24U388 (Pages: 2) Name : .....

Reg. No : .....

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(FYUGP)

CC24USTA3MN210 - PROBABILITY THEORY AND SAMPLING TECHNIQUES

(Statistics - Minor Course)

(2024 Admission - Regular)

Time: 2.0 Hours Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

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

1. Explain Boole's inequality. [Level:2] [CO1]
2. Explain independent events and dependent events. [Level:2] [CO1]
3. Explain moments. [Level:2] [CO2]
4. Describe random variable and different types of random variable with example. [Level:2] [CO2]
5. Summarise the difference between Census and sampling. [Level:2] [CO3]
6. Describe systematic sampling with example. [Level:2] [CO3]
7. Summarise population and sample with example. [Level:2] [CO3]
8. Write the general syntax of a while loop in R. [Level:2] [CO4]
9. Given the following data for monthly sales and monthly expenses: sales = 5000, 7000, 8000, 6000, 9000 and expenses = 2000, 2500, 3000, 2200, 2800. Write R code for finding Pearson's coefficient of correlation. [Level:3] [CO4]
10. The following data represents the ages of a group of people: 12, 15, 18, 20, 21, 25, 28, 30, 32, 35.Write R code for finding IQR. [Level:3] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

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

11. Explain conditional probability. (a) Three persons A,B,C are simultaneously shooting a target probability of A hitting the target is 4/5, that of B is 3/4 and that of C is 2/3. Find the probability (i) exactly one of them will hit the target (ii) at least one of them will hit the target (iii) exactly two of them will hit the target [Level:3] [CO1]

12. Prove that: [Level:2] [CO1]

$P(A') = 1 - P(A)$

$P(\phi) = 0$

13. Explain Distribution function and it's properties (a) A random variable x has following pobability function f(0)=1/6 , f(1)=2/6 , f(2)=3/6 and f(x)=0 otherwise Write down the density function and Distribution function Also find P(X<2). [Level:3] [CO2]

14. Describe Sampling errors and non sampling errors. [Level:2] [CO3]

15. Describe the advantages and limitations of sampling. [Level:2] [CO3]

16. Discuss the difference between srs with replacement and srs without replacement. [Level:2] [CO3]

17. Summarise stratified random sampling with example. [Level:2] [CO3]

18. Define Loops in R. Explain different types of Loops in R. [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

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

19. A random variable X follows a probability distribution as given below. [Level:3] [CO2]

x	8	12	16	20	24
f(x)	1/8	1/6	K/6	1/4	1/12

(a) Find the value of K. Also find P(12≤X≤20), P(X>16), P(X<24).

(b) Explain pmf of a random variable.

20. Define census. What are the principal steps involved in a sample survey. [Level:2] [CO3]

(1 × 10 = 10 Marks)

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