

# STATISTICS & MATH

2017

Time: 3 Hours

(Regular)

Max. Marks: 100

Instructions: Attempt TWO questions from each section.

## SECTION "A"

1. (a). Find the equation of straight line in general form passing through the point (-2, 4) and (3, -1).

(b). Find the derivatives of the following functions:

i).  $y = \log(x^2 + x)$       ii).  $y = \frac{x^2}{1+x^3}$

2. (a). Draw the graph of the function.

$y = x^2 + 3x + 1$  for  $x = -3, -2, -1, 0, 1, 2, 3$

(b). Find the maximum or minimum value of following function:  $y = 3x^2 - 2x + 50$

3. (a). Given two Matrices.

$A = \begin{bmatrix} 3 & 0 & 1 \\ -1 & 2 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 1 \\ 3 & 6 \end{bmatrix}$

Find (i)  $A^t$  (ii)  $B \times A$

(b). use Cramer's rule to solve the following equations:

$X + 3y = 10,$        $2x - y = -8$

## SECTION "B"

4. (a). Define descriptive and inferential statistics.

(b). Calculate A.M and Mode Comment on the shape of the distribution:

C.I.	110-119	120-129	130-139	140-149	150-159	160-169
F	3	8	12	17	6	4

(c). the speed of cars on highway is 60, 65, 62, 60, 70, 68, 72, 65 find average speed using a suitable formula.

5. (a). what are the properties of mean?

(b). find the quartile deviation for the following data:

10, 13, 9, 6, 4, 9, 18, 8, 7, 5, 14

(c). form the data given below, calculate coefficient of variation and comment on results.

C.I.	11-15	16-20	21-25	26-30	31-35
F	1	2	5	1	1

6. (a). the following table shows chart of price and demand:

Price (x)	12	15	18	25	22	18	30
Demand (y)	65	60	50	41	40	56	45

Find:

i. Regression equation Y on X

- ii. Coefficient of correlation.
- iii. Draw a scatter diagram for the above data.

(b). find: Fisher's index Number:

Commodity	Price		Quantity	
	1995	1996	1995	1996
A	9.3	13.0	100	180
B	6.4	8.5	11	20
C	5.1	8.0	5	13

7. (a) fill in the blanks:

- i. Three students can be sit in-----.
- ii. A fair die is rolled once. The probability of an even number is-----.
- iii. The sample mean is denoted by-----.
- iv. In estimated  $\alpha$  is called-----.
- v. The population mean is denoted by-----.

(b). Find the number of permutations of the words:

(i). KARIM (ii). UNIVERSITY

(c). A bag contains 12 red and 8 black marbles if two marbles are selected at random from the bag, what is the probability.

(i). Both are Red (ii). Both are black (iii). Once each Color.

8 (a). Given  $n = 36$ ,  $\bar{x} = 62$ ,  $S = 5$ , find 95% confidence interval for population mean.

(b). Draw all possible sample each of size 2 without replacement from the population 5, 8, 10, 15, 16 also show that  $E(\bar{x}) = \mu$

(c). the probability that a person win a prize is  $\frac{3}{4}$  find the probability that out of 5 persons selected at random:

i). 4 will win prize ii). 2 will win prize iii). At least 4 will win prize

9 Consider the data :

$$n_1 = 11, \bar{x}_1 = 75, S_1 = 6.25$$

$$n_2 = 14, \bar{x}_2 = 80, S_2 = 4.8$$

Test the hypothesis  $\mu_1 = \mu_2$  against  $\mu_1 \neq \mu_2$  use  $\alpha = 0.05$  (assume both population variance are equal)

(b). A random variable follows the poisson distribution with mean is 1.5, find the probability that:

i)  $P(x \leq 2)$  ii)  $P(x = 4)$ .

10 (a). given  $n = 16$ ,  $\bar{x} = 30$ ,  $S = 2.4$

$\mu = 32$  against  $\mu \neq 32$  use  $\alpha = 1\%$

(b). two fair dice are rolled once. Find the probability that:

(i). Both dice shows same number. (ii). Sum of dots is 10

(iii). Sum dots is multiple of 5      (iv). Product of dots is 8

(c). the frequencies given in the table are the sales data on five colors of a name brand washing machine.

Green	Gray	Red	Blue	White
88	65	52	45	50

Test the null hypothesis that all five colors of washing machine are equally popular. Use  $\alpha = 0.05$ .

COLLEGE OF BANKING & FINANCE

Instructions: Attempt TWO questions from each section.

**SECTION “A”**

1. (a). Find the equation of straight line which passing through the point (3, 5) and (-2, 3)
- (b). Find vertex of the parabola  $y = 2 + 2x^2 - 5x$ . also state which way the parabola opens.
2. (a). Find  $\frac{dy}{dx}$  of the functions: i)  $y = \frac{x^2}{x+3}$  ii).  $Y = \sqrt[4]{x^4 - 4x^3 + 8x}$
- (b). Find the value of X for which the function  $y = 6x - 9x^2 - 7$  has minimum or maximum value.
3. (a). if following matrix is a singular matrix, then find value of:

$$\text{“a”} \begin{bmatrix} 2 & a & -3 \\ 1 & 9 & 12 \\ 2 & -5 & -3 \end{bmatrix}$$

- (b). show that matrix A and B are multiplicative inverse of each other, (hint:  $A A^{-1} = I$ )

$$A = \begin{bmatrix} 2 & -3 & -4 \\ 0 & 0 & -1 \\ 1 & -2 & 1 \end{bmatrix}, B = \begin{bmatrix} 2 & -11 & -4 \\ 0 & -6 & -2 \\ 0 & -1 & 0 \end{bmatrix}$$

4. (a). Following are the result obtained from a data representing the wages of workers. Mean=Rs.750, Median=Rs.880, Mode=Rs.910, Range=Rs.250, S.D(x) Rs. 15. If wages of each worker is increased by Rs.50. state what will happen to mean, median, mode, range and S.D (x).
- (b). Compute mean and mode of the following data and comment on the shape of distribution:

Weight in lbs.	118-126	127-135	136-144	145-153	154-162	163-171	172-180
No. of workers	3	5	9	12	9	5	3

- (c). find Variance of:

X	0	1	2	3	4	5	6
F	1	5	7	10	7	5	1

5. (a). following are the ages (x) and heights (y) of a class of a students, estimated the heights of a students, estimate the height of a student whose age is 14 years using regression line.10

Age ( years)	6	7	8	9	10	11
Heights (inch)	46	47	50	51	54	54

- (b). Calculate parson’s coefficient of correlation for the following data, also state correlation coefficient if each value of X and Y is multiplied with 3.

X	4	5	9	14	18	22	24
F	16	22	11	16	7	3	17

(c). find G.M and H.M of the following data if exist: 6, 10, -5, 14, and 5.

6. Following data represents prices and quantities Consumed for four commodities:

Commodity	2016		2017	
	Price	Qty.	Price	Qty.
A	12	70	15	74
B	08	82	10	85
C	32	28	38	32
D	68	18	62	20

Compute the price index number of 2016 using:

- i) Base year index
- ii) Current year index

(b). following are the runs scored by two batsmen A and B in a series of one day Matches:

Batsman A	60	58	65	62	48	70
Batsman B	90	85	62	70	50	48

Find which batsman has more stable batting performance.

### SECTION "C"

7. (a). in how many ways one can select a group of 3 persons of a random, out of 5 boys and 4 girls. If a group contains.
- i) 2 boys and 1 girl.
  - ii) 2 girls
  - iii) At most boy.

(b). two card are drawn at random from an ordinary deck of 52 playing cards; find probability of getting.

(i). Both queen (ii). All from same suit (iii). Two spade cards.

(c). A pair of Fair dice is rolled once, draw sample space and find the probability of obtaining a sum of dots equal to a perfect square.

8. Draw all possible random sample of size 2 without replacement from the population 1, 3, 5, 7. Also verify that simple mean is unbiased.

(b). A random sample is drawn from a normal population. Construct 95% confidence interval for population means if sample result are 85, 82, 75, 88.

9. Given two random samples of sizes  $n_1 = 45$  and  $n_2 = 60$  from two independent and normal population with  $\bar{x}_1 = 11.5$  and

$\bar{x}_2 = 13.2$ ,  $S_1 = 3.2$  and  $S_2 = 3.8$ . Test the hypothesis at 0.05 level of significance that  $\mu_1 = \mu_2$

(b). find  $E(x)$ ,  $E(2x-4)$  and  $E(x^2)$  of the following probability distribution:

X	-2	-1	0	1	2
P ( X = x )	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{12}$

(c). a die is tossed 180 times with the following results:

Dots	1	2	3	4	5	6
Frequency	28	36	36	30	27	23

In this a fair die? Use 0.01 level significance.

**10.** (a). 8 fair coins are tossed together, find the probability of getting at least 2 heads.

(b). the average number of cars arriving at a petrol pump is 2 per minute. What is the probability that at any randomly selected four minutes interval, exactly 5 cars will arrive at the station.

(c). the marks obtained by candidates are normally distributed with mean 58 and standard deviation 12. Find the probability that a candidate selected at random gets the marks:

i). Greater than 82

ii). between 70 and 78.

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# STATISTICS & MATH

2016

Time: 3 Hours

(Regular)

Max. Marks: 100

Instructions: Attempt TWO questions from each section.

## SECTION A

1. (a). Find the value of X for which the function  $y = 3x^2 = 12x - 7$  has minima and / or maxima.

(b). find  $\frac{dy}{dx}$  of any two of the following function:

i).  $Y = \sqrt{3x = 2(2x^2 - 3)}$  ii).  $Y = \sqrt[3]{x^4 + 2x^2 - 3x}$  iii).  $Y = \frac{x^2 - 3}{x - 3}$ .

2. (a). find the equation of the straight line passing through the points (-6, -3) and (0, 9) in general form. Also find slope and y - intercept of the line.

(b). find vertex and root of the parabola  $y = 5x + 2x^2 + 2$

3. (a). For the given matrixes verify that  $(A - B)^t = A^t - B^t$

$$A = \begin{bmatrix} 5 & -6 \\ 3 & 11 \\ 1 & 8 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -1 \\ 0 & 7 \\ 9 & -2 \end{bmatrix}$$

(b). solve the system of equations using Cramer's rule.

$$x + 2y - 3z = -4, \quad y - z = -1, \quad 5x + y = 7$$

## SECTION "B"

4. (a). verify the relationship  $G.M > H.M$  using data: 10, 20, 40

(b). Comment on the symmetry of data using the relationship among mean and mode.

Weight in lbs.	118 - 126	127 - 135	136 - 144	145 - 153	154 - 162	163 - 171	172 - 180
No. of worker	3	5	9	12	9	5	3

(c). find Mean and variance of  $5x - 3$

5. (a). A trader sells toys for a different fixed price 'x' in each of six weeks. If 'y' represent the number of toys sold in each week. Find the linear regression equation of y on x.

Estimated y at  $x = 22$ :

X (Rs.)	19	15	20	25	30	35
Y	68	60	55	48	38	31

(b). Calculation coefficient of rank correlation for the following data:

Individual	A	B	C	D	E	F	G	H
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Rank by judge I	6	7	1	5	3	4	8	2
Rank by judge II	6	8	2	3	1	7	5	4

(c). Arithmetic mean and standard deviation of 49 observation are found to be 32 and 12 respectively. Later on, while checking it was discovered that as observation 20 was wrongly entered as 02. Find the corrected mean and standard deviation of the data.

6. (a). Following data represent prices and quantity consumed for 4 quantities for the year 2015 and 2016.

Commodity	2015		2016	
	Price	Qty.	Price	Qty.
A	12	70	15	74
B	8	82	10	85
C	32	28	38	32
D	58	18	62	20

Compute the price index number of 2016 using:

- i) Base year index
- ii) Current year index
- iii) Ideal index

(b). following are the runs scored by two players A and B in a series of one day matches.

Player A	60	58	65	62	48	70
Player B	90	85	62	70	50	48

Find which player has more stable batting performance.

### SECTION "C"

7. (a). In how many ways one can select a group of three student out of 6 boys and 4 girls. If a group contains:

(b). two cards are drawn at random from an ordinary deck of 52 playing cards: find the probability of getting: i) both kings ii). All of same suit iii). Two black face card.

(c). A pair of fair dice is rolled once, draw sample space and find the probability of obtaining an odd sum.

8. (a). draw all possible random samples of size 2 with replacement from the population 1, 2, 5, 6.

Also verify (i). Sample mean is unbiased (ii).  $V = (\bar{x}) = \frac{\sigma}{n}$

(b). A random sample is drawn from a normal population whose variance is 2.5 construct 96% confidence interval for population mean if sample results are 85,82,75,88,80,83,86,85.

9. (a). ) A same task is assigned to skilled and unskilled workers. Following are the results obtained from the samples:



Category	No. of Worker	Mean	Standard
Skilled Worker	13	9.5 min.	1.7 min.
Unskilled Worker	15	12 min.	2.5 min.

Assuming normality and equality of population variance test the hypothesis that difference between average of two categories is 2 minutes ( $\alpha = 0.02$ )

(b). Find mean and variance of the following probability distribution:

X	-2	-1	0	1	2
P = (X = X)	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{12}$

(c). The following table shows the numbers of students passed and failed by three examiners A, B and C.

#### EXAMINERS

	A	B	C	Totals
Pass	51	48	58	157
Fail	4	14	7	25
Total	55	62	65	182

Test at 5% level of significance that the three Examiners have no association.

10. (a). The probability that a pen drawn at random from a box of pens is defective is 0.1. if a sample of 6 pens is taken, find the probability will contain:

(i) No defective pen (ii) 5 or 6 non defective pens (iii) Less than 3 defective pens

(b) The average rate of accidents per week at a certain intersection is 1.60, find the probability that:

(i) Exactly 3 accidents will occur in a week

(ii) More than 3 accidents will occur in 4 weeks.

(c) Packages from a packing machine have a mass which is normally distributed with mean 200 g and standard deviation 2 g. Find the probability that a package from the machine weight

(i) more than 203 g (ii) Between 198.5 g and 199.5 g

# STATISTICS & MATH

2016

Time: 3 Hours

(Private)

Max. Marks: 100

Instructions: Attempt TWO questions from each section.

## SECTION "A"

1. (a). Find equation of straight line passing through (-2, 0) and (0,-3). Also find slope and intercepts.  
(b). Find roots and vertex of parabola  $y = 3 - 4x + x^2$
2. (a). Find maxima & minima of the function  $f(x) = x^3 - 3x + 2$   
(b). Differentiate (i)  $y = \sqrt[3]{x^3 + 3x + 1}$  (ii).  $y = x^3 / (x^2 + 2)$ .
3. (a). Find solution of the equations by Cramer's rule  $X + 2y = 3, 3x + 4y = 8$ .  
(b). Given:  $A = \begin{bmatrix} 3 & 4 \\ 1 & 2 \\ 0 & 1 \end{bmatrix}, B = \begin{bmatrix} 12 & 6 & 2 \\ 6 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix}$  Find  $(A \times A^t) + 2B$

## SECTION "B"

4. (a). Table shows the distribution of students according to their weights.

Weight (in Lbs).	No. of students
101 – 110	5
111 – 120	10
121 – 130	20
131 – 140	9
141 – 150	6
Total	50

- (i). Construct both types (less than and more than) of cumulative frequency distribution.  
(ii). Construct relative frequency distribution.
- (b). table show the distribution of daily wages (in US \$) of a company.

Wages (US \$)	50 – 74	75 – 99	100 – 124	125 – 149	150 – 174	175 – 199	200 – 224	225 – 249	Total
No. of worker	5	8	11	10	7	6	2	1	50

- (i). Compute Arithmetic Mean and Mode.  
(ii). Comment on the shape of the distribution of wages of worker on the basis of computations in (i). above.

5. (a) Goals scored by United King Football team in a season were as follows:

No. of goals in a match	0	1	2	3	4	Total

No. of matches (f)	27	9	8	5	4	50
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Compute standard deviation, Mean and Co-efficient Variation (C.V) and comments on results.

(b). Construct Fisher's price index No. for the following data using 2015 as the base year:

Commodity	Price		Quantity	
	2015	2016	2015	2016
A	64	102	270	320
B	40	70	124	210
C	83	95	130	125

6. (a). table show yield (y) (in bushels / Acre) to the amount of supplies fertilizer (x) (in lbs /acre)

Fertilizer (x) Lbs/acre	100	200	300	400	500	600	700
Yield (y) bushels / acre	40	45	50	65	70	70	80

(i). fit a least square regression line  $y = a + b x$  on the above data.

(ii). Estimate yield (y) for the application of 350 lbs/acre of fertilizer.

(b). Following are the ranks given by the judges in a naat competition of ABC College:

Judge A	1	6	5	10	3	2	4	9	7	8
Judge B	3	5	8	4	7	10	2	1	6	9

Compute Co-efficient of rank correlation.

### SECTION "C"

7. (i). How many license plates of three letters followed by three digits can be made if the letters and digits can be repeated?

(ii). Two fair dice are thrown. A prize is won if the total is 10 or dice show same numbers. Find the probability that a Prize is won?

(iii). random variable x has following probability distribution:

X	1	2	3	4
P(x)	0.1	a	0.3	B

Given that  $E(x) = 3$ , find a and b.

(iv). The probability that a student is a smoker is  $1/3$ . Find the probability that out of 5 student Window only one is smoker.

8. (a). Draw all possible samples of size 2 without replacement from the population of marks obtained by 5 students in a statistics test: 15, 10, 7, 11, 13 to prove that  $E(\bar{x}) = \mu$

(b). Two hundred passengers have made reservations for an airplane flight. If the probability that a passenger who has a reservation will not show up is 0.01. What is the probability that exactly 4 will not show up?

9. (a). Construct 95% Confidence interval for the difference in the two population means. Sample data is as follows:

$$\begin{aligned}n_1 &= 75 & n_2 &= 75 \\ \bar{x}_1 &= 20 & \bar{x}_2 &= 18 \\ S_1 &= 2.5 & S_2 &= 2.05\end{aligned}$$

(b). A random sample of 250 girls and 250 boys was taken to know their desire to have a smart mobile phone. Data is summarize in the table below:

	Girls	Boys	Total
Want a smart phone	80	120	200
Do not want a smart phone	170	130	300
Total	250	250	500

Is the desire to have a smart phone independent of sex (use  $\alpha = 0.05$ )

10. (a). A test of breaking strengths of six ropes showed a mean breaking strength of 750 N and a Standard deviation of 145 N. Can you support the manufacturer's claim of mean breaking strength of 800 N against the alternative that mean breaking strength is less than 800

N. Use  $\alpha = 0.05$ .

(b) Four cards are drawn without replacement from 5 black and 5 white cards. What is the probability of having equal number of cards of each color?

**Time: 3 Hours**

**(Regular)**

**Max. Marks: 100**

Instructions: Attempt TWO questions from each section.

**SECTION "A"**

1. (a). Find the equation of straight line when x-intercept = 3 and y-intercept = 5. Also find slope of the equation.

(b). for the derivatives  $\frac{dy}{dx}$  in each of the problem. (Any TWO).

i.  $y = 5x^3 (3x - 2)$

ii.  $y = \frac{3x^2}{\sqrt{2x+1}}$

iii.  $\sqrt{x^2 + 5}$

2. (a). For the quadratic equation  $y = x^2 - 4x + 3$ .

Determine: (i). which way parabola opens. (ii). the vertex (iii). The roots.

(b). find the inverse of the following square matrix A then verify that  $A^{-1} \times A = I$   $A = \begin{bmatrix} 4 & -2 \\ 5 & 3 \end{bmatrix}$

3. (a). Given,  $A = \begin{bmatrix} 5 & 6 \\ 7 & 8 \\ 2 & 3 \end{bmatrix}_{3 \times 2}$  and  $B = \begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 5 \end{bmatrix}_{2 \times 3}$  Find  $A \times B$ .

(b). Examine Maximum and Minimum value of the function  $y = x^2 - 27x + 10$

**SECTION "B"**

4. Calculate G.M, A.M, H.M and mode for the gives frequency distribution:

X	0	1	2	3	4	5
F	2	2	4	6	8	3

(b). Find Chain index using 2001 base for the production of wheat from the data given below:

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production	2046	1776	2134	2380	2785	2765	2420	2595	2425

(c). if an inventory buys shares of Rs. 9,000 at a price of Rs. 45 per share of Rs. 9,000 at Rs. 36 per share. Calculate the average price per share.

5. (a). for the following frequency distribution:

C.B.	10 – 12	12 – 14	14 – 16	16 – 18	18 – 20
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F	14	26	42	30	8
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Find mean deviation from mean.

(b). in a moderately skewed frequency distribution.

Mean = 62.5 and median = 59.2 find mode.

(c). given,  $\bar{x} = 20$ ,  $\sigma_x = 4$  find  $\bar{y}$  and  $\sigma_y$  (mean and sd of  $y$ )  $y = 9x = 70$

6. (a). the following table shows the heights of father and height of son:

Heights of fathers	63	65	66	67	67	68
Heights of Sons	66	68	65	67	69	70

i. Find the Karl person coefficient of correlation.

ii. Find the equation of the regression line of son on father.

(b). the average is 68 and S.d is 8 of marks of section A. The average is 52 S.d is 12 of marks of section B. which consistent?

### SECTION "C"

7. (a). how many three numbers can be formed from the digit 1,2,5,6 and 9 if each digit can be used only once?

(b). what is the probability of getting a total of 7 or 11, when a pair of dice is tossed?

(c). find 90% confidence interval of the mean of a normal sample of size 8 give the value 9, 14, 10, 12, 7, 13, 11, 12.

8. (a). A type of 200 watt light bulb has been found to have a mean life of 2000 hours & S.d. of 250 hours. What is the life of fewer than 1920 hours?

(b). find the expected value of X, where X represents the outcome when the die is tossed.

(c). in survey of 400 infants chosen at random, it was found that 190 were girls. Fit test to examine the hypothesis that boy and girl are equally likely  $\alpha = 0.05$

9. (a). an unbalance coin is tossed 3 times. If "x" is a random variable showing the number of heads then construct the binomial distribution of "x" if the probability of head is single toss is  $2/3$ .

(b). A random variable of 50 observation produced the following sums.

$$\sum x = 20 \quad \sum x^2 = 10.9$$

Test the hypothesis that population mean is 0.45 against the alternative less than 0.45, use  $\alpha = 0.10$

10. (a). for a normal random variable x with mean equal to 30 and standard deviations 5. Find the probabilities.

i).  $P(24 \leq x \leq 32)$

ii).  $P(x \geq 25)$

(b). draw all possible of size 2 with replacement from the population 2, 4 10 verify that sample mean is an unbiased estimated of population mean.  $E(\bar{x}) = \mu$

$\alpha / z$	Z – test	T – test	$X^2$ – test
0.1	1.282	1.415	-
0.05	1.645	1.895	3.841
0.025	1.96	2.365	5.024
-2.88	0.002	-	-
-1.2	0.1151	-	-
0.4	0.6554	-	-
-1.0	0.1587	-	-

**Time: 3 Hours**

**(Private)**

**Max. Marks: 100**

Instructions: Attempt TWO questions from each section.

**SECTION "A"**

1. (a). find the distance between the points ( 1, 2) and (4, 5)
- (b). find the root of function  $y = 2x^2 - 8x + 6$ .
  
2. (a). find the equation of straight line passing through the points (3, -2) and (5, 1).
- (b). find the derivatives of the functions:
  - i)  $Y = \sqrt{x^2 + 1}$
  - ii)  $Y = \frac{x}{x+1}$
3. (a). solve he equations by Cramer’s rule:  
 $2x - 3y = 1, x + 4y = 6$
- (b). Give two matrices

$A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$  Show that  $(A \times B)^t = B^t \times A^t$

**SECTION "B"**

4. (a). Fill in the blanks:
  - i. Statistics mainly concern with ..... Data.
  - ii. Ogive is used to find.....
  - iii. The standard deviation is positive square root of .....,
  - iv. The limit of coefficient of correlation is .....,
  - v. The base year index is always .....,
- (b). find mean, mode and comments on the shape of distribution:

C.F.	00 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
F	12	18	27	20	17	6

5. (a). Calculate Mean absolute deviation about mean:  
 32, 28, 47, 63, 75, 39, 10, 60, 96
- (b). find the variance of the number: 1, 2, 3, 4, 5.
- (c). find the coefficient of variation:

X	3	5	7	9	11
F	2	5	10	2	1

6. (a) find the regression line y on x.



X	6	2	10	4	8
Y	9	11	5	8	7

(b). Calculate Karl parson coefficient of correlation:

X	1	2	3	4	5	6
Y	6	4	3	5	4	2

(c). shift the base year from 1991 to 1995:

Year	1991	1992	1993	1994	1995
Price index (%)	100	103	105	107	110

**SECTION "C"**

7. (a). find the number of permutation of the words.

(i). KARIM

(ii). ACCOUNTANT

(b). from a group of 5 men and 3 women. How many committees are possible with 2 men and 1 women?

(c). Two unbiased coins are tossed once: Find the probability of : (i) No head (ii). Two tails (iii). All heads

8. (a). a random sample of 36 students selected from different colleges showed an average number of marks 62 with S.D of 5. Construct 95% of confidence interval for the average marks of all students.

(b). A plant manufacture 8% defective items. A sample of 6 selected. What is the probability that:

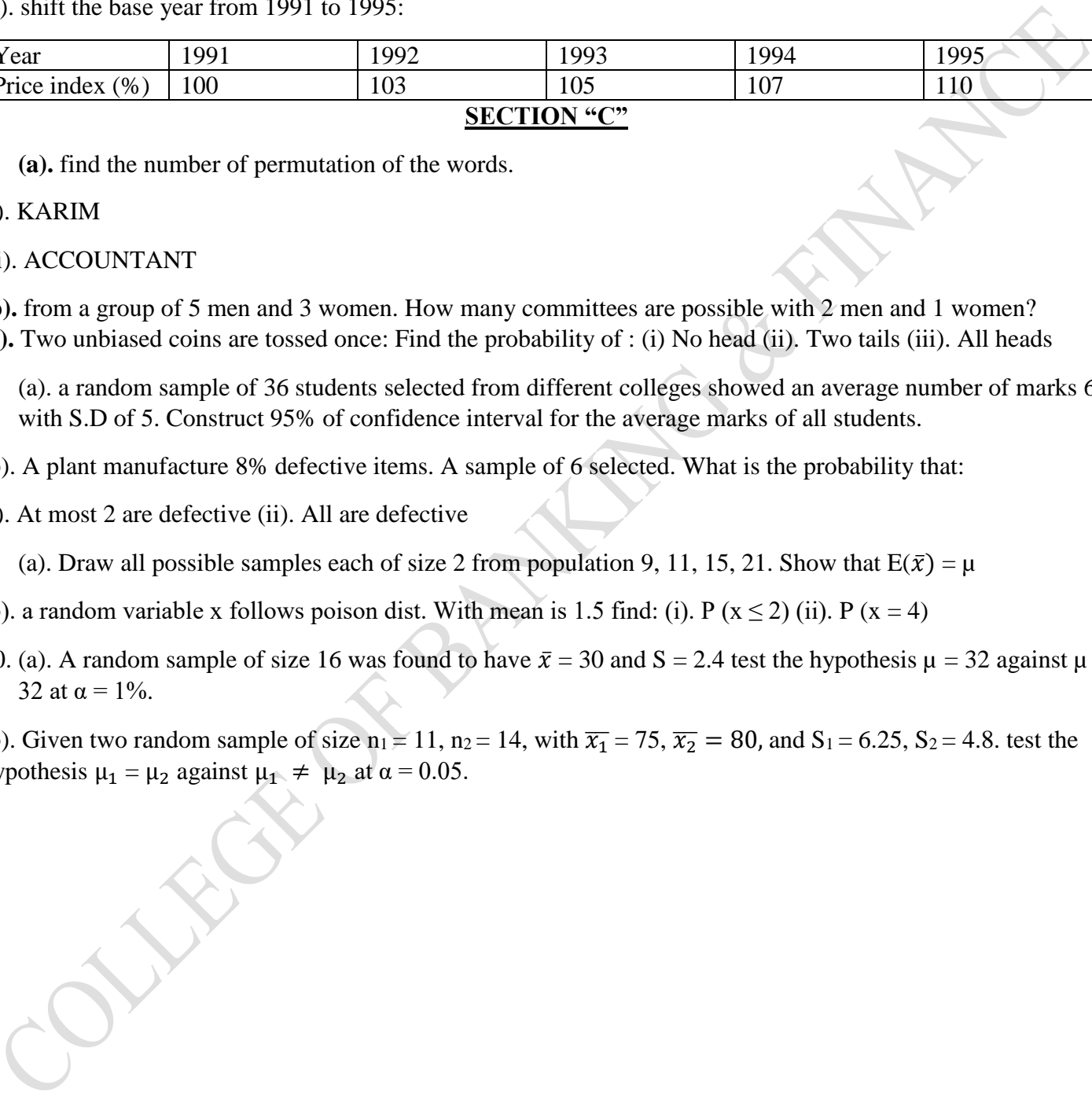
(i). At most 2 are defective (ii). All are defective

9. (a). Draw all possible samples each of size 2 from population 9, 11, 15, 21. Show that  $E(\bar{x}) = \mu$

(b). a random variable x follows poison dist. With mean is 1.5 find: (i).  $P(x \leq 2)$  (ii).  $P(x = 4)$

10. (a). A random sample of size 16 was found to have  $\bar{x} = 30$  and  $S = 2.4$  test the hypothesis  $\mu = 32$  against  $\mu \neq 32$  at  $\alpha = 1\%$ .

(b). Given two random sample of size  $n_1 = 11$ ,  $n_2 = 14$ , with  $\bar{x}_1 = 75$ ,  $\bar{x}_2 = 80$ , and  $S_1 = 6.25$ ,  $S_2 = 4.8$ . test the hypothesis  $\mu_1 = \mu_2$  against  $\mu_1 \neq \mu_2$  at  $\alpha = 0.05$ .



Instructions: Attempt TWO questions from each section.

1. (a). find the equation of straight line which passes through the points ( 3, -2) and (-2, 5). Also find distance between two points.  
 (b). Find the roots of quadratic equation  $5x^2 + 4x - 1 = 0$

2. (a). (i) Find inverse of A

$$A = \begin{bmatrix} 8 & 5 \\ 4 & 4 \end{bmatrix}$$

(ii). Find AB where  $A = \begin{bmatrix} 3 & 4 & 2 \\ 5 & 4 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 3 \\ 2 & 2 \\ 4 & 4 \end{bmatrix}$

(b). find derivative of any two of the following:

(i).  $y = \frac{4x^3 - 2x = 1}{5x^2 - 3}$  (ii).  $y = \sqrt{2x^2 + 4x + 3}$

(iii).  $Y = (3x^2 - 4)^2(x^3 + 3x - 4)$

3. (a). use creamer’s rule to solve the following equation:

$$3x - 4y = -6$$

$$2x + 3y = 13$$

(b). simplify  $\left[ \frac{1}{a+b} + \frac{1}{a-b} \right] \div \frac{2a}{a^2 - b^2}$

(c). find the value of determinant “D”.

$$D = \begin{vmatrix} 15 & 17 & 5 \\ 12 & 19 & 4 \\ 25 & 13 & 8 \end{vmatrix}$$

**SECTION”B”**

4. (a). the following data show mark of 100 students of statistics Examination:

Marks	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 70
No. of students	5	10	20	30	20	10	5

- i. Find the A.M and Mode
- ii. Draw a histogram and comment on it.

(b).From the given data, calculate the price index. Taken 1967 as base using simple aggregative method.

Commodities	Price		
	1967	1970	1973

A	12.00	15.00	5.60
B	3.00	3.60	3.60
C	5.00	6.00	9.70

5. (a). the frequency distribution of daily wages of productive and non-productive workers a factory are given as under:

Wages in Rs.	51 - 74.99	75 - 9.99	100-124.99	125-149.99	150-174.99	175-199.99	200-224.99
Productive	20	25	43	32	23	6	1
Non Productive	12	25	30	25	30	20	8

Which type of worker have relatively core consistent wage.

- (b). Find A.M and H.M of data 3, 4, 9, -5, 7, -2. If calculation is possible gives relation and is not calculated gives reason?

6. (a). in utopia the whole sale food price index and retail food price index over six years had the following value in order:

X	Whole sale price	100	89	96	97	95	92
Y	Retail price	100	97	95	98	94	95

- Find the value of whole sale price when price retail price is 89.
- Find the value of retail price when the whole sale price is 91.
- Find the coefficient of correlation between X and Y. also give comment.

- (b). the average of 36 value is computed as 60.5. Later on at the of checking it was discovered that one value 25 was wrongly entered in the data while the correct value is 52. Find the correct mean.

### SECTION "C"

7. (a). one card is drawn from the deck of playing card what is the probability that:

- A card is black or jack.
- A red ace
- A face card.

- (b). in how many ways can 2 mangos, 3 black berry and 2 tamarind trees can be planted in a straight line. If one does not distinguish between of the same kind?

- (c). in how many ways can three digit odd numbers can be formed from the digits 1, 2, 3, 4, 5 if the digit not replaced?

8. (a). if A and B are two event. Such that  $P(A) = 0.5$ ,  $P(B) = 0.67$ ,  $P(A/B) = 0.4$  find (i).  $P(A \text{ and } B)$  (ii).  $P(B/A)$ .

- (b). the average number of customer at a window of a certain bank per minute during banking hours is one. Find the probability that during 4 minutes interval three or more customers appear.

- (c). the burning time of an experimental rocket is an random variable having the normal distribution with mean 4.76 seconds & S.D. 0.04 second. What is the chance that this kind of rockets will burn anywhere from 4.70 to 4.82 seconds?

9. (a). consider the following population 3, 5, 9, 7, 4

- i. Draw all possible samples of size 2 using without replacement.
- ii. Verify that : (a)  $E(\bar{x}) = \mu$
- iii.  $V(\bar{x}) = \frac{s^2}{n} (1 - f)$  where  $f = \frac{n}{N}$

(b). Two independent sample of size 10 and 11 from  $N(\mu_1, \sigma^2)$  and  $N(\mu_2, \sigma^2)$  have sample means 5 and 8 with sample variance 1 and 2 respectively. Find 95% level of confidence interval for difference between the population means.

10. (a). Two independent reading of the voltage of a cell were taking and the results were as follows: 1.15, 1.12, 1.11, 1.14, 1.10, 1.05. Test the claim that they average voltage of a cell is exceeds 1.10 with known S.D = 0.04 at 5% level of significance.

(b). the following table gives the no. of air craft accidents that occurred during the various days of the week.

Days	SAT	SUN	MON	TUE	WED	THU	FRI
No. of accidents	14	16	8	12	11	9	14

Find whether accidents are uniformly distributed over the week days use  $\alpha = 0.05$

**Time: 3 Hours**

**(Private)**

**Max. Marks: 100**

Instructions: Attempt TWO questions from each section.

1. (a). for the following equation  $y - 2x = 2(x - 4) - 6(x - 3)$

Find: (i) slope (ii). x – Intercept (iii). y – Intercept

(b). Give two points  $P_1(3, -2)$  and  $P_2(5, 1)$

Find: (i). Distance between  $P_1$  and  $P_2$

(ii). Slope between  $P_1$  and  $P_2$

2. (a). find the derivative of any two of the following functions:

i.  $Y = (2x + 5)(3x^2 + 2x)$

ii.  $Y = \frac{x^6 + 7}{x^5 + 3x}$

iii.  $Y = \sqrt[3]{x^2 - 3x + 1}$

(b). find the 1<sup>st</sup> and 2<sup>nd</sup> order derivatives of the given equation:  $y = (x^2 - 3x)(x + 1)$

3. (a). solve the equation by using matrix:

(b). for the Matrices:

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

Find: (i)  $(AB)^t$

(ii).  $2A + 3B^t$

**SECTION "B"**

4. (a). the following table shows the distribution of maximum load in tons:

Max. Load	30 – 40	40 - 50	50 - 60	60 – 70	70 - 80	80 – 90	90 – 100
No. of cables	15	13	8	6	15	7	6

Compute arithmetic mean, Geometric mean and harmonic mean.

(b). For the following data:

8	15	53	49	19	62	7	15	95	77
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Calculate mean absolute deviation about median.

5. (a). construct the price index number using laspeyre’s passche and fisher’s formulas taking 2009 as base year:

Commodities	Production (1000 tons)		Price (Rs.)	
	2009	2010	2009	2010
A	105	116	18.50	15.60
B	166	134	10.00	10.40
C	97	82	12.90	7.70

Who is more consistent player?

6. The following table the following table shows the chart of price and demand of an item:

A	12	15	18	25	22	18	30
B	65	60	50	41	40	56	45

(i). determine the regression equation of  $y$  on  $x$  and estimated  $y$  when  $x = 35$

(ii). determine co-efficient of correlation.

### SECTION "C"

7. (a) for the number of permutation that can be formed from all the letter of the word PROPOSITION.

(b). two balance dice are rolled once. What is the probability of getting a total of 7 or 11?

(c). A box contains 6 red, 3 black balls. Two balls are drawn in succession. What is the probability that both are of same color. If 1<sup>st</sup> ball drawn is.

(i). replaced (ii). not replaced

8. (a). A salesman has estimated that the probability of making a sale when calling on a customer's 0.5, if this sales man call 5 customers on a giving day what is the probability of making:

(i). exactly 3 sale (ii) at most 2 sale

(b). the probability that a person dies from repertory infection is 0.003. find the probability more than 2 of 2000such patient may die.

9. (a). the weight of 10 boxes of cereal are:

9.2	8.7	9.1	9.3	9.1	8.8	8.9	9.4	9.3	8.8
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Ounces. Find 99% confidence interval for the mean of all such boxes of cereal assuming an approximated normal distribution.

(b). Draw all possible sample of size 2 without replacement from the population. 2, 3, 5, 7, 9

Verify that the sample mean is an unbiased estimate of the population mean.

10. (a). A random sample of 250 men and 250 women were polled as to their desire concerning the ownership of T.V sets. Following data resulted:

Classification	Men	Women
Desire a T.V	80	120
Do not desire a T.V	170	130

Test the hypothesis that the desire to own a T.V set is independent of sex use 0.05 level of significance.

(b). Given two random sample of size  $n_1 = 11$ ,  $n_2 = 14$  from two independent normal population with  $\bar{x}_1 = 75$ ,  $\bar{x}_2 = 80$   $S_1 = 6.25$  and  $S_2 = 4.8$ . Test at 0.05 level of significance that two population means are equal. Assume that population variance are equal.

Instructions: Attempt TWO questions from each section.

**SECTION "A"**

1. (a). For the following equations of straight line:  $8y - 3x - 10 = 0$

Find: (i). Slope (ii). Y – Intercept

(b). Find the root of the quadratic functions:  $Y = 4x^2 - 5x - 6$ .

2. (a). Find derivatives  $\frac{dy}{dx}$  in each of the problems: (any two).

i.  $Y = \sqrt{x^4} + x^4$

ii.  $Y = \frac{1}{x^2+5}$

iii.  $Y = (x + 1)x^3$

(b). if  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$  compute  $(2A - B)^2$

3. (a). Solve the following equation with the help of Cramer's Rule

$3x + y = 7$

$X + Z = 4$

$Y - Z = -1$

(b). Let the Matrix:

$A = \begin{bmatrix} 2 & 4 \\ 5 & -6 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & 8 \\ -7 & 3 \end{bmatrix}$  Show that  $(A \times B^t) = B^t \times A^t$

**SECTION "B"**

4. (a). The measurement of heights of 100 individuals are given in the following frequency distribution.

Height (cm)	No. of Individuals
0 -06	03
7 -13	17
14 -20	20
21 -27	25
28 -34	30
35 -41	05

Compute Mode and Median.

(b). The rate of Inflation in three successive year in a country was 13%, 17% and 21%. Find the average rate of inflation per year.

5. (a) Compute price index by applying the weighted average of relative method using base year quantities as weight:

Commodity	Base Year		Current year
	Price	Quantity	Price
A	20	60	15
B	15	30	25
c	12	50	15
D	18	30	20

- (b). Coefficient of Variation of two series is 60% and 80%. Their standard deviations are 21 and 16. What are their respective means?

- (c). Two sales representatives for manufacture of large- scale. Compute system report the following quarterly sales for the last year.

Representative 1 = 5, 8, 6, 10

Representative 2 = 3, 13, 5, 0

Which one is more consistent?

6. (a). Age and systolic blood pressure of random sample of 8 persons are recorded below:

Age in years (x)	70	30	50	60	45	40	65	50
Blood pressure in mm Hg(y)	160	120	160	170	180	130	140	150

Find regression line y on x.

- (b). if  $N = 50$ ,  $\sum x = 75$ ,  $\sum y = 80$ ,  $\sum x^2 = 130$ ,  $\sum xy = 120$ , find coefficient of correlation.

### SECTION "C"

7. (a). If A and B are two dependent events  $P(A) = 0.22$ ,  $P(B) = 0.35$ ,  $P(A \cap B) = 0.20$ . Find  $P(A \cup B)$ .
- (b). A fair coin is tossed 3 times. Find the probability that exactly two heads appears if head appears on first toss.
- (c). A die is tossed only once. What is probability that either a number less than five or an even number occurs on the die.
8. (a). It is claimed that the average consumption expenditure of the average class Pakistani families (all the same income and asset level.) is Rs.1050 with a standard deviation of Rs.230. To test this claim a research organization took a random sample of 36 families. What is the probability that the sample mean will be found between Rs.980 and Rs.1120.
- (b) The contents of 7 similar containers of sulfuric acid are 9.8, 10.2, 10.4, 9.8, 10.0, 10.2 and 9.6 liters. Find a 95% confidence interval for the mean content of all such containers. Assuming an approximate normal distribution for container contents.



9. (a) The yield of corn in kg I hectare is normally distributed with variance  $\sigma^2 = 14400$ . For a random sample of six plots the yields are 1430, 1190, 1280, 1270, 1310 and 1380 kg. Test the hypothesis that mean yield ( $\mu$ ) is greater than equal to 1350 kg 5% level of significance.

(b). A market researcher believes that in a certain population the proportion of persons preferring brands, A, B,C and D of tooth paste are 0.30, 0.60, 0.08 and 0.02 respectively. A simple random sample of 600 persons drawn from the population shows the following preference.

T -table			Z - table			X <sup>2</sup> - table	
N	0.1	0.5	0.025	-2	0.0228	N	0.01
6	1.440	1.943	2.447	+2	0.9772	3	11.345
7	1.415	1.89	2.365	0.05	1.64	4	13.277
8	1.397	1.86	2.306	0.025	1.96	5	15.086
						6	16.812

COLLEGE OF BANKING & FINANCE

**Time: 3 Hours**

**(Private)**

**Max. Marks: 100**

Instructions: Attempt TWO questions from each section.

1. (a). Find the distance between the two points (-4,-5) and (-8, -10)  
 (b). Determine the roots of the following quadratic equation  $y = x^2 + 9x + 18$

Write down the equation of straight line passing through the points (o,-a) and (b, o)

2. (a). Find derivatives of any One of the following functions:

(i).  $Y = \frac{x^7}{8x^5+4}$  (ii).  $y = e^{7x}$

- (b). Determine the "Maxima" OR "Minima" OR Point of inflexion for:  $f(x) = y = x^2 - 6x + 9$

3. (a). find x and y if  $2A + \frac{1}{2}B = C$  where  $A = \begin{bmatrix} x \\ 2 \end{bmatrix}$   $B = \begin{bmatrix} 4 \\ y \end{bmatrix}$   $C = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

- (b). by using any suitable method to solve the system of equation.

$4c + 3y - 2z = 4$

$3x - 2y + 4z = 11$

$-2x + 5y + 3z = 17$

- (c). Find A x B of the matrix:

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

**SECTION "B"**

4. (a). compute median and mode of the following distribution:

Class interval	Frequency
20 – 24	09
25 – 29	13
30 – 34	24
35 – 39	38
40 – 44	16

- (b). A moderately skewed distribution has Mean = 87, Mode = 96. By using empirical relationship, determine Median In a class there are 22 girls and 38 boys. The mean score of girls are in an examination is 78 and the Mean score of boys are in 71. What is the mean score of the entire class?

5. (a). The Mean of the data is 17.2 and the Co-efficient of Variation is computed as 35%. What is the standard deviation of the data?

- (b). Determine the Co-efficient of correlation of the following data and interpret our results :

X	12	13	14	15	16	17	18	19	20
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Y	0.01	0.1	0.2	0.2	0.5	0.5	0.6	0.7	0.8
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(c) .The Mean, Median and Standard Deviation of a frequency distribution are computed as Mean = 27.2. Median = 24.6, Standard Deviation = 16.00.

Find: (i) The Co-efficient of skewness of the distribution.

(ii) Is the distribution Positive or Negative Skewed.

6. (a). Given the following data construct Fisher Ideal I. No.

Commodity	Base year		Current year	
	P	Q	P	Q
A	10	70	08	65
B	20	35	25	50
C	05	40	08	40
D	08	25	12	36
E	40	16	56	12

(b). Write down the properties of Variance and Standard Deviation.

(c). Given:  $r = -0.73$   $\bar{x} = 110$

$$\bar{y} = 125$$

$$S_x = 10.65 \quad S_y = 15.35$$

### SECTION "C"

Find TWO lines of Regression.

7. (a) Ten independent readings of the voltage of a cell were taken and the result were as,

1.5, 1.10, 1.12

1.12, 1.05, 1.14

1.11, 1.08

1.14, 1.09

Calculate 95% confidence Interval for mean voltage of the cell assuming an approximate normal distribution.

(b). Two machines are used to cut steel bars of equal length. A random sample of 50 bars cut on machine A gives a mean of 55.6 inches with a standard deviation of 0.10 inches. Another random sample of 50 bars cut on machine B gives a mean 55.5 inches with standard deviation of 0.12 inches. At 0.05 level of significance, are the machines cutting equal length.

8. (a). How many "Five" digit numbers are possible from the digits 0, 1, 2, -----, 7. If each digit is use only once...

(b) The random variable X has the following probability distribution:

X	-2	-1	0	1	2
P(X)	0.05	0.20	0.40	0.20	0.15

Find: (i)  $P(x \geq 0)$  (ii).  $P = (-1 \leq x \leq 1)$  (iii).  $P = (-2 < x < 2)$

(c). A coin and a die are tossed independently. Compute the probability of observing head on the coin and 2 or 4 on the die.

9. (a). A certain manufacturing process yields electrical fuses of which in the long run 15% are defective. Find the probability that in a sample of 7 fuses there will be

- (i) No defective
- (ii) At least one defective
- (iii) Not more than one defective  $P(x \leq 1)$  .

(b). A contingency table containing sample frequencies are given:

Preference	Material Status	
	Single	Married
Candidate A	20	10
Candidate B	20	50

Test the hypotheses that material status and candidate preference are independent at 0.01 level of significance.

(c). A normal random variable  $x$  has mean  $\mu = 312$  and standard deviation  $\sigma = 50$ . Determine value of  $x$  for  $z=0,$

$1.2, -1.75, 2, -2.33$  where  $Z = \frac{x - \mu}{\sigma}$ .

10. (a). For the following probability distribution, find the mathematical expectation >

X	0	1	2	3	4	5	6	7
P(x)	0.01	0.07	0.18	0.34	0.24	0.12	0.03	0.01

(b) Random sample of size 2 are drawn with replacement from a finite population 2, 4, 6.

(i). Construct the sampling distribution of  $\bar{x}$ .

(ii). verify that  $\mu_x = \mu$  OR  $E(\bar{x}) = \mu$ .