A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code:U4M25

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Fourth Semester

Agriculture Engineering

21UMA425 - PROBABILITY, STATISTICS AND NUMERICAL METHODS

(Regulations 2021)

(Statistical Tables are permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The limiting form a Poisson distribution is CO6- U

   (a) Geometric (b)Binomial (c) Normal (d) None of the above

2. If X is the discrete random variable having the probability density function, then calculate k. CO1- App

X	-1	0	1
P(X)	k	2k	3k

   (a) 1/6 (b) -1/6 (c) -1 (d) 1

3. Choose the t-test for mean CO6- U

   (a) $t = \frac{\overline{x_1} - \mu}{s / \sqrt{n-1}}$ (b) $t = \frac{\overline{x_1} + \mu}{s / \sqrt{n-1}}$ (c) t = 0 (d) None of the above

4. In Chi-square the sample observations should be CO6- U

   (a) dependent (b) independent (c) equal (d) none of these

5. The science of experimental designs is associated with the name CO6- U

   (a) Latin square (b) Latin cube (c) RBD (d) None of these

6. Choose the correction factor_____ CO6- U

   (a) T^2N (b) T/N (c) T^2/N (d) 0

7. In Newton's forward formula, u =. CO6- U

   (a) $\frac{x - x_0}{h}$ (b) $\frac{x - x_1}{h}$ (c) $\frac{x - x_2}{h}$ (d) $\frac{x - x_n}{h}$

8. In Newton's backward formula, v =. CO6- U

(a) $\frac{x - x_0}{h}$ (b) $\frac{x - x_1}{h}$ (c) $\frac{x - x_2}{h}$ (d) $\frac{x - x_n}{h}$

9. The Simpson's one third rule is approximated by _____ CO6- U

(a) parabola (b)trapezoid (c)hyperbola (d) elliptic

10. Gaussian three point quadrature formula is exact for polynomials upto degree _____ CO6- U

(a) 1 (b) 2 (c) 3 (d) 5

PART – B (5 x 2= 10Marks)

11. A random variable X have a uniform distribution over (-3, 3) Find mean value? CO1 App

12. What is the assumption of t-test? CO6- U

13. Compare and contrast LSD and RBD. CO6- U

14. If f(0) = 1, f(1) = 2, f(2) =1 and f(3) = 10 then then calculate the third difference. CO4-App

15. Using two –point Gaussian quadrature formula find $\int_0^1 \frac{dx}{1+x}$ CO5- App

PART – C (5 x 16= 80Marks)

16. (a) (i) The number of monthly breakdowns of a computer is a R.V. having a Poisson distribution with mean equal to 1.8. Find the Probability that his computer will function for a month (a)Without a breakdown (b) With only one breakdown (c) With at least one breakdown CO1- App (8)

(ii) Using an Geometric distribution State and Prove the memory less property. CO1- App (8)

Or

(b) (i) Define Geometric distribution. Find the moment generating function and Hence find mean and variance. CO1- App (8)

(ii) A RV X has the following distribution CO1- App (8)

x	0	1	2	3	4	5	6	7	8
P(X)	a	3a	5a	7a	9a	11a	13a	15a	17a

(i) Find the value of 'a'

(ii) Find $P(X < 3)$, $P(X \geq 3)$ & $P(1 < X < 5)$

17. (a) (i) A group of 10 rats fed on diet A and another group of 8 rats fed on diet B, recorded the following increase in weight. CO2- Ana (8)

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		

Find the variances are significantly different.

(ii) Two researchers A and B adopted different techniques while rating the students level. Can you say that the techniques adopted by them are significant? CO2- Ana (8)

Researchers	Below Average	Average	Above Average	Geniuss	Total
A	40	33	25	2	100
B	86	60	44	10	200
Total	126	93	69	12	300

Or

(b) (i) A company keeps records of accidents. During a recent safety review, a random sample of 60 accidents was selected and classifields by the day of the week on which they occurred. CO2- Ana (8)

Days	Mon	Tue	Wed	Thu	Fri
No.of. accidents	8	12	9	14	17

(ii) To verify whether a course in accounting improved performance, a similar test was given to 12 participants both before and after the course. The marks are: CO2- Ana (8)

Before	44	40	61	52	32	44	70	41	67	72	53	72
After	53	38	69	57	46	39	73	48	73	74	60	78

Was the course was useful?

18. (a) Analyze the variance in the latin square of yields(in kgs) paddy where P,Q,R,S denote the different methods of cultivation. CO3- Ana (16)

S122	P121	R123	Q122
Q124	R123	P122	S125
P120	Q119	S120	R121
R122	S123	Q121	P122

Or

(b) A company appoints 4 salesman A,B,C and D and observes their sales in 3 seasons: Summer, winter and Monsoon. The figures (in lakhs of Rs.) are given in the following table: CO3- Ana (16)

		A	B	C	B
Season	Summer	45	40	38	37
	Winter	43	41	45	38
	Monsoon	39	39	41	41

Carry out an analysis of Variance.

19. (a) (i) From the data given below, find the number of students whose weight lies between 60-70 CO4- App (8)

Weight in lbs	0-40	40-60	60-80	80-100	100-120
No. of Students	250	120	100	70	50

(ii) Using Lagrange's interpolation formula calculate the profit in the year 2000 from CO4- App (8)

year	1997	1999	2001	2002
Profit (Rs.in lakhs)	43	65	159	248

Or

(b) Fit a natural cubic spline for the following data CO4- App (16)

X	-1	0	1	2
Y	-1	1	3	35

20. (a) (i) Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ with 8 equal intervals by Trapezoidal rule and Simpson's 1/3rd rule. CO5- App (8)

(ii) Evaluate $\int_{0}^{1} \frac{dx}{1+x}$ by using Romberg's method correct to 3 decimal places CO5- App (8)

Or

(b) Evaluate $\int_{0}^{1}\int_{0}^{1} \frac{dxdy}{1+x+y}$ by (i). Trapezoidal (ii) Simpson's rule by taking h=k=0.25 CO5- App (16)