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DATE:24-4-19

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

B.Sc. STATISTICS - II SEMESTER

SEMESTER EXAMINATION - APRIL 2019

**ST:217 – THEORETICAL PROBABILITY DISTRIBUTION**

**Time: 2½hrs Max: 70 Marks**

 **Supplementary candidates only.**

**Attach the question paper with the answer booklet**

This question paper has **TWO** printed pages and **THREE** parts

Graph sheets will be provided on request

**SECTION – A**

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

1. If X and Y are independent Poisson variates with mean 2 and 3 respectively. Obtain mean and variance of 3X+2Y
2. The MGF of a random variable X is$\frac{0.4}{1-0.6e^{t}}$. Obtain E(X)
3. Give any three characteristics of Normal distribution
4. If a random variable X has the probability density function f(x) then find k, E(X)

f(x) = k if -3 < x < 3

 0 otherwise

1. Define Chi-Square statistic under normality assumptions
2. Define Pilot Survey. Mention any two advantages.
3. Explain any one method of drawing a random sample from a finite population

**SECTION – B**

**II Answer any FIVE of the following: 5 x 7 = 35**

1. A) Let X follows Poisson Distribution with parameter λ1 and Y follows Poisson Distribution with parameter λ2. Find the distribution of Z = X + Y (4)

B) Which distribution satisfies for following situation?

* + - 1. Estimation of number of fishes in a lake
			2. Throwing a dice until a three appears
			3. Number of typological errors in a page (3)

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1. A) Derive the recurrence relationship for the moments for Binomial Distribution. (5)

B) State the conditions under which Binomial Distribution tends to Poisson Distribution. (2)

1. Using MGF, derive the expression for mean and variance of Normal Distribution (7)
2. Define Exponential Distribution. State and prove lack of memory property of Exponential distribution (7)
3. A) Define Beta Distribution of first kind. (2)

B) Derive the expression for mean of Beta Distribution of second kind (5)

1. A) Distinguish between Sampling error and Non sampling Error (3)

B) Define Reliability and Hazard function (4)

1. A) Distinguish between probability sampling and non-probability sampling (2)

B) Write a note on drafting the questionnaire with an example (5)

**SECTION – C**

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

1. A) Give the probability mass function of Hyper Geometric Distribution. Derive the expression for mean of Hyper Geometric Distribution (5)

B) Define Geometric Distribution. Derive the mean and variance of it. (5)

1. A)If X1, X2, …..,Xn be a random sample from Exponential Distribution with parameter θ. Show that ΣX is a Gamma variate with parameter (n, θ) (5)

B) Sketch the reliability and hazard function for Exponential Distribution with parameter θ=0.0005 (5)

1. A) Differentiate between census and sample survey. What are the advantages of sample survey over census? (7)

B) If X1, X2,...,X10 be a random sample from N(µ=5,σ2=100), then give mean and variance of $\overbar{X}$ (3)

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