

**Second Semester FYUGP Degree (Reg/Sup/Imp) Examination
April 2026**

**KU2DSCSTA132 - PROBABILITY THEORY AND
BIVARIATE DATA ANALYSIS**

2024 Admission onwards

Time : 2 hours

Maximum Marks : 70

Section A

Answer any 6 questions. Each carry 3 marks.

1. Define discrete random variables. Give an example.
2. Identify discrete and continuous random variables from the following.
 - (a) The outcomes of tossing a coin three time.
 - (b) The weight of persons in a country.
 - (c) The temperature of a room.
 - (d) The number of red blood cell.
 - (e) The height of buildings in a city.
 - (f) The length of hair.
3. Write the properties of simple correlation coefficient.
4. Explain the utility of regression analysis.
5. Find the correlation coefficient if the regression coefficients are,
 - (i) 4.5 and 0.18 and (ii) -2.8 and -0.3
6. If X is a Poisson random variable such that $E(X^2) = 6$, find $E(X)$.
7. A coin is tossed six times. What is the probability of getting 5 or more heads?
8. If $X \sim N(6, 2^2)$, find $P(1 < X < 3)$.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Write note on different kinds of correlation.
10. Calculate Karl Pearson's coefficient of correlation for the following data.

X	10	12	13	16	17	20	25
Y	19	22	26	27	29	33	37

11. You are given the following data.

	X	Y
AM	36	85
SD	11	8

Correlation coefficient between X and $Y = 0.66$.

- (i) Find the two regression equations.
(ii) Estimate the value of X when $Y = 75$.
12. For a binomial distribution mean is 4 and variance is $12/9$. Find $P(X \leq 2)$.
13. For a standard normal variate Z , find
(i) $P(0 < Z < 1.83)$ (ii) $P(Z > 1.54)$ (iii) $P(Z > -0.86)$.
14. Explain any 6 properties of normal distribution.

Section C

Answer any 2 questions. Each carry 14 marks.

15. (a) State and Prove Bayes theorem.
(b) Mr. Arther speaks truth in 70% cases and Mrs. Benny in 85% cases. In what percentage of cases are they likely to contradict each other in stating the same fact?
16. (a) The contents of Urns I, II and III are respectively as follows:
1 White, 2 Black and 3 Red balls;
2 White, 1 Black and 1 Red balls;
4 White, 5 Black and 3 Red balls.
One Urn is chosen at random and two balls drawn from it. They happen to be white and red. What is the probability that they came from Urn II?
- (b) A card is randomly drawn from a pack of playing cards. Find the probability that the drawn card is (i) a spade or a king (ii) a king or a queen.
17. The amount of bread (in hundreds of pounds), X that a certain bakery is able to sell in a day is found to be a numerical valued random phenomenon with a probability density function $f(x)$ given by
- $$f(x) = \begin{cases} ax, & 0 \leq x \leq 5 \\ a(1-x), & 5 \leq x \leq 10 \\ 0, & \text{otherwise} \end{cases}$$
- (i) Determine a .
(ii) What will be the probability that the sales on tomorrow (a) exceed 500 pounds?
(b) less than 500 pounds? (c) between 250 and 750 pounds.