



Registration Number:

Date & session:

ST. JOSEPH'S UNIVERSITY, BENGALURU -27

B. Sc. (Statistics) – II SEMESTER

SEMESTER EXAMINATION: APRIL 2023

(Examination conducted in May 2023)

ST 221: Probability and Distributions

(For current batch students only)

Time: 2 Hours

Max Marks: 60

This paper contains TWO printed pages and THREE parts.

PART – A

I. Answer any FIVE of the following

3 X 5 = 15

1. Define Equally likely, mutually exclusive and exhaustive events.
2. State Bayes' theorem.
3. Distinguish between discrete and continuous random variable.
4. Prove, if X is a random variable, then $V(aX+b)=a^2 V(X)$ where a and b are constants.
5. Derive the moment generating function of Bernoulli distribution.
6. Derive mean of uniform distribution with parameter $(0, \theta)$.
7. Give R codes to get Histogram, Bar plot and Pie chart.

PART – B

II. Answer any FIVE of the following

5 X 5 = 25

8. Define conditional probability. State and prove multiplication theorem of probability.
9. What is distribution function? State the properties of distribution function.
10. Obtain moment generating function of a geometric distribution. Find its mean and variance.
11. Write probability density function of normal distribution. State its properties.
12. Explain exponential distribution. Obtain its distribution function and moment generating function.
13. Write R code to create a 3 X 3 matrix containing the numbers 1 to 9 and how do you get the inverse and transpose of this matrix in R. How do you find trace of M .
14. Write a note on using $c()$, $seq()$ and colon operators.

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PART – C

III. Answer any TWO of the following

10 X 2 = 20

15. Two fare dice are rolled. Write the sample space. Find the probability that

- a. Both the dice shows number six.
- b. Sum of the numbers is equal to 7 or 11.
- c. The sum of the numbers obtained is less than 11.
- d. The sum is divisible by three.

16. A) Define Poisson distribution with example. Derive its mean, variance.

B) State and prove additive property of Poisson distribution. (5+5)

17. A) Define mathematical expectation and list out its properties and prove any two.

B) Give any six features of R. (7+3)
