Reg. No.: .....

Name: .....

University of Kerala

W6918

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

STATISTICS

UK3DSCSTA206-BASIC STATISTICS-III

Academic Level: 200-299

2024 Admission

Time: 1 Hour 30 Minutes(90 Mins.) **Max. Marks: 42**

Part A 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn.No.	Question	CL	CO
1	Define probability mass function.	RE	1
2	Beta type II distribution is defined in the interval …….	RE	2
3	Give the PDF of exponential distribution with parameter θ.	UN	2
4	If $E(X) = 10$, what is $E(3X - 5)$	UN	1
5	In one-way ANOVA with k groups and a total of N observations, the within-group (error) degrees of freedom is…….....	UN	3
6	Hypergeometric distribution poses memoryless property. True/False?	UN	2

Part B 8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn.No.	Question	CL	CO
7	Distinguish between assignable causes and random causes affecting variations in observations with example.	UN	3
8	Differentiate between probability mass function and probability density function?	UN	1
9	Explain any one principle of design of experiments.	AP	4
10	If X and Y are independent with MGFs $M_x(t) = e^{2t^2}$ and $M_x(t) = e^{3t^2}$. Find the MGF of **Z=X+Y** and simplify the expression.	AP	1

Part C 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn.No.	Question	CL	CO
11	A) B) Differentiate between PGF and MGF for discrete and continuous data and also mention its properties. OR B) If X follows Beta distribution of first kind with parameter p and q. Find the distribtion of Y= $\frac{X}{1-X}$	AP	1
12	A) A random variable X has pdf $$f(x) = \begin{cases} kx^2, & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$$ Find the value of k and calculate E(X)and Var(X). OR B) A) i) A machine breaks down according to an exponential distribution with mean 20 hrs. If it has already been running for 10 hrs, what is the probability it runs at least another 15 hours? ii) Prove the property relevant to the above case.	AN	1
13	A) Define geometric distribution. The probability that a certain machine produces a defective bolt is 0.1. Find the probability that the first defective bolt occurs on the 5th inspection. Also, find the expected number of inspections required to find the first defective bolt. OR B) Discuss the memoryless property of the exponential distribution. Prove it mathematically.	EV	2

Qn.No.	Question	CL	CO
14	A) An agricultural researcher is testing the effectiveness of three fertilizers (F1, F2, F3) on crop yield (in kg per plot). The key goal is to minimize variability while maximizing the mean yield. Fertilizer F1 | Fertilizer F2 | Fertilizer F3 10 | 12 | 15 11 | 13 | 16 9 | 11 | 14 10 | 12 | 15 **Design a strategy** to itesting the effectiveness of three fertilizers in experiment using ANOVA OR B) Create a problem illustrating the use of probability generating functions for a discrete random variable, showing how it can be used to find moments like mean and variance.	CR	4