

MATHEMATICAL STATISTICS-II

K1 Level Questions

MULTIPLE CHOICE QUESTIONS:-

UNIT- 1

1. Which of the following statements is not correct concerning the probability distribution of a continuous random variable

- A) The vertical coordinate is the probability density function
- B) The range of the area random variable is found on the x-axis
- C) The area under the curve between points a and b represents the probability that $X=a$**
- D) The total area represented under the curve will equal to 1

2. Which of the following is not a characteristic of the normal distribution?

- A) Its is a symmetrical distribution
- B) The mean is always zero**
- C) The mean median and mode are equal
- D) Its a bell-shaped distribution

3. Which of the following do the normal distribution and the exponential density function have in common?

- A) Both are bell shaped and symmetrical distributions
- B) Both approach infinity as x approaches infinity
- C) Both approach zero as x approaches infinity**
- D) All of the above

4. Which distribution is suitable to model length of time exponential?

- A) Normal
- B) Poisson**
- C) Binomial

D) None of these

5. Which is true regarding normal distribution?

A) Its is symmetrical ,bell-shaped

B) Mean ,median, mode are located at same location

C) It is asymptotic in that each end approaches the horizontal axis but never reaches it

D) all the above

6. The mean of the exponential distribution equals to mean of the poisson distribution only when mean equal to

a.1.0

b.0.5

c.0.25

d.2.0

7. A type I error occurs when

A) Reject a false null hypothesis

B) Reject a true null hypothesis

C) Accept a false null hypothesis

D) Accept a true null hypothesis

8. A type II error occurs when

A) Do not reject a false null hypothesis

B) Do not reject a true null hypothesis

C) Reject a false null hypothesis

D) None of the above

9. In a one-tail test for the population mean, if null hypothesis is NOT rejected when alternative hypothesis is true

A) Type I error is committed

B) Type II error is committed

C) Two-tail test should be used

D) All the above

10. If a hypothesis is rejected at the level of 0.025 level of significance ,it:

- A) Must be rejected at any level
- B) Must be rejected at the 0.01 level
- C) May or may not be rejected at the 0.01 level**
- D) Must not be rejected at any level

UNIT- 2

1. Since the population size is always greater than the sample size ,then the sample statistic

- A) can never be equal to population parameter
- B) Can never be zero
- C) Can never be smaller than population parameter
- D) None of the above**

2. Non sampling error is reduced by

- A) Increasing sample size
- B) Reducing amount of data
- C) Decreasing sample size**
- D) None of these

3. Any numerical value calculated from sample data is

- A) Statistic
- B) Bias
- C) Mean**
- D) Standard deviation

4. Sample is a subset of

- A) Data
- B) Group
- C) Population**
- D) Distribution

5. Non probability form of sampling is

- A) Random sampling
- B) Non random sampling
- C) Probability sampling

D) Quota sampling

6) Sampling in which unit can be repeated more than once is called

- A) Sampling without replacement
- B) Simple sampling

C) Sampling with replacement

D) One of the above

7. The degree of the Co-relation between a set of independent variables X and a dependent variable Y is measured by

- A) Coefficient of correlation
- B) Coefficient of determination
- C) Standard error of estimate

D) All the above

8. The percent of total variation of the dependent variable Y explained by the set of independent variables X is measured by

- A) Coefficient of correlation
- B) Coefficient of skewness

C) Coefficient of determination

D) Standard error or estimate

9. A coefficient of correlation is computed to be -0.95 means that

- A) The relationship between two variable is weak
- B) The relationship between two variables is strong and positive

C) The relationship between two variables is strong and but negative

D) Correlation coefficient cannot have this value

10. Let the coefficient of determination computed to be 0.39 in a problem involving one independent variable and one dependent variable. This result means that

A) The correlation coefficient is 0.39also

B) 39% of the total variation is explained by the independent variable

C) 39% of the total variation is explained by the dependent variable

D) The relationship between two variable is negative

UNIT- 3

1. When data are collected in a statistical study for only a portion or subset of all elements of interest we are using:

- A) **Sample**
- B) Parameter
- C) Population
- D) Both A and B

2. In statistics, a sample means

- A) A portion of the sample
- B) A portion of the population
- C) **all the items under investigation**
- D) none of the above

3. The height of a student is 60 inches. This is an example of _____

- A) **Qualitative data**
- B) Categorical data
- C) Continuous data
- D) Discrete data

4. You asked five of your classmates about their height. On the basis of this information, you stated that the average height of all students in your university or college is 67 inches. This is an example of:

- A) Descriptive statistics
- B) **Inferential Statistics**
- C) Parameter
- D) Population

5. In statistics, conducting a survey means

- A) **Collecting information from elements**
- B) Making mathematical calculations
- C) Drawing graphs and pictures
- D) None of the above

6. To test the significance of the difference between two sample means .

- A) **t – distribution**

B) Chi – square distribution

C) F – test

D) none of the above

7. In statistics, a population consists of:

A) All People living in a country

B) All People living in the are under study

C) All subjects or objects whose characteristics are being studied

D) None of the above

8. In the textile industry a manufacture is interested in the no of flaws occurring in each 100 feet of materials. The probability distribution that has the greatest chance of applying to this situation is the

A) Normal Distribution

B) Binomial Distribution

C) Poisson Distribution

D) Uniform Distribution

9. The level of significance is the

A) Maximum Allowable Probability of type 2 error

B) Maximum Allowable Probability of type 1 error

C) Same as confidence coefficient

D) Same as the p value

10. An important application of the chi-square distribution is

A) Making inferences about a single population variance

B) Testing for goodness of fit

C) Testing for the independence of two variable

D) All of these

UNIT- 4

1. If a hypothesis is rejected at the 5% level of significance, it

A) Will always be rejected at the 1% level

B) Will always be accepted at the 1% level

C) Will never be tested

D) May be rejected or not rejected

2. Whenever using the t – distribution in estimation we must assume that

A) The sample size is atleast 30

B) The Sampling distribution is Appx. Normal

C) The population is appx. Normal

D) The finite population correction factor is necessary

3. The mean of the distribution is 14 and the S.D is 5. What is the value of the coefficient of a variation

A) 60.4%

B) 48.3%

C) 35.7%

D) 27.8%

4. The sum of the deviations about the mean is always :

A) The range

B) Total standard deviation

C) Positive or negative

D) Zero

5. A parameter is a measure which is computed from

A) Population data

B) Sample data

C) Test statistic

D) None of these

6) A chance variation in an observational process is

A) Dispersion\Variability

B) Measurement error

C) Random error

D) Instrument error

7) The first moment about mean is

A) Zero

B) One

C) Negative

D) None of these

8) The second moment about mean is

A) Standard deviation

B) Variance

C) Coefficient of variation

D) All the above

9) If the third moment about the mean is zero then distribution is

A) Mesokurtic

B) Positively skewed

C) Symmetrical

D) Negatively skewed

10) The coefficient of skewness is always zero for

A) Symmetrical

B) Skewed

C) Unsymmetrical

D) None of these

UNIT- 5

1) In uni-modal distribution, if mode is less than mean

A) Symmetrical

B) Normal

C) Positively skewed

D) Negatively skewed

2) Statistic is a numerical quantity , which is calculated from

A) Population

B) Sample

C) Data

D) Observation

3) The algebraic sum of deviations from mean is

A) Maximum

B) Zero

C) Minimum

D) Undefined

4) χ^2 – test is an approximate test for _____ values of n.

A) large

B) small

C) similar

D) none of these

5) A very powerful test for testing the significance of of the discrepancy between theory and experiment is known as _____ of goodness of fit.

A) t – test

B) F – test

C) Chi – square test

D) none of the above

6) A classification in which attributes are divided into more than two classes is known as _____ classification.

A) Chi – square

B) Manifold

C) Karl pearson's

D) contingency

7) The number of independent variates which make up the statistic is known as the _____.

A) degrees of freedom

B) Chi – square distribution

C) null hypothesis

D) alternative hypothesis

8) Two events A and B are said to be mutually exclusive if

A) $P(A|B) = 1$

B) $P(B|A) = 1$

C) $P(A \text{ and } B) = 1$

D) $P(A \text{ and } B) = 0$

9) Two events A and B are said to be independent if

A) $P(A \text{ and } B) = P(A) \cdot P(B)$

B) $P(A \text{ and } B) = P(A) + P(B)$

C) $P(A|B) = P(B)$

D) $P(B|A) = P(A)$

10) Chebyshev's inequality states that the probability of a 'six sigma' event is less than

A) 10%

B) 20%

C) 30%

D) 3%

MATHEMATICAL STATISTICS-II

K2-level Questions

UNIT I

1. Define two dimensional random variable.

Ans : Let X and Y be two random variables defined on the same sample space s, then the function (X,Y) that assigns a point in $R^2=(R*R)$ is called a two dimensional random variable.

2. What is joint probability mass function?

Ans : If (X,Y) is a two dimensional discrete random variable, then the joint discrete function of X,Y also called the joint probability mass function of X,Y

$$P_{xy}(x_i, y_j) = P(X=x_i, Y=y_j)$$

3. What is marginal probability function?

Ans : Random variable which takes countable number of values (x_i, y_j) is called marginal probability mass function.

4. Define conditional probability function.

$$\text{Ans : } P_{X/Y}(x, y) = P[X=x, Y=y]/P[Y=y]$$

5. What is two dimensional distribution function?

$$\text{Ans : } F_{XY}(X, Y) = P[X \leq x, Y \leq y]$$

6. Define marginal distribution function.

Ans : $F_X(x)$ is termed as the marginal distribution of x corresponding to joint distribution is called marginal distribution function.

7. Define moments of bivariate probability distribution.

Ans : In particular , the r^{th} and s^{th} product moment about origin of the random variables x and y respectively.

8. State $E(X) = E\{E(X/Y)\}$

Ans : The expected value of X is equal to the expectation of the expectation of X given Y.

9. State variance theorem.

Ans : The variance of X can be regarded as consisting of two parts ,the expectation of the conditional variance and the variance of the conditional expectation.

10. Define conditional expectation.

Ans : $E\{g(x,y)/Y=y_j\} = \sum_{i=1}^{\infty} g(x_i) P(X=x_i/Y=y_j)$

UNIT II

1. Define correlation.

Ans : If the change in one variable effects a change in other variable are said to be correlated.

2. What is meant by positive correlation?

Ans : Two variables deviation in "same direction" is called positive or direct correlations.

3. what is meant by diverse correlation?

Ans : Two variables divert in "opposite direction" is said to be negative or diverse correlation.

4. Define perfect correlation.

Ans : The deviation in one variable is followed by a corresponding and proportional deviations in other.

5. What is coefficient of correlation?

Ans : $r(X,Y) = \text{Cov}(x,y)/\sigma_x\sigma_y$

6. Define probable error.

Ans : P.E (r) = 0.6745*S.E = 0.6745 (1 - r²)/√n

7. What is meant by rank correlation?

Ans : $p = 6\sum^n d_i^2/n(n^2 - 1)$

8. Define regression.

Ans : Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of the original units of data.

9. Define curvilinear.

Ans : Curve of regression is called curvilinear.

10. What is the angle between two lines of regression?

Ans : $\tan\theta = \{1 - r^2/|r|\} (\frac{\sigma_{x\sigma_y}}{\sigma_x\sigma_y})$

UNIT III

1. Define parameter and statistic.

Ans : population observation is called parameter and sample observation is called statistic.

2. What is unbiased estimate?

Ans : parameter = E(statistic)

3. sampling distribution of a statistic

Ans : ${}^N C_n = \frac{N!}{n!(N-n)!}$

4. What is standard error?

Ans : The standard deviation of the sampling distribution of a statistic is known as standard error.

5. What is utility of standard error?

Ans : $Z = \frac{t - E(t)}{S.E(t)}$

6. What is null hypothesis and alternative hypothesis?

Ans: A hypothesis which is usually a hypothesis of no difference is called H_0 . There is a statistically significant relationship between two variables is called H_1

7. Define error in sampling.

Ans: α and β are called the producer's risk and consumer's risk.

8. What is critical region?

ANS: Rejection of null hypothesis

9. what is level of significance?

Ans: When t belongs to the critical region it's said to be level of significance.

10. What are the types of tail test?

Ans; one tailed test and two tailed test.

UNIT IV

1. Define chi-square

Ans: The square of a standard normal variate with 1 degree of freedom is called chi-square.

2. What is the m.g.f of chi.

Ans: $(1 - 2t)^{-n/2}, |2t| < 1$

3. Application of chi square

Ans: Test the goodness of fit, To test the independent of attributes.

4. What is population variance/

Ans: σ^2

5. If sample is large then, then fishers approximation is

Ans: $Z = \frac{\chi^2 - n}{\sqrt{2n}} \sim N(0, 1)$

6. Define goodness of fit

Ans: The discrepancy between theory and experiment is called goodness of fit

7. What is f_i and e_i ?

Ans; f_i refers to observed frequency, e_i refers to expected frequency

8. Equation of goodness of fit

Ans: $\chi^2 = \sum_{i=1}^n \frac{(f_i - e_i)^2}{e_i}$

9. Decision rule

Ans: χ^2 is the calculated value and $\chi^2_{(n-1)}$ is the tabulated value

10. To combine which estimates of the population variance

Ans: Homogeneity independent estimates.

UNIT V

1. The entire large sample theory was based on

Ans: Normal test

2. What is t distribution single mean?

Ans: $t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$

3. What is the correlation coefficient of t distribution

Ans: $r = \frac{t}{\sqrt{t^2 + n - 2}}$

4. What is f distribution?

Ans: $F = \frac{S_X^2/S_Y^2}{\sigma_X^2/\sigma_Y^2}$

5. Application of f distribution

Ans: To test the significance of observed partial correlation coefficient, Difference between two samples mean

6. What assumption is being made when t-distribution to perform a hypothesis test?

Underlying population follows an approximately Normal distribution

7. What is the mean of a sample ?

Computed by summing all the data values and dividing the sum by the number of items.

8. What test statistic is used for a global test of significance?

F test

9. What is **Unbiased Sampling**?

A property of a point estimator that occurs whenever large sample sizes tends to provide point estimates closer to the population parameter is known as **Unbiased Sampling**

10) What is the Null hypothesis?

$H_0 - P1 = P2$

MATHEMATICAL STATISTICS-II

K3 LEVEL QUESTIONS

UNIT- 1

- 1) Find the limits for correlation coefficient
- 2) Prove that correlation coefficient is independent of change of origin and scale
- 3) Prove that two independent variables are uncorrelated
- 4) Calculate the correlation coefficient of following heights (in inches) of father x and mother y

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

- 5) Show that if x', y' are deviations of the random variable x & y from their respective mean, then
- 6) The variables x & y are connected by the equation $ax+by+c=0$, show that the correlation between them is -1 if signs of a & b are alike and ± 1 if they are different.
- 7) If x and y are two random variables with variances σ_x^2 and σ_y^2 respectively r is the correlation coefficient between them. If $u=x+ky$, $V=v+(\sigma_x/\sigma_y)$. find the value of k , so that u & v are uncorrelated.
- 8) The joint probability distribution of x, y is given below

y	x	-1	1
0		1/8	3/8
1		2/8	2/8

Find the correlation coefficient between x & y

- 9) If x and y are standardized random variable and $r(ax+by, bx+ay) = 1 + 2ab/a^2 + b^2$. find $r(x, y)$ the coefficient of correlation between x and y .
- 10) if x and y are random variables and a, b, c, d are any numbers providing only that $a \neq 0$ and $c \neq 0$ then prove that $v(ax+b, cy+d) = ac/|ac| \cdot r(x, y)$

UNIT- 2

11) Find the Limits for correlation co- efficient?

12) Correlation co efficient is independent of change of origin and scale;

13) If X and Y are random variable and a, b, c, d are any numbers provided only that $a \neq 0$, $b \neq 0$, $c \neq 0$ then $r(ax+b, cy+d) = \frac{c}{d}r(x, y)$

14) Calculate the correlation co efficient of following height (inch) of father X and mother Y

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

15) The variables X and Y are connected by the equation $ax+by+c=0$. Show that the correlation between them is -1 if signs of a and b are alike and +1 if they are different.

16) If $z= ax+by$ and r is the correlation co efficient between X and Y show that

$$(1) \sigma_z = a \sigma_x + b \sigma_y + 2abr \sigma_x \sigma_y$$

(2) show that the correlation co efficient r between two random variables X and Y is given by $r = \frac{\sigma_{X-Y}}{\sigma_X + \sigma_Y}$ where σ_X and σ_Y and σ_{X-Y} are the standard deviations of X, Y and X-Y respectively

17) The joint probability distribution of x and y is given below

Y	X	-1	+1
0		1/8	3/8
1		2/8	2/8

Find the correlation co efficient between X and Y

18) The ranks of same 16 students in mathematics and physics are as follows. Two numbers within brackets denote the ranks of the students in mathematics and physics:

(1,1) (2,10) (3,3) (4,4) (5,5) (6,7) (7,2) (8,6) (9,8) (10,11) (11,15) (12,9) (13,14) (14,12) (15,16) (16,13).

Calculate the rank correlation co efficient for proficiencies of this group in mathematics and physics.

19) Obtain the rank correlation co efficient for the following data

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

20) Find the angle between two lines of regression.

UNIT- 3

21) Write down the procedure for testing of hypothesis .

22) Define one-tailed test with diagram.

23) Define two – tailed test.

24) Write about sampling of attributes.

25) Derive the test of significance of single proportion.

26) The means of two single large samples of 1000 and 2000 members are 67.5inches and 68.0inches.Can the samples be regarded as drawn from same population of S.D 2.5 inches? .(test at 5% level of significance)

27) Random samples of 400men and 600 women are asked whether they would like to have a flyover near their residence .200 men and 325 women were in favour of proposal. Test the hypothesis that proportions of men and women in favour of proportions are same against that they are not ,at 5 % level.

28) Work sampling studies are conducted to find the utilisation of a machine out of 200 observations made ,only 40 observations indicated the machine to be idle .Find the number of observation to be made in order to satisfy 95% confidence to state the utilization of machine with expected accuracy of 5%

29) Define the critical values or significant values.

30) Write about null and alternative hypothesis.

UNIT- 4

31. Test the hypothesis that $\sigma=10$, go that $S= 15$ for a random sample of size 50 from a normal population.

32. Explain the MGF of chi-square distribution.

33. Explain the inference about a population variance.

34. A sample analysis of examination results of 200 MBAs was made. It is found that 46 students had failed.68 secured third divisions, 62 secured second division and the rest secured

first division. Are these commensurate with the general examinations result which in the ratio 4:3:2:1 for various categories respectively?

35. Two sample poles of vote two candidates A and B for a public office are taken. One from rural areas. The result are given in the adjoining table. Examine the nature of area relating to voting preference in the election.

Area	Votes for A	Votes for B	Total
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

36. The following figures show the distribution of digits in numbers chosen at random from a telephone directory. Test whether the digits may be as occur equally frequently in the directory.

Digits	1	2	3	4	5	6	7	8	9	0	Total
Frequency	1107	997	966	1075	933	1107	972	964	853	1026	10000

37. The demand for a particular spare parts in a factory was found to vary from day to day. In a sample study the following information is obtained. Test the hypothesis that the no.of parts demanded on that week.

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No.of parts obtained	1124	1125	1110	1120	1126	1115

38. What are the applications of chi-square distribution.

39. Describe the notes of degree of freedom.

40. Test the goodness of fit and write its remarks.

UNIT- 5

41. Explain limits for correlation coefficient.

42. Explain t-test for difference of means.

43. A coefficient of correlation of 0.2 is derived from a random sample of 625 pairs of observations.

a.) Is this value of r significant?

b.) What are the 95% and 99% confidence limits of the correlation coefficient in the population?

44. Explain the goodness of fit test.

45. The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?

46. a.) A random sample of 27 pairs of observation from a normal population gave a correlation coefficient of 0.6. Is this significant of correlation in the population?

b.) Find the least value of r in the sample of 18 pairs of observations from a bi-variate normal population, significant at 5% level of significance.

47. A machinist is making engine parts with axle diameters of 0.700 inches. A random sample of 10 parts shows a mean diameter of 0.742 inch with a standard deviation of 0.040 inch. Compute the statistics you will used to test whether the work is meeting the specifications. Also state how you would proceed further.

48. In one sample of 8 observations, the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of ten observations it was 102.6. Test whether this difference is significant at 5% level, given that the 5% point of F for $n_1=7$ and $n_2=9$. Degree of freedom is 3.29.

49. Two random sample gave the following results,

Sample	Size	Sample mean	Sum of square of deviation from mean
1	10	15	90
2	12	14	108

test whether the sampkes come from the same normal population at 5% level of significance.(given data: $F_{0.05}(9,11)=2.90$, $F_{0.05}(11,9)=3.10$ (app) and $t_{0.05}(20)=2.086$, $t_{0.05}(22)=2.07$)

50. A random sample 16 values from a normal population has a mean of 41.5 inches and sum of squares of deviations from The mean is equal to 135 inches. Another sample of 20 values from an unknown population has a mean of 43.0 inches and sum of squares of deviations from their

mean is equal to 171 inches. Show that the two samples may be regarded as coming from the same normal population.

MATHEMATICAL STATISTICS-II

K4 LEVEL QUESTIONS

UNIT- 1

1) If x and y are uncorrelated random variables with mean 0 and variances σ_1^2 and σ_2^2 respectively. Show that $u=x \cos\alpha+y \sin \alpha$, $v=x \sin\alpha- y \cos\alpha$ have a correlation coefficient ρ are given by $\rho=\frac{\sigma_1^2-\sigma_2^2}{(\sigma_1^2+\sigma_2^2)+4\sigma_1^2 \sigma_2^2 \operatorname{cosec}^2 2\alpha}^{1/2}$

2) Calculate the correlation coefficient of following height of father x and mother y

X 65 66 67 67 68 69 70 72

Y 67 68 65 68 72 72 69 71

3) Obtain the rank correlation from the following data

X : 68 64 75 50 64 80 75 40 55 64

Y : 62 58 68 45 81 60 68 48 50 70

4) Find the angle between two lines of regression

5) prove that regression coefficient are independent of change of origin but not scale.

UNIT- 2

6) Show that if X, Y are the deviations of the random variable X, Y from their respectively means, then

$$(1) \quad R=1-1/2n\sum (x / - /)^2$$

$$(2) \quad R=-1+1/2n\sum (x / - /)^2$$

Deduce that $-1 \leq r \leq 1$

7) A random variables x and y are jointly, normally distributed and u and v are defined by $u=x \cos\alpha-x \sin\alpha$ show that u and v are will be un correlated if $\tan 2\alpha=2r / -$.
Where $r=\operatorname{cov}(x, y)$, $=v(x)$ & $=v(y)$, are u and v then independent.

- 8) If x and y are uncorrelated random variables with mean 0 and variance σ_x^2 and σ_y^2 respectively show that $u = x \cos \alpha + y \sin \alpha$, $v = x \sin \alpha - y \cos \alpha$ have a correlation coefficient ρ given by

$$\rho = \frac{\sigma_x^2 - \sigma_y^2}{\{(\sigma_x^2 + \sigma_y^2) \operatorname{cosec}^2 \alpha\}^{1/2}}$$

- 9) The following table gives according to age the frequency of marks obtained by 100 students in an intelligent test.

Ages in year	18	19	20	21	Total
Marks					
10-20	4	2	2	-	8
20-30	5	4	6	4	19
30-40	6	8	10	11	35
40-50	4	4	6	8	22
50-60	-	2	4	4	10
60-70	-	2	3	1	6
Total	19	22	31	28	100

- 10) 10 competitors in a musical test were ranked by the three judges A, B, C and in the following order;

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

Using rank correlation method, discuss which pair of judges has the nearest approach to common likings in music.

UNIT- 3

11) A die is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. Show that die cannot be regarded as unbiased one and find the limits between which probability of a throw of 3 or 4 lies

12) Twenty people were attacked by a disease and only 18 survived. Will you reject the hypothesis that the survival rate, if attacked by this disease, is 85% in favour of hypothesis that it is more, at 5% level (use large sample test)

13) A sample of 900 members has a mean 3.4 cms and S.D 2.61 cms. Is the sample from large populations of mean 3.25 cms and S.D 2.61 cms? If the population is normal and its mean is unknown, find 95% and 98% fiducial limits of mean.

14) In a sample of 1000 people in Maharashtra, 540 are rice eaters and rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance?

15) In a large city A, 20% of random sample of 900 school children defective eye-sight. In other large city B, 15% of random sample of 1600 children had the sample. Is this difference between two proportion significant? Obtain 95% confidence limits for difference in population proportions.

UNIT- 4

16. Out of 8000 graduates in a city 800 are females, out of 1600 graduate employees 120 are female. Use Chi-square to determine if any distinction is made in appointment on the basis of sex. Value of chi-square at 5% level of one d.f. is 3.84.

17.

a	b
d	d

Prove that 2×2 contingency table, chi-square test of independent gives

Chi-square = $\frac{N(ad-bc)^2}{(a+c)(b+d)(a+b)(c+d)}$, where $N = a+b+c+d$.

18. Test the independent attribute of contingency table

19. A sample analysis of 200 MBAs was made. It is found that 46 students had failed, 68 students secured third division, 62 secured second division, and the rest secured first division. Are these commensurate with the general exam result which is in the ratio 4:3:2:1 for various categories respectively?

20. Explain the inference about variance and MGF of chi-square distribution.

UNIT- 5

21. A random sample of 10 boys had the following IQ's 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of the population mean IQ of 100? Find a reasonable change in which most of mean IQ values of samples of 10 boys lie.

22. Pumpkins were grown under two experimental conditions. Two random samples of 11 & 9 pumpkins show the sample standard deviation of their weights as 0.8 and 0.5 respectively. Assuming that the weight distribution are normal, test the hypothesis that the two variance are equal, organise the alternative that they are not at the 10% level. (assume that $p(F_{10,8} \geq 3.35) = 0.05$ and $p(F_{8,10} \geq 3.07) = 0.05$)

23. The heights of 10 males of given locality are found to be 60, 70, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test that 5% significance level assuming that for 9 degrees of freedom $p(t > 1.83) = 0.05$.

24. Below are given the gain in weights (in kgs) of pig fed on two diets A and B.

Diet A	25	32	30	34	24	14	32	24	30	31	35	25			
Diet B	44	34	22	10	47	31	40	30	32	35	18	21	35	29	22

Test if two diets differ significantly as regards their effect on increase in weights.

25. Samples of two types of electric light bulbs were used for length of life and following data were obtained.

Sample no	n1 = 8	n2 = 7
Sample means	1,234 hrs	1,036 hrs
Sample s.d 's	36 hrs	40 hrs

Is this difference in the mean sufficient to warrant that type I is superior to type II regarding length of life?