Reg No:..... K25FY2477 B
Name :.....

Second Semester FYUGP Statistics Examination APRIL 2025 (2024 Admission onwards) KU2DSCSTA131 (PROBABILITY AND RANDOM VARIABLES)

(DATE OF EXAM: 30-4-2025)

Time : 120 min Maximum Marks : 70

Part A (Answer any 6 questions. Each carries 3 marks)

1. If $P(A) = 0.3$, $P(B) = 0.2$ and $P(Astheorem.$ 3

2. Define sigma field. 3

3. Define binomial distribution. 3

4. Write the properties of Poisson distribution. Give some practical situations in which Poisson distribution can be applied. 3

5. If X follows a normal distribution with mean 12 and variance 16, find $P(X \geq 20)$. 3

6. How do you infer the nature of relationship of the variables from scatter diagram? 3

7. Differentiate between linear and non-linear regression. 3

8. What are the regression coefficient? How they are related to correlation coefficient? 3

Part B (Answer any 4 questions. Each carries 6 marks)

9. The ratio to 2 successes and 4 successes among 6 independent Bernoullian trials is 0.25. Find the probability of success. 6

10. A random variable X follows normal distribution with mean 45 and S.D 10. Find the probability that for an item to form (i) beyond 60 (ii) between 40 and 50. 6

11. Assume the height of soldiers follows the normal distribution with mean 68 inches and variance 25 inches. In a regiment of 1000 soldiers, how many are expected to be
(i) over 6 feet tall (ii) under 5 feet 6 inches. 6

12. The following are the ranks given by two judges for 10 competitors in a recitation competition. Are they like the same type of recitation? 6

Judge I	5	4	2	6	7	10	9	1	8	3
Judge II	4	1	5	7	8	9	10	6	3	2

13. Is there any correlation between X and Y based on the following data.

X	200	270	340	310	400
Y	150	162	170	180	180

6

14. Find the regression equation of x on y for the following data.

x	2	3	7	8	10
y	10	9	11	8	12

6

Part C (Answer any 2 question(s). Each carries 14 marks)

15. 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 $f(x)$ is given by

$$f(x) = \begin{cases} ax, & 0 \le x \le 5 \\ a(1-x), & 5 \le x \le 10 \\ 0, & \text{otherwise} \end{cases}$$

(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.

14

16. (a) A random variable X has the p.d.f. $f(x) = 6x(1-x)$, $0 \le x \le 1$.
(a) Check that $f(x)$ is p.d.f.
(b) Determine the number $'b'$ such that $P(X < b) = P(X > b)$. 7

(b) For the p.d.f. $f(x) = 3ax^2$, $0 \le x \le a$,
(a) find the value of a
(b) find $P(0 \le X \le 1/2)$ and $P(1/2 < X < 3/4)$. 7

17. (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? 14