Reg No:.....
Name :.....

K25FY2477 B

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 $P(A$*stheorem.* 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?

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

6

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

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

(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.

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16. (a) A random variable X has the p.d.f. $f(x) = 6x(1-x)$, $0 \leq x \leq 1$.
(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. $f(x) = 3ax^2$, $0 \leq x \leq a$,
(a) find the value of a
(b) find $P(0 \leq X \leq 1/2)$ 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