

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – STATISTICS

SECOND SEMESTER – APRIL 2018

17/16UST2MC02 / ST 2504 – DISCRETE DISTRIBUTIONS

Date: 26-04-2018

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART A

Answer **ALL** the questions:

(10X2=20 marks)

1. Define conditional expectation.
2. Explain moment generating function.
3. The mean and variance of binomial distribution are 4 and $\frac{4}{3}$ respectively. Find $P(X \geq 1)$.
4. X is binomially distributed with the parameters n and p . What is the distribution of $Y = n - x$?
5. List any four application of Poisson distribution.
6. Under what condition Binomial tends to Poisson. Distribution.
7. Define Negative Binomial Distribution.
8. Write the expression for moment generating function of Geometric distribution.
9. Define trinomial distribution.
10. Write the expression for mean and variance of hypergeometric distribution.

PART B

Answer any **FIVE** questions:

(5X8=40 marks)

11. The joint probability distribution of two random variables X and Y is given by $P(X = 0, Y = 1) = \frac{1}{3}$;

$$P(X = 1, Y = -1) = \frac{1}{3}; P(X = 1, Y = 1) = \frac{1}{3}$$

Find (i) Marginal distribution of X and Y , (ii) conditional probability distribution of $X | Y = 1$.

12. Variate X and Y take the values 1, 2, 3 along with the probabilities shown below:

Y \ X	1	2	3
1	k	k	k
2	k	2k	k
3	k	k	k

Find k , $E(X + Y)$, $V(X)$ and $Cov(X, Y)$

13. State and prove any two properties of moment generating function.
14. Find the recurrence formula for Binomial distribution.
15. Derive the MGF of Poisson distribution. Find measure of Skewness and kurtosis.
16. Find the mean and variance of Negative Binomial Distribution.
17. Describe geometric distribution.
18. Explain multinomial distribution.

PART C

Answer any **TWO** questions:

(2X20=40 marks)

19. (i). Find the mode of Binomial distribution.
(ii). Obtain the recurrence relation for the central moments of Poisson distribution.
20. (i). Explain memory less property. Prove that Geometric distribution has this property.
(ii). Show that negative binomial distribution tends to Poisson distribution.
21. (i). Derive the mean and variance of Hypergeometric distribution.
(ii). Derive the MGF of trinomial distribution and hence find mean and variance of X and Y.
22. (i). The joint probability distribution of pair of random variables is given by

Y X	1	2	3
1	0.1	0.1	0.2
2	0.2	0.3	0.1

- a) Find Marginal distributions.
b) Evaluate conditional probability distribution of $Y | X = 2$.
- (ii). Let X and Y be independent Poisson random variable with parameters λ_1 and λ_2 respectively. Obtain the distribution of $X + Y = n$.
a) Marginal probability density function of X and Y.
b) Covariance between X and Y.
