

25U288

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Name :

Reg. No :

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2026

(FYUGP)

(Regular/Supplementary/Improvement)

CC24USTA2MN109 - THEORY OF PROBABILITY

(Statistics - Minor Course)

(2024 Admission onwards)

Time: 2.0 Hours

Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

Answer *all* questions. Each question carries 3 marks.

1. An unbiased coin is tossed twice, calculate the probability of getting (i) head in the first toss (ii) two tails. [Level:3] [CO1]
2. Define probability. Explain axiomatic definition. [Level:2] [CO1]
3. Explain sets. What do you mean by union of two sets? [Level:2] [CO1]
4. Explain independent events. [Level:2] [CO1]
5. A bag contains 7 white balls, 5 black balls and 4 red balls. If two balls are drawn at random from the bag, compute the probability that both are white. [Level:3] [CO1]
6. Define random variable. What do you mean by discrete and continuous random variable. [Level:2] [CO2]
7. What are the properties of expectation? [Level:2] [CO2]
8. Explain application of normal distribution. [Level:2] [CO3]
9. Explain characteristics of poisson distribution. [Level:2] [CO3]
10. Define random number method. [Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

Answer *all* questions. Each question carries 6 marks.

11. For three events A,B and C give an illustration to show that the pairwise independence need not imply their mutual independence. [Level:3] [CO1]

12. If A and B are mutually exclusive events and if $P(A)=0.5$, and $P(B)=0.3$ find (i) $P(A \cup B)$ (ii) $P(A/B)$ (iii) $P(B/A)$ [Level:3] [CO1]
13. Given a discrete random variable X with probability distribution as [Level:3] [CO2]

x	0	1	2	3	4
f(x)	0.2	k	2k	k/2	0.1

- Find value of k
 - Find $P(0.5 \leq X \leq 2.5)$
14. A random variable x follows a probability distribution as given below. [Level:3] [CO2]

x	0	1	2	3
f(x)	k/2	k/3	(k+1)/3	(2k-1)/6

Find the value of k. Also find mean and variance of the variable.

15. The variable X follows Normal distribution with mean 12 and SD = 4. Calculate [Level:3] [CO3]
- $P(X > 20)$
 - $P(10 < X < 20)$
16. Explain stratified random sampling with suitable examples. [Level:2] [CO4]
17. Compare and contrast systematic sampling with stratified random sampling. [Level:2] [CO4]
18. What do you mean by purposive sampling? [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

Answer any **one** question. The question carries 10 marks.

19. Determine mean and variance of Binomial distribution. [Level:3] [CO3]
20. Discuss the principal steps in a sample survey. [Level:2] [CO4]

(1 × 10 = 10 Marks)
