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Question Paper Code: 94025

B.E./B.Tech. DEGREE EXAMINATION, MAY 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. The r^{th} moment about origin is CO6-R
(a) $\mu(X)$ (b) $\mu(X^2)$ (c) $\mu(X^r)$ (d) None of the above
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. Lagrange's interpolation formula can be used for _____ interval CO6-U
(a) equal (b) unequal (c) equal and unequal (d) none of these
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. Using Probability mass function, Compute the mean value for the following distribution. CO1-App

X	-2	-1	0	1
P(X)	0.4	0.1	0.2	0.3

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) A Random Variable X has the following probability distribution CO1-App (16)

X=x	0	1	2	3	4	5	6	7
P(X=x)	0	a	2a	2a	3a	a ²	2a ²	7a ² +a

Find (i) ‘a’

(ii) $P(X < 6)$, $P(X \geq 6)$, $P(0 < X < 4)$,

(iii) $P(X < 6 / X > 4)$

(iv) Find the minimum value of ‘ λ ’ such that $P(X \leq \lambda) > \frac{1}{2}$

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) Five coins are tossed 256 times. The number of heads observed is given below. Examine if the coins are unbiased, by employing χ^2 goodness of fit. CO2-App (8)

No of Heads	0	1	2	3	4	5
Frequency	5	35	75	84	45	12

- (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 classified 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) Analyse the following is a Latin square of a design. CO3-U (16)

A 105	B 95	C 125	D 115
C 115	D 125	A 105	B 105
D 115	C 95	B 105	A 115
B 95	A 135	D 95	C 115

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)

Analyse 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 $\int_0^1 \int_0^1 \frac{dxdy}{1+x+y}$ by (i). Trapezoidal (ii) Simpson's rule by taking $h=k=0.25$ CO5-App (16)

Or

- (b) (i) Evaluate. $\int_1^5 \frac{dx}{x}$ Using three point Gaussian quadrature formula. CO5- App (8)

- (ii) Evaluate the integral $\int_1^2 \frac{dx}{x^2+1}$ using Trapezoidal rule and Simpson's 1/3rd rule CO5- App (8)