LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2019**

16/17/18UST2MC02 / ST 2504– DISCRETE DISTRIBUTIONS

Date: 04-04-2019 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART- A

Answer **ALL** questions *10X2=20marks*

1. Define stochastic independence.
2. Define conditional expectation.
3. State the conditions under which binomial tends to Poisson distribution.
4. State the inconsistency of the following statement:
   Mean and variance of binomial distribution is 6 and 4/3.
5. Give four examples of occurrence of Poisson distribution in different fields.
6. Write the moment generating function of Poisson distribution.
7. Define geometric distribution.
8. Find the probability generating function of negative binomial distribution.
9. Define hypergeometric distribution.
10. Define multinomial distribution.

PART – B

Answer any FIVE questions. *5 X 8=40 marks*

11. Given

X \ Y	**0**	**1**	**2**
-1	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{2}{9}$
0	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$
1	$\frac{1}{18}$	$\frac{1}{18}$	$\frac{1}{9}$

Find (i) Marginal distributions

(ii) E(X) (iii) V(X) (iv)E(X | Y=1)

12. Show that E(X+Y) = E(X) + E(Y) for two random variables X and Y.
13. Derive the moment generating function of binomial distribution. Hence obtain its mean and variance.
14. Show that for a Poisson distribution the coefficient of variation is the reciprocal of standard deviation.

15. Explain lake of memory property, Prove that Geometric distribution possesses this property.

16. Obtain the mean and variance of hypergeometric distribution.

17. Find mean deviation about mean of binomial distribution.

18. If X *and* Y are independent Poisson variate with mean a_1 and a_2 respectively.
Find (i) $P(X+Y=k)$ and (ii) $P(X=Y)$.

PART – C

Answer any TWO questions. ***2 X 20=40 marks***

19. Let X and Y be two random variables each taking three values -1, 0 and 1 respectively. Having the joint probability distribution

Y \ X	-1	0	1
-1	0	0.1	0.1
0	0.2	0.2	0.2
1	0	0.1	0.1

(i). Show that X and Y have different expectations.

(ii). Prove that X and Y are uncorrelated.

(iii). Find variance of X and Y.

(iv). Given $Y=0$, what is the conditional probability distribution of X.

(v). Find $Var(Y \mid X=-1)$.

20. (a). Derive Poisson distribution as a limiting form of binomial distribution.

(b). Obtain the recurrence relation for the central moments of Poisson distribution.

21. (a). Derive the mean and variance of geometric distribution.

(b). Show that negative binomial tends to Poisson distribution.

22. (a). Find the moment generating function of trinomial distribution. **(8 Marks)**

(b). Find marginal distributions in the case of trinomial distribution. Obtain conditional distributions. **(3+3+3+3).**

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