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

Question Paper Code: 94025

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Fourth Semester

Agriculture Engineering

19UMA425 - Probability, Statistics and Numerical Methods

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which of the following discrete distribution has equal mean and variance? CO6-R

   (a) Binomial (b) Poisson (c) Gamma (d) Uniform

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

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

3. The degrees of freedom in t-tests is CO6-U

   (a) n-1 (b) n-2 (c) n-3 (d) n-4

4. Chi-square test is very popularly known as a test of CO6-R

   (a) Independent of attributes (b) t- test (c) F-test (d) goodness of fit

5. Latin square design is a _____ CO6- U

   (a) One way (b) Two way c) Three way d) None of these

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

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

7. In Cubic Spline, M0=Mn= _____ CO6-U

   (a) 1 (b) n (c) 3 (d) 0

8. Newton's forward interpolation formula used only for _____intervals CO6-U

   (a) equal (b) unequal (c) equal and unequal (d) none of these

9. Trapezoidal rule is so called, because it approximates the integral by the sum of _____trapezoids CO6-U

(a) n (b) n+1 (c) n-1 (d) 2n

10. In Simpson's 3/8 rule the number of subintervals should be_____ CO6-U

(a) multiple of 1 (b) multiple of 2 (c) multiple of 3 (d) All of these

PART – B (5 x 2= 10Marks)

11. A Continuous random variable with density function is given by CO1-App

$f(x) = 6x(1-x), 0 \le x \le 1$ Check the above is PDF or not.

12. Give two types of errors in testing a statistical hypothesis CO6-U

13. For a one way classification on 12 observations involving 3 treatments the sum of squares of treatment and sum of squares of total are 8 and 36 respectively, compute the value of the F – ratio. CO3-App

14. State Lagranges interpolation formula for three set of values (X_0,Y_0) , (X_1,Y_1) and (X_2,Y_2) are given CO6-U

15. Evaluate using two –point Gaussian quadrature formula $\int_{-1}^{1} (3x^2 + 5x^4)\, dx$ CO5-App

PART – C (5 x 16= 80Marks)

16. (a) Define Gamma distribution. Find the moment generating function and Hence find mean and variance. CO1-App (16)

Or

(b) (i) Using the probability mass function for Binomial distribution, Compute the moment generating function and hence find its mean and variance. CO1- App (8)

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

17. (a) (i) Two independent samples of sizes 9 and 7 from a normal population had the following values of the variables. CO2-App (8)

Sample I	18	13	12	15	12	14	16	14	15
Sample II	16	19	13	16	18	13	15		

(ii) Two horses A and B were tested according to time (in seconds) to run on a particular track with the following results: CO2-App (8)

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

Test whether horse A is running faster than B at 5% level..

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-U (16)

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

Or

(b) Four varieties A, B, C, D of a fertilizer are tested in a randomized block design with 4 replication. The plot yields in pounds are as follows. CO3-App (16)

	1	2	3	4
1	A(12)	D(20	C(16)	B(10
2	D(18)	A(14	B(11)	C(14
3	B(12)	C(15	D(19)	A(13
4	C(16)	B(11	A(15)	D(20

Analyze the experimental yield.

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) Evaluate $\int_0^1 \frac{dx}{1+x}$ by using Romberg's method correct to 3 decimal places CO5-App (16)

Or

(b) Evaluate $\int_0^1 \int_0^1 e^{-(x+y)} dxdy$ by (i). Trapezoidal (ii) Simpson's rule by taking h=k=0.5 CO5- App (16)