STATISTICS & MATH 2019

Times: 3 Hours (REGULAR) Max Marks: 100

Instructions: Attempt TWO questions from each section.

SECTION "A"

1. **(a)** Find the equation of straight line passing through the point (2, 4) & (3, 8) also write the y intercept of the line.

(b) Find the roots and vertex of the y = 2x2 – 3x + 1

2. **(a)** Find the derivative of any two of the following:

1. $\sqrt{\frac{x+I}{x-I}}$

2. $\frac{I}{x2+3x}$

3. $(x^2 - 2x) (5x + 2)$

(b) Find the minima and maxima in the function: Y = 4x2 -12x – 1

3. **(a)** Solve the following equation by using Cramer's rule, find the value of x, y, z

x - 2y + z = 8 3x + 5y + 7z = 6 2x -3y – 5z =7

(b) *If* A = $\begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 5 \end{bmatrix}$ B = $\begin{bmatrix} 5 & 6 \\ 7 & 8 \\ 1 & 5 \end{bmatrix}$ then find

(i) A x B (ii) B x A (iii) $A + B^t$

SECTION "B"

4. **(a)** Consider the following distribution:

C.I	8-10	11-13	14-16	17-19	20-22	23-25
F	2	4	6	4	3	1

Compute. (i) Mean (ii) Mode

(b) Calculate Harmonic Mean and Geometric Mean from the given data.
Also verify that G.M > H.M.

C.I	10-14	15-19	20-24	25-29	30-34
F	14	26	42	30	08

(c). Calculate Mean absolute deviation from mean: 6, 4, 2, 0, 4, 8, 10, 12

5. (a) Production of two machines are given select the machine which Is more referable

Machine — A	10	15	20	30	15	10
Machine — B	8	12	15	35	18	12

(b). Construct Price Index using Laspeyers & Paaches.

Commodity	Price		Quantity	
	2010	2011	2010	2011
A	12	15	40	48
B	2.5	3.75	120	150
C	16	20	25	30
D	10.50	12	08	10

(c). Calculate the co-efficient of skewness
$\bar{x}$ = 30, $\bar{\bar{x}}$ = 27, S.D. = 5, x = 25

6. (a) The following table shows the chart of Price and demand of the items:

Price	1.2	1.6	2.2	2.4	2.6	3.3	3.5
Demand	4.0	4.6	4.8	5.4	5.2	6.0	6.4

i) Determine the equation of Regression line y on x.
ii) Predict the demand for the Price of 70.

(b) Find (i) Co-efficient of determination (ii) Co-efficient of Correlation y = 0.5 x + 13
And x = 2 + 1.3 y

SECTION "C"

7. (a) How many words can be made using the letters of the words:
(i) Profession (ii) Lemon.

(b). An unbiased coin is tossed 3 times find the probability of getting
(i) At least 2 Heads (ii) 3 to 4 Heads

(c). Given P (A) = 0.6, P (B) = 0.40, (P ∩ B) = 0.24. Find
(i) P (A I B) (ii) (P U B) (iii) P (A')

8. (a). The probability that any given truck owned by a firm will require a major repair is .20, the firm have 8 trucks. What is the probability that more than 5 of them require a major repair?

(b). The number of entries made in an account receivable is a Poisson random variable with A = 5 per day. What is the probability that a specified day at least 4 entries will be received.

(c). The mean weight of 500 students is 60 Kg and standard deviation is 10 Kg. Assuming that weight are normally distributed. Find how many students have weight less than 45 Kg.

9. (a). Draw all possible samples of size 3 chat can be drawn from the population without replacement O, 2, 7, 9, 12, verify that E ($\bar{x}$) = μ

(b). Find the 95% confidence interval for the mean of normal distribution if the standard deviation is to be 2. If the sample size is 10. Given the values 10, 11, 12, 16, 20, 13,

10. (a). Given two random sample of size n_1 = 15, n_2 15 are drawn from two normal population with $\bar{x}_1$ = 18.3 $\bar{x}_2$ = 16.2, S_1= 6.2 and S_2 = 5.3. Test the hypothesis at 0.05 level of significance that two population mean are equal. Assume the population variance are equal.

(b). The sales representative of a Company were classified by the number of years of experience in sale before joining the company and their performance during the first ear with com an. The data is given below:

	Prior Experience in year		
Performance	Over 5 years	2 - 5 years	Below
Poor -	20	25	90
Satisfactory	30	40	65
Exceptional	60	45	55

Test the Hypothesis at 0.05 level of significance is the sale experience is the significant factor in the performance of the representation.

STATISTICS & MATH 2018

Times: 3 Hours (REGULAR) Max Marks: 100

Instructions: Attempt TWO questions from each section.

SECTION "A"

1. (a) For the given Matrices verify that $(A - B)^t = \mathbf{A^t} - B^t$

if $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \\ 8 & 9 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Then show that (A x B) + (B^1 x A) - 2A Is a null matrix.

(b) Solve the equations by using Cramer's Rule
$4x - z = 0 \quad 2x + y = -3 \quad 3y + 2z = -7$

2. (a) For the quadratic equation $y = x (5x + 4) - 1$.
Determine:
(i) Coordinate of the vertex.
(ii) The roots of the equation

(b) Find the derivative of function $y = (x^2 - 5x)(2x - 1)$

3. (a) Find the equation of straight line In general form when X intercept = 2 and Y intercept = -1/3. Also find slope of the equation. .

(b) Compute the maximum value of the function $y = - 2 x 2 + 12x + 40$

(c) Find the value of Determinant "D" $D = \begin{bmatrix} 5 & -9 & 2 \\ 0 & 8 & 11 \\ 3 & 4 & -7 \end{bmatrix}$

SECTION "B"

4. (a) Calculate measures of Central tendency of dividend paid by 80 companies in a city and also comments on the share of the distribution.

Dividend % age	Below 2.9	03 – 5.9	06 – 8.9	09 – 11.9	12 – 14.9	15 – 17.9	18 & above
No. of Company	4	10	22	18	12	10	4

(b). If a n investor buy shares of Rs. 9,000 at a price of Rs.45 per share and shares of Rs.9,000 at Rs.36 = per share. Calculate the average price per share.

5. (a) The following are the scores by batsman A and B in a series of 6 one day matches.

A	12	15	08	73	07	19
B	47	12	76	48	04	51

Using a suitable relative measure· of dispersion, decide which Batsman has more consistent scores.

(b) Compute ·mean deviation about mean and mean deviation about Median for the given set of observations and also write the relation between them: -5, 0, 3, 5, 5, 6

(c) Mean and Variance of a variable "x" in 50 and 30 respectively. Find the mean and variance of "y" where y = 2x - 15.

6. (a) The heights and weights of men as follows:

Heights in inch X	64	48	70	72	74
Weights in pounds Y	160	170	180	190	195

Determine the regression equation y on x and estimate the weight of a man in ponds whose height is 69 inches.

(b) If n = 100 $\Sigma x = 150$ $\Sigma y = 160$ $\Sigma x^2 = 260$ $\Sigma y^2 = 280$ $\Sigma xy = 240$ then and the coefficient of correlation and comments on the result.

(c) For the data given below calculate the weighted Aggregative Price index for 1985 taking 1980 as base year:

Commodity	Price 1980	Price 1985	Quantity 1985
A	10	12	30
B	12	18	25
C	08	10	40

SECTION "C"

7. (a) A college plays 12 football games during how many ways can the team and the season 7 wins, tosses and 2 ties?

(b) Find 90% confidence interval for the mean of normal distribution if variance is known to be 4 and if a sample of size 8 gave the values. 9, 14, 10, 12, 7, 13, & 12.

(c) A class contains 16 boys and 10 girls of which half of the boys and half of the girls are fat find the probability that a student chosen at random is a boy or a fat student.

8. (a) Draw all possible samples of size 2 with replacement from the population 9 and 18 and prove that the mean of all sample mean is equal to the population mean.

(b) A fair coin is to be tossed 100 times. Find the probabilities of getting:
(i) 45 to 60 heads (ii) Exactly 56 heads.

(c) Two balanced dice are rolled what is the probability that the product of the number of dots is a multiple of 8.

9. (a) Independent random samples from two normally distributed population with equal variance produced the following result:
$n_1 = 8$, $n_2 = 10$, $\bar{x}_1 = 98$, $\bar{x}_2 = 76$ $s_1 = 18$, $s_2 = 15$ Perform a test at 5% level of significance to reject the hypothesis that the difference between two population moan is not more than 15.

(b) The probability that a student Is not a smoker is ¼. Find the probability that out of 5 students selected at random: (i) 4 are smokers. (ii) at least 4 are smokers.

10. (a) A random sample of 30 adults are classified according to sox and the number of hours they watch television during a week:

Time	Male	Female
Over 25 hours	05	09
Under 25 hours	09	07

Using 0.01 level of significance. Test the hypothesis that a Person sex and time watching television are independent

(b) The number of entries made in an accounts receivable is a Poisson random variable with ð 2 or (m = 2) per day what is the probability that on a specific day at least 3 entries will be received?

(c). If size of a sample is 81 and standard error the mean ($\sigma \bar{x} = 4$) what should be the size of the sample if standard error is reduced to 3.6 what is additional measurement.

STATISTICS & MATH 2018

Times: 3 Hours (PRIVATE) Max Marks: 100

Instructions: Attempt TWO questions from each section.

SECTION "A"

1. (a). Find the equation of straight line passing through the point (4,5) and (3,1).

(b). Find vertex & the roots of the equation: y = 4x (2 – x) -1

2. (a). Find the derivative y, w, r. to x of any Two:

i) $y = \sqrt{\frac{x+I}{x-I}}$

ii) $y = \frac{3x-2}{5x+3}$

iii) $y = x^3 - 6x^2 + 9x - 8$

(b). Find the minima and maxima $y = x^3 - 6x^2 + 9x - 8$

3. (a). Find the determinant $\begin{bmatrix} 3 & 2 & 1 \\ 3 & 2 & 4 \\ 4 & 5 & 2 \end{bmatrix}$

(b). Find the value of x, y and z by using Cramer's rule: $2x + y = 5 \quad 3x + 2y = 6$

SECTION "B"

4. (a). Life of 50 batteries are given below in a week:

Life in week	16 – 20	21 -25	26 – 30	31- 35	36 – 40	41 – 45
No. of batteries	04	06	08	14	08	06

(i) Compute the mean and mode

(ii) Comments on the shape of distribution on the basis of computation in (i).

(b). From the giving data 80, 70, 90, 86, 74, 60 verify that H.M < G.M

(c). The mean of the value 3, 8 and 4 is 5 show that $\Sigma (x - \bar{x}) = 0$

5. (a). The score of two batsman A and B in 10 innings are given below:

A	12	15	06	73	07	29
B	47	12	46	48	14	51

Who is more consistent player in term of C.V?

(b). Calculate the mean deviation from median from the following data:
25, 43, 45, 50, 46, 76, 28, 87

(c). Mean and variance of variable x are given 25 and 5 respectively. Find the mean & variance of y where $y = 150 + 2x$.

6. (a). Compute the regression line y on x also estimate the value of y =20

Price	12	15	08	25	22	18
Demand	65	60	50	41	40	56

(b). Calculate Co-efficient of co relation from data given in (Q-6 a)

(c). Calculate the index number using laspeyer's formula.

Commodity	Price		Quantity
	2011	2012	2011
Sugar	50	62	15
Rice	80	120	09
Cotton	60	130	07

SECTION "C"

7. **(a).** How many 3 digits numbers can bo formed from tho digits 6, 2, 4, 9
If (i) each digit to be used only once.
(ii). digits can be repeated

(b). A fair coin is tossed 3 times. What is the probability of
(i) Exactly one Head
(ii) All Heads or All tails

(c). From a group of 3 Statistician 4 Economist and 4 Chemist of Committees of 3 person is to be selected. Find the probability that the selected will base

(i) 2 Economist (ii) at least 2 Economist

8. **(a)**. The number of entries made in an account receivable is a Poisson Random Variable with A=3 per day. What is the probability that on specified day at least 3 entries will be received?

(b). Calculate the expected E(x) and v(x) for the probability distribution is given below:

X	0	1	2	3	4	5	6
P(x)	0.07	0.13	0.20	0.37	0.11	0.09	0.03

9. **(a).** Find 90% confidence interval for the mean of normal distribution If the standard deviation to be 2 and If a sample size 8.Given the values 9, 14, 10, 12,7,13, 11, 12

(b) Draw all samples of size z without replacement from the Population 3, 4, 7, 8, 9 and verify that E (x)= μ

10. **(a)** Given two random samples of size n_1 = 11and n_2 = 14 from the Independent population with x1= 85, x2 = 80, 51 = 6.25, S2 = 4.8 Test at 0.05 level of significance that two population means are equal. Assume the population variance are equal.

(b). for the following data were obtained from 232 respondents

Status	**SEX**	
	Male	**Female**
Unemployed	10	133
Employed	22	67

Test the hypothesis at the level 0.05 that unemployed and sex are independent.

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 7the 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 α is called-----.
v. The population mean is denoted by------.

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

(i). KARIM (ii). UNIVERSITY

(c). A beg 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 ($\bar{x}$) = μ

(c). the probability that a person win a prize is ¾ 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 poission 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 α = 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 $\alpha = 0.05$.

STATISTICS & MATH 2017

Time: 3 Hours (Private) Max. Marks: 100

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 = 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:

"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: $A\ A^{-1} = 1$)

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

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 $\mu_1 = \mu_1$

(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.

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) is 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.

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

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
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) idal index\

(b). following are the runs scored by two players A and B is 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 pf 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 ten 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 = $(\bar{x}) = \frac{\alpha}{n}$

(b). A random sample is draws from a normal population whose variance is 2.5 construct 96% confidence interval for population mean if example 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 teste 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 assed 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 defected 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 distrubtion.

(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

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:

$n_1 = 75$ $n_2 = 75$

$\overline{x_1} = 20$ $\overline{x_1} = 18$

$S_1 = 2.5$ $S_2 = 2.05$

(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 a = 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 a = 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?

STATISTICS & MATH 2015

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}` x A = I $A = \begin{bmatrix} 4 & -2 \\ 5 & 3 \end{bmatrix}$

3. (a). Given, $A = \begin{bmatrix} 5 & 6 \\ 7 & 8 \\ 2 & 3 \end{bmatrix}_{3x2}$ and $B = \begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 5 \end{bmatrix}_{2x3}$ Find A x 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
F	14	26	42	30	8

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 σ_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.

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

Test the hypothesis that population mean is 0.45 against the alternative less than 0.45, use α = 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 ($\bar{x}$) = μ

α / 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	-	-

STATISTICS & MATH 2015

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 $\overline{x_1} = 75$, $\overline{x_2} = 80$, and $S_1 = 6.25$, $S_2 = 4.8$. test the hypothesis $\mu_1 = \mu_2$ against $\mu_1 \neq \mu_2$ at $\alpha = 0.05$.