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

Question Paper Code: 54025

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Agriculture Engineering

15UMA425 - PROBABILITY,STATISTICS AND NUMERICAL METHODS

(Regulation 2015)

(Statistical tables maybe permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The mean of Binomial distribution is _____ CO1- R

   (a) np (b) npq (c) nq (d) q

2. If the random variable X has uniform distribution in (-3,3) , then its mean is CO1- App

   (a) 2 (b) 1.96 (c) 3 (d) 0

3. When do you say the sample is large, When n=? CO2-R

   (a) <30 (b) >30 (c) 0 (d) None of these

4. Choose the F-test CO2- App

   (a) $F = S_1^2 / S_2^2$ (b) $F = S_2^2 / S_1^2$ (c) F = 0 (d) None of the above

5. The number of factors analysed in Completely Randomised Block Design is CO3- R

   (a) Two (b) One (c) Three (d) Four

6. The number replications of each treatment and the number of treatments in LSD is CO3- R

   (a) Equal (b) Unequal (c) Equal to two (d) Equal to one

7. In Newton's forward formula, u=. CO4-R

   (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. The value of any divided difference is _____ of the order of the arguments. CO4- R

(a) equal (b)dependent (c) unequal (d) independent

9. Degree of y(x) in Simpson's one third rule is_____ CO5- R

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

10. Truncation error in Trapezoidal rule is of the order ___. CO5- R

(a) h^3 (b) h^2 (c) h^4 (d) 0

PART – B (5 x 2= 10Marks)

11. State memory less property. CO1- R

12. Define Type- I error and Type – II error. CO2- R

13. Why a 2x2 Latin square is not possible? Explain. CO3- U

14. State Cubic Spline formula CO4- App

15. State Romberg's method formula. CO5- R

PART – C (5 x 16= 80Marks)

16. (a) A RV X has the following distribution CO1- App (8)

x	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find the value of 'k'
Find P (X<6) and
P[1.5<X<4.5/X>2]

(ii) Derive MGF, Mean & Variance of Poisson distribution. CO1- App (8)

Or

(b) (i) The pdf of CO1- App (8)

$$f(x,y) = \begin{cases} ax & ,0 \le x \le 1 \\ a & ,1 \le x \le 2 \\ 3a - ax & ,2 \le x \le 3 \\ 0 & ,\text{Otherwise} \end{cases}$$ then find 'a' and cumulative distribution function of X.

(ii) The time (in hours) required to repair a machine is exponentially distributed with parameter $\lambda = 1/2$. CO1- App (8)

(1) What is the probability that the repair time exceeds 2 hours?

(2) What is the conditional probability that a repair takes at least 10 hours given that its duration exceeds 9 hours?

17. (a) (i) The means of two simple large samples of 1000 and 2000 members are 67.5 inches and 68 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation of 2.5 inches? Test at 5% level of significance. CO2- App (8)

(ii) The mean height and the standard deviation height of eight randomly chosen soldiers are 166.9 cm. and 8.29 cm. respectively. The corresponding values of six randomly chosen sailors are 170.3cm and 8.50cm. respectively. Based on this data, can we conclude that soldiers are, in general, shorter than sailors at 5% level of significance? CO2- App (8)

Or

(b) (i) The following table gives the number of air-craft accidents that occurred during the various days of a week. Test whether the accidents are uniformly distributed over the week at 5% level of significance. CO2- Ana (8)

Day	Mon	Tues	Wed	Thu	Fri	Sat
No. of accidents	15	19	13	12	16	15

(ii) A sample of size 13 gave an estimated population variance of 3.0, while another sample of size 15 gave an estimate of 2.5. Could both samples be from populations with the same variance at 5% level of significance? CO2- Ana (8)

18. (a) In order to determine whether there is significant difference in the durability of 3 makes of computers, samples of size 5 are selected from each make and the frequency of repair during the first year of purchase is observed. The results are as follows: CO3- Ana (16)

Makes		
A	B	C
5	8	7
6	10	3
8	11	5
9	12	4
7	4	1

Analyse the above data

Or

(b) The following is the Latin square lay out of a design when 4 varieties of seeds are being tested. Set up the analysis of variance table and state your conclusion — CO3- Ana — (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

19. (a) (i) Find the value of y at x = 8 by Newton's divided difference formula from the following data: — CO4- App — (8)

x	4	5	7	10	11	13
y	48	100	294	900	1210	2028

(ii) The population of a town in the census is as given in the data. Estimate the population in the year 1996 using Newton's backward interpolation — CO4- App — (8)

Year (x) : 1961 1971 1981 1991 2001

Population (in 000's) : 46 66 81 93 101

Or

(b) (i) From the following table find f(x) and hence find f(6) using Newton's divided difference formula. — CO4- App — (8)

x: 1 2 7 8

$f(x)$: 1 5 6 4

(ii) Using cubic spline, find y(0.5) and y'(1) given $M_0 = M_2 = 0$ and the table — CO4- App — (8)

X	0	1	2
Y	-5	-4	3

20. (a) (i) Evaluate $\int_4^{4.4} \int_2^{2.6} \frac{dydx}{xy}$ by Simpson's rule taking $\Delta x = 0.1$, $\Delta y = 0.15$. — CO5-App — (8)

(ii) Evaluate $\int_4^{4.4} \int_2^{2.6} \frac{dydx}{xy}$ numerically by Trapezoidal rule with h=0.1and k = 0.15. — CO5- E — (8)

Or

(b) Evaluate $\int_1^{1.4} \int_2^{2.4} \frac{1}{xy}\, dxdy$ by using Trapezoidal and Simpson's rules, assuming h = 0.1 and k = 0.1. — CO5- E — (16)

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