LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION – **STATISTICS**

SECONDSEMESTER – APRIL 2017

ST 2504- DISCRETE DISTRIBUTIONS

Date: 05-05-2017 Dept. No. Max. : 100 Marks
01:00-04:00

Part – A

Answer **ALL** questions: **(10*2=20 Marks)**

1. Define conditional expectation of X given Y=y in discrete case.
2. State conditional variance of X given Y=y in discrete case.
3. Find mean of discrete uniform distribution $P(x)=\frac{1}{N}, x=1,2,.N.$
4. Explain Bernoulli random variable.
5. State any two applications of Poisson distribution.
6. What are the mean and variance of Poisson distribution with parameter?
7. If the probability that a child exposed to certain contagious disease will catch is 0.4. What is the probability that among eight children exposed to the disease 3 of them will be infected?
8. Four roads start from a junction. Only one of them leads to a mall Skywalk. The remaining roads ultimately lead back to the starting point. A statistics person not familiar with these roads wants to try the different roads one by one to reach the mall Skywalk. What is the probability that his second attempt will be successful?
9. Write the probability mass function of Hypergeometric distribution.
10. In a binomial distribution consisting of 5 independent trials, probabilities of 1 and 2 successes are 0.4996 and 0.2048 respectively. Find the parameter p of the distribution.

Part – B

Answerany **FIVE**Questions **(5*8=40 Marks)**

11. Obtain the moment generating function about mean of Binomial distribution. Hence or otherwise obtain the first two central moments of Binomial Distribution.
12. Show that all cumulants of Poisson distribution are equal.
13. Obtain the mean and variance of a geometric distribution.
14. Establish the mean and variance of Hypergeometric distribution.
15. Show thatHypergeometric distribution tends to Binomial distribution.
16. Obtain additive property of independent Poisson variates.
17. Show that Geometric distribution has lack of memory property.
18. Drive the recurrence relation for the moments of Poisson distribution.

Section - C

Answer any **TWO** Questions **(2*20=40 Marks)**

19. Given the following joint probability mass function of X and Y

x/y	**-1**	**0**	**1**	**2**
1	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{24}$	$\frac{1}{24}$
2	$\frac{1}{24}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$
3	$\frac{1}{24}$	$\frac{1}{6}$	$\frac{1}{12}$	$\frac{1}{6}$

i. Obtain marginal distribution of X and Y **(4)**

ii. Obtain E(x), E(y) **(2)**

iii. Obtain V(x), V(y) **(4)**

iv. Obtain E[x/y=2], V[x/y=2]. **(5)**

v. Correlation between X and Y. **(5)**

20. a. Obtain β_1 *and* β_2 for Poisson distribution.

b. Derive the mode of Poisson distribution.

21. a. Drive the MGF of negative Binomial distribution. Hence obtain the mean & variance.

b. Derive the distribution of $X_1=r$ given $X_1+X_2=n$ when X_1 and X_2 are i.i.d. geometric random variables.

22. a. Derive the MGF of trinomial distribution. **(8)**

b. Obtain the correlation between X_1 and X_2 in trinomial distribution. **(12)**

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