Date:

Registration number:

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

B.Sc. STATISTICS – II SEMESTER

SEMESTER EXAMINATION: APRIL 2022

(Examination conducted in July 2022)

ST – 221: PROBABILITY AND DISTRIBUTIONS

Time: 2 Hours **Max: 60 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. Give classical definition of probability. What are its limitations?
2. Define sample space of a random experiment. Give any two examples.
3. Define a random variable. State true or false: Temperature of a city at various points of time during a day is a discrete random variate.
4. List the properties of cumulative distribution function (CDF).
5. Define Poisson distribution with an example.
6. Derive mean of uniform distribution with parameters (1, 3) (i.e.; X ~ U (1, 3))
7. Give the different ways of assigning a variable in R?

PART B

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

8. A) State addition theorem and multiplication theorem of probability.
   B) A die is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head. (2+3)
9. A) A and B are two candidates seeking admission in a college. The probability that A is selected is 0.7 and the probability that exactly one of them is selected is 0.6. Find the probability that B is selected.
   B) If E(X) = 5 and $E(X^2) = 30$. Find mean and variance of Y = 3X+4 (3+2)
10. A) List properties of probability of an event.
    B) 10% of the bulbs produced in a factory are of red colour and 2% are red and defective. If one bulb is picked up at random, determine the probability of its being defective if it is red. (2+3)
11. Let X be a continuous random variable with PDF $f(x) = \begin{cases} kx^3 & 0 < x \leq 1 \\ 0 & Otherwise \end{cases}$
    Find k, Find E(X) and Evaluate P (0.25 < X < 0.75) (5)
12. State and prove additive property of Poisson distribution (5)
13. State and prove memoryless property of exponential distribution (5)
14. Write a note on evaluation and important features of R (5)

PART C

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

15. A) State and prove Law of total probability (6)
    B) Let X has moment generating function $M_X(t)$. Derive the moment generating function of Y = a X +b (4)
16. A) Define normal distribution. Give characteristic of normal distribution (5)
    B) If X ~ B (n, p) then derive mean and variance of X (5)
17. A) Define probability mass function and probability density function. (4)
    B) Explain different types of R – object with examples (6)

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