

# D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1

## ADVANCE BUSINESS STATISTICS

### I -M.COM

1. On the basis of the following information .  
Calculate  $r_{12.3}$ ,  $r_{13.2}$  and  $r_{23.1}$ ,  
 $r_{12}=0.70$ ,  $r_{13} = 0.61$  and  $r_{23}=0.40$ .
2. From the following information calculate Partial correlation Co-efficient.  
 $r_{12.3}$ ,  $r_{13.2}$ , and  $r_{23.1}$   
 $r_{12}=0.80$ ,  $r_{13}= 0.65$ ,  $r_{23}=0.70$
3. From the following information Calculate  
 $r_{12.3}$ ,  $r_{13.2}$  and  $r_{23.1}$ , when  
 $r_{12}=0.70$ ,  $r_{13} = 0.5$ ,  $r_{23}=0.5$
4. From the following information Calculate  
 $r_{12.3}$ ,  $r_{13.2}$  and  $r_{23.1}$ , when  
 $r_{12}=0.80$ ,  $r_{13} = 0.7$ ,  $r_{23}=0.6$ ,
5. From the following information calculate multiple correlation,  
 $R_{1.23}$ ,  $R_{2.13}$  and  $R_{3.12}$   
 $R_{12}=0.98$ ,  $R_{13}=0.44$  and  $R_{23}=0.54$
6. Calculate Multiple correlation  
 $R_{12}=0.9$ ,  $R_{13}=0.75$  and  $R_{23}=0.7$   
 $R_{23}=0.4$ ,  $R_{13}=0.60$  and  $R_{12}=0.7$
7. Calculate partial correlation  
 $r_{23}=0.8$ ,  $r_{13}=-0.5$ ,  $r_{12} = -0.6$
8. Calculate Multiple correlation  
 $R_{12}=0.5$ ,  $R_{13}=0.4$ ,  $R_{23}=0.1$
9. Calculate partial Regression Co-efficient
  - (i)  $B_{12.3}$
  - (ii)  $B_{13.2}$
  - (iii)  $B_{23.1}$ $\sigma_1=2$ ,  $\sigma_2=3$ ,  $\sigma_3=3$ ,  $r_{12}=0.7$ ,  $r_{23}=0.5$  and  $r_{13}=0.5$
10.  $\sigma_1=3$ ,  $\sigma_2=5$ ,  $\sigma_3=5$ ,  $r_{12}=0.6$ ,  $r_{23}=0.8$ ,  $r_{13}=0.8$   
Calculate  $b_{12.3}$ ,  $b_{13.2}$ ,  $b_{23.1}$ .
11. Calculate regression equation of
  - (i)  $X_1$  on  $X_2$  and  $X_3$
  - (ii)  $X_2$  on  $X_1$  and  $X_3$
  - (iii)  $X_3$  on  $X_1$  and  $X_2$ $r_{12}=0.28$ ,  $r_{13}=0.51$ ,  $r_{23}=0.49$ ,  
 $\sigma_1=2.7$ ,  $\sigma_2=2.4$ ,  $\sigma_3=2.7$ ,
12. From the following information calculate the regression equation.

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

13. From the following information Calculate regression equation,

X	50	60	50	60	80	50	80	40	70
Y	30	60	40	50	60	30	70	50	60

14. From the data given below find,

- (i) The 2 Regression equation
- (ii) The Co- efficient of correlation between marks in economics and statistics.
- (iii) The most likely marks in Statistics when the marks in economics are 30.

X Marks in economics	25	28	35	32	31	36	29	38	34	32
Y Marks in Statistics	43	46	49	41	36	32	31	30	33	39

15. The height of fathers and sons are given below, Calculate

- (i) Two Regression equation
- (ii) Correlation Co-efficient
- (iii) Find height of the son, when the height of the father is 70 inches.

<b>FATHER</b>	71	68	66	67	70	71	70	73	72	65	66
<b>SON</b>	69	64	65	63	65	62	65	64	66	59	62

16. A Panel of Judges A and B graded 7 competitors and independently awarded the following Marks.

Mark by A	40	34	28	30	44	38	31
Mark by B	32	39	26	30	38	34	28

- (i) Compute Regression Equation
- (ii) Correlation Co- efficient
- (iii) Find the expected Marks by Judge B

If the score is awarded as 36 Marks by Judge A.

17. Find the Multiple linear Regression Equation of X1 on X2 and X3 from the 3 Variables given below.

X1 = 4	6	7	9	13	15
X2 = 15	12	8	6	4	3
X3 = 30	24	20	14	10	4

Regression Equation of X1, X2, and X3,

18. Calculate Multiple Regression

X1 = 3	5	6	8	12	14
X2 = 16	10	7	4	3	2
X3 = 90	72	54	44	30	12

Regression Equation of X1,X2 and X3.

19. Calculate Karl Pearson correlation Co-efficient for the following data

X Marks in Accountancy	48	35	17	23	47
Y Marks in Accountancy	45	20	40	25	45

20. Calculate Karl Pearson Correlation Co-efficient for the following data

<b>Case</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>
<b>X</b>	10	6	9	10	12	13	11	9
<b>Y</b>	9	4	6	9	11	13	8	4

21. Calculate Spearman Rank correlation Co-efficient for the following data and the Ranking of 10 students in 2 Subjects A and B are as follows.

<b>A</b>	6	5	3	10	2	4	9	7	8	1
<b>B</b>	3	8	4	9	1	6	10	7	5	2

22. Calculate Spearman Co-efficient of correlation between Marks assigned to 10 students by Judges X and Y in a certain competitive test.

<b>Mark by Judge</b>	<b>X</b>	52	53	42	60	45	41	37	38	25	27
<b>Mark by Judge</b>	<b>Y</b>	65	68	43	38	77	48	35	30	25	50

23. Calculate Spearman Rank Correlation co-efficient for the following data.

<b>Price of Tea</b>	75	88	95	70	60	80	81	50
<b>Price of Tea</b>	120	134	150	115	110	140	142	100

### PROBABILITY DISTRIBUTION

#### SECTION-A                  6 MARKS

1. From a bag containing 10 Black Balls and 20 White Balls. A ball is drawn at random, what is the probability that it is Black.
2. One card is drawn from a standard pack of 52 cards. What is the probability that is either a king or Queen.
3. A person is known to hit a Target in 3 out of 4 shots whereas another person is known to hit the Target in 2 out of 3 shorts. Find the probability of Target being hit at all when they both try.
4. What is the Probability of picking a card that was Heart or diamond.
5. What is the Probability of picking a card that was Heart or diamond.
6. The Bag contains 30 balls numbered from 1 to 30. 1 Ball is drawn at random. What is the probability that the No. of Balls drawn will be a multiple of

$$A = 5 \text{ or } 7$$

$$B = 3 \text{ or } 7$$

7. A Man wants to Marry a girl having Qualities White Complexion- The probability of getting such a girl is 1 in 20, Handsome dowry. The probability of getting this is 1 in 50. Westernized manner the probability here is 1 in 100. Find out the probability of his getting married to such a girl when the possession of these 3 Attributes is independent.

8. A problem is Statistics is given to 5 students A, B,C,D,E. The Chances of solving it are  $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}$ . What is the probability that the problem will be solved?

9. A Ball is drawn at random from a Box containing 6 red Ball, 4 white Balls and 5 Blue Balls determine the probability that it is

1. Red,                  2.White, 3.Blue, 4.Not Red, 5.Red or White.

#### 10. **CONDITIONAL PROBABILITY:**

A Bag contains 5 white Balls and 3 Black balls 2 Balls are drawn at random one. After the other without replacement. Find the probability that Both Balls drawn are Black.

11. A Bag contains 6 White, 4 Red and 10 Black Balls. 2 Balls are drawn at random. Find the probability that the both will be black.

12. A Bag contains 8 White and 4 red Balls, 5 Balls are drawn at random. What is the probability that 2 of them are red and 3 White.

13. A Bag contains 10 White and 6 red Balls. 6 Balls are drawn at random. What is the probability that 2 of them are Red and 4 of them are White.

### **SUBJECTIVE PROBABILITY**

#### **SECTION-B                      15 MARKS**

A Bag contains 10 Black balls and 6 white balls 5 balls are drawn Random. Find the probability,

1. All are White
2. 2 White
3. None is White
4. At least 1 White

14. 4 Workers from a group of 20 Applicants consisting of 12 men and 8 women are equally Qualified. Selection is made at Random.

1. Find the probability all are Men.
2. All are Women.
3. At least one Women.
4. Almost two will be Women.

15. When the first proof of 200 pages of an encyclopedia of 500 pages was distribution of printing mistake was found and the table given below;

X	0	1	2	3	4	5
F	113	62	20	3	1	1

16. Suppose on an Average 1 house in 1000 districts as a Fire during a Year. If there are 2000 houses in that district, what is the probability that exactly 5 houses will have a Fire during the Year – Fit a Poisson distribution.

17. 10% of the Tools produced in a Certain Manufacturing process turn out to be defective. Find the probability that in a sample of 10 tools chosen at random, exactly 2 will be defective. Fit a Poisson distribution.

18. The mean of the Poisson distribution is 2.25. Find the other constance of Poisson distribution.

19. The Mean of the poisson distribution is 3.36. Find the other constance of poisson distribution.

**BINOMIAF DISTRIBUTION:**

20. The Following data show the No.of seed germinating out of 10 on dam. Filter for 80 sets of seeds. Fit a Binomial distribution to this data.

21. 5 Coins were tossed 100 times from the following outcomes calculate the expected frequency mean, standard deviation.

X	0	1	2	3	4	5
F	2	10	24	35	18	8

Fit a Binomial distribution.

22.A Coin is tossed 6 Times. What is the probability of obtaining 4 or more heads. Fit a Binomial distribution.

23. 8 Coins are thrown simultaneously. Find chances of Obtaining at least 6 heads, No heads and all heads. Fit a Binomial distribution.

24.Assuming that of the population is Vegetarian so that the chance of an individual being a Vegetarian is  $\frac{1}{2}$  and assuming that 100 investigators. Whether they are vegetarian. How many investigations would you expect to Report that 3 people are less were vegetarian.

**MULTINOMIAF DISTRIBUTION:**

25.A dice is rolled 5 times and the value of

$r$  ;  $r_1 = 1$  ;  $r_2=1$  ;  $r_3=3$ . Find the probability of getting A1 and 3 other numbers.

26.A Community consist of 50% Hindu 30% Muslim and 20 Sikhs. If a sample of 6 individuals selected at random .What is the probability that 2 are Hindu's 3 are Muslims and 1 is Sikh.

**NORMAL DISTRIBUTION SECTION-A 6 MARKS**

1. Find the Area under the Normal curve for Z 1.54.
2. Find the Area to the left of z 1.96.
3. Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches. A assuming the Actual heights of soldiers are 72 inches. Fit a Normal distribution.
4. A Sample of 12 battery cells has the Mean of 10 hours and S.D of 3 hrs. Fit a Normal distribution.
5. The Area under Normal curves with the  $X=B$ , and  $\sigma = 3$ , Find the constants of Normal distribution.

**BAVES THEOREM SECTION-B 15 MARKS**

Assume that the factory has 2 machines past records show that machine 1 produces 30% of the items of output and machine 2 produces 70 % of the items of output. Further 5 % of the items produced by, machine 1 where defective and only 1 % produced by ,achine 2 where defective. If a defective item is drawn at random. What is the probability that the defective item was produced by machine 1 or machine 2. Apply Bayes Theorem.

2. Assume that the factory has 3 machines A,B,C. The past record shows that 25 %, 35% 40%, of the output of each Machines respectively and the estimation of defective goods are 5 % , 4% and 2% respectively. Find out the probability by using Bayes Theorem.

### **SAMPLING METHODS**

Test of Significance of Attributes:

- (i) Test of Number of successes.
- (ii) Test for proportion of successes
- (iii) Test for difference between proportions.

#### **TEST FOR NUMBER OF SUCCESSES**

#### **SECTION-A**

**6 MARKS**

##### **Problem 1 :**

A coin was tossed 400 times and then the head turned at 216 items. Test the Hypothesis that the Coin is Unbiased.

##### **Problem 2:**

In 324 throws of a six faced dice, odd coins appeared 180 times. Would you say that the dice is fair at 5 % level of significance?

##### **Problem 3 :**

In a sample of 500 people from a village in Rajasthan, 280 are found to be rice eaters and the rest wheat eaters? Can be assume that both the food articles are equally popular? Test @ 1 % significant level?

##### **Problem 4 :**

A person throws 10 dice 500 times and obtains 2560 times 4.5 or 6. Can this been attributed to fluctuation of sample Test @ 5% level?

##### **Problem 5:**

In a Hospital, 480 Females, 520 male Babies born in a week. Do these figures conform the hypothesis that the male and female are born in equal Number? Test @ 5% level?

**Test for Proportion of Successes:**

**Problem 1 :**

500 Apples taken up Random from an large Basket and 50 are found to be Bad. Estimate a proportion of Bad Apples in the Basket and Assign limits within which the percentage. Most probably lies.

**Problem 2 :**

The Whole seller in Apple claims that only 4 % of the Apples supplied by him are defective. A Random sample of 600 Apples contained 36 defective Apples. Test the claim of the Whole seller?

**TEST OF DIFFERENCE BETWEEN PROPORTIONS SECTION-B 15 MARKS**

**Problem 1 :**

In a Random Sample of 1000 persons from Town – A, 400 are found to be the consumers of wheat. In a sample of 800 from Town B, 400 are found to be the consumers of wheat. Do there data, Reveal a significance Difference between Town A and Town B, so far as the proportion of wheat consumers is concerned.

**Problem 2 :**

A Simple random sample of 600 men taken from Big city, 400 are found to be smokers. In another simple random sample of 900 men taken from another city 450 are smokers. Do the Data indicate that there is a significant difference in habit of smoking in two cities?.

**Problem 3:**

Before an Increase in exercise duty on tea, 400 people out of the sample of 500 persons were found to be tea drinkers. After an increase in the duty 400 persons were known to be tea drinkers in a sample of 600 people. Do you think that there has been a significant difference in the consumption of tea after the increase in the exercise duty? Test @ 1% significant level?

**Problem 4 :**

A Machine produced 20 defective Articles in a Batch of 400. After modifying it produced 10 defectives in a batch of 300 as the machines improve tested @ 5 % level.



**Test of Significance of Variables :( Large Sample) SECTION-A 6 MARKS**

**Problem 1 :**

Calculate standard error of mean from the following data showing 100 firms in Kolkata for Dhurga Pooja:

Mid Value	:	39	49	59	69	79	89	99
		2	3	11	20	32	25	7

**Problem 2 :**

The Mean height obtained from Random Sample of size – 100 is 64 Inches. The standard deviation of the distribution of height of the population is known to be 3 inches. Test the statement that the mean height of the population is 67 Inches? Test@ 5% level?

**Problem 3 :**

Under the Assumption what could you test the significance of mean?

X	-	10,	20,	30,	40,	50,	60,	70,	80,
Y	-	50,	150,	300,	500,	700,	800,	900,	1000

**Problem 4 :**

The Mean lifetime of a sample of 400 light bulbs produced by a company is found to be 1570, the standard deviation of 150 hrs. To the Hypothesis that the mean life time of the bulbs produced by the company is 1600 hours, against the alternative Hypothesis that it is greater than 1600 hours @ 1% level?

**Two- Tailed test for difference between means of two samples:**

**SECTION-B 15 MARKS**

**Problem 1:**

Intelligence test on two groups of Boys and Girls:-

Gender	Mean	$\sigma$	n
Girls	75	15	150
Boys	70	20	250

Is there is any significant difference between means course obtained by boys and girls.

**Problem 2 :**

A Man buys 50 Electric bulbs of Philips and 50 Electric Bulbs of HMT. He finds that Phillips bulbs gives an average life of 1500 hours with a standard deviation of 60 hours and hmt bulbs gives and average life of 1512 hours with an standard deviation of 80. Is there is any significant difference in the mean life of 2 Bulbs?

**Problem 3 :**

Two samples of 100 Electric Bulbs each has a mean of 1500 and 1550. Standard deviation of 50 and 60. Can it be concluded that two brands differ significantly at 1 % level?

**Problem 4 :**

A simple sample of the height of 6400 Englishmen has a mean of 67.85 Inches, and standard deviation of 2.56 Inches, while a simple sample of heights of 1600 Austrians has a mean of 68.55 inches and standard deviation of 2.52 Inches. Does the Date reveals the difference between the Englishmen?

**Standard Error of difference between 2 standard deviations:****SECTION-A            6 MARKS****Problem 1 :**

In a sample of 1000 the mean is 17.5, standard deviation is 2.5. In another sample of 800, the mean is 18 and standard deviation is 2.7. Assume that samples are independent, Discuss @ 1 % level? Whether the two samples can come which have the same standard deviations.

**Problem 2 :**

The Mean produce of Wheat of a sample of 100 facts 200 lb per acre with a standard deviation of 10 lb.

Another sample of 150 feets give the mean at 220 lb with a standard deviation of mean feed @ 1 lb of the population. Find @ 1 % level if two results are consistent.

**Test of Significance of Small Samples:****SECTION-B 15 MARKS****Problem 1 :**

A Manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months. The Standard deviation of 5 months. A Random sample of 6 such bulbs gives Random sample of 6 such bulbs gives the following values:

Life months - 24, 26, 30 20 20 18

Test @1 % significant level.

**Problem 2 :**

The Lifetime of Electric bulbs for a random sample of 10 from a large commencement gave the following data:

ITEM	1	2	3	4	5	6	7	8	9	10
LIFE IN (1000 hours)	4.2	4.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

Can we accept the hypothesis that the Average life time of Bulbs is 4000 hours.

**Problem 3 :**

A Random sample of size 16 has 53 mean. The sum of the squares of deviation taken from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95 % and 99 % confidence limit of the mean of the population?

**Problem 4:**

Prices of shares of a Company on difference days in the month were found to be 66,65,69,70,69,71,70,63,64,68. Discuss whether the price of the shares to be 65.

**Testing difference between means of two samples (Independent samples)**

**SECTION-A 6 MARKS**

**Problem 1 :**

Two types of Drugs were used on 5 and 7 patients for reducing their weight . Drug A was imported and Drug B is intergenious. The Decrease in the weight after using the Drugs for 6 months.

A	10	12	13	11	14		
B	8	9	12	14	15	10	9

Is there is any Significant difference in the effect of 2 Drugs.

**SECTION-B 15 MARKS**

**Problem 2 :**

2 Laborites A and B carried out Independent estimates of fat content in Ice-cream may buy a firm:

Batch No :	1	2	3	4	5	6	7	8	9	10
Lab A :	7	8	7	3	8	6	9	4	7	8

Lab B : 9 8 8 4 7 7 9 6 6 6

Is there any significant difference between the mean fact content obtained by the 2 laboratories A and B.

**Problem 3 :**

The Mean life of a sample of 10 Electric bulbs was found to be 1456 hours with standard deviation 423 hours a second sample of 17 light bulbs chosen from different batch showed by mean life of 1280 hours. Standard deviation of 398 hours. Is there is any difference?

Testing Differences between means of 2 Samples:

**Problem 1 :**

To verify whether a course in Accounting improved performance, a similar test was given to 12 participants both after and before the course. The Original marks are recorded in Alphabetical order of the participants were 44,40,61,52,32,44,70,41,67,72,53,72. After the course the marks were in the same order 53 38,69,57,56,39,73,48,73,74,60,78. Was the test @ 5% level?

**Problem 2 :**

12 Students were given intensive coaching and 5 tests were conducted in a month the scores of test 1 and 5 are given :-

Students = 1 2 3 4 5 6 7 8 9 10 11 12

Marks in

1 st Test = 50 42 51 26 35 42 60 41 70 55 62 38

Marks in

5 th Test = 62 40 41 35 30 52 68 51 84 63 72 50

Testing the significance of an observed correlation Co-efficient:-

1. A Random sample of 27 pairs of observations from a normal population gives the correlation Co- EFFICIENT OF 0.42. It is likely to the variables in population or Uncorrelated?
2. A Random sample of 11 pairs of observations from an normal population gives a correlation Co- efficient of 0.50. Is that the variables in population are Uncompleted test @ 1%.

**UNIT – IV    Chi – Square Test**  
**SECTION-A            6 MARKS**

1. From the data given below about the treatment of 250. Patients suffering from the Diseases state whether the new Treatment is superior to the conventional Treatment.

<b>Treatment</b>	<b>Favarable</b>	<b>Non-favorable</b>	<b>TOTAL</b>
New	140	30	170
Conventional	60	20	80
<b>Total</b>	<b>200</b>	<b>50</b>	<b>250</b>

Calculate Chi Square Value at 5% significant level V=1 is 3.84.

2. Based on the Information of 1000 randomly .Selected fields gives the status of cultivation of these Fields and uses of fertilizers collected in an Agro economic survey.

<b>CATEFORY</b>	<b>OWN</b>	<b>RENTED</b>	<b>TOTAL</b>
Using Fertilizers	416	184	600
Non using fertilizers	64	336	400
<b>TOTAL</b>	<b>480</b>	<b>520</b>	<b>1000</b>

Would you conclude that Owner cultivates are more Inclined Towards the use of fertilizers at 5 % Significant level. Carry out Square Test as per Testing procedure.

**SECTION-B            15 MARKS**

3. In an Experiment of Immunization of Capital from Tuberculosis the Following Information are obtains.

<b>CATEGORY</b>	<b>AFFECTED</b>	<b>NOT AFFECTED</b>	<b>TOTAL</b>
In Ucolated	12	26	38

Non Incolated	16	6	22
<b>TOTAL</b>	<b>28</b>	<b>32</b>	<b>60</b>

Calculate Chi-Square and Discuss the effect of Vaccine in controlling the Tuberculosis.

4. A certain drug is claimed to be effective In curing the cold the Results are recorded in the Following Table.

<b>CATEGORY</b>	<b>HELPED</b>	<b>HARMED</b>	<b>NO EFFECT</b>	<b>TOTAL</b>
DRUG	150	30	70	250
SUGAR PILLS	130	40	80	250
<b>TOTAL</b>	<b>280</b>	<b>70</b>	<b>150</b>	<b>500</b>

On the Basis of the data can it be concluded that there is a significant differences in the effect of the drug and sugar pill. (table value at 5% significant level is 5.99.

5. 1000 Students at College level are graded. According to their IQ and their Economics conditions use Chi- Square test to find out. Whether there is Any Association between Economics condition and level of IQ.

<b>ECONOMIC CONDITION</b>	<b>HIGH</b>	<b>MEDIUM</b>	<b>LOW</b>	<b>TOTAL</b>
Under Economic Condition	160	300	140	600
Poor	140	100	160	400
<b>TOTAL</b>	<b>300</b>	<b>400</b>	<b>300</b>	<b>1000</b>

V=2 @ 5% level of significance is 5.99.

6. In a survey of 200 Boys of which 75 where Intelligent, 40 had skilled Fathers while 85 of the Unintelligent boys had unskilled for father do these figures support the Hypothesis that skilled for this have Intelligent boys? Use Chi-Square Test value for Chi-Square 1% of Freedom at 5 % significant level is 3.84.

<b>CATEGORY</b>	<b>SKILLED</b>	<b>UNSKILLED</b>	<b>TOTAL</b>
Intelligent Boys	40	35	75

Unintelligent Boys	40	85	125
<b>TOTAL</b>	<b>80</b>	<b>120</b>	<b>200</b>

7. The following Result were obtained when 2 set of items were subjected to 2 different Treatment (Z Andy) to Enhance the medical strength.

Treatment X was applied on 400 items and 80 were found to have gained in strength this treatment of superior to treatment X. Apply Chi-Square Test.

**SECTION-A          6 MARKS**

8. 200 Digits selected at Random from set of table the Frequencies of the Digits are as follows.

**DIGITS**

	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use Chi-Square test to assess the correctness of the Hypothesis that the Digits were distributed in equal numbers in the tables from which they were chosen. Table value @ 5% significant level  $V = 9$  IS 16.92.

9. The demand for a particular spare parts in a factory was found to be varied from day to day operation. In a sample study the following information were obtained.

<b>DAYS</b>	<b>MONDAY</b>	<b>TUESDAY</b>	<b>WEDNESDAY</b>	<b>THURSDAY</b>
No.of Parts	1124	1125	1110	1120
Demanded	Friday	Saturday		
<b>TOTAL</b>	<b>1126</b>	<b>1115</b>		

Test the Hypothesis that the No.of parts demanded does not depend on the day of the week the table value of Chi-Square for 5% significant level 11.07.

**SECTION-B****15 MARKS**

10. A Personal Manager is Interested in trying to determine whether absenteeism is greater on 1 day of the week than on another. The Records for past year show the sample distribution.

<b>DAYS</b>	<b>MON</b>	<b>TUE</b>	<b>WED</b>	<b>THURS</b>	<b>FRI</b>
No.of Absentism	66	57	54	48	75

Test whether the absence is uniform distributed over the week Chi-Square Test at 5% level is 9.49.

11. The Number of Scooters Accidents per month in certain town was as follows.

12    8    20    2    14    10    15    6    9    4

Use Chi-Square test to determine with these frequencies are In arranges with the belief that Accident condition where the same during 10 months period Test at 5 % level  $V = 9$  is 16.9.

12. A Sample analysis of examination result of 500 students were made. It was found that 220 students had failed, 170 had secured 3<sup>rd</sup> class 90 students were placed in 2<sup>nd</sup> Class and 20 students got 1<sup>st</sup> class. Are these figures commensurate with the general examination result which is the Ratio of 4:3:2:1 for the various categories Respectively.

(Table value of Ch-Square @5% significant level is 7.81)

13. In an Experiment of Vegetable cultivation obtained the following frequencies of seeds, 315 round and yellow 101 Blue and Yellow 108 round and green 32 Blue and green. According to this theory of cultivation the numbers should be in proportion 9:3:3:1, Is there any evidence use Chi-Square Test.
14. A Sample of 300 Students of undergraduate and 300 students of post graduate classes of a University where asked to given there opinion towards the Autonomous colleges. 190 of the undergraduate and 210 of the post graduate students favoured the Autonomous status.

Use Chi-Square analysis that opinions of under graduate and post graduate students on Autonomous status of Colleges are significant.

	<b>Favoured</b>	<b>Not favoured</b>	<b>Total</b>
Under graduate students	190	110	300



Post graduate students	210	90	300
<b>TOTAL</b>	<b>400</b>	<b>200</b>	<b>600</b>

15. The figures given below are

1. The Theoretical frequency of a distribution
2. The Frequency of the Normal Distribution having the same mean, Standard deviation and the total frequency.

A = 1 5 20 28 42 22 15 5 2

B = 1 6 18 25 40 25 18 6 1

Apply the Chi-Square test of Goodness of fit.

16. The following table shows the numbers of people interviewed by age group and the number in each age group estimated to have peptic ulcer.

<b>AGE GROUP</b>	<b>20-25</b>	<b>25-30</b>	<b>30-35</b>	<b>35-40</b>
No Interview	50	100	200	350
PU Cases	5	12	25	28
Age Group	40-45	45-50	50-55	55-60
No. of Interview	400	250	150	100
PU Card	40	27	12	11

The data reveal in Association Between age groups and Peptic User.

**YATES CORRECTION**  
**SECTION-A 6 MARKS**

1. A Survey among women was conducted to study the family life the observation are as follows.

<b>CATEGORY</b>	<b>HAPPY</b>	<b>NOT HAPPY</b>	<b>TOTAL</b>
Educated	10	30	100
Not Educated	60	40	100
<b>TOTAL</b>	130	70	200

Test whether there is any association between family life and education by using Yates correction.

- 100 Families were selected at random in a city to test the belief that High Income families usually send their Children to Public school and low Income families often send their Children to Government Schools.

The following Results were obtained

<b>INCOME</b>	<b>PUBLIC</b>	<b>GOVERNMENT</b>	<b>TOTAL</b>
LOW	37	43	80
HIGH	13	07	20
<b>TOTAL</b>	<b>50</b>	<b>50</b>	<b>100</b>

Test whether Income and type of Schooling are Independent apply Yates Corrections.

**SECTION-B                      15 MARKS**

- 1.

<b>PARTICULAR</b>	<b>MALE</b>	<b>FEMALE</b>	<b>TOTAL</b>
Skilled	40	10	50
UnSkilled	20	30	50
<b>TOTAL</b>	<b>60</b>	<b>40</b>	<b>100</b>

Test whether the Nature of work is Independent to the category of the workers. Apply Yates corrected Chi-Square test.

- From the Adult male populations of 7 large cities Random samples of married and unmarried men as given below were taken and it can be said that there is a significant variation among the people there is a significant variation among the people of different cities in the tendency to Marry.

<b>CITY</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>TOTAL</b>
Married	170	285	165	106	153	125	146	1150
Un Married	40	125	35	37	55	35	33	360
<b>TOTAL</b>	<b>210</b>	<b>410</b>	<b>200</b>	<b>143</b>	<b>208</b>	<b>160</b>	<b>179</b>	<b>1510</b>

$V = 6 @ 5 \% \text{ significant level} = 12.59$

### Chi-Square for Specified Value Population Variation.

#### SECTION-A

6 MARKS

1. A Random sample of size 25 from the population use the sample standard deviation to be 8.5 test the Hypothesis is that the population standard deviation is 10 @ 5% Significant level is 36.415.
2. A Random sample size is 10 from the population gives the sample standard deviation to the 280. Test the Hypothesis that the population standard deviation is 20.

#### Binomial distribution

1. 4 Coins where tossed 160 times and the following Result where obtained.

No.of Heads	01234
Observed Frequency	17 52 54 31 6

Under the Assumption that the coins are Biased, find the expected frequency of getting 0,1,2,3 and 4 Heads and also test the goodness of fit. Fit a Binomial Distribution.

2. A Set of 5 coins are lossed 3200 times and the No. of Heads appeared in each time was noted and the result are given below,

No.of Heads	0	1	2	3	4	5
Observed frequency	80	570	1100	900	500	50

#### Test the Hypothesis that the coins are Biased

#### SECTION-B

15 MARKS

3. A Survey of 800 Families with 4 Children each Revealed the following Distribution.

No.of Boys :	0	1	2	3	4
No.Of Girls :	4	3	2	1	0
No.of Families :	32	178	290	236	64

Is this result consistence with the Hypothesis that the male and female Birth are equally probable. Fit a Binomial Distribution.

4. The table below summaries the Result obtained in a study conducted by the research organization for Analysis the performance of 4 Brands of Toothpaste.

BRAND					
CATEGORY	A	B	C	D	TOTAL
No.of Cavities	9	13	17	11	50
1-5 Cavities	63	70	85	82	300
More than 5 Cavities	28	37	48	37	150
<b>TOTAL</b>	<b>100</b>	<b>120</b>	<b>150</b>	<b>130</b>	<b>500</b>

Test the Hypothesis that Incidence of Cavities is Independent of the Brand of Toothpaste use . Apply Chi- Square test AT 5 Significant level 12.59.

### POISSON DISTRIBUTION

#### SECTION-A 6 MARKS

1. A Book has 700 pages the No. of pages with various No.of Mis prints are recorded below at 5% significant level or the misprints. Distributed according to position law.

No.of Misprint (x)	0	1	2	3	4	5
No. of pages With misprints (F)	616	70	10	2	1	1

Apply poisson law and test the Goodness of fit.

2. The No.of Defects per unit in a sample of 330 units of a manufacture product was found as follows,

No.of defects	0	1	2	3	4
No.of Units	214	92	20	3	1

Fit a poisson distribution to the data and test the Goodness of fit.

3. The following mistakes per page are observed in a Book.

No.of Mistakes per page	0	1	2	3	4
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No.of times the mistakes occurred
211 90 19 05 0

Fit a Poisson distribution to the data and test the Goodness of fit.

**SECTION-B 15 MARKS**

4. The following table gives the No. of days in a 50 day period during which an automobile accident accrued in a certain part of a city. Fit a poisson distribution to the data.

No.of Accidente	0	1	2	3	4
No. of days	19	18	08	04	1

**UNIT -V**

**F- DISTRIBUTION OR F TEST OR VARIABLE**

**TEST RATIO**

**SECTION - A**

1. Two Random samples where drawn from the 2 normal population on they variable or

A	66	67	75	76	82	84	88	90	92	95
B	64	66	74	78	82	85	86	92	93	97

Test wheater the two population having the same variances at 5 % @ significant level. The table value is 3.36 (F).

2. A Samples are drawn from to population and test wheater the 2 samples having the same variances @ 5 % significant level the F Value for V1 =9, and V2=7 is 3.6767

**Samples**

I	60	65	71	74	76	82	85	87		
II	61	66	67	85	78	63	85	86	88	91

3. The following data present the yield production of common ten sub-deviation of equal area of 2 agricultural plots.

Plot I	6.2	5.7	6.5	6.0	6.3	5.8	5.7	6.0	6.0	5.8
Plot II	5.6	5.9	5.6	5.7	5.8	5.7	6.0	5.5	5.7	5.5

Test whether 2 samples have taken to random population have the same variance @5% significant level of F.

4. In a sample 8 observation, the sum of squared deviation of items from the mean was 84.4 in another sample of 10 observation the value of deviation was found to be 102.6. Test whether the difference between is significant @5 % significant level with the critical value F.
5. In a Laboratory experiment, 2 random sample gave the following data

Sample	Size	Sample Mean	Sum of Square deviation mean
1	10	15	90
2	12	14	108

Test the equality of variance @ 5% significant level with the critical value of F.

### SECTION- B

1. 2 assets the significant of possible variation in a certain test between the village, School. A common test was given two a number of students takes random from the senior 5 th class of each of the 4 school concerned the result are given below makes an analysis sources of variance of data.

A	B	C	D
8	12	18	13
10	11	12	9
12	9	16	12
8	14	6	16
7	4	8	15

2. For the following table gives the Yields on 15 remarkable plats under three variety at needs.

A	B	C
20	18	25
21	20	28
23	17	22

16	15	28
20	25	32

We have to find out the average Yield to land under different Variance Yield to land under different variance should significant difference.

- The Company wishes to test wheater its 3 Sales Man A,B,C Tenth Made to sales of the same size or wheather in the different there by the selling ability us the Measures the Sales. During the last week there have been 14 sales calls A made 5 calls B made 4 calls C Made 5 calls following of the weekly sales records of the 3 sales man.

<b>A</b>	<b>B</b>	<b>C</b>
300	600	700
400	300	300
300	300	400
500	400	600
00	-	500

Performances anova by using coding data.

- The benefits of coding can be the approached better if we have big figures the figure are as follows.

SAMPLE I	740	742	848	660	762
SAMPLE II	745	650	758	664	754
SAMPLE III	785	579	652	720	738

Perform annova by using coding data.

- The Manufacturing Company as purchases 3 new Machines of different categories and wishes to determine whether one of them is faster than the others in producing in certain output the observation are given below.

<b>Observation</b>	<b>Machine I</b>	<b>Machine II</b>	<b>Machine III</b>
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1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

Use anova and determined wheather the Machine are significantly different in means speed.

6. 3 Samples each of size pices were known from 3 un corrected normal populations with equal variance test the Hypothesis that the population means are equal @5% level.

<b>SAMPLE I</b>	<b>SAMPLE II</b>	<b>SAMPLE III</b>
10	9	14
12	7	11
9	12	15
16	11	14
13	11	16

Performance anova.

7. A T Company appoints 4 sales man A,B,C D and observe they sales in 3 seasons summer winter and monsoon.

**SALESMAN**

<b>SEASONS</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>TOTAL</b>
SUMMAR	38	40	41	39	158
WINTER	45	42	49	36	172
MONSOON	40	38	42	42	162
TOTAL	123	120	132	117	492



1. Due the Salesman significantly difference in performance.
2. Is they are significant difference between the senses.

(Use coding method subtractions HO from the given number) perform anova.

8. The following table gives the number of frigter sold by 4 salesmen in 3 month May, June **and July**.

**SALES MAN**

<b>MONTHS</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>TOTAL</b>
MAY	50	40	48	39	177
JUNE	46	48	50	45	189
JULY	39	44	40	39	162
<b>TOTAL</b>	<b>135</b>	<b>132</b>	<b>138</b>	<b>123</b>	<b>528</b>

1. Is the any significant difference in the sales made by a 4 sales man.
2. Is there any significant difference in the sales made during different months.
3. Use coded data performance anova (40).
9. Perform two way anova on the data given below.

**TREATMENT**

<b>PLOTS OF LAND</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>TOTAL</b>
I	36	36	21	35	
II	28	29	31	32	
III	26	28	29	29	

Use coded data perform anova.

10. To study the performance of 3 different and 3 different water temperature the following clean readings were obtained with specially designed apparatus.

**DETERGENT**

<b>WATER TEMPERATURE</b>	<b>A</b>	<b>B</b>	<b>C</b>
Cold Water	57	55	67
Warm Water	49	52	68
Hot Water	54	46	58

Perform anova at 5% level.

11. The following table given Monthly sales of a certain firm in 3 states by a 4 sales man.

**SALES MAN**

<b>STATES</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
A	6	5	3	8
B	8	9	6	5
C	10	7	8	7

- Set up analysis of variance table and test whether there is significant difference between sales by the firm salesmen.
- Between the sales and in the 3 states.

12. Below are given the Yield per acre of wheat for six plots entering a crop competition, three of the plots being sown with wheat of variety A and three with Variety B.

<b>Yields in Fields per acre</b>			
<b>Variety</b>	<b>1</b>	<b>2</b>	<b>3</b>
A	30	32	22
B	20	18	16

Set up a table of anova state wheater the difference between the yields of two varities are significant. (Table value of F @ 5 % level for 1 and 4 d.f.is 7.71)

13.Perform Anova @ 5% significant level,

<b>A</b>	<b>B</b>	<b>C</b>
4	4	6
5	3	5
3	5	7
7	4	6
6	4	7

14.The following tables give the number of units of production per day turned out by four different type of machine.

EMPLOYEE	TYPES OF MACHINE			
	M1	M2	M3	M4
E1	40	36	45	30
E2	38	42	50	41
E3	36	30	48	35
E4	46	47	52	44

Apply coded data and perform Anova at 5% level.

- (i) Test the hypothesis that the mean production is the same for the four machine.
- (ii) Test the hypothesis that the employees do not differ with respect to mean productivity.