: 4	-yearly M.A	.'s for 2	013 t	o 2018	B resp	oectiv	ely a	are:	•		-	-	-
495.70	), 50	03.60,		511.60	D, <sup>-</sup>	52	9.5	0,	55	3.00,		572.50	
5. From t	he given dat	ta, comp	oute 't	rend' a	nd 'sl	hort-te	erm	fluctuat	ions	' by t	he Mov	ving Ave	rage 🖗
Metho	d, assuming	-								-		-	-
Year 201			013	2014	201	-	16	2017	1	018	2019	2020	]
Sales 75			60	65	70		'0	75		35	100	70	6
Ans: Year			201		)13	201		2015		2016	201		.8
<b>M.A</b> .	Values		61.		1.2	64.3	7	68.12	7	72.5	78.7	7 82.5	.8 50
<b>T</b>	ad aller	incted	5		5	100 (	10	100 74		0	5	) 100	
Treı valu		inated	89. 0		7.9 6	100.9	98	102.76		96.5 5	95.2 4	2 103.	03
R	ate trend by	moving	v		•	and co	mm	ent:		3	т		ą
Year		l <sup>st</sup> Quart			Qua			3 <sup>rd</sup> Qua	rter		4th (	)uarter	8
2015	-	40	.01	-	35			38				40	e
2016		42			37			39				38	ę
2016 2017		41			35			38				42	
лпэ.	M.A. Value												
multip	olicative mo	del) foi	r 3rd (	<b>Juarte</b>	r of 2	015 to	) 2 <sup>nd</sup>	<sup>d</sup> Quarte	er o	f 201	7, resp	pective a	re:
M. A. V	7. 38.5	39.0 39	9.375	39.2	25	38	.87	5 38	8.5		38.125	5 38.5	5
> <b>T.E.V</b>	<b>. 98.70</b> 1	102.56	106	.67	94.2	7	10(	).32	98.'	70	107.5	<b>54</b> 90	91
7. What i	s trend in a	time sei	ries? ]	I'he foll	owin	g table	e giv	es the a	nnu	al sal	es (un	Rs 1,000	) of [
a comr	nodity:	0.5.1.5								0.5		0	
Year 20	010 2011	2012	201	3 201	4 2	2015	201	16   201	17	2018	3 201	9 2020	) 8
Sales 7	$\frac{10}{100} = \frac{705}{100}$	680 d by act	687	$\frac{75}{100}$	/   5 vice	629 rly	64	4 78	3	/81	80	5   873	
M. A. V T. E. V. 7. What i a comr Year 20 Sales 7 Detern Ans: 5 9. Find th weight Year Value Ans: 10. For the equiva Year Value Ans: M	inne tie tren	iu by Cal	iculati	ing the	5 yea	0 II I II	ייז 111 איז 117 איז		305. Into		diata	June 10	וסבז
Ano. F	VOORLY M A	(Trong	1) for	2012 4	0.20	0. 19 ana	[]. . ros	u. w.A. (	, mue Slava -	n me (Da 4		june, 19	ן נכי
AIIS: 5	yearry WI.A.	i ( i rell( م	101° 101° 20	2012 ( ) 674	.0 40	10 are 700	- 1 es	710 C	=1y:  20	1 גאן סכד	,000J 40	777 00	
9. Find th	/U/.OU,	the fall	<b>91.0</b>	$\mathbf{U}_{\mathbf{r}} = \mathbf{U}_{\mathbf{r}}$	<b>7.40</b> ,	700 a a the	UU,	/ 1 <b>0.</b> (	jU, iaht	<b>20</b> / مط	.4 <b>U</b> , oving c		vith
2. Fillu U Weight	r = 1 = 101		0 vv 1112	5 301105	usiii	gauii	ce-y	ycai We	igiit	cu III	oving a	iverage V	VILII
Year	.5 1, 2, 1. 1	2		2		1		L				7	
Value	2	4		<u>ა</u> 5		- <u>+</u> 7	-+	<u>ט</u> א		1	,	/ 13	
Ans:	3.75. 5	25. 6	.75.	8.25	10.2	25	[	0	L	1	~	13	
10. For the	e following s	series of	ohse	rvation	S. VAI	-~ rifv th:	at th	le 2-vea	r ce	ntred	movir	ig averad	re is
equiva	lent to 3-ves	ar weigh	ited m	10ving 2	avera	ge wit	h we	eights 1	. 2. 1	resn	ectivel	- <u>.</u>	,
Year	2014	201	5	2016		2017		2018	, _, 1	20	19	2020	
Value	2011	4	5	5		7	-+	8		1	0	13	-  ]
§	. –	· ·	I		1	-	[I.(	.W.A. (	Inte	erme	diate)	June, 20	02]
Ans: M	I.A. Values f	or 2015	5 to 2	019 ar	e res	pectiv	velv:	3.75,	5.25	5, 6.7	<b>5, 8.2</b>	5, 10.25	
					(45)	-	2						9
\$	<b>olicative mo</b> 7. 38.5         98.70         s trend in a         nodity:         10       2011         10       705         nine the trend         yearly M.A.         707.80,         ne trend for         is 1, 2, 1.         1         2         3.75, 5.         e following s         lent to 3-yea         2014         2         I.A. Values f				(13)								Ś
	$\sim$	~ ~	~ ~	~ ~	0	~	$\sim$	~ .	~	$\sim$	~	~ ~	$\sim$

। ବେଜିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆବର୍ଷ୍ଟିଆ

		<u>েঞ্চ&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;ঞ্জি&gt;&lt;</u>									
11. For the following data, verify that the 5-yearly moving weighted moving average trend values with weights 1, 2, 2, 2, 1 respectively are equivalent to 4-yearly centred moving											
values w	vith weig	hts 1, 2	, 2, 2, 1	l respe	ctively	are equ	uivalent	to 4-y	early c	entred	movin
	trend val			-	-	-		-	-		
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sales (Rs lakhs		3	7	6	4	8	9	10	8	9	9
	A.'s for 20	007 to 2	2013 ai	re: 5.12	25, 5.62	25, 6.50	0, 7.25		0, 8.87	5, 9.00	0
					rcise 9		•				
1 Commut	a tha ana	a a na l a r					fortho	falloui	n a time o		
-	e the seas		-						-		
Month	2014 15	201 23		2016		onth	2014 20	ł	2015 22	20 3	
Jan. Feb.	15 16	23		25 25	July Aug		20 28		22	3	
March	10	28		35	Sep	-	20		32	3	
April	18	22		36	0ct		33		37	4	
May	23	3		36	Nov		33		34	4	
June 23 28 30 Dec. 38 44 53											
Year20052006200720082009201020112012201320142015Sales (Rs lakhs)537648910899Ans: M.A.'s for 2007 to 2013 are: 5.125, 5.625, 6.500, 7.250, 8.250, 8.875, 9.000Exercise 9.31. Compute the seasonal averages, and seasonal indices for the following time-series:Month201420152016Month201420152016Jan.152325July202230Feb.162225Aug.282834March182835Sept.293238April182736Oct.333441June232830Dec.384453[Hints: Use Method of Simple Average]Ans: 70, 70, 90, 90, 100, 90, 80, 100, 110, 130, 120, 150.2. Assuming no trend in the series, calculate seasonal indices for the following data:YearIIIIIIIV201478668480201576748278201672688070201774708474											
-		-			30.120	). 150.					
Ans: 70, 70, 90, 90, 100, 90, 80, 100, 110, 130, 120, 150. 2. Assuming no trend in the series, calculate seasonal indices for the following data:											
	8		001100)		larter				(in u		
Year		I		्र	II		III		(in u	IV	
2014		78			66		84			80	
2015		76			74		82			78	
2016		72			68		80			70	
2017		74			70		84			74	
2018		76			74		86			82	
							[C./	A. (Fou	ndatio	n) May	, <u>19</u> 99
Hints: U	se the m	ethod o	of simp	le aver	ages						
Ans: Sea	sonal in	dices fo	or the f	our qu	arters a	are: 98	.43; 92	2.15; 1	108.90;	100.5	52
3. Find seas	sonal var	iations l	by the r	atio-to	-trend ı	nethod	from th	ne data	given b	elow:	
Year	1s	<sup>st</sup> Quarte	er	2nd Q	uarter	3	rd Quar	ter		uarter	
2013		30		-		J	· ·		T V	uarter	
		50		4	ł0	J	36		т Q	34	
2014		34			40 52	J	36 50			-	
2014 2015				5		J				34	
2015 2016		34 40 54		5 5 7	52 58 76	J	50 54 68			34 44 48 62	
2015		34 40		5 5 7 9	52 58 76 92		50 54 68 86			34 44 48 62 82	
2015 2016		34 40 54 80		5 7 9 s: Strai	52 58 76 92 <b>ght line</b>	e trend	50 54 68 86 <b>equati</b>	-	iven by	34 44 62 82 <b>: Y = 56</b>	
2015 2016	Origin	34 40 54 80 : <b>1995</b> (	(1 <sup>st</sup> July	5 7 9 s: Strai y): X ur	52 58 76 92 <b>ght line</b> nits = 1	e trend year : `	50 54 68 86 <b>equati</b> Y units	: Avera	iven by age qua	34 44 62 82 : <b>Y = 56</b> rterly	values
2015 2016 2017		34 40 54 80 : <b>1995</b> ( Sea	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice	52 58 76 92 ght line nits = 1 s: 92.0,	e trend year : `	50 54 68 86 equati Y units 117.4,	: Avera	iven by age qua 102.1	34 44 62 82 : <b>Y</b> = 56 rterly	values 88.!
2015 2016 2017	<b>Origin</b> seasonal	34 40 54 80 : <b>1995</b> ( Sea	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice	52 58 76 92 ght line nits = 1 s: 92.0,	e trend year : `	50 54 68 86 equati Y units 117.4,	: Avera	iven by age qua 102.1	34 44 62 82 : <b>Y</b> = 56 rterly	values 88.!
2015 2016 2017		34 40 54 80 : <b>1995</b> ( Sea	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> o to tre	e trend year : `	50 54 68 <b>equati</b> <b>Y units</b> 117.4, hod from	: Avera	iven by age qua 102.1	34 44 62 82 : <b>Y</b> = 56 rterly	values 88.!
2015 2016 2017 4. Find the Year		34 40 54 80 : <b>1995 (</b> <b>Se</b> : I variation	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght ling</b> <b>nits = 1</b> <b>s: 92.0</b> , o to tre ( II	e trend year : ` nd met	50 54 68 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from	: Avera	iven by age qua 102.1	34 44 62 82 <b>: Y = 56</b> <b>rterly</b> I, en below	values 88.!
2015 2016 2017 4. Find the Year 2011		34 40 54 80 : <b>1995 (</b> <b>Se:</b> I variation I 60	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght ling</b> <b>nits = 1</b> <b>s: 92.0,</b> o to tre ( II 80	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72	: Avera	iven by age qua 102.1 ata give	34 44 62 82 <b>: Y = 56</b> <b>rterly</b> L, en below	values 88.!
2015 2016 2017 4. Find the Year 2011 2012		34 40 54 80 : <b>1995 (</b> <b>Se</b> I variation I 60 68	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> o to tre ( II 80 104	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100	: Avera	iven by age qua 102.1 ata give	34 44 62 82 <b>: Y = 56</b> <b>: terly</b> 1, en below 1V 68 88	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013		34 40 54 80 : <b>1995 (</b> <b>Se</b> I variation I 60 68 80	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre ( II 80 104 116	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108	: Avera	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below IV 68 88 96	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014		34 40 54 80 : <b>1995 (</b> <b>Se:</b> l variation I 60 68 80 108	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght ling</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre ( II 80 104 116 152	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136	: Avera	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below IV 68 88 96 124	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015		34 40 54 80 : <b>1995 (</b> <b>Se</b> I variation I 60 68 80	(1 <sup>st</sup> July asonal	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre ( II 80 104 116	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108	: Avera	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below IV 68 88 96	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015 <b>Ans:</b>		34 40 54 80 : <b>1995 (</b> <b>Se:</b> l variation I 60 68 80 108 160	(1st July asonal ons by	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre (11 80 104 116 152 172	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136 172	m the d	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below IV 68 88 96 124 164	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015 <b>Ans:</b> <b>Quarter</b>	seasonal	34 40 54 80 : <b>1995 (</b> <b>Se:</b> l variation I	(1st July asonal ons by	5 5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre (1 80 104 116 152 172 <b>Q</b> <sub>2</sub>	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136 172 <b>Q</b>	m the d	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below 1V 68 88 96 124 164 <b>Q</b> 4	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015 Ans: Quarter S.I. (Adjust	seasonal	34 40 54 80 : <b>1995 (</b> <b>Se:</b> l variation I 60 68 80 108 160	(1st July asonal ons by	5 5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre (11 80 104 116 152 172	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136 172	m the d	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below IV 68 88 96 124 164	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015 <b>Ans:</b> <b>Quarter</b> <b>S.I. (Adjust</b> 5.	e seasonal	34 40 54 80 : <b>1995 (</b> <b>Se:</b> l variation I 60 68 80 108 160 <b>Q</b> 1 <b>92.0</b>	(1st July asonal ons by	5 7 9 s: Strai y): X ur Indice the rati	52 58 76 92 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre (11 80 104 116 152 172 <b>Q</b> <sub>2</sub> <b>117.36</b>	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136 172 <b>Q</b>	: <b>Aver</b> a m the d	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en below 1V 68 88 96 124 164 <b>Q</b> 4 <b>88.46</b>	values 88.!
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015 <b>Ans:</b> <b>Quarter</b> <b>S.I. (Adjust</b> 5. 11. From the	e seasonal ed) given rat	34 40 54 80 <b>: 1995 (</b> <b>Se:</b> l variation I variation I variation 60 68 80 108 160 <b>Q</b> 1 <b>92.0</b> cios of ol	(1st July asonal ons by 05 bserved	s: Strai y): X ur Indice the rati	$ \frac{52}{58} \\ \frac{76}{92} \\ \frac{91}{52} \\ \frac{91}{51} \\ \frac{91}{52} \\ \frac{92}{51} \\ 9$	e trend year : ` nd met	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136 172 <b>Q</b>	: <b>Aver</b> a m the d	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en belov IV 68 88 96 124 164 <b>Q</b> 4 <b>88.46</b>	values 88.! w:
2015 2016 2017 4. Find the Year 2011 2012 2013 2014 2015 <b>Ans:</b> <b>Quarter</b> <b>S.I. (Adjust</b> 5.	e seasonal ed) given rat (%), calc	34 40 54 80 <b>: 1995 (</b> <b>Se:</b> l variation I variation I variation 60 68 80 108 160 <b>Q</b> 1 <b>92.0</b> cios of ol culate se	(1st July asonal ons by 05 bserved easonal	s: Strai y): X ur Indice the rati	52 58 76 52 <b>ght line</b> <b>nits = 1</b> <b>s: 92.0,</b> 0 to tre (17 80 104 116 152 172 <b>Q</b> <sub>2</sub> <b>117.36</b> s to s. If	e trend year : ` nd met )uarter	50 54 68 86 <b>equati</b> <b>Y units</b> <b>117.4</b> , hod from III 72 100 108 136 172 <b>Q</b>	: <b>Aver</b> a m the d	iven by age qua 102.1 ata give	34 44 48 62 82 <b>: Y = 56</b> <b>rterly</b> 1, en belov 1V 68 88 96 124 164 <b>Q</b> 4 <b>88.46</b>	values 88.!

	he likely sales for inc		2018		<u></u>	90	
quarters?	The likely sales for find	liviuuai	2018	101	95	90 90	100
-	and multiplicative mo	adala in					
	-		2020	115	110	100	120
time series analys	sis, which is better and	wny:		А	ns: S.I.: 9	99, 101	, 90, 11
6. 12. Calculate	the seasonal indices f	rom the fol	lowing da	ita:			
		Ratio to N	•	erages (%	J)		
Year	T	П	Quarters			117	
2015	Ι	II		III		IV	
2017				85.21		90.25	
2018 2019	128.12 112.33	91.71 100.35		96.10 70.12		10.90	
2019	105.20	100.55		78.13		97.88	
2020	105.20	105.50		 s: 115.93,	99 1	2, 87.0	1 97 9
7. Calculate th	e seasonal indices	from the				•	•
expressed in			10110 W 1112	5 1410-10	moving	averag	c value
	$on \rightarrow$ Summer		Rain		Winte	er	—
Year	on / Summer		Ram		vv III C	-1	
2019			101.75		107.1	4	_
2020	96.18		92.30		114.0		
2021	92.45		95.20		118.1		
				[C.A. (I	Foundat	ion) Ma	y, 2002
	Ans:	(Summer)	) 93.127;	(Rain) 95	5.202; (V	Vinter)	111.68
8. The following	g are the figures of qu						
	ages have been calcula		ouuccion,		some qu	urterij	contor o
Year	Quarter		Produc	tion	Mou	ing aver	200
2012	<u>Quarter</u>		216		IVIOVI	ing aver	age
2012	1 2		210				
	2 3			209			
	3		209			227.00 226.13	
2013	т 1		200			220.13	
2013	1 2		220			237.50	
	3		250			243.75	
	4		220			252.50	
0.0.1.1	1		250			252.50	
2014	1						
2014	2						
2014	2		310	)			
2014	2 3 4		310 280	)			
	3 4	10ving ave	310 280 246	) )	noving a	verages	astren
Calculate the	3 4 remaining values of n	•	310 280 246	) )	noving a	verages	as tren
Calculate the	3 4 remaining values of n oute the seasonal indice	es	310 280 246 rages. Tre	) 5 ating the 1	Ū		
Calculate the values, comp	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b>	es alues for I	310 280 246 rages. Tre <b>and II Qu</b>	) 5 ating the 1 a <b>rter of 2</b>	2014 are	261.25	5, 268.2
Calculate the values, comp	3 4 remaining values of n oute the seasonal indice	es alues for I	310 280 246 rages. Tre <b>and II Qu</b>	) 5 ating the 1 a <b>rter of 2</b>	2014 are	e 261.25 e: 96.65,	5, 268.2 , 115.77
Calculate the values, comp Assuming	3 4 remaining values of n oute the seasonal indice Ans: M.A. va multiplicative mode	es alues for I el of time s	310 280 246 rages. Tre <b>and II Qu</b> series, Sea	ating the r ating the r arter of 2 asonal Inc	2014 are lices are	261.25 e: 96.65, 98.2	5, 268.2 , 115.77 29, 88.6
Calculate the values, comp <b>Assuming</b> 9. Given the following	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> g <b>multiplicative mode</b> lowing quarterly sales	es alues for I el of time s s figures in	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand	ating the r ating the r a <b>arter of 2</b> asonal Inc s of rupee	2014 are lices are	261.25 e: 96.65, 98.2	5, 268.2 , 115.77 29, 88.6
Calculate the values, comp <b>Assuming</b> 9. Given the following	3 4 remaining values of n oute the seasonal indice Ans: M.A. va multiplicative mode	es alues for I el of time s s figures in ethod of mo	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand	) ating the r a <b>rter of 2</b> asonal Inc s of rupee: rages.	2014 are lices are	261.25 e: 96.65, 98.2 year 20	5, 268.2 , 115.77 29, 88.6
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I	es alues for I el of time s s figures in ethod of mo II	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand	ating the r ating the r a <b>arter of 2</b> asonal Inc s of rupee: ages. III	2014 are lices are	e 261.25 e: 96.65, 98.2 year 20 IV	5, 268.2 , 115.77 29, 88.6 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290	es alues for I el of time s figures in ethod of mo II 280	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand	ating the r ating the r aarter of 2 asonal Inc s of rupee ages. III 285	2014 are lices are	261.25 2: 96.65, 98.2 year 20 IV 310	5, 268.2 , 115.72 29, 88.6 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320	es alues for I el of time s figures in ethod of mo II 280 305	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand	ating the r ating the r arter of 2 asonal Inc s of rupeer ages. III 285 310	2014 are lices are	261.25 e: 96.65, 98.2 year 20 IV 310 330	5, 268.2 , 115.77 29, 88.6 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017 2018	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320 340	es alues for I el of time s figures in ethod of mo II 280 305 321	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand	ating the r ating the r arter of 2 asonal Inc s of rupeer rages. III 285 310 320	2014 are lices are	2 261.25 2: 96.65, 98.2 year 20 IV 310 330 340	5, 268.2 , 115.77 29, 88.6 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320	es alues for I el of time s figures in ethod of mo II 280 305	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand oving aven	ating the p ating the p arter of 2 asonal Inc s of rupee rages. III 285 310 320 362	2014 are lices are	261.25 e: 96.65, 98.2 year 20 IV 310 330 340 380	5, <b>268.2</b> , <b>115.7</b> 2 <b>9, 88.6</b> 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017 2018	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320 340	es alues for I el of time s figures in ethod of mo II 280 305 321	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand oving aven	ating the r ating the r arter of 2 asonal Inc s of rupeer rages. III 285 310 320	2014 are lices are	2 261.25 2: 96.65, 98.2 year 20 IV 310 330 340	5, <b>268.2</b> , <b>115.7</b> 2 <b>9, 88.6</b> 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017 2018	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320 340	es alues for I el of time s figures in ethod of mo II 280 305 321	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand oving aven	ating the p ating the p arter of 2 asonal Inc s of rupee rages. III 285 310 320 362	2014 are lices are	261.25 e: 96.65, 98.2 year 20 IV 310 330 340 380	5, <b>268.2</b> , <b>115.7</b> 2 <b>9, 88.6</b> 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017 2018	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320 340	es alues for I el of time s figures in ethod of mo II 280 305 321	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand oving aven	ating the p ating the p arter of 2 asonal Inc s of rupee rages. III 285 310 320 362	2014 are lices are	261.25 e: 96.65, 98.2 year 20 IV 310 330 340 380	5, <b>268.2</b> , <b>115.7</b> 2 <b>9, 88.6</b> 16-2019
Calculate the values, comp <b>Assuming</b> 9. Given the foll find the spec 2016 2017 2018	3 4 remaining values of n oute the seasonal indice <b>Ans: M.A. va</b> <b>multiplicative mode</b> lowing quarterly sales ific seasonal by the me I 290 320 340	es alues for I el of time s figures in ethod of mo II 280 305 321	310 280 246 rages. Tre <b>and II Qu</b> series, Sea thousand oving aven	ating the p ating the p arter of 2 asonal Inc s of rupee rages. III 285 310 320 362	2014 are lices are	261.25 e: 96.65, 98.2 year 20 IV 310 330 340 380	5, <b>268.2</b> , <b>115.7</b> 2 <b>9, 88.6</b> 16-2019

moving averages i	ave been calculated.		
Year	Quarter	Production	Moving average
2012	1	216	
	2	281	
	3	209	227.00
	4	200	226.13
2013	1	220	229.88
	2	270	237.50
	3	250	243.75
	4	220	252.50
2014	1	250	
	2	310	
	3	280	
	4	246	

#### Ans: M.A. values for I and II Quarter of 2014 are 261.25, 268.25 Assuming multiplicative model of time series, Seasonal Indices are: 96.65, 115.77, 98.29, 88.67

			Ans: 104 25	97 94 96 52 101 2
2019	270	360	362	380
2018	340	321	320	340
2017	320	305	310	330
2016	290	280	285	310
	Ι	II	III	IV

<u>ଞ୍ଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚାବଞ୍ଚିଚ</u>ାବ

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10. Obtain the seasonal indices by the link relative method, for the following data:

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AVERAGE QUARTERLY PRICE OF A COMMODITY									
Quartar	Years								
Quarter	2016	2017	2018	2019	2020				
Ι	30	35	31	31	34				
II	26	28	29	31	36				
III	22	22	28	25	26				
IV	31	36	32	35	33				

Ans: 108.02, 99.75, 81.21, 111.0

ଞ୍ଜିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚାବଙ୍ଖିଚ

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V A					_				
200			Fill in t	he bla	anks:				
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5	1.	There a	are methods of collecting p	orimary	v data.				
			are method of collecting se		ry data.				
V A			re classified intoand						
\$\$ V	4.		is a suitable method of collecting	data w	hen the informants are literates and spread				
4		over a	vast area.						
V			riginally collected by an investigator a		wn as				
8			a questionnaire is finalized, it should		·				
Å			s of assembling the primary data is ca		of statistics.				
899 V			onnaire method cannot be used when						
			f the statistical analysis rest on		ata.				
V A			ta which is more reliable is known as		data.				
\$			ta which are collected from outside an		vn asdata.				
Å			ta which are collected from inside are		n as data.				
V			ta which are collected from the source		gin are known as data.				
\$	14.		ta which are collected from published	i and u	npublished sources are known as				
V A	1 5	data.	when one durate the statistical arraying	ia lun ar	ata. data. vn asdata. n as data. gin are known as data. npublished sources are known as vn as				
5			who conducts the statistical enquire		vn as				
4		-		-	the information is known as				
V		-	rsons from whom the statistical data		himself personally goes to the sources of data is				
\$	10.		as method.	ligator	minisch personany goes to the sources of data is				
Å	19			d wher	n the original informants are either not found or				
V	171		to be reluctant to provide information						
\$	20.		_		Paper or periodical agencies is known as				
V A			·						
\$\$ V	21.	When a	a list of questions relating to the subje	ect mat	ter of the problem is sent to the informants then				
		it is kn	own as method.		8				
V A	22.	When t	the questionnaire contains only two t	ypes of	answer i.e. Yes or No then it is known as				
8									
	23.	The qu	estionnaire which contains three type	es of an	iswers i.e. Yes or No or Don't know then it is				
V			as						
\$	24.	-			alternatives answers is known as				
	25.	The str	rategy to test the questionnaire using	a small	er sample compared to plan size is known as				
	26.	That da	ata which includes one piece of inform	nation i	is known as				
V	27.	The set	t of data which includes information o	on two	characteristics is known as				
\$	28.		t of data which comprises of three or a		haracteristics is known as				
V A	29.		ta which are recorded in chronologica		r is known as				
	30.	The da	ta which not recorded in time sequen	ce is kr	nown as				
<	it is known as method.         22. When the questionnaire contains only two types of answer i.e. Yes or No then it is known as         23. The questionnaire which contains three types of answers i.e. Yes or No or Don't know then it is known as         24. The questionnaire which contains more than three alternatives answers is known as         25. The strategy to test the questionnaire using a smaller sample compared to plan size is known as         26. That data which includes one piece of information is known as         27. The set of data which includes information on two characteristics is known as         28. The set of data which comprises of three or more characteristics is known as         29. The data which are recorded in chronological order is known as         30. The data which not recorded in time sequence is known as         31. Primary Secondary       4. Mailed Questionnaire         5. Primary Date       6. Pretested								
6	1. 5 2. 3								
Å		3.	Primary , Secondary	4.	Mailed Questionnaire				
8		5.	Primary Date	6.	Pretested				

9.	Secondary data	10.	Primary data
11.	External data	12.	Internal data
13.	Primary data	14.	Secondary data
15.	Investigator	16.	Enumerator
		(1)	

l	17.	Respondent	18.	Direct Personal Investigation
ľ	19.	Indirect oral investigation	20.	Local correspondent
	21.	Questionnaire	22.	Dictonomous
	23.	Tricotomons	24.	Multiple questions
	25.	Pilot survey	26.	Univariate data
	27.	Bivariate data	28.	Multi-variate data
	29.	Time series data	30	Cross sectional data
apt	ter –	2 (Classification and Tabu	lation of	f data)
1	Class	ification is the star in	tohulation	
1. 2		sification is the step in		
2. 3.				chief requisite and is the chief teach lassification is known as chronological
э.		ification.	le type of t	lassification is known as chronological
1			nding to p	articular class is known as the of tha
4.		-	nuing to pa	
-	class		dina to com	a characteristics that say he managed
5.			-	ne characteristics that can be measured.
6.		sification, Seriation and Tabulation		
7.		sification and tabulation facilitate		
8.		stical errors can bethrough the structure of the st		
9.		screte variable can be presented in		
10				ble are shown in a discontinuous manner along
		respective frequency is known as		
11	. Arra	ngement of data into various grou	ips or cate	gories of homogeneous character is known as
		·		
12			asis of area	or place then it is known as
	class	ification.		
	A ala		at of moore	
13	. A ch	aracteristic which varies in amoui	nt of magn	itude under different time and place is known a
13	. A Ch	aracteristic which varies in amoui	nt of magn	itude under different time and place is known a
			_	-
14	. The	 variable which always takes an in	tegral valu	e viz. 10, 15, 20, 12, etc. is known as
14 15	. The . The	 variable which always takes an in difference between the largest val	tegral valu lue and sm	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as
14 15	The The The	 variable which always takes an in difference between the largest val	tegral valu lue and sm	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as
14 15 16	The The The be ex	 variable which always takes an in difference between the largest val form of classification made by exc ccluded is known as	tegral valu lue and sm luding the	itude under different time and place is known a e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0
14 15 16	. The . The . The be ex . The	 variable which always takes an in difference between the largest val form of classification made by exc ccluded is known as form of classification made by inc.	tegral valu lue and sm luding the luding the	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as
14 15 16	The The The be ex The and	 variable which always takes an in- difference between the largest val form of classification made by exc ccluded is known as form of classification made by inc. 10 will be included is known as	tegral valu lue and sm luding the luding the	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0
14 15 16 17	The The The be ex The and The	variable which always takes an in difference between the largest val form of classification made by exc ccluded is known as form of classification made by inc 10 will be included is known as number of items coming within or	tegral valu lue and sm luding the luding the  r shown ag	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as
14 15 16 17	The The The be ex The and The The	wariable which always takes an indifference between the largest val form of classification made by exc kcluded is known as form of classification made by inc form of classification made by inc 10 will be included is known as number of items coming within or small lines put usually vertically a	tegral valu lue and sm luding the luding the  r shown ag	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0
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14 15 16 17 18 19	. The . The . The . The and . The . The e.g. <i>I</i> . The	wariable which always takes an in- difference between the largest val form of classification made by exc accluded is known as form of classification made by incl 10 will be included is known as number of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class interva	tegral valu lue and sm cluding the luding the  r shown ag as the repro	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as
14 15 16 17 18 19	The The The The The and The e.g. <i>I</i> The . The	wariable which always takes an in- difference between the largest val form of classification made by exc kcluded is known as form of classification made by incl 10 will be included is known as number of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class intervatible of observations with similar of	tegral valu lue and sm luding the luding the r shown ag is the repro-	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value itude of a class is known as elated values are put in separate bunches or
14 15 16 17 18 19 20 21	The The De ex The The and The e.g. <i>I</i> Num grou	wariable which always takes an indifference between the largest val form of classification made by exc accluded is known as form of classification made by incl 10 will be included is known as number of items coming within on small lines put usually vertically a <i>III</i> is known as frequency per unit of class intervatible ber of observations with similar of ps and each group are in order of	tegral valu lue and sm luding the luding the s the repro- al or magni or closely r magnitude	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as
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14 15 16 17 18 19 20 21 22 23 24	<ul> <li>The 1</li> <li>The 2</li> <li>The 2</li> <li>The 3</li> <li>and 4</li> <li>The 4</li> <li>and 5</li> <li>The 4</li> <li>The 5</li> <li>e.g. <i>I</i></li> <li>The 5</li> <li>The 5</li> <li>An in 6</li> <li>The 5</li> </ul>	variable which always takes an in- difference between the largest val form of classification made by exc kcluded is known as form of classification made by incl 10 will be included is known as number of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class interva ber of observations with similar of ps and each group are in order of arrangement of the different value  ndividual series arranged in order row heading of a table is known as	tegral valu lue and sm luding the luding the r shown ag is the repro- al or magnit or closely r magnitudo es of a vari i.e. Asceno s	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value itude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as
14 15 16 17 18 19 20 21 22 23 24 An	. The . . Num grou . The . . An in . The . . Swers 1.	variable which always takes an in- difference between the largest val form of classification made by exc ccluded is known as form of classification made by incl 10 will be included is known as number of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class interva ber of observations with similar of ps and each group are in order of arrangement of the different value  ndividual series arranged in order row heading of a table is known as <u>First</u>	tegral valu lue and sm cluding the luding the r shown ag is the repro- al or magnit or closely r magnitude es of a vari	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as 
14 15 16 17 18 19 20 21 22 23 24 An	. The . The . The . The . The . The . The . The . Num grou . The . Num grou . The . The . Swers 1. 3.	variable which always takes an in- difference between the largest val form of classification made by exc ccluded is known as form of classification made by incl 10 will be included is known as number of items coming within on small lines put usually vertically a <i>111 is known</i> as frequency per unit of class interva aber of observations with similar of ps and each group are in order of arrangement of the different value  ndividual series arranged in order row heading of a table is known as  First Over a period of time	tegral valu lue and sm cluding the luding the r shown ag is the repro- al or magnit or closely r magnitude es of a vari i.e. Ascene s 2. 2. 2.	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as 
14 15 16 17 18 19 20 21 22 23 24 An	. The . The be ex. . The and . The . The . The . The . Num grou . The . Num grou . The . Num 5.	variable which always takes an indifference between the largest val form of classification made by exc accluded is known as form of classification made by incl 10 will be included is known as number of items coming within on small lines put usually vertically a <i>III</i> is known as frequency per unit of class intervations ber of observations with similar of ps and each group are in order of arrangement of the different value  ndividual series arranged in order row heading of a table is known as <u></u> <u>First Over a period of time Quantitative</u>	tegral valu lue and sm luding the luding the r shown ag is the repro- al or magnit or closely r magnitude es of a vari i.e. Ascene s i.e. Ascene s 2. 4. 6.	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as
14 15 16 17 18 19 20 21 22 23 24 An	. The . The . The be ez. . The and . The . The . The . The . The . Num grou . The . Num grou . The . The . The . The . The . The . The . The . The . The . The . The . Th	variable which always takes an in- difference between the largest val form of classification made by exc ccluded is known as form of classification made by incl 10 will be included is known as number of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class interva- ber of observations with similar of ps and each group are in order of arrangement of the different value  ndividual series arranged in order row heading of a table is known as <u>First</u> <u>Over a period of time</u> <u>Quantitative</u> <u>Analysis of data</u>	tegral valu lue and sm luding the luding the r shown ag is the repro- al or magnitude es of a vari i.e. Ascene s i.e. Ascene s 2. 4. 6. 8.	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 gainst a particular class is known as esentative of an item against a particular value itude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as 
14 15 16 17 18 19 20 21 22 23 24 An	. The . . Num grou . The . . Num grou . The . . An in . The . . The .         	variable which always takes an indifference between the largest val form of classification made by exceeded is known as form of classification made by included is known as form of classification made by included is known as form of classification with a series arrangement of the different value for a period of time Quantitative Analysis of data Continuous	tegral valu lue and sm luding the luding the r shown ag is the repro- al or magnitudo es of a vari i.e. Asceno s i.e. Asceno s 2. 4. 6. 8. 10.	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 gainst a particular class is known as esentative of an item against a particular value itude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as 
14 15 16 17 18 19 20 21 22 23 24 An	. The . The . The be ex. . The . The . The . The . The . The . Num grou . The . Num grou . The . Swers 1. 3. 5. 7. 9. 11.	variable which always takes an indifference between the largest val form of classification made by exceeded is known as form of classification made by incluted is known as form of classification made by incluted is known as In umber of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class intervatiber of observations with similar of ps and each group are in order of arrangement of the different value Individual series arranged in order row heading of a table is known as First Over a period of time Quantitative Analysis of data Continuous Classification	tegral valu lue and sm luding the luding the r shown ag is the repro- al or magnitude es of a vari i.e. Ascene s i.e. Ascene s 2. 4. 6. 8. 10. 12.	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as <u>Complementary</u> <u>Minimised</u> <u>Discrete</u> <u>Geographical/Areal/spatial</u>
14 15 16 17 18 19 20 21 22 23 24 An	. The . The .	variable which always takes an indifference between the largest val form of classification made by exc ccluded is known as form of classification made by incl 10 will be included is known as number of items coming within or small lines put usually vertically a <i>111</i> is known as frequency per unit of class interva- ber of observations with similar of ps and each group are in order of arrangement of the different value  ndividual series arranged in order row heading of a table is known as : <u>First</u> Over a period of time Quantitative Analysis of data Continuous Classification Variable	tegral value lue and sm cluding the luding the r shown ag is the repro- al or magnitude es of a vari r i.e. Ascene s	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as <u>Commonsense, Experience</u> Frequency Complementary Minimised Discrete Geographical/Areal/spatial Discrete variable
14 15 16 17 18 19 20 21 22 23 24 An	. The . The . The be ex. . The . The . The . The . The . The . Num grou . The . Num grou . The . Swers 1. 3. 5. 7. 9. 11.	variable which always takes an indifference between the largest val form of classification made by exceeded is known as form of classification made by incluted is known as form of classification made by incluted is known as In umber of items coming within or small lines put usually vertically a <i>III</i> is known as frequency per unit of class intervatiber of observations with similar of ps and each group are in order of arrangement of the different value Individual series arranged in order row heading of a table is known as First Over a period of time Quantitative Analysis of data Continuous Classification	tegral valu lue and sm luding the luding the r shown ag is the repro- al or magnitude es of a vari i.e. Ascene s i.e. Ascene s 2. 4. 6. 8. 10. 12.	e viz. 10, 15, 20, 12, etc. is known as allest value of a variable is known as upper boundary of a class viz. (0 – 10), 10 will upper boundary of a class viz. (0 – 10) both 0 ainst a particular class is known as esentative of an item against a particular value tude of a class is known as elated values are put in separate bunches or e in a class is known as able in a successive manner is known as ding or Descending is known as <u>Complementary</u> <u>Minimised</u> <u>Discrete</u> <u>Geographical/Areal/spatial</u>

- 22. The arrangement of the different values of a variable in a successive manner is known as
- 23. An individual series arranged in order i.e. Ascending or Descending is known as \_\_\_\_
- 24. The row heading of a table is known as \_\_\_\_\_

#### Answers:

1.	First	2.	Commonsense, Experience
3.	Over a period of time	4.	Frequency
5.	Quantitative	6.	Complementary
7.	Analysis of data	8.	Minimised
9.	Continuous	10.	Discrete
11.	Classification	12.	Geographical/Areal/spatial
13.	Variable	14.	Discrete variable
15.	Range	16.	Exclusive form
17.	Inclusive form	18.	Class frequency

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	9.	Tally Bar	20.	Frequency density
	21.	Frequency distribution	22.	Seriation
2	23.	Array	24.	Stub
hapt	er –	4 (Measures of Central Value	)	
1.		is more suitable measure of ce	ntral ten	dency as it is least affected by sampling
	fluct	uation.		
2.	Harn	nonic Mean gives weightag	ge to sm	aller values.
3.	Simp	le Arithmetic Mean gives	weightag	ge to values of the variables.
4.		n is affected by presence of		
5.	Recij	procal of the of a number i	s the nu	mber itself.
6.	If Me	ean and number of items of different s	series ar	e given, the Mean can be obtained.
7.	If all	the items of a series are divided by p	, the val	ue of Mean is also by p.
8.	Harı	monic Mean cannot be computed whe	en any of	f the values in the series is
9.	Whe	en all the values of a series are equal t	hen the	A.M., G.M. and H.M. of the series are
10.	If an	y value in a series is zero, the value o	f Geome	tric Mean becomes
11.	Medi	ian is a average.		
12.	Mod	e is the value that has the greatest		
13.	Perc	entiles divide the series into	equal	parts.
14.	Inaı	moderately skewed distribution, if th	e values	of Mean and Median are 8 and 9, the value of
	Mod	e will be		
15.		is the most ill defined average.		
16.	Whe	n Mean, Median and Mode of a series	are equ	al the series is called series.
17.	Inaj	positively skewed distribution Mode	is	than Mean.
		lian is more suitable for cla		
19.	A ser	ries having 2 modal values is called		_ series.
		nd quartile and decile of a		
		e = 3 Median –		-

#### Chapter - 4 (Measures of Central Value)

- 1. \_ is more suitable measure of central tendency as it is least affected by sampling fluctuation.
- 2. Harmonic Mean gives \_\_\_\_\_\_ weightage to smaller values.
- 3. Simple Arithmetic Mean gives \_\_\_\_\_\_ weightage to values of the variables.
- 4. Mean is affected by presence of \_\_\_\_\_\_ values in the series.
- 5. Reciprocal of the \_\_\_\_\_ of a number is the number itself.
- 6. If Mean and number of items of different series are given, the \_\_\_\_\_\_ Mean can be obtained.
- 7. If all the items of a series are divided by p, the value of Mean is also \_\_\_\_\_ by p.
- 8. Harmonic Mean cannot be computed when any of the values in the series is \_\_\_\_
- 9. When all the values of a series are equal then the A.M., G.M. and H.M. of the series are \_\_\_\_
- 10. If any value in a series is zero, the value of Geometric Mean becomes \_\_\_\_\_\_.
- 11. Median is a \_\_\_\_\_ average.
- 12. Mode is the value that has the greatest \_\_\_\_\_
- 13. Percentiles divide the series into \_\_\_\_\_equal parts.
- 14. In a moderately skewed distribution, if the values of Mean and Median are 8 and 9, the value of Mode will be \_\_\_\_
- 15. \_\_\_\_\_ is the most ill defined average.
- 16. When Mean, Median and Mode of a series are equal the series is called \_\_\_\_\_\_ series.
- 17. In a positively skewed distribution Mode is \_\_\_\_\_\_ than Mean.
- 18. Median is more suitable for \_\_\_\_\_ classification.
- 19. A series having 2 modal values is called \_\_\_\_\_\_ series.
- 20. Second quartile and \_\_\_\_\_\_ decile of a series are equal.
- 21. Mode = 3 Median \_\_\_\_\_

- 22. Median is better suitable in case of \_\_\_\_\_ \_\_\_\_\_ series.
- 23. Mode is better suited to \_\_\_\_\_\_ series.
- 24. \_\_\_\_\_ average is better suited to qualitative phenomenon.
- 25. The reciprocal of reciprocal of arithmetic mean is known as \_\_\_\_\_\_.
- 26. The n<sup>th</sup> root of the products of n items of a series is known as \_\_\_\_
- 27. The value of mean median and mode are equal in case of \_\_\_\_\_\_ distribution.
- 28. The variable having the highest frequency is known as \_\_\_\_\_.
- 29. \_\_\_\_\_ can be calculated from a frequency distribution with open end classes.
- 30. In the calculation of \_\_\_\_\_, all the observations are taken into consideration.
- 31. \_\_\_\_\_ is not affected by extreme observations.
- 32. Average rainfall of a city from Monday to Saturday is 0.3 inch. Due to heavy rainfall on Sunday, the average rainfall for the week increases to 0.5 inch. The rainfall of Sunday was \_\_\_\_

- 33. The sum of squared deviations is minimum when taken from \_\_\_\_\_
- 34. The sum of absolute deviations is minimum when taken from \_\_\_\_\_\_
- 35. Median = \_\_\_\_\_ Quartile.
- 36. Mean is \_\_\_\_\_ by extreme observations.
- 37. Median is the average suited for \_\_\_\_\_ classes.
- 38. For studying phenomenon like intelligence and honesty \_\_\_\_\_\_ is a better average to be used while for phenomenon like size of shoes or readymade garments the average to be preferred is
- 39. Typist A can type a sheet in 5 minutes, typist B in 6 minutes and typist C in 8 minutes. The average number of sheets types per hour per typist is \_\_\_\_\_

ଞ୍ଚାବଙ୍କ୍ରା ବଙ୍କରା ବଙ୍କର କାର୍ଯ୍ୟରେ କାର୍ଯ୍ୟରା ବଙ୍କରା ବଙ୍କରା କାର୍ଯ୍ୟରେ କାର୍ଯ୍ୟରେ କାର୍ଯ୍ୟରେ କାର୍ଯ୍ୟରେ କାର୍ଯ୍ୟରେ କା

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- 40. The mean of 10 observations is 20 and median is 15. If 5 is added to each observation, the new mean is \_\_\_\_\_\_ and median is \_\_\_\_\_\_.
- 41. A distribution with two modes is called \_\_\_\_\_\_ and with more than two modes is called
- 42. Average suited for qualitative phenomenon is \_\_\_\_\_
- 43. If 25% of the observations lie above 80, 40% of the observations are less then 50 and 70% are greater than 40, then \_\_\_\_\_ = 80; \_\_\_\_ = 50; \_\_\_\_ = 40.

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- 44. Relationship between Median, Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub> is \_\_\_\_\_
- 45. D<sub>5</sub>, P<sub>80</sub>, Median., D<sub>7</sub> and P<sub>50</sub> are related by \_\_\_\_
- 46. Relationship between D<sub>4</sub>, Q<sub>2</sub>, P<sub>60</sub>, P<sub>75</sub> and Q<sub>3</sub> is \_\_\_\_\_
- 47. The empirical relationship between mean, median and mode for a moderately asymmetrical distribution is \_\_\_\_\_
- 48. If the maximum frequency is repeated then mode is located by the method of \_\_\_\_\_
- 49. The distance covered is fixed but speeds are varying and an average speed is to be calculated by using \_\_\_\_\_\_ mean
- 50. When depreciation is charged by diminishing balance method and an average rate of depreciation is to be calculated by using \_\_\_\_\_ mean.
- 51. If the A.M. of X is 25, then A.M. of X + 2 will be \_\_\_\_\_.
- 52. If the A.M. of X is 18, then A.M. of X 2 will be \_\_\_\_\_.
- 53. If the A.M. of X is 62, then A.M. of 2X + 2 will be \_\_\_\_\_.
- 54. If the A.M. of X is 28, then A.M. of 3X 2 will be \_\_\_\_\_.
- 55. If the A.M. of X is 26, then A.M. of  $\frac{x}{2}$  + 5 will be \_\_\_\_\_
- 56. The A.M. of 50 items is calculated to be 12. If all the observations are increased by 3, then the new A.M. will be \_\_\_\_\_

#### Answers:

1.	Mean	2.	More
3.	No	4.	Extreme
5.	Reciprocal	6.	Combined
7.	Divided	8.	Zero
9.	Equal	10.	Zero
11.	Positional	12.	Frequency
13.	100	14.	11
15.	Mode	16.	Symmetrical
17.	Smaller	18.	Positional
19.	Bi-modal	20.	5 <sup>th</sup>
21.	2 Mean	22.	Open-end
23.	Equal class interval	24.	Median
25.	Harmonic Mean	26.	Geometric Mean
27.	Symmetrical	28.	Mode
29.	Median Or Mode	30.	Mean
31.	Median or Mode	32.	1.7"
33.	Mean	34.	Median
35.	Second	36.	Very much affect
37.	Open-end	38.	Median, Mode
39.	9.47	40.	25, 20
41.	Bi-modal, Multi-modal	42.	Median
43.	$Q_3 = 80, P_{40} = D_4 = 50, P_{30} = 40$	44.	$Q_1 \leq Q_2 = Md. \leq Q_3$
45.	$D_5 = P_{50} = Md. \le D_7 \le P_{80}$	46.	$D_4 < Q_2 < P_{60} < P_{75} = Q_3$
47.	Mo. = 3Md 2M	48.	Grouping
49.	Harmonic	50.	Geometric

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	51.	27			52.	16			1
	53.	126			54.	82			
	55.	18			56.	15			,
									(
				UNIT	II – 1				as
1	. Q. D.	is of S	S. D.						
2	. Whe	n Q1 = 30, Q3	= 50,	the coefficient of Q. D	). is				
3	. If C. Y	V. is 20, <del>X</del> is 5	60, σ is						
4	. If Va	riance is 81 a	nd Me	an is 50, CV is	•				
5			secon	d of dispersio	n and o	other measures of o	lisper	sion are known	as
		of the order.							
6				om median is					
7		-		eviations from			. 1	1 .	
8		-		istributions can't be c	compar	ed properly without	ut kno	wing their	
0		sure of disper		f disporsion are	from	n unite omnloved			
9 1				f dispersion are two extreme values of					
				on which is used in q				nrice changes	etc is
T		vn as	590131	on which is used iff q	aunty	control, weather 10	100051	, price changes (	13
1			andard	l deviation of first 'n'	natura	l numbers is			
_							-		
Insw	ers:								
	2.12			20		250/	4	10	
1. 5.	2/3	, none	2. 6.	20 Minimum	3. 7.	25% Mean	4. 8.	18 Relative	
<u> </u>	Exem		0. 10.	Range	7. 11.	Range	o. 12.	F	
	LACIN	pieu	10.	Runge	11.	Runge	12.	$\sqrt{\frac{1}{12}(n^2-1)}$	
1.		is the sim	plest r	neasure of dispersion	1.				
2.				ed coefficient of					
3. 4.	0	• •		measures of positio	-				
4. 5.		-		is of further		-			
6.				in open-end distribu		inacical analysis			
7.	Range	is 1	by fluc	tuations of sampling.					
8.				ne same scale from Q		n series.			
9. 10				series of distribu percent in asym		al series			
nsw	-	iuucs at iedst		percent in asym		ui Jui iuj.			
1.	Range		2.	Scatter	3.	Positional	4.	counterparts	
5.	capab		6.	cannot	7.	affected	8.	symmetrical	
9.	asym	metrical	10.	fifty					
1.	Mean	deviation is –		- defined					
1. 2.				ffected by extreme it	ems.				
3.	Mean	deviation is u	seful i	n ––––– business cy	ycle.				
4.				- capable of further a					
5. 6				to compute if Mean,					
6. 7.				signs in computing M gful in studying					
7. 8.				sed in studi					
9.		-– is based on	all the	e observations of the	series.				
				mean of deviation			alue.		
				own as mean own as first (					
14.	mean	reviation is a	13U KII(	JVVII as III St (	or uisp	CI 51011.			
Answ	ers				•				
Answ 1.	ers: Rigid		2.	Less	3.	Forecasting	4.	Not	

#### UNIT – II

- 1. Q. D. is ----- of S. D.
- 2. When Q1 = 30, Q3 = 50, the coefficient of Q. D. is ------.
- 3. If C. V. is 20,  $\overline{X}$  is 50,  $\sigma$  is ------
- 4. If Variance is 81 and Mean is 50, CV is ------.
- 5.  $\sigma$  is known as the second ------ of dispersion and other measures of dispersion are known as -------- of the order.
- 6. Sum of the deviations from median is ------.
- 7. Sum of the squares of deviations from ------ is the minimum.
- 8. The dispersion of two distributions can't be compared properly without knowing their -----measure of dispersion.
- 9. The relative measures of dispersion are ------ from units employed.
- 10. The difference between two extreme values of a series is known as ------.
- 11. The measure of dispersion which is used in quality control, weather forecast, price changes etc. is known as -----.
- 12. The formula of standard deviation of first 'n' natural numbers is ------.

#### **Answers**:

1.	2/3	2.	20	3.	25%	4.	18
5.	Order, none	6.	Minimum	7.	Mean	8.	Relative
9.	Exempted	10.	Range	11.	Range	12.	$\sqrt{\frac{1}{12}(n^2-1)}$

- ------ is the simplest measure of dispersion. 1.
- 2. Coefficient of range is called coefficient of ------.
- 3. Range, I.Q.R. and Q.D. are ----- measures of dispersion.
- Positional dispersion are ----- of positional average. 4.
- Mathematical dispersion is ----- of further mathematical analysis. 5.
- 6. Range ------ be used in open-end distributions.
- 7. Range is ----- by fluctuations of sampling.
- 8. Median lies half-way on the same scale from  $Q_1$  to  $Q_3$  in ------ series.
- $Q_1 + QD \neq Q_3 QD$  in ----- series of distribution. 9.
- 10. QD includes at least ------ percent in asymmetrical series.

#### Answers:

1.	Range	2.	Scatter	3.	Positional	4.	counterparts
5.	capable	6.	cannot	7.	affected	8.	symmetrical
9.	asymmetrical	10.	fifty				

- 1. Mean deviation is ----- defined.
- Mean deviation ----- affected by extreme items. 2.
- 3. Mean deviation is useful in ----- business cycle.
- Mean deviation is ----- capable of further algebraic treatment. 4.
- Mean deviation is difficult to compute if Mean, Median and Mode are in ------. 5.
- 6. It is ----- to ignore ' $\pm$ ' signs in computing Mean Deviation.
- Mean Deviation is meaningful in studying ----- samples. 7.
- Mean deviation is rarely used in ----- studies/surveys. 8.
- 9. ----- is based on all the observations of the series.
- 10. Mean deviation is the ----- mean of deviations taken from a central value.
- 11. Mean deviation is also known as mean ----- deviation.
- 12. Mean deviation is also known as first ----- of dispersion.

A	nsw	ver	s:

3	1.	Rigidly	2.	Less	3.	Forecasting	4.	Not
5	5.	Fractions	6.	Illogical	7.	Small	8.	Socio-logical

	<u> </u>		<u> </u>	<u> </u>			३२ < ध्		0 0
9. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. Answe 1. 5. 9. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. Answe 1. 5. 6. 7. 8. 9. 10. 11. 5. 9. 10. 11. 5. 9. 10. 11. 5. 9. 10. 11. 5. 9. 10. 11. 5. 9. 10. 11. 5. 9. 10. 11. 12. 7. 8. 9. 10. 11. 5. 9. 10. 11. 5. 9. 10. 11. 2. 7. 8. 9. 10. 11. 2. 7. 8. 9. 10. 11. 12. 7. 8. 9. 10. 11. 5. 9. 1. 5. 9. 1. 5. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 8. 9. 1. 7. 7. 8. 9. 1. 7. 7. 8. 9. 1. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7	Mean deviation 10.	Arith	nmetic		11.	Absolute		12.	Moment
1.	is the best measu	e of dis	norcio	h					
	Standard Deviation is		-		gin				
	S.D. is upon chang			inge of off	9				
	Coefficient of variation i			coefficien	t of Stai	ndard Devi	iation	l.	
5.	The Standard Deviation	of first '	ʻn' natu	ral numb	oers is –				
	Standard Deviation can								
	S.D. is free from any defe				neasure	of dispers	ion.		
	S.D. is capable of –––– a When mean is 12, Variai				fugrict	ionia			
	If in a series the coefficie							Standar	d Deviation shall h
101	<u>.</u>				/o unu i		, ene e	Junuar	
11.	If the coefficient of varia	tion of	a serie	s is 48.86	and its	Standard	Devia	ation is	24.43, the Arithme
	Mean shall be								
	The higher the degree of	f variabi	ility, th	e i:	s the co	nsistency i	n the	value o	of variables.
Answe	rs: Standard Deviation	2.	indepe	ndont	3.	donondo	nt	4	norcontago
		Ζ.	maepe	ndent	5.	depende	int	4.	percentage
5.	$\sqrt{\frac{n^2-1}{12}}$	6.	Mean		7.	Other		8.	Further
9.	25%	10.	25.495		11.	50		12.	Lesser
1.	The sum of the square	s of dev	iations	of 10 obs	servatio	ns taken fr	rom N	/lean 50	) is 250. The C.V. of
	the series will be	•							
2.	The Mean and S.D. of a	series a	are 30 a	and 60 re	spectiv	ely. By add	ing 2	to each	n variable, the new
	Mean = and n	iew S.D.	=	•					
3.	If both the Mean and t	he Varia	ance of	a series a	re 25, t	he coefficie	ent of	S.D. = _	and C.V. =
	•								
4.	If 25% of the items are	e less th	an 10 a	nd 25% a	are mor	e than 40,	the co	oefficie	nt of Q.D. will be
									C C
5.	The median and stand	ard dev	iation a	re 20 an	d 4 resp	ectively. If	each	item is	increased by 2, th
	median will be				-	<b>)</b>			, , , , , , , , , , , , , , , , , , ,
6.									
7.	The the Lore		-		e of the	equal distr	ibuti	on. the	greater is the
	variability in the series					- 1		- ,	0
8.	Variance is equal to sq								
9.	Mean deviation is norr				ng devia	tions from	ı	<u>.</u>	
	. Sum of the deviations				-				
	. Standard deviation is o								
	. If each item is added b		-	-					
	. If each item is multipli								
	If each item is multipli								
	. The measure of disper							treme it	tems is
	. The measure of disper				-				
	. The half of Inter Quart								·
	. The formula of coeffici					•			
10			anatio						
Answe	rs:								
						<u> </u>			
1.	10			32		3		20, 20%	
4.	60%			22, 4		6		Absolu	
7.	Farther			Standard				Median	
10				Arithmeti				Unchar	nged
13	· · ·			<u>Aultiplier</u>				Range S.D.	100
16	5. Inter Quartile Range		17. (	Quartile D		n 1	8.	$\frac{S.D.}{Mean} \times$	100
				UNIT	– III				
			Com	relation	Analy	cic			
			COL		-	313.			
				(6)	)				
~	~ ~ ~ ~ ~			(6)	)				

#### UNIT – III

#### **Correlation Analysis:**

জ v । বঞ্চে>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>াবঞ্চি>।বঞ্চি>।বঞ্চি>।বঞ্চি>। ।

	<mark>স্কিস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞস্বজ্ঞ The value of correlation coefficient must lie in between</mark>
-	When the value of correlation coefficient is + 1 then it is known as
-	When the value of correlation coefficient is – 1 then it is known as
-	When the value of correlation coefficient is 0 then it is known as
-	If all the variables are added with a constant then the value of correlation coefficient
-	will be
-	If all the variables are deducted with a constant then the value of correlation coefficien will be
	If all the variables are multiplied with a constant then the value of correlation
7)	coefficient will be
8)	If all the variables are divided with a constant then the value of correlation coefficient
	will be
	The value of correlation coefficient is of change of scale.
	The value of correlation coefficient is of change of scale.
-	The value of correlation coefficient is independent of change of and
11)	The value of correlation coefficient is independent of change of and
12)	
-	Correlation coefficient of rank is calculated by method.
13)	In ranks are not repeated then the result of Spearman's method will be to
1.43	Karl Pearson's method.
14)	Coefficient of correlation is significant when r is more than times of probabl
	error.
-	The 'r' of population lies between of the sample.
-	The probable error of coefficient of correlation is calculated by
-	The standard error of coefficient of correlation is given by
-	The coefficient of determination is given by
19)	The relationship between two or more variables is studied by
20)	The cause and effect relationship between two or more variables is known as
	·
21)	When the relationship between two variables is studied at a time then it is known as correlation.
22)	When the relationship between three or more variables is studied at a time then it is known as correlation.
23)	When the value of the two variables move in the same direction then it is known as correlation.
24)	When the value of two variables move in the opposite direction then it is known as
= - )	correlation.
25)	When the value of correlation coefficient is + 1 then it is known as
_0)	correlation.
261	When the value of correlation coefficient is – 1 then it is known as
20)	correlation.
27)	When the value of correlation coefficient is + 0.86 then it is known as correlation.
201	When the value of correlation coefficient is – 0. 84 then it is known as
-	correlation.
29)	When the value of correlation coefficient is + 0.35 then it is known as correlation.
30)	When the value of correlation coefficient is – 0.39 then it is known as correlation.
	(7)

#### <u>ଏଡ଼ି>ାରଡ଼ି>ାଏଡ଼ି>ାଏଡ଼ି>ାଏଡ଼ି>ାଏଡ଼ି>ାଏଡ଼ି>ାଏଡ଼ି>ାରଡ଼ି</u>

- 31) When the two variables are plotted on a graph and it produces a straight line then the correlation is said to be \_\_\_\_\_.
- 32) When the two variables are plotted on a graph and it produces a straight line moving upward from left to right then it is \_\_\_\_\_\_ correlation.
- 33) When the two variables are plotted on a graph and it produces a straight line moving downward from left to right then it is \_\_\_\_\_\_ correlation.
- 34) When the graph of two variables gives a curve line then it is known as \_\_\_\_\_\_ correlation.

#### Answer:

1.	±1	2.	Perfect positive
3.	Perfect negative	4.	No correlation
5.	Unchanged	6.	Unchanged
7.	Unchanged	8.	Unchanged
9.	Independent	10.	Independent
11.	Origin, Scale	12.	Spearman's
13.	Equal	14.	6
15.	$r \pm PE_r$	16.	$PE_r = 0.6745 \times \frac{1-r^2}{\sqrt{n}}$
17.	$SEr = \frac{1 - r^2}{\sqrt{n}}$	18.	$r^2$
19.	Correlation	20.	Conisation
21.	Simple	22.	Multiple
23.	Positive	24.	Negative
25.	Perfect positive	26.	Perfect negative
27.	High degree positive	28.	High degree negative
29.	Low degree positive	30.	Low degree negative
31.	Linear or Perfect	32.	Perfect Positive
33.	Perfect Negative	34.	Non-liner or imperfect

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#### **Regression Analysis:**

- 1) The Pearson's coefficient of correlation is the square root of the two \_\_\_\_\_\_.
- 2) If b<sub>xy</sub> is positive then b<sub>yx</sub> will be \_\_\_\_\_.
- 3) If both b<sub>xy</sub> and b<sub>yx</sub> are positive then correlation coefficient will be \_\_\_\_\_.
- 4) The regression analysis measures \_\_\_\_\_\_ relations between X and Y.
- 5) The purpose of regression analysis is to study \_\_\_\_\_\_ between variables.
- 6) Lines of regression are \_\_\_\_\_\_ if r = 0 and they are \_\_\_\_\_\_ if  $r = \pm 1$ .
- 7) The farther the two regression lines cut each other the \_\_\_\_\_ be the degree of correlation.
- 8) If the regression coefficient of X on Y and Y on X are 0.4 and 0.9 respectively then the value of correlation coefficient is \_\_\_\_\_
- 9) If one regression coefficient is more than unity then the other must be \_\_\_\_\_\_ than unity.
- 10) The statistical tool with the help of which we estimate the value of \_\_\_\_\_\_ variable from the value of another \_\_\_\_\_\_ variable, is known as \_\_\_\_\_\_.
- 11) The product of two regression coefficients must be \_\_\_\_\_\_ than 1.
- 12) The name of the variable whose value will be estimated is \_\_\_\_\_
- 13) The geometric mean of two regression coefficients is known as \_\_\_\_\_.
- 14) If  $b_{xy} = 0.5$ , r = 0.8 and  $V_y = 16$ , then  $\sigma_x =$  \_\_\_\_\_.
- 15) If  $b_{xy} = 4$  then the value of  $b_{yx}$  will be less than or equal to \_\_\_\_\_.
- 16) If  $b_{xy} = 0.5$  then  $b_{yx}$  will be less then or equal to \_\_\_\_\_.

#### ৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিনৰঞ্জিন Answer:

1.	Regression coefficients	2.	Positive
3.	Positive	4.	Average
5.	Dependence	6.	Perpendicular, Same
7.	Lesser	8.	- 0.6
9.	Less	10.	Unknown, Known, Regression
11.	Less than or equal to	12.	Dependent
13.	Correlation coefficient	14.	2.5
15.	$\frac{1}{4}$ or 0.25	16.	2

#### UNIT – IV

#### **Index Numbers:**

- 1. To measure changes in the price level for a group of people \_\_\_\_\_\_ index number is prepared.
- 2. Index numbers are called \_\_\_\_\_\_ of economic changes.
- 3. \_\_\_\_\_test is satisfied by both Fisher's and Kelly's formulae.
- 4. The base period should be a \_\_\_\_\_ period.
- 5. Fisher's index is \_\_\_\_\_\_ mean of Laspeyre's and Paasche's index numbers.
- 6. Quantity index number reflects \_\_\_\_\_\_ changes from one period to another.
- 7. \_\_\_\_\_\_ is the most suitable average for constructing index numbers.
- 8. Kelly's index number \_\_\_\_\_ the circular test.

#### Answers:

1.	Cost of living	2.	Barometer	3.	Factor reversal
4.	Normal	5.	Geometric	6.	Quantity
7.	Geometric mean	8.	Satisfies		

V 1

1. Statistical device which is used to indicate the relative movement of data is \_\_\_\_\_

- 2. A year in relations to which the data of any other year is compared to known the percentage of increase and decrease in changes is \_\_\_\_\_\_ year.
- 3. The method in which quantities consumed in the base year are taken as weight is \_ method.
- 4. The method in which quantities consumed in the current year are taken as weight is \_\_\_\_\_ method.
- 5. The method of index number which is the arithmetic mean of Laspeyre's method and Paasche's method is \_\_\_\_\_ method.
- 6. The method of index number which is the geometric mean of Laspeyre's method and Paasche's method is \_\_\_\_\_ method.
- 7. The method of index number in which the average quantities consumed in base year and current year are taken as weight is \_\_\_\_\_ method.
- 8. The index number in which quantities consumed are ignored is known as \_\_\_\_\_ index number.
- 9. The index number which is constructed to show the change in quantities is known as \_\_\_\_\_\_ index number.
- 10. The series of index numbers in which the base year is always the same are known as \_\_\_\_\_\_ index numbers.
- 11. The index numbers in which the base year is never fixed but changes from year to year is known as \_\_\_\_\_\_ index numbers.
- 12. When two series of index numbers having different base years are joined together to form a new series of index numbers then it is called \_\_\_\_\_.

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- 13. The percentage of money wage with respect to price index is known as \_\_\_\_\_
- 14. The base of BSE Sensex is \_\_\_\_\_.
- 15. When the index number of constructed for a particular group of persons living in the society is known as \_\_\_\_\_\_ index.

#### Answers:

1.	Index Numbers	2.	Base	3.	Laspeyre's
4.	Paasche's	5.	Dorbish-Bowley	6.	Fisher's
7.	Marshall-Edgeworth	8.	Un-weighted or simple	9.	Quantity
10.	Fixed Base	11.	Chain Base	12.	Splicing
13.	Real wage	14.	1978-79	15.	Cost of living

Time Series Analysis:

- 1. The one that is very useful in forecasting in the short-term is \_\_\_\_\_\_ component.
- 2. The cyclical movements are due to \_\_\_\_\_.
- 3. An overall tendency of rise or fall in a time series is called \_\_\_\_\_\_.
- 4. Of the four components of a time series, the one that has primary uses for long term forecasting is \_\_\_\_\_\_ component.

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- 5. The line obtained by the method of least square is known as the line of \_\_\_\_\_\_.
- 6. A time series consists of the data arranged in \_\_\_\_\_\_ order.
- 8. In trend equation Y = A + bX, a is the \_\_\_\_\_ and b is the \_\_\_\_\_.
- 9. Comparable monthly data may be obtained by multiplying each of the values by \_\_\_\_\_\_ and in a leap year by \_\_\_\_\_\_.
- 10. A polynomial equation in the form of Y = a + bX + cX2 + dX3 is called a \_\_\_\_\_\_.
- 11. The additive model of a time series is expressed as \_\_\_\_\_.
- 12. When the difference between successive observations of a time series are constant or nearly so, the \_\_\_\_\_ may be an appropriate representation of trend equation.
- 13. Link relative method is one of the methods of determining \_\_\_\_\_\_ of a time series.
- 14. The tool which used to understand the underlying structure and function that produces the observation is known as \_\_\_\_\_.
- 15. The trend that gives the general tendency of the data for a long period is known as
- 16. Component of a time series which is defined as the repetitive and predictable movement around the trend line in one year or less is known as \_\_\_\_\_.
- 17. The variation in a time series that usually lasts for two or more years is known as

#### Answers:

1.	Seasonal	2.	Trade cycle	3.	Secular tend
4.	Trend	5.	Best fit	6.	Chronological
7.	$Y = a^{bX}$	8.	Y-intercept, Slope of trend	9.	30.4167, 30.5
10.	Second degree parabola	11.	Y = T = S + C + I	12.	Straight line
13.	Seasonal variation	14.	Time Series Analysis	15.	Secular trend
16.	Seasonal variation	17.	Cyclical variation		

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### **COMMERCE DSE – I (BUSINESS STATISTICS)**

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#### UNIT – I

#### Questions of 2 Marks and 3 Marks each

#### Two Marks Questions will be answered within 3 sentences each and Three Marks Questions will be answered within six sentences each

- 1. Explain the meaning of Descriptive Statistics.
- 2. Explain Statistics as Date and as Method.
- 3. What are the limitations of Statistics?
- 4. Explain the use of statistics in Commerce.
- 5. Explain the characteristics of Statistics.
- 6. What are the functions of Statistics?
- 7. What are the qualities of a Statistician?
- 8. Who is an investigator?
- 9. Who is an Enumerator?
- 10. What is primary data?
- 11. What is secondary data?
- 12. What do you mean by Pilot Survey?
- 13. What is time series data?
- 14. What do you mean by Cross Sectional Data?
- 15. What is Range?
- 16. What do you mean by class interval?
- 17. What is meant by class boundaries?
- 18. What is Tally Bar?
- 19. What do you mean by frequency density?
- 20. What do you mean by Relative Frequency?
- 21. What is open-end series?
- 22. Give the difference between Exclusive series and Inclusive series.
- 23. Give the differences between 'More than' and 'Less then' frequency distribution.
- 24. Distinguish between Univariate and Bi-variate series.
- 25. What do you mean by central value?
- 26. Give three features of a good average.
- 27. What is Arithmetic Mean?
- 28. What is simple Arithmetic Mean?
- 29. What do you mean by Weighted Arithmetic Mean?
- 30. What is combined Arithmetic Mean?
- 31. Write three properties of Arithmetic Mean.
- 32. Write two advantages of Arithmetic Mean.
- 33. Write two advantages of Arithmetic Mean.
- 34. What is Geometric Mean?
- 35. What is combined Geometric Mean?
- 36. Give three advantages of G.M.
- 37. Write two disadvantages of Geometric Mean.
- 38. For what purpose G.M. is used?
- 39. What is Harmonic Mean?
- 40. Give the uses of Harmonic Mean.
- 41. Give two advantages of Harmonic Mean.
- 42. Give three limitations of H.M.
- 43. What are the relationship between A.M., G.M. and H.M.?
- 44. What is median?
- 45. Write three advantages of Median.
- 46. Write three limitations of Median.

- 48. What is Decile?
- 49. What is percentile?
- 50. What is Mode?
- 51. Give three advantages of Mode.
- 52. Give three disadvantages of Mode.
- 53. What is the relationship between Mean, Median and Mode?
- 54. What do you mean by Emperical Mode?

#### **PRACTICAL PROBLEMS:**

1. Calculate average bonus paid per member from the following data:

Bonus (in Rs)	50	60	70	80	90	100	110
No. of persons	1	3	5	7	6	2	1

#### Ans: Rs 79.60

2. Peter travelled by car for 4 days. He drove 10 hours each day. He drove: first day at the rate of 45 km per hour; second day at the rate of 40km per hour; third day at the rate of 38 km per hour and fourth day at the rate of 37 km per hour. What was his average speed?

#### Ans: 40 km p. h.

3. Typist A can type a letter in 5 minutes, typist B in 10 minutes and typist C in 15 minutes. What is the average number of letters types per hour per typist?

#### Ans: Required average = (12 + 6 + 4)/3 = 7.33

4. A taxi ride in a city costs one rupee for first kilometre and sixty paise for each additional kilometre. The cost of each kilometer is incurred at the beginning of the kilometre, so that the rider pays for a whole kilometer. What is the average cost for  $2\frac{3}{4}$  kilometre?

### Ans: Average cost for $2\frac{3}{4}$ kilometre = (100 + 60 + 60) $\times \frac{4}{11}$ paise = 80 paise

5. The mean weight of student in a group of 6 students is 119 lbs. The individual weights of five of them are 115, 109, 129, 117 and 114 lbs. What is the weight of the sixth student?

#### Ans: 130 lbs.

6. Average marks in Statistics of 10 students of a class was 68. A new student took admission with 72 marks, whereas two existing students left the college. If the marks of these students were 40 and 39, find the average marks of the remaining students.

#### Ans: 75.78 (approx.)

7. Shri Narendra Kumar has invested his capital in three securities, namely RELIANCE Ltd.. TISCO and SATYAM: Rs 40,000, Rs 50,000 and Rs 80,000 respectively. If he collects dividends of Rs 10,000 from each company, compute his average return from three securities.

#### Ans: 17.5%

8. Twelve persons gambled on a certain night. Seven of them lost at an average rate of Rs 10.50 while five gained at an average of Rs 13.00. Is the information given above correct? If not, why?

#### Ans: Information is incorrect.

9. Goals scored by a hockey team in successive matches are 5, 7, 4, 2, 4, 0, 5 and 3. What is the number of goals, the team must score in 10<sup>th</sup> match in order that the average comes to 4 goals per match.

#### Ans: 5

The sum of deviations of a certain number of observations measured from 4 is 72 and the sum of the deviations of the same value form 7 is – 3. Find the number of observations and their mean.

Ans: n = 25 and  $\overline{X}$  = 6.88

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11. The daily average sales of a store were Rs 2,750 for the month of Feb. 1996. During the month, the highest and the lowest sales were Rs 8,950 and Rs 580 respectively. Find the average daily sales if the highest and the lowest sales are not taken into account.

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#### Ans: Rs 2,600.74

12. Two variables X and Y are related by: Y = (X - 5)/10 and each of them has 5 observations. If the man of X is 45, find mean of Y.

#### Ans: 4

- 13. The average salary of 49 out of 50 employees in a firm is Rs 100. The salary of 50<sup>th</sup> employee is Rs 97.50 more than the average salary of all the 50 workers. Find the mean salary of all the employees of the firm.
- 14. The mean of 99 items is 55. The value of 100<sup>th</sup> item is 99 more than the mean of 100 items.What is the value of 100<sup>th</sup> item?
- 15. The mean of 200 items was 50. Later on it was discovered that two items were wrongly read as 92 and 8 instead of 192 and 88. Find out the correct mean.
- 16. The average daily income for a group of 50 per sons working in a factory was calculated to be 169. It was later discovered that one figure was mis-read as 134 instead of the correct value 143. Calculate the correct average income.
- 17. The average marks of 80 students were found to be 40. Later, it was discovered that a score of 4 was misread as 84. Find the correct mean of 80 students.
- 18. The mean age of a combined group of men and women is 30 years. If the mean age of the group of men is 32 and that of the group of women is 27, find out the percentage of men and women in the group.
- 19. The mean annual salary of all employees is a company is Rs 25,000. The mean salary of male and female employees is Rs 27,000 and Rs 17,000 respectively. Find the percentage of males and females employed by the company.
- 20. If the means of two groups of m and n observations are 40 and 50 respectively, and the combined mean of two groups is 42, find the ratio m : n.
- 21. The mean marks obtained by 300 students in the subject of Statistics are 45. The mean of the top 100 of them was found to be 70 and the mean of the last 100 was known to be20. What is the mean of the remaining 100 students?
- 22. The mean hourly wage of 100 labourers working a factory, running two shifts of 60 and 40 workers respectively, is Rs 38. The mean hourly wage of 60 labourers working in a morning shift is Rs 40. Find the mean hourly wage of 40 labourers working in the evening shift.
- 23. There are three section of B. Com. 1<sup>st</sup> year in a certain college. The number of students in each section and the average marks obtained by them in the Statistics paper in the annual examination are as follows:

Section	Average marks in Statistics	No. of Students
А	75	50
В	60	60
С	55	50

Find the average marks obtained by the students of all the sections taken together.

- B. Com. (Pass) III year has three Sections A, B and C with 50, 40 and 60 students respectively.
  The mean marks for the three sections were determined as 85,60 and 65 respectively.
  However, marks of a student of section A were wrongly recorded as 50 instead of zero.
  Determine the mean marks of all the three sections put together.
- 25. The mean monthly salary paid to 77 employees in a company was Rs 78. The mean salary of 32 of them was Rs 75 and that of other 25 was 82. What was the mean salary of the remaining?

- 26. Define the weighted arithmetic mean of a set of numbers. Show that it is unaffected if all the weights are multiplied by some common factor.
- 27. A contractor employs three types of workers male, female and children. To a male worker he pays Rs 16 per hour, to a female worker Rs 13 per hour and to a child worker Rs 10 per hour. What is the average wage per hour paid by the contractor if the number of male, female and children is 20, 15 and 5 respectively?
- 28. Find the harmonic mean of the numbers:  $\frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, 1$

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#### [I.C.W.A. (Foundation) Jun 2004, Dec; 2002]

- Ans:  $\frac{1}{2}$
- 29. If each of 3, 48 and 96 occurs once and 6 occur thrice, verify that geometric mean is greater than harmonic mean.

#### Ans: G.M. = 12; H.M. = 6.94; G.M. > H.M.

- 30. Show the weighted harmonic mean of the first n natural numbers, where the weights are equal to the corresponding numbers, is given by (n + 1)/2.
- 31. An aeroplane flies around a square the sides of which measuring 100 km. each. The aeroplane covers at a speed of 100 km. per hour first side, at 200km. per hour the second side, at 300 km. per hour the third side and at 400 km. per hour the fourth side. Use the correct mean to find the average speed around the square.

#### Ans: 192 km. p.h.

32. Four factories emit a kilogram of pollutant each in 4, 5, 8 and 12 days respectively. What is the average rate of pollutant discharge? Use you answer to calculate the total pollutant discharged by the four factories in one week.

Hint: Find H.M. of 4, 5, 8, 12

Ans: 1kg. pollutant in 480/79 days per factory. Total pollutant discharged by four factories per week =  $\frac{79}{480} \times 4 \times 7 = 4.608$  kg.

33. A railway train runs for 30 minutes at a speed of 40 miles an hour and the, because of repairs of the tract runs for 10 minutes at a speed of 8 miles an hour, after which it resumes its previous speed and runs for 20 minutes except for a period of 2 minutes when it had to run over a bridge with a speed of 30 miles per hours. What is the average speed?

Hints: Average speed = Total Distance covered ÷ Total time taken =  $\left[\left(\frac{40}{60} \times 30 + \frac{8}{60} \times 10 + \frac{40}{60} \times 18 + \frac{30}{60} \times 2\right) \div (30 + 10 + 20\right] m. p. h$ 

#### Ans: 34.33 m.p.h.

34. A cyclist covers his first three kilometres at an average speed of 8 km. per hour, another 2 kms. at 9 km. per hour and the last 2 kms. at 4 km. per hour. Find the average speed for the entire journey.

#### Ans: 6.38 kms. Per hour

35. If X travels 8 kms. at 4 km. per hour; 6 kms. at 3 km. per hour and 4 kms. at 2km. per hour, what would be the average rate per hour at which he travelled?

#### Ans: Weighted H.M. = 3 km. p.h.

36. A man travelled by car for 3 days. He covered 480 km. each day. On the first day he drove for 10 hours at 48 km. an hour; on the second day he drove for 12 hours at 40 km. an hour and on the last day he drove for 15 hours at 32 km. an hour. What was his average speed?

#### Ans: 38.919 km. p. h.

37. Kishore travels 900 kms. by train at an average speed of 60 km. per hour; 3,000 km. by steamship at an average of 25 km. per hour; 400 kms. by aeroplane at 350 km. per hour; and finally 15 kms. by bus at 25 km. per hour. Calculate his average speed for the entire journey.

Ans: 31.556 km. p. h.

gallon of petrol and via Ghaziabad with an additional journey of 40 miles at the rate of 15 miles per gallon. Find the average mileage per gallon. Ans: 10.58 miles per gallon. 39. The consumption of petrol by a motor was a gallon for 20 miles while going up from plains to hill station and a gallon for 24 miles while coming down. What particular average would you consider appropriate for finding the average consumption in miles per gallon for up and down journey, and why? Ans: Harmonic Mean = 21.82 miles per gallon. 40. A man having to drive 90 kilometres wishes to achieve an average speed of 30 kilometres per hour. For the first half of the journey he averages only 20 km. p. h. What must be his average for the second half of the journey if his overall average is to be 30 km. p. h. Ans: 60 km. p.h. 41. An aeroplane travels distances of  $d_1$ ,  $d_2$  and  $d_3$ kms. at speed  $V_1$ ,  $V_2$  and  $V_3$  km. per hour respectively. Show that the average speed (V) is given by:  $\frac{d_1+d_2+d_3}{v} = \frac{d_1}{v_1} + \frac{d_2}{v_2} + \frac{d_3}{v_3}$ 42. A person purchases one kilogram of cabbage from each of the four places at the rate of 20 kg., 16 kg., 12kg. and 10kg. per 100 rupee respectively. On the average how many kg.of cabbage has he purchased per 100 rupee? 43. If you spend Rs 100 per week on apples and the price of apples for three weeks is Rs 25, Rs 20 and Rs 10 per kilogram, what is the average price of apples for you? Ans: Rs 15.79 44. In a certain office a letter is types by A in 4 minutes. The same letter is types by B, C and D in 5, 6, 10 minutes respectively. What is the average time taken in completing one letter? How many letter do you expect to be typed in one day comprising of 8 working hours. Ans: H.M. = 5.58 minutes per letter; Letters type in 8 hours (480 minutes) =  $\frac{480}{5.58}$  = 86 45. A scooterist purchased petrol at the rate of Rs 24, Rs 29.50 and Rs 36.85 per litre during three successive years. Calculate the average price of petrol: (i) If he purchased 150, 180 and 195 litres in the respective years; and (ii) If spent Rs 3,850, Rs 4,675 and Rs 5,825 in three years Give support to your answer. Hints: Average price of petrol/litre =  $\frac{Total money spent on petrol}{Total petrol consumed in litres}$ (i) Weighted A.M. of prices the weights being the quantities of petrol purchased. (ii) Weighted H.M. of prices, the weights being money spent on petrol. Ans: (i) Rs 30.65/litre (ii) Rs 30/litre (approx.) 46. Define Arithmetic Mean, Harmonic Mean and Geometric Mean for a set of n observations and state the relationship between them. Ans:  $A \ge G \ge H$ ; the sign of equality holds if and only if all the observations are equal. Show the relationship between arithmetic mean and harmonic mean for the variable X, which can take the values a and b such that a, b are non-negative integers. Ans:  $A \times H = \left(\frac{a+b}{2}\right) \left(\frac{2ab}{a+b}\right) = ab = G^2$ If for two number, the arithmetic mean is 25 and the harmonic mean is 9, what is the 47. geometric mean of the series. Ans: G.M. = 15 48. If A.M. of two numbers is 17 and G.M. is 15, find the H.M. of these numbers. Ans: 13.24 49. Comment on the following: "The G.M. and A.M. of a distribution are 27 and 30. Then H.M. is 26." (5) 

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38.

32. A man travels from Agra to Dehradun covering 204 miles at a mileage rate of 10 miles per

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	Ans: Since A.M. $\geq$ G.M. $\geq$ H.M.; the statement is correct.
50.	State giving reasons which average will be more appropriate in the following cases:
(	i)The distribution has open-end classes.
	Ans: (i) Md. or Mo.
(	ii) The distribution has wide range of variations.
	Ans: <b>G.M.</b>
51.	Find the G.M. of 1, 2, 3, $\frac{1}{2}$ , $\frac{1}{3}$ . What will be the geometric mean is '0' is added to this set of
	values?
	[I.C.W.A (Foundation) June 2003]
	Ans: 1 and 0
52.	Find the geometric mean of: 1, 7, 29, 18, 65, 91 and 103.
52.	Ans: 20.62
53.	
55.	Calculate the geometric mean of the data: 1, 7, 29, 92, 115 and 375
<b>F</b> 4	Ans: 30.50
54.	If population of a city doubled itself in twenty years, is it correct to say that the rate of growth
	has been 5% per annum?
	Ans: No, r = 3.5%
55.	The population of a city was 1,00,000 in 2005 and 1,44,000 a decade later. Estimate the
	population at the middle of the decade.
	Ans: 1,20,000
56.	The population of India in 2011 and 2021 were 361 and 439 million respectively.
	a. What was the average percentage increase per year during the period?
	b. If the average rate of increase from 2011 to 2021 remains the same, what would be the
	population in 2031?
	Ans: (i) 2% (ii) 533.85 million
57.	The population of a country increased by 20 per cent in the first decade and by 30 per cent in
071	the second decade and by 45 per cent in the third decade. Determine the average decennial
	growth rate of population.
	Ans: 31.3%
58.	A machine depreciates by 40% in the first year, by 25% in the second year and by 10% per
50.	
	annum for the next three years, each percentage being calculated on the diminishing value.
	What is the average percentage of depreciation for the entire period.
	Ans: 20%
59.	An income tax assessee depreciated the machinery of his factory by 20 per cent in each of the
	first two years and 40 per cent in the third year. How much average depreciation relief should
	he claim from the taxation department?
	Ans: 27.32%
60.	(b) A businessman depreciated the machinery of his factory by 20% in the first two years and
	40% in the third year. What is the average depreciation for the three years?
	Ans: G.M. = 27.32%
61.	An economy grows at the rate of 2% in the first year, 2.5% in the second year, 3% in the third
	year, 4% in the fourthand 10% in the tenth year. What is the average rate of growth on
	the economy?
	Ans: 5.6% p.a.
62.	The annual rates of growth achieved by a nation for 5 years are 5%, 7.5%, 2.5%, 5% and 10%
02.	
	respectively. What is the compound rate of growth for the 5 year period?
	Ans: 5.9%
	(6)

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63.	The number of divorces per 1,000 marriage in a big city in India increased from 96 in 2010 to 120 in 2020. Find the annual rate of increase of the divorce rate for the period 2010 to 2020.
	Ans: $r = 2.26\%$
64.	If arithmetic mean and geometric mean of two values are 10 and 8 respectively, find the
04.	values.
	Ans: 16, 4
65.	18. A man gets three successive annual raises in salary of 20%, 30% and 25% respectively
	each percentage being reckoned in his salary at the end of the previous year. How much
	better or worse would he have been if he had been given three annual raises of 25% each reckoned in the same way.
Α	ns: The man would be better in the second case by $0.31\%$ of his starting salary in the $1^{ m s}$
y	ear.
66.	The geometric mean of 4 items is 100 and of another 8 items is 3.162. Find the geometric
	mean of the 12 items.
	Ans: 10
67.	Geometric mean of n observations is found to be G. How will you find the correct value of the
	Geometric Mean if some of the values used in its calculation are found to be wrong and should
	be replaced by correct values?
68.	Geometric mean of 2 numbers is 15. If by mistake one figure is taken as 5, instead of 3, find
	the correct geometric mean.
	Ans: 11.62
69.	The geometric mean of four values was calculated as 16. It was later discovered that one o
	the values was recorded as 32 when, in fact, it was 162. Calculate the correct geometric mean.
	Ans: 24
70.	Define simple and weighted geometric mean of a given distribution.
71.	The weighted geometric mean of three numbers 229, 275 and 125 is 203. The weights for 1 <sup>s</sup>
	and $2^{nd}$ numbers are 2 and 4 respectively. Find the weight of the third.
	Ans: 3
72.	The weighted geometric mean of the four numbers 9, 25, 17 and 30 is 15.3. If the weights o
	the first three numbers are 5, 3 and 4 respectively, find the weights of the fourth number.
	Ans: 2 (approx.
73.	Define Harmonic Mean and discuss its merits and demerits. Under what situations would you
	recommend its use.
74.	In a moderately skewed distribution:
	rithmetic mean = 24.6 and the mode = 26.1. Find the value of the median and explain the reason
	r the method employed.
10	Ans: Median = 25.
75.	In a moderately asymmetrical distribution the value of median is 42.8 and the value of mod
	is 40. Find the mean.
	Ans: Mean = 44.2
76.	In a moderately asymmetrical distribution the value of mean is 75 and the value of mode is
, 0.	60. Find the median.
	Ans: Median = 70
77.	In a moderately skewed distribution Arithmetic mean = 24.6 and the mode = 26.1. Find the
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	value of the median and explain the reason for the method employed.
70	Ans: Median = 25.1
78.	In a moderately asymmetrical distribution the value of median is 42.8 and the value of mode
	is 40. Find the mean.
	Ans: Mean = 44.2

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79.	In a moderately asymmetrical distribution the value of mean is 75 and the value of mode is 60. Find the median.
	Ans: Median = 70
80.	Find the G.M. of 1, 2, $3, \frac{1}{2}, \frac{1}{3}$ . What will be the geometric mean is '0' is added to this set o values?
	[I.C.W.A (Foundation) June 2003
	Ans: 1 and
81.	Find the geometric mean of: 1, 7, 29, 18, 65, 91 and 103.
	Ans: 20.62
82.	Calculate the geometric mean of the data: 1, 7, 29, 92, 115 and 375
	Ans: 30.50
83.	If population of a city doubled itself in twenty years, is it correct to say that the rate of growth
05.	has been 5% per annum?
	Ans: No, $r = 3.5\%$
84.	The population of a city was 1,00,000 in 2005 and 1,44,000 a decade later. Estimate the
04.	population at the middle of the decade.
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	population in 2031?
	Ans: (i) 2% (ii) 533.85 million
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5.1	annum for the next three years, each percentage being calculated on the diminishing value
	What is the average percentage of depreciation for the entire period.
	Ans: 20%
88.	(a) An income tax assessee depreciated the machinery of his factory by 20 per cent in each o
-	the first two years and 40 per cent in the third year. How much average depreciation relie
	should he claim from the taxation department?
	Ans: 27.32%
	(b) A businessman depreciated the machinery of his factory by 20% in the first two years and
	40% in the third year. What is the average depreciation for the three years?
	Ans: G.M. = 27.32%
89.	(a) An economy grows at the rate of 2% in the first year, 2.5% in the second year, 3% in the
	third year, 4% in the fourthand 10% in the tenth year. What is the average rate of growth
	on the economy?
	Ans: 5.6% p.a.
	(b) The annual rates of growth achieved by a nation for 5 years are 5%, 7.5%, 2.5%, 5% and 10%
	respectively. What is the compound rate of growth for the 5 year period?
	Ans: 5.9%
90.	The number of divorces per 1,000 marriage in a big city in India increased from 96 in 2010 to
	120 in 2020. Find the annual rate of increase of the divorce rate for the period 2010 to 2020.
	Ans: r = 2.26%
	(8)

91. If arithmetic mean and geometric mean of two values are 10 and 8 respectively, find the values.

#### Ans: 16, 4

92. A man gets three successive annual raises in salary of 20%, 30% and 25% respectively, each percentage being reckoned in his salary at the end of the previous year. How much better or worse would he have been if he had been given three annual raises of 25% each, reckoned in the same way.

Ans: The man would be better in the second case by 0.31% of his starting salary in the 1<sup>st</sup> year.

93. The geometric mean of 4 items is 100 and of another 8 items is 3.162. Find the geometric free mean of the 12 items.

#### Ans: 10

94. (a) Geometric mean of n observations is found to be G. How will you find the correct value of the Geometric Mean if some of the values used in its calculation are found to be wrong and should be replaced by correct values?

(b) Geometric mean of 2 numbers is 15. If by mistake one figure is taken as 5, instead of 3, find the correct geometric mean.

#### Ans: 11.62

(c) The geometric mean of four values was calculated as 16. It was later discovered that one of the values was recorded as 32 when, in fact, it was 162. Calculate the correct geometric mean.

Ans: 24

95. Define simple and weighted geometric mean of a given distribution.

The weighted geometric mean of three numbers 229, 275 and 125 is 203. The weights for 1<sup>st</sup> and 2<sup>nd</sup> numbers are 2 and 4 respectively. Find the weight of the third.

#### Ans: 3

96. The weighted geometric mean of the four numbers 9, 25, 17 and 30 is 15.3. If the weights of the first three numbers are 5, 3 and 4 respectively, find the weights of the fourth number.

Ans: 2 (approx.)

97. Find the harmonic mean of the numbers:  $\frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, 1$ 

#### [I.C.W.A. (Foundation) Jun 2004, Dec; 2002]

Ans:  $\frac{1}{3}$ 

98. If each of 3, 48 and 96 occurs once and 6 occur thrice, verify that geometric mean is greater than harmonic mean.

#### Ans: G.M. = 12; H.M. = 6.94; G.M. > H.M.

99. Show the weighted harmonic mean of the first n natural numbers, where the weights are equal to the corresponding numbers, is given by (n + 1)/2.

100. An aeroplane flies around a square the sides of which measuring 100 km. each. The aeroplane covers at a speed of 100 km. per hour first side, at 200km. per hour the second side, at 300 km. per hour the third side and at 400 km. per hour the fourth side. Use the correct mean to find the average speed around the square.

#### Ans: 192 km. p.h.

101. Four factories emit a kilogram of pollutant each in 4, 5, 8 and 12 days respectively. What is the average rate of pollutant discharge? Use you answer to calculate the total pollutant discharged by the four factories in one week.

Hint: Find H.M. of 4, 5, 8, 12

Ans: 1kg. pollutant in 480/79 days per factory. Total pollutant discharged by four factories per week =  $\frac{79}{480} \times 4 \times 7 = 4.608$  kg.

102. A railway train runs for 30 minutes at a speed of 40 miles an hour and the, because of repairs of the tract runs for 10 minutes at a speed of 8 miles an hour, after which it resumes its previous speed and runs for 20 minutes except for a period of 2 minutes when it had to run over a bridge with a speed of 30 miles per hours. What is the average speed?

Hints: Average speed = Total Distance covered ÷ Total time taken =  $\left[\left(\frac{40}{60} \times 30 + \frac{8}{60} \times 10 + \frac{40}{60} \times 18 + \frac{30}{60} \times 2\right) \div (30 + 10 + 20\right] m. p. h$ 

#### Ans: 34.33 m.p.h.

103. A cyclist covers his first three kilometres at an average speed of 8 km. per hour, another 2 kms. at 9 km. per hour and the last 2 kms. at 4 km. per hour. Find the average speed for the entire journey.

#### Ans: 6.38 kms. Per hour

104. If X travels 8 kms. at 4 km. per hour; 6 kms. at 3 km. per hour and 4 kms. at 2km. per hour, what would be the average rate per hour at which he travelled?

#### Ans: Weighted H.M. = 3 km. p.h.

105. A man travelled by car for 3 days. He covered 480 km. each day. On the first day he drove for 10 hours at 48 km. an hour; on the second day he drove for 12 hours at 40 km. an hour and on the last day he drove for 15 hours at 32 km. an hour. What was his average speed?

#### Ans: 38.919 km. p. h.

106. Kishore travels 900 kms. by train at an average speed of 60 km. per hour; 3,000 km. by steamship at an average of 25 km. per hour; 400 kms. by aeroplane at 350 km. per hour; and finally 15 kms. by bus at 25 km. per hour. Calculate his average speed for the entire journey.

#### Ans: 31.556 km. p. h.

107. A man travels from Agra to Dehradun covering 204 miles at a mileage rate of 10 miles per gallon of petrol and via Ghaziabad with an additional journey of 40 miles at the rate of 15 miles per gallon. Find the average mileage per gallon.

#### Ans: 10.58 miles per gallon.

108. The consumption of petrol by a motor was a gallon for 20 miles while going up from plains to hill station and a gallon for 24 miles while coming down. What particular average would you consider appropriate for finding the average consumption in miles per gallon for up and down journey, and why?

#### Ans: Harmonic Mean = 21.82 miles per gallon.

109. A man having to drive 90 kilometres wishes to achieve an average speed of 30 kilometres per hour. For the first half of the journey he averages only 20 km. p. h. What must be his average for the second half of the journey if his overall average is to be 30 km. p. h.

#### Ans: 60 km. p.h.

110. 35. An aeroplane travels distances of  $d_1$ ,  $d_2$  and  $d_3$ kms. at speed  $V_1$ ,  $V_2$  and  $V_3$  km. per hour respectively. Show that the average speed (V) is given by:  $d_1+d_2+d_3 = d_1 + d_2 + d_3$ 

$$\frac{a_1 + a_2 + a_3}{V} = \frac{a_1}{V_1} + \frac{a_2}{V_2} + \frac{a_3}{V_3}$$

- 111. A person purchases one kilogram of cabbage from each of the four places at the rate of 20 kg., 16 kg., 12kg. and 10kg. per 100 rupee respectively. On the average how many kg.of cabbage has he purchased per 100 rupee?
- 112. If you spend Rs 100 per week on apples and the price of apples for three weeks is Rs 25, Rs 20 and Rs 10 per kilogram, what is the average price of apples for you?

#### Ans: Rs 15.79

113. In a certain office a letter is types by A in 4 minutes. The same letter is types by B, C and D in5, 6, 10 minutes respectively. What is the average time taken in completing one letter? How many letter do you expect to be typed in one day comprising of 8 working hours.

Ans: H.M. = 5.58 minutes per letter; Letters type in 8 hours (480 minutes) =  $\frac{480}{5.58}$  = 86

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114.	A scooterist purchased petrol at the rate of Rs 24, Rs 29.50 and Rs 36.85 per litre during three
	successive years. Calculate the average price of petrol:
(	i) If he purchased 150, 180 and 195 litres in the respective years; and
(	ii) If spent Rs 3,850, Rs 4,675 and Rs 5,825 in three years
(	Give support to your answer.
ŀ	Hints: Average price of petrol/litre = Total money spent on petrol Total petrol consumed in litres
(	i) Weighted A.M. of prices the weights being the quantities of petrol purchased.
(	ii) Weighted H.M. of prices, the weights being money spent on petrol.
A	Ans: (i) Rs 30.65/ litre (ii) Rs 30/litre (approx.)
115.	Define Arithmetic Mean, Harmonic Mean and Geometric Mean for a set of n observations and
	state the relationship between them.
A	Ans: $A \ge G \ge H$ ; the sign of equality holds if and only if all the observations are equal.
116.	Show the relationship between arithmetic mean and harmonic mean for the variable X, which
	can take the values a and b such that a, b are non-negative integers.
	Ans: $A \times H = \left(\frac{a+b}{2}\right) \left(\frac{2ab}{a+b}\right) = ab = G^2$
117.	If for two numbers, the arithmetic mean is 25 and the harmonic mean is 9, what is the
	geometric mean of the series.
	Ans: G.M. = 15
118.	If A.M. of two numbers is 17 and G.M. is 15, find the H.M. of these numbers.
	Ans: 13.24
119.	Comment on the following: "The G.M. and A.M. of a distribution are 27 and 30. Then H.M. is
	26."
A	Ans: Since A.M. $\geq$ G.M. $\geq$ H.M.; the statement is correct. G.M. = $\sqrt{A.M. \times H.M.}$ = $\sqrt{30 \times 26} \neq$
2	27. So the statement is false from another angle.
	UNIT – II
1. \	What do you mean by Range?
	Give three different fields where range is used.
	Give two advantages of Range.
	Give three disadvantages of Range.
	Give three essential features of a good measure of dispersion.
	What do you mean by absolute measure of dispersion?
	What do you mean by Relative measure of dispersion?
	Distinguish between absolute and relative measure of dispersion.
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- 9. What is the Inter Quartile Range?
- 10. What is Quartile Deviation?
- 11. Give three advantages of IQR.
- 12. Give three disadvantages of IQR.
- 13. Compare IQR with QD as measures of dispersion.
- 14. What is mean deviation?
- 15. Give three advantages of Mean Deviation.
- 16. Give three disadvantages of Mean Deviation.
- 17. What is Standard Deviation?
- 18. Give three advantages of Standard Deviation.
- 19. Give three disadvantages of Standard Deviation.
- 20. Compare mean deviation with standard deviation.
- 21. Taking three imaginary items prove that S.D. is independent of change of origin.
- 22. Taking three imaginary items prove that S.D. is dependent of change of scale.

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23.	Write three essential properties of Standard Deviation.
PRACT	'ICAL PROBLEMS:
1	Find the many and the second character for the full second the second time.
<b>A</b>	Find the range and the coefficient of range for the following observations: 5, 70, 82, 59, 81, 76, 57, 60, 55 and 50
0	
2	Ans: 32; 0.2424
2.	Find the value of third quartile if the values of first quartile and quartile deviation are 104 and 18 respectively.
5	<b>Ans:</b> $Q_1 = 140$
3.	Why is standard deviation considered to be the best measure of dispersion? Find the variance if $\sum x^2 = 150$ and N = 6. Deviations are taken from actual mean.
5	Ans: 25
4.	From the following information, find the standard deviation for X and Y variables: $\Sigma X = 235 \ \Sigma Y = 250 \ \Sigma X^2 = 6,750 \ \Sigma Y^2 = 6,840 \ N = 10$
	$z_{1} = 255 \ z_{1} = 255 \ z_{1} = 6,755 \ z_{1} = 6,755 \ z_{1} = 6,755 \ z_{1} = 10$ Ans: $\sigma_{x} = 11.08 \ ; \sigma_{y} = 7.68$
5	You are given the following raw sums in a statistical survey of two variables X and Y:
5.	$\Sigma X = 240$ $\Sigma Y = 250$ $\Sigma X^2 = 6,400$ and $\Sigma Y^2 = 7,060$
	$\sum X = 240 \sum I = 250 \sum X = 0,400$ and $\sum I = 7,000$ Ten items are included in each survey. Compute Standard Deviation of X and Y variable.
	Then items are included in each survey. Compute Standard Deviation of A and T variable. Ans: $\sigma_x = 8$ ; $\sigma_y = 9$
E	
6.	State the formula for computing standard deviation of <i>n</i> natural numbers 1, 2n.
	Ans: $\sigma = \sqrt{\frac{1}{12}(n^2-1)}$
7.	Show that the standard deviation of the natural numbers 1, 2, 3, 4 and 5 is $\sqrt{2}$
8.	Mean of 10 items is 50 and S.D. is 14. Find the sum of the squares of all the items.
	Ans: $\sum X^2 = 26,960$
9.	The standard deviation calculated from a set of 32 observations is 5. If the sum of the
	observations is 80, what is the sum of the square of these observations?
	Ans: $\sum X^2 = 1,000$
10.	The mean of 200 items is 48 and their standard deviation is 3. Find the sum and sum of
	squares of all the items.
	Ans: 9,600; 4,62,600
11.	Given: No. of observations (N) = 100, Arithmetic Average $(\overline{X}) = 2$ , Standard deviation (s <sub>x</sub> ) =
	4, find $\sum X$ and $\sum X^2$
	Ans: $\sum X = 200; \sum X^2 = 2,000$
12	The mean of 5 observations is 3 and variance is 2. If three of the five observations are 1, 3, 5,
12.	find the other two.
	Ans: 2, 4
	UNIT – III
1.	What is positive correlation?
2.	What is negative correlation?
3.	What do you mean by simple correlation?
4.	What do you mean by multiple correlation?
5.	What is perfect correlation?
6.	What is imperfect correlation?
7.	What is perfect positive correlation?
8.	What is perfect negative correlation?
9.	What is partial correlation?

10. What is linear correlation?

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### 11. What is non-linear correlation?

- 12. What is absence of correlation?
- 12. What is absence of correlation?
- 13. What do you mean by Standard Error in correlation?
- 14. What do you mean by Probable Error in correlation?
- 15. What do you mean by regression?
- 16. What is the meaning of regression lines?
- 17. What do you mean by regression coefficient?
- 18. What is standard error of estimate?
- 19. What is Scatter diagram?
- 20. What is the method of Least Square in Regression Analysis?

### Short problems:

- In a bivariate sample, the sum of the squares of differences between the ranks of observed values of two variables is 231 and the correlation coefficient between them is 0.4. Find the number of pairs.
   Ans: n = 10
- 2. The coefficient of rank correlation of the marks obtained by 10 students in biology and chemistry was found to be 0.8. It was later discovered that the difference in ranks in two subjects obtained by one of the students was wrongly taken as 7 instead of 9. Find the correct coefficient of rank correlation.

### Ans: Correct value of R = 0.6061.

3. The coefficient of rank correlation of the marks obtained by 10 students in Statistics and Accountancy was found to be 0.2. It was later discovered that the difference in ranks in two subjects obtained by one of the students was wrongly taken as 9 instead of 7. Find the correct coefficient of rank correlation.

### Ans: Correct value of R = 0.3939.

4. The coefficient of rank correlation of the marks obtained by 12 students in biology and chemistry was found to be 0.6. It was later discovered that the difference in ranks in two subjects obtained by one of the students was wrongly taken as 8 instead of 3. Find the correct coefficient of rank correlation.

### Ans: Correct value of R = 0.7924.

5. Given the information: Sum of X = 5; Sum of Y = 4Sum of squares of deviation from the mean of X = 40; Sum of squares of deviation from the mean of Y = 50; Sum of the products of deviations from the mean of X and Y = 32. Number of pairs of observations = 10

### Calculate:

- (i) Regression coefficient of Y on X; (ii) Regression coefficient of X on Y
- (iii) Karl Pearson's coefficient of correlation

### Ans: $b_{xy} = 0.80$ ; $b_{yx} = 0.64 r_{(X,Y)} = 0.7156$

6. For some bivariate data, the following results were obtained:

Mean value of variable X = 53.2 and Y = 39.5

- Regression Coefficient of Y on X = -1.5 and of X on Y = -0.38
  - What should be the most likely value of X when Y = 50?

Also find the coefficient of correlation between two variables.

Ans: X = 53.2 + (-1.5)(50 - 39.5) = 49.21; r = 
$$-\sqrt{(-1.5)(-0.38)} = -\sqrt{0.57} = -0.7549$$

7. For a particular product, the sales (Y) and advertisement expenditure (X) for 10 years, provide the results:

 $\sum X = 15, \sum Y = 110, \sum X^2 = 250, \sum Y^2 = 3200, \sum XY = 400$ 

Find the regression line of Y on X and the estimated value of Y for X = 10

[ICWA Inter]

9-9-			Ans: Y = 1.033X + 9.4	
8.	Calculate the correlation coefficient from the following results:			
0.	N = 10, $\sum X = 350$ , $\sum Y = 310$ , $\sum (X - 35)^2 = 162$ , $\sum (Y - 31)^2 = 22$ ,			
			2, 2(1  51) = 22,	
	$\sum (X - 35)(Y - 31) =$			
	Also find the regression line of Y on X.			
9.	For bivariate data, you are given the following:			
	$\Sigma(X - 58) = 46, \Sigma(Y - 58) = 9, \Sigma(X - 58)^2 = 3086, \Sigma(Y - 58)^2 = 483, \Sigma(X - 58)(Y - 58)^2 = 483, \Sigma(X - 58)^2 = 483,$			
	58) = 1095. No. of pairs of observations is 7. You are required to determine the two			
	regression equation and the coefficient of correlation between X and Y.			
	Ans: Regression Equations:			
	Y on X: Y = 0.372X + 35.266; X on Y: X = 2.197Y - 65.680; r(X,Y) = 0.904			
	If the two regression line corresponding to two variables X and Y meet at a point (2,30) $V_{(X)} =$			
	4, $V_{(Y)} = 1$ and correlation coefficient between X and Y is $\frac{1}{2}$ , the estimated value of Y for X =			
	6 is:			
10.	Let the two variables X and Y have the covariance and correlation coefficient between them			
	as 2 and 0.5 respectively and $V(X) = 2V(Y)$ , then the regression coefficient of X on Y is:			
11.	For bivariate data the mean value of X is 20 and the mean value of Y is 45. The regression			
	coefficient of Y on X is 4 and that of X on Y is 1/9. Find:			
	(i) The coefficient of correlation.			
	(i) The standard deviation of X if the standard deviation of Y is 12.			
	(iii) Also write down the equation of regression lines.			
	Ans: (i) 0.67 (ii) $\sigma_x =$	2 (iii) Regression equation	ons of Y on X and X on Y are res	
			$\mathbf{Y} = \mathbf{4X} - 35; \mathbf{9X}$	= Y + 135
12.	31. From the following	results, obtaine the two re	gression equations and estimate the	e yield
	when the rainfall is 22c	ms. and the rainfall when	he yield is 600 kgs.	
		Yield in kgs.	Rainfall in cms.	
		(X)	(Y)	
	Mean	508.4	26.7	
	S.D.	36.8	4.6	
	Coefficient of correlation between yield and rainfall is 0.52.			
			[C.A. (Foundation), N	lov. 2001]
	Ans: $Y = 4.16X + 397$ .	328: X = 0.065Y - 6.346:	488.85 kgs.; 32.654 cms.	
13.	The following table sho	ows the mean and standard	deviation of the prices of two shar	es in a
	stock exchange:		-	
	Shares	Mean (in Rs)	Standard deviation (in Rs)	
	A Ltd.	39.5	10.8	
	B Ltd.	47.5	16	
		relation between the price	of two shares is 0.42, find the most	st likely
	price of share. A corresponding to a price of Rs 55 observed in the case of share B.			
			Ans: $X = 0.27Y + 26.675$	: Rs 41.52
14.	Given the following int	formation.		11.02
14.	Siven the following III		V	
	Mean	X 6	Y 8	
	Standard Devi	•	8 13	
	Coefficient of			
		l (ii) Value of Y when $X =$		
Ane (i			$D_{xy} = 0.31 \text{ or} - 0.31(\text{ii}) 203.52$	
лиз. (I	$J I = \underline{T} 0.0$	$y_{yx} - 2.00 \text{ or} - 2.00 \text{ all} 0$	5xy = 0.51 01 = 0.51(11) 203.52	
		<b>Regression Anal</b>	vsis:	
		Negressiun Alldi	yərə.	
1.	What do you mean by	regression?		
±.		(14)		
		(++)		

- What is regression coefficient?
   What is regression line?
- 4. What is coefficient of determination?
- 5. What is scatter diagram?
- 6. Explain the method of least square in regression.

#### Practical problems:

- 1. If the two regression line corresponding to two variables X and Y meet at a point (2, 30)  $V_{(X)} = 4$ ,  $V_{(Y)} = 1$  and correlation coefficient between X and Y is  $\frac{1}{2}$ , find the estimated value of Y for X = 6
- 2. Let the two variables X and Y have the covariance and correlation coefficient between them as 2 and 0.5 respectively and  $V_{(X)} = 2V_{(Y)}$ , then find the regression coefficient of X on Y.
- 3. For bivariate data the mean value of X is 20 and the mean value of Y is 45. The regression coefficient of Y on X is 4 and that of X on Y is 1/9. Find the coefficient of correlation.
- 4. For bivariate data the mean value of X is 20 and the mean value of Y is 45. The regression coefficient of Y on X is 4 and that of X on Y is 1/9. Find the standard deviation of X if the standard deviation of Y is 12.
- 5. For bivariate data the mean value of X is 20 and the mean value of Y is 45. The regression coefficient of Y on X is 4 and that of X on Y is 1/9. Write down the equation of regression lines.

#### UNIT – IV

#### Index Numbers:

- 1. What do you mean by index numbers?
- 2. Give the purposes for which index number is constructed.
- 3. What is Price Index Number?
- 4. What is Quantity Index Number?
- 5. What is Value Index Number?
- 6. What do you mean by change of base of index numbers?
- 7. What do you mean by splicing of index numbers?
- 8. What is deflating of index numbers?
- 9. What is cost of living index number?
- 10. What is a base year?
- 11. What is Time Reversal Test?
- 12. What do you mean by Factor Reversal Test?
- 13. What is Circular Test?
- 14. What do you mean by Unit Test?
- 15. Explain unweighted index numbers.
- 16. When is weighted index number used?
- 17. Explain Laspeyre's method of index number.
- 18. Explain Paasche's method of index number.
- 19. Why is Fisher's method called Ideal Index number?

### Practical Problems:

1. The geometric mean of index number of Laspeyre and Paasche is 229.5648 while the sum of Laspeyre's and Paasche's index number is 480. Find out Laspeyre's and Paasche's indices.

Ans: 310; 170

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A company spent Rs 50, Rs 48, Rs 18 and Rs 42 during 1998. The company increased the expenditure to Rs 100, Rs 98, Rs 60 and Rs 102 respectively on four commodities. If the units of four commodities purchased during 1998 and 1999 are identical i.e. 5, 2, 6 and 17, compute the price index for 1999 by the most suitable method.

#### Ans: Simple Aggregative method 227.85

Given that ∑p₁q₁ = 250, ∑p₀q₀ = 150. Paasche's Index Number = 150 and Dorbish-Bowley's Index Number = 145, find out (i) Fisher's Ideal Index Number; and (ii) Marshall-Edgeworth's Index Number.

#### Ans: 144.9, 145.26

4. A worker earned Rs 900 per month in 2010. The cost of living index increased by 70% between 2010 and 2013. How much extra income should the worker have earned in 2013 so that he could buy the same quantities as in 2010?

Ans: Rs 
$$12 \times \left[ \left( \frac{170}{100} \times 900 \right) - 900 \right]$$
 = Rs 7,560

5. During a certain period the cost of living index number goes up from 110 to 200 and the salary of the worker is also increased from Rs 325 to Rs 550. Does the worker really gain, and if so, by how much in real terms?

#### Ans: Loss of Rs 90.90

6. In calculating the cost of living index the following weights were used: Food 8  $\frac{1}{2}$ ; Rent 2; Clothing  $2\frac{1}{2}$ ; Fuel and Light 1; Miscellaneous 11. Calculate the index number for a data when the percentage increase in prices of the various items over prices of July, 2018 = 100 were 31, 57, 90, 75 and 88 respectively.

#### Ans: 152.2

7. In calculating a certain cost of living index number, the following weights were used. Food 15, Clothing 3, Rent 4, Fuel and Light 2, Miscellaneous 11. Calculate the index for a date when the average percentage increases in price of item in the various groups of the base period were 32, 54, 47, 78 and 58 respectively.

Suppose a business executive was earning Rs 2,050 in the base period. What should be his salary in the current period if his standard of living is to remain the same?

#### Ans: 141.76; Rs 2,906.08

8. The cost of living index uses the following weights:

Food 40, Rent 15, Clothing 10, Fuel 10, Miscellaneous 15. During the period 2010 – 15, the cost of living index raised from 100 to 205.83. Over the same period the percentage rise in prices were:

Rent 60, Clothing 180, Fuel 75 and Miscellaneous 165. What is the percentage of change in the price of food?

#### Ans: 90

9. The relative importance of the following eight groups of family expenditure we found to be – Food 348, Rent 88, Clothing 97, Fuel and Light 65, House durable goods 71, Miscellaneous goods 35, Services 79, Drink and tobacco 217. The corresponding % increase in price for Oct. 2015 gave the following values – 25, 1, 22, 18, 14, 13, ?and 4. Calculate the percentage increase in group – services, if the percentage increase for whole group is 15.278.

#### Ans: 11

10. From some given data, the retail price index based on five items, viz. Food, Rent and Rates, Fuel and Light, Clothing and Miscellaneous was calculated as 205. Percentage increases in prices over the base period are given below:

Rent and Rates 60, Clothing 210, Fuel and Light 120, Miscellaneous 130 Calculate the percentage increase in the Food Group, given that the weights of different items are as follows:

Food 60, Rent and Rates 16, Fuel and Light 8, Clothing 12, Miscellaneous 4, All items 100.

Ans: 92.3% increase in food group

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#### Time Series Analysis:

- 1. What do you mean by residual method?
- 2. What is meant by Direct Percentage method?
- 3. What is Harmonic analysis method?
- 4. What is meant by reference cycle analysis method?
- 5. Explain the meaning of secular trend?
- 6. Write short note on seasonal variation.
- 7. What do you mean by cyclical variation?
- 8. What is erratic variation?

#### **Practical Problems:**

- 1. In a study of its sales, a motor company obtained the following least square trend equations: Y = 1,600 + 200X (origin 2010, X units = 1 year; Y = total number of units sold annually) The company has physical facilities to produce only 3,600 units a year and it believes that it is reasonable to assume that at least for the next decade the trend will continue as before.
  - (a) What is the average annual increase in the number of units sold?
  - (b) By what year will the company's expected sales have equaled its present physical capacity?

(c) Estimate the annual sales for 2015.

How much in excess of company's present physical capacity is this estimated value?

#### Ans: (a) 200 units (b) In 2020 (c) 4,600 units: Excess = 4,600 - 3,600 = 1,000 units

2. Convert the following annual trend equation for total sales of a company to a monthly trend equation:

Y = 162 + 15.8X (Origin: 2015; Scale: 1 units of X = 1 year)

Forecast the sales for June, 2018 by the two equations. Compare your results.

Ans: Y = 13.5 + 0.1097X; (Origin: 2015, X unit = 1 month: Y unit = monthly sales)
3. The trend of the annual sales of Bharat Aluminum Company is described by the following equation:

 $Y_c = 12 + 0.7X$ : (Origin: 2010; X unit = 1 year and Y unit = Annual production)

Step the equation down to a month to month basis and shift the origin to 1<sup>st</sup> January 2010.

## Ans: $Y_c = 1 + \frac{0.7}{144} X$ ; (Origin: 1<sup>st</sup> July 2010; X unit = 1 month);

Y<sub>c</sub> = 0.9712 + 0.0048X (Origin: 1<sup>st</sup> January, 2010)

4. The trend equation for certain production is given by : Y = 3,600 + 288t; where

Y = Annual production in thousand tons: t: Time with origin, the year 2010 and unit = 1 year

Estimate the trend value of the production for September, 2014.

#### [I.C.W.A (Intermediate) June, 2000]

Hints: Monthly trend equation is given by:

5.  $Y = \frac{3,600}{12} + \frac{288}{144}t = 300 + 2t$ : Origin: 1<sup>st</sup> July, 2010; t: Unit 1 month; Y: Monthly production For September 2014 i.e. 15<sup>th</sup> September, 2014:  $t = 4 \times 12 + 2.5 = 50.5$ Estimated production for 2014 = 300 + 2 × 50.5 = 401 thousand tons.