

[LD 1013]

OCTOBER 2013

Sub. Code: 2861

M.Sc NON-MEDICAL DEGREE EXAMINATION

FIRST YEAR

BRANCH II - BIOSTATISTICS

PAPER I – PROBABILITY AND DISTRIBUTION THEORY

Q.P. Code : 282861

Time : 3 hours

Maximum : 100 marks

I. Elaborate on :

(2X20=40)

1. (a) Derive the marginal and conditional distribution of X and Y in a Bivariate Normal distribution.
- (b) Find mean, median and mode for lognormal distribution and prove lognormal distribution is positively skewed.
2. (a). Define expectation. State and prove all properties of expectation.
- (b). The joint p.d.f of (X,Y) is given by
 $f(X, Y) = k(4 - x - y), \quad 0 \leq x, y \leq 2, \quad f(X, Y) = 0 \text{ elsewhere}$
Find the constant k. Also $\text{Var}(X)$, $\text{Var}(Y)$ and $\text{Cov}(X, Y)$.

II. Write notes on :

(10X6=60)

1. Give an example to show that $E(X, Y) = E(X) E(Y)$, then X and Y need not be independent.
2. List the properties of distribution function.
3. Define moment generating function. Also state and prove any two important properties of M.G.F.
4. State and prove Inversion formula.
5. Define Hypergeometric distribution and find its mean and variance.
6. State and prove the interrelation between t, F and chisquare.
7. Explain memory less property and prove that Geometric distribution has this property.
8. Find the moment generating function of Normal distribution.
9. Define partial correlation. Also derive the expression of partial correlation coefficient for trivariate distribution.
10. State Cochran's theorem. Explain its application in Biostatistics.

[LF 1014]

OCTOBER 2014

Sub. Code: 2861

**M.Sc NON-MEDICAL DEGREE EXAMINATION
FIRST YEAR
(New Regulation)
BRANCH II - BIOSTATISTICS
PAPER I – PROBABILITY AND DISTRIBUTION THEORY**

Q.P. Code : 282861

Time : Three hours

Maximum : 100 marks

I. Elaborate on :

(2 x 20 = 40)

1. Addition and Multiplication theorem on Expectation of Random variables.
2. Any two applications of Chi-Square distribution.

II. Write notes on :

(10 x 6 = 60)

1. Distribution function of a random variable
2. Chebychev's inequality
3. Convergence in probability. Give an example
4. Moment generating function of Binomial distribution
5. Any two properties of Moment generating function
6. Mean and Variance of Poisson Distribution
7. Any five properties of Normal distribution
8. Multivariate Normal distribution and its mean vector and its Variance – Covariance matrix
9. Differentiate Partial and Multiple correlation coefficients
10. Mahalanobis D^2 statistic and its application

[LH 0415]

OCTOBER 2015

Sub. Code: 2861

**M.Sc., NON – MEDICAL DEGREE COURSES
BRANCH II - BIOSTATISTICS
FIRST YEAR
PAPER I – PROBABILITY AND DISTRIBUTION THEORY**

Q.P. Code: 282861

Time: Three hours

Maximum: 100 marks

I. Elaborate on:

(2 x 20 = 40)

1. Sample space and random variables.
2. Jensen's and Minkowski's inequality.

II. Write notes on:

(10 x 6 = 60)

1. Probability density function. Give examples.
2. Moment generating function of a Random variable.
3. Almost sure Convergence. Give an example.
4. Moment generating function of Binomial distribution.
5. Any two properties of characteristics function.
6. Mean and variance of Geometric distribution.
7. Lognormal distribution.
8. Estimation of covariance matrix.
9. Conditional and Marginal distributions.
10. Distribution of quadratic forms.

[LI 0416]

APRIL 2016

Sub. Code: 2861

**M.Sc., NON – MEDICAL DEGREE COURSES
BRANCH II - BIOSTATISTICS
FIRST YEAR
PAPER I – PROBABILITY AND DISTRIBUTION THEORY**

Q.P. Code: 282861

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Holder's and Jensen's inequality.
2. Logistic and Log normal Distribution.

II. Write notes on:

(10 x 6 = 60)

1. Applications of Poisson Distribution.
2. Properties of Characteristic function.
3. Conditional and Marginal distribution.
4. Chebychev's Inequality.
5. Properties of Expectation.
6. Gamma and Beta Distribution.
7. Properties of Normal Distribution.
8. Mahalanobis D^2 statistic.
9. Chi Square Distribution.
10. Distribution of Quadratic forms.

[LJ 1016]

OCTOBER 2016

Sub. Code: 2861

**M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
PAPER I – PROBABILITY AND DISTRIBUTION THEORY**

Q.P. Code: 282861

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Convergence in probability, almost sure convergence and convergence in distribution.
2. Applications of t-distribution.

II. Write notes on:

(10 x 6 = 60)

1. Definition of probability and discrete probability space.
2. Addition property of characteristic function.
3. Hypergeometric distribution with its mean and variance.
4. Moment generating function and its properties.
5. Central limit theorem.
6. Characteristic function and inversion theorem.
7. Logistic and lognormal distribution.
8. Memory less property of exponential distribution.
9. Additive property of bivariate normal distribution.
10. Distributions of quadratic forms.

[LL 1017]

OCTOBER 2017

Sub. Code: 2861

M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
(New Regulation)
PAPER I – PROBABILITY AND DISTRIBUTION THEORY

Q.P. Code: 282861

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $1/7$ and that wife's selection is $1/5$. What is the probability that?
 - i) Both of them will be selected
 - ii) Only one of them will be selected and
 - iii) None of them will be selected.
- b) Explain the concept of convergence in probability and almost surely convergence.

2. a) Define discrete random variable. Explain with example how it is applied to health professionals.
- b) State central limit theorem and its application.

II. Write notes on:

(10 x 6 = 60)

1. Inverse formula.
2. Expectation and its properties.
3. Jensen's Inequality.
4. Hyper-geometric distribution and its characteristics.
5. Prove the reproductive property of independent poisson random variable.
6. The concept of convergence in probability and almost surely convergence.
7. State and prove the interrelation between t, F and chi-square.
8. Explain memory less property and prove that geometric distribution has this property.
9. Properties of normal distribution.
10. Gamma and beta distribution.

[LM 0518]

MAY 2018

Sub. Code: 2861

M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
(New Regulation)
PAPER I – PROBABILITY AND DISTRIBUTION THEORY

Q.P. Code: 282861

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Derive the marginal and conditional distribution of X and Y in a bivariate normal distribution.
b) Define expectation. State and prove all properties of expectation.
2. Eight coins are tossed at a time 256 times. Number of heads observed at each throw is recorded and the results are given below. Find the expected frequencies. What are 17 40 20 the theoretical values of mean and standard deviation? Calculate also the mean and SD of observed frequencies. No. of heads at throw:
0 1 2 3 4 5 6 7 8 Frequency : 2 6 30 52 67 56 32 10 1.

II. Write notes on:

(10 x 6 = 60)

1. Bivariate and multivariate normal distribution.
2. Mahalanobis D² statistic.
3. Cochran's theorem.
4. Logistic distribution.
5. Holders Inequality.
6. Characteristic functions.
7. If X and Y are independent random variables show that g(x) and h(y) function of X and Y is also independent. Is the converse true.
8. Mahalanobis D² and its relation with T² statistic.
9. Mean and variance of Hypergeometric distribution.
10. Minkowski inequalities.

[LN 1018]

OCTOBER 2018

Sub. Code: 2861

M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
(New Regulation)
PAPER I – PROBABILITY AND DISTRIBUTION THEORY

Q.P. Code: 282861

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Define random variable.
b) Define distribution function of a random variable and prove any two of its properties.
c) State and prove Addition theorem of expectation.
2. a) Calculate mean, standard deviation, moment coefficient of skewness and coefficient of kurtosis of a binomial distribution if the number of trials is 18 and probability of success is $1/3$.
b) Obtain the inter relationship between t.F.Chi-square distribution.

II. Write notes on:

(10 x 6 = 60)

1. Tchebechev's inequality.
2. Convergence in probability.
3. Inversion formula.
4. Mean and variance of Geometric distribution.
5. Characteristics of Normal distribution.
6. Multivariate normal distribution.
7. Partial and multiple correlation coefficients.
8. Cochran's theorem.
9. Wishart distribution and generalized T^2 statistic.
10. Application of poisson distribution in the field of Bio-statistics.

[LP 1019]

OCTOBER 2019

Sub. Code: 2861

M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
(New Regulation)
PAPER I – PROBABILITY AND DISTRIBUTION THEORY

Q.P. Code: 282861

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) State and prove any three important properties of moment generating function.
b) Jeinson's and Minkowski inequalities.
2. a) Logistic and normal distribution.
b) Addition properties of Bivariate and Multivariate normal distribution.

II. Write notes on:

(10 x 6 = 60)

1. Define Probability density function. Give examples.
2. Central limit theorem.
3. Holder's Inequality.
4. General probability space.
5. Properties of Chi-square distribution.
6. Define Quadratic forms.
7. Prove that Geometric distribution has memory less property.
8. Conditional and marginal distribution.
9. Partial correlation.
10. Multiplication properties of random variables.
