LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2022**

17UST2MC02 – DISCRETE DISTRIBUTIONS

Date: 18-06-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION-A (10 x 2 = 20)

Answer ALL the questions. Each carries 2 marks.

1. Define stochastic independence.
2. Define E [X/ Y = y] .
3. State any two properties of Joint distribution function.
4. Define discrete uniform distribution.
5. 10 coins are thrown simultaneously. Find the probability of getting atleast seven heads.
6. State the inconsistency of the following statement: Mean and variance of binomial distribution is 6 and 4/3.
7. In a book of 520 pages, 390 typo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.
8. Give four examples FOR occurrence of Poisson distribution in different fields.
9. Define geometric distribution.
10. Define Multinomial distribution.

SECTION-B (5 x 8 = 40)

Answer any FIVE questions. Each carries 8 marks.

11. For the joint probability distribution of two random variables X and Y, find
(i) P(X≤1, Y=2) (ii) P(X≤1) (iii) P(Y ≤ 3) and (iv) P(X< 3, Y≤ 4)

X \ Y	1	2	3	4	5	6
0	0	0	1/32	2/32	2/32	3/32
1	1/16	1/16	1/8	1/8	1/8	1/8
2	1/32	1/32	1/64	1/64	0	2/64

12. In a Poisson frequency distribution, frequency corresponding to 3 successes is 2/3 times frequency corresponding to 4 successes. Find mean and standard deviation of the distribution.
13. Show that for a Poisson distribution the coefficient of variation is the reciprocal of standard deviation
14. A Multiple Choice test consists of 8 questions with 3 answers to each question (of which only one is correct). A student answers each question by rolling a balanced die and checking the first answer if he gets 1 or 2, the second answer if he gets 3 or 4 and the third answer if he gets 5 or 6. To get a distinction, the student must secure atleast 75% correct answers. If there is no negative marking, what is the probability that the student secures a distinction?

15. Explain Lack of Memory property of Geometric distribution.
16. Show that negative binomial tends to Poisson distribution.
17. If X_1 and X_2 are independent Poisson variates with parameters λ_1 and λ_2 respectively, find the distribution of $X_1 = r$ given $X_1 + X_2 = n$.
18. Derive the MGF of Multinomial distribution.

SECTION-C (2 x 20 =40)

Answer any TWO questions. Each carries 20 marks.

19. The joint probability distribution of X and Y is given by the following table.

X|Y	1	3	9
2	1/8	1/24	1/12
4	1/4	1/4	0
6	1/8	1/24	1/12

(i) Find marginal distribution of Y.

(ii) Find conditional distribution of Y/X =2.

(iii) Find COV(X,Y)

(iv) Are X and Y independent? **(2+2+4+2)**

20. Obtain the recurrence relation of binomial distribution. Hence find Mean and variance.

21. (a) Obtain the density function of a Poisson distribution as a limiting case of Binomial distribution. **(10)**

(b) Derive the mean and variance of Hyper geometric distribution. **(10)**

22. (a) Prove that the sum of independent Poisson variates is also a Poisson variate. **(10)**

(b) Obtain MGF of Negative Binomial distribution and hence obtain its mean and variance. **(10)**

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