Reg. No ..... Name 25INT316

END SEMESTER EXAMINATION- OCTOBER 2025

SEMESTER 3 : INTEGRATED M.Sc. PROGRAMME COMPUTER SCIENCE-DATA SCIENCE

COURSE : **21UP3CPSTA01 : PROBABILITY AND STATISTICS**

(For Regular - 2024 Admission and Improvement/Supplementary 2023/2022/2021 Admissions)

Time : Three Hours Max. Weightage: 30

PART A
Answer any 8

1. Show that the mathematical expectation of the sum of two random variables is the sum of their individual expectaions
2. Define frequency density of a class
3. If the arithmetic mean of 4 observations is 6, what is the new arithmetic mean of 3 is subtracted from each observations?
4. Explain the terms ' apriori probabilities' and posteriori probabilities in connection with Baye's theorem
5. What is scatter diagram?
6. What is Bowley's measure of skewness?
7. Examine whether the following is a p.d.f.

$$f\left(x\right) = \begin{cases} \frac{1}{3}\ for\ x = -1 \\ \frac{1}{3}\ for\ x = 0 \\ \frac{1}{3}\ for\ x = 5 \end{cases}$$

8. What are various types of bar diagrams?
9. Distinguish between census and sampling
10. What is the correlaton coefficient between the pairs of points (2,5) and (3,1)?

(1 x 8 = 8 weight)

PART B
Answer any 6

11. State and prove Boole's inequality
12. Following are the daily wages of ten workers of a firm, find 6^{th} decile and 40^{th} percentile? 120, 130, 140, 110, 160, 150, 190, 180, 170, 200
13. Briefly explain advantages of sampling over census.
14. Describe the properties of bivariate regression coefficients.
15. Draw a frequency curve for the following data ;

Age in years	2-5	5-11	11-12	12-14	14-15	15-16
No. of boys	6	6	2	5	1	3

16. Calculate the correlation coefficient from the following data
$N = 100\ \sum x = 12500\ \ \sum y = 8000\ \ \sum x^2 = 1585000\ \ \sum y^2 = 648100\ \sum xy = 1007425$
17. Given Q_3 = 18; Q_1 =25, mode =21:mean=18 Find the coefficient of skewness?
18. The joint pdf of a random variable X and Y is f(x,y) = e−(x+y) if x≥0, y≥0 f(x,y) = e-(x+y) if x≥0, y≥0 and =0 otherwise. Find the marginal p.d.f's

(2 x 6 = 12 weight)

PART C

Answer any 2

19. From the following distribution, calculate (1) the first four moments about mean (2) skewness based on moments (3) kurtosis

Income	Frequency
0-10	1
10-20	3
20-30	4
30-40	2

20. Draw less than and greater than ogives for the following frequency distribution of the marks obtained for 100 students in Mathematics.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	6	12	20	30	18	10	4

21. (i) What is Rank correlation coefficient ? (ii) Find the coefficient of rank correlation for the data given below

x	78	89	69	97	59	57	79	68	83	64
y	125	137	156	107	112	118	123	138	115	122

22. Find the value of k and examine whether X and Y are independent ifthe joint density function of X and Y is given by f(x,y) = k(2x+3) e−y2 f(x,y) = k(2x+3) e-y2 , 0<x<2, y>0

(5 x 2 = 10 weight)