

24U2100

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Name : .....

Reg. No : .....

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2025

(FYUGP)

CC24USTA2MN111 - STATISTICAL MODELING 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. Define symmetric distribution and explain how it relates to skewness. [Level:2] [CO1]
2. How is kurtosis defined in statistics.Explain briefly. [Level:2] [CO1]
3. Define the census method. [Level:2] [CO2]
4. Determine the normal equation to fit a straight line  $y=ax+b$ . [Level:3] [CO3]
5. Differentiate between linear and non-linear correlation. [Level:3] [CO3]
6. Explain how to calculate regression coefficients ( $b_{yx}$  and  $b_{xy}$ ) from regression equations. [Level:2] [CO3]
7. Given the following data for monthly sales and monthly expenses: sales = 5000, 7000, 8000, 6000, 9000 and expenses = 2000, 2500, 3000, 2200, 2800. Provide an R script to calculate Pearson's correlation for the given data. [Level:3] [CO4]
8. Explain the **while** loop in R and provide its syntax. [Level:3] [CO4]
9. The following data represents the ages of a group of people: 25, 28, 30, 35, 40, 42, 50, 55, 60, 65. Provide an R code for calculating variance and standard deviation. [Level:3] [CO4]
10. Consider the dataset: 5, 7, 9, 12, 15, 150. Provide an R code for calculating range and inter quartile range. [Level:3] [CO4]

**(Ceiling: 24 Marks)**

**Part B** (Paragraph questions/Problem)

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

11. Calculate the percentile coefficient of kurtosis for the following data. [Level:3] [CO1]

Interval	0-10	10-20	20-30	30-40	40-50
Frequency	12	18	35	25	10

12. Describe the advantages and limitations of sampling in research and data collection. [Level:2] [CO2]
13. Define non-sampling errors and explain how they differ from sampling errors. [Level:2] [CO2]
14. Describe simple random sampling and systematic sampling. [Level:2] [CO2]
15. Discuss the key stages in organizing a large sample survey. [Level:2] [CO2]
16. Explain what precautions must be taken while drafting a questionnaire. [Level:2] [CO2]
17. The ranking of 10 students in two subjects A and B are as follows. [Level:3] [CO3]

A	3	5	8	4	7	10	2	1	6	9
B	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient.

18. The following data are given the monthly income and expenditure on food of 10 families. [Level:3] [CO3]

Income	120	90	83	150	130	140	110	95	75	105
Expenditure	40	36	40	45	40	44	45	38	50	35

(Ceiling: 36 Marks)

### Part C (Essay questions)

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

19. Calculate Karl Pearson's measure of skewness for the following data. [Level:3] [CO1]

Size	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110
Frequency	14	46	58	76	68	62	48	28

20. Calculate the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y). [Level:3] [CO3]

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

(1 × 10 = 10 Marks)

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