LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – NOVEMBER 2016

ST 2504 - DISCRETE DISTRIBUTIONS

Date: 14-11-2016
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

SECTION –A

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

1. Define marginal probability distribution.

2. The first three moments of a distribution about the value 5 of a random variable are 2, 20 and 40. Show that the mean is 7 and variance is 16.

3. If the chance of running a bus service according to the schedule is 0.8. Calculate the probability on a day schedule with 10 service exactly one is late.

4. Write the recurrence formula for moments of binomial distribution.

5. If X is a Poission random variable such that $P(X=1) = 0.3$ and $P(X=2) = 0.2$. Find $P(X=0)$.

6. State additive property of Poission distribution.

7. Define probability mass function of Geometric distribution.

8. State any two properties of the negative binomial distribution.

9. Obtain mean of the hypergeometric distribution.

10. Define multinomial distribution.

SECTION- B

Answer any FIVE questions: **(5 X 8 = 40 marks)**

11. Prove that if X and Y are independent, then

     (i) $E[E X / Y]] = E(X)$
     (ii) $E(X / Y) = E(X)$

12. If X follows binomial with parameters n and p, show that
     (i) $E\left(\frac{X}{n} - p\right)^2 = \frac{pq}{n}$
     (ii) $Cov\left(\frac{X}{n}, \frac{n-X}{n}\right) = -\frac{pq}{n}$

13. If X is a Poisson variate such that $P(X = 2) = 9P(X=4) + 90 P(X = 6)$
     find (i) λ
          (ii) the variance of X
          (iii) β_1, the coefficient of skewness.

14. Obtain cumulants of negative binomial distribution and hence find mean and variance.

15. Obtain moments of multinomial distribution.

16. Deduce the first four moments about the mean of the Poission distribution from those of Binomial distribution.

17. If X is binomial with parameters n and p, what is the distribution of $n - x$?

18. Define discrete uniform distribution and obtain its mean and variance.

1

SECTION - C

Answer any TWO questions: **(2 x 20 =40 marks)**

19. For the following bivariate probability distribution,

$p(1,1) = 1/10$, $p(1,2) = 3/10$, $p(2,1) = 1/10$, $p(2,2) = 1/10$

$p(3,1) = 2/10$, $p(3,2) = 2/10$, $p(x,y) = 0$, elsewhere.

find (i) $V(X / Y=1)$

(ii) correlation coefficient.

20. (a) Obtain Poisson distribution as a limiting case of binomial distribution.

(b) In a binomial distribution consisting of 5 independent trials, the probability of 1 and 2 successes are

0.4096 and 0.2048 respectively. Find the parameter 'p' of the distribution.

21. (a) Obtain memoryless property of Geometric distribution.

(b) Let X be a discrete random variable having geometric distribution with parameter p, obtain its

mean and variance through m.g.f.

22. (a) Obtain binomial distribution as a limiting case of hypergeometric distribution.

(b) Explain how you will use hypergeometric distribution to estimate the number of fish in a lake.

****