Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
B.Sc. STATISTICS – II SEMESTER
SEMESTER EXAMINATION: APRIL 2022 (Supplementary)
(Examination conducted in July 2022)

ST 218: THEORETICAL PROBABILITY DISTRIBUTION

Time: 2 ½ Hours **Max: 70 Marks**

*This question paper contains **ONE** printed page and **THREE** parts*

Note: Scientific calculators are allowed.

PART A

I Answer any FIVE from the following **3 x 5 = 15**

1. Mention any three properties of Bernoulli distribution.
2. Prove that the area between Normal distribution is equal to 1.
3. Define 't' statistic under normality assumptions.
4. What do you mean by sampling distribution? And explain random sample with an example.
5. A random variable has an exponential distribution with probability density function given by f(x) = $\begin{cases} 2e^{-2x} & for\ x \geq 0 \\ 0 & elsewhere \end{cases}$ What is the probability that X is not less than 2?
6. Define Binomial distribution. Derive the variance of this distribution.
7. Define Normal distribution with an example.

PART B

II Answer any FIVE from the following **5 x 5 = 25**

8. A) Prove that $\sum_{x=0}^{\infty} P(X = x) = 1$ for Poisson distribution. (2)
   B) Obtain the moment generating function of Exponential Distribution and hence find its mean. (5)
9. A) Obtain the recurrence relationship for the moments of Negative Binomial Distribution. (5)
   B) State Inter relationships between Binomial, Poisson and Negative Binomial Distributions. (2)
10. A) Find the mean and variance for discrete Uniform Distribution. (3)
    B) Derive the mean and variance of Geometric Distribution. (4)
11. A) Define Normal Distribution and give any four properties of it. (3)
    B) Find the mean and variance of Beta distribution of 2nd kind. (4)
12. A) State and prove additive property of Gamma Distribution. (3)
    B) Define of chi-square variate and obtain the mean and variance of it (4)
13. A) Define F – statistic under normality assumption. (3)
    B) Derive the sampling distribution of sample variance (4)
14. A) Explain principal steps in Sample survey. (3)
    B) Derive moment generating function of Poisson Distribution. (4)

PART C

III Answer any TWO from the following **10 x 2 = 20**

15. A) Give recurrence relationship for probabilities for Binomial Distribution. (5)
    B) State and prove memory less property of Exponential Distribution. (5)
16. A) Define student's t distribution and give any four properties of t-distribution. (6)
    B) If $X_1, X_2 \ldots X_n$ be a random sample from N (μ, σ^2), then find the distribution of sample mean $\bar{x}$. (4)
17. A) Define Hyper Geometric Distribution along with its mean and variance with usual notations (6)
    B) State and prove additive property of Gamma Distribution (4)

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