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Question Paper Code:U3M24

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Third Semester

Electrical and ElectronicsEngineering

21UMA324-PROBABILITY, STATISTICS, COMPLEX ANALYSIS AND NUMERICAL METHODS

(Regulations2021)

Duration: Three hours Maximum: 100 Marks

Answer All Questions

PART A - (10x 1 = 10Marks)

1. Large sample size is _____ CO6-U

   (a) 30 (b) >30 (c) < 30 (d) none of the above

2. The degrees of freedom for the sample size n= 25 in t test is _____. CO6- U

   (a) 20 (b) 22 (c) 24 (d) 26

3. If A and B are independent events then $P(A \cap B)$ = CO6- U

   (a) 0 (b) P (A). P(B) (c) P (A). P(B) (d) P(A) – P(B)

4. The r^{th}moment about origin is CO6- U

   (a) $\mu(X)$ (b) $\mu(X^2)$ (c) $\mu(X^r)$ (d) None of the above

5. When Gauss Jordan method is used to solve AX=B, A is transferred in a _____ matrix. CO6- U

   (a) diagonal (b) identity (c) square (d) zero

6. Newton's method also called _____ method CO6- U

   (a) tangents (b) slope (c) secants (d) false

7. In Euler's method, if h is small, the method is too _____ CO6- U

   (a) fast (b) slow (c) average (d) None of these

8. _____ prior values are required to predict the next value in Milne's method CO6- U

(a) 1 (b) 2 (c) 3 (d) 0

9. Simple pole is a pole of order _____ CO6- U

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

10. Find the order of pole z=0 of the following functions $f(z)=\frac{e^z}{z}$ CO6- U

(a)0 (b)3 (c)2 (d)1

PART – B (5 x 2= 10Marks)

11. The theory predicts the population of beans in the four groups A, B, C and D should be 6:4:3:2. In an experiment among 1200 beans, Compute the expected frequencies. CO1- App

12. The mean and standard deviation of the binomial distribution 20 and 4 respectively, Calculate the value of the parameter 'n'. CO2- App

13. State the principle used in Gauss Elimination Method. CO6- U

14. Write down the fourth order RungeKutta algorithm CO6- U

15. Expand $\log(1+z)$ as a Taylor's series. CO5 App

PART – C (5 x 16= 80Marks)

16. (a) Two researchers A and B adopted different techniques while rating the student's level. Identify the Sampling distribution; Can you say that the techniques adopted by them are significant? CO1-Ana (16)

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

Or

(b) Two independent samples of sizes 9 and 7 from a normal population had the following values of the variables. CO1 -Ana (16)

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

Identify the sampling distribution, Do the estimates of the population variance differ significantly.

17. (a) A Random Variable X has the following probability distribution CO2 -App (16)

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

Find (i) 'K'

(ii) $P(X<6)$, $P(X\geq 6)$ & $P(1.5<X<6.5/X>5)$

(iii) If $P(X\leq x)>\frac{1}{2}$,Find the minimum value of 'x'

(iv) Distribution function of x. (V) E(X)

Or

(b) (i) A Random Variable X has the following probability distribution CO2 -App (8)

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

Using the probability mass function, calculate the following

(i) 'a'

(ii) P(X < 3), P(X ≥ 3)

(iii) (0 < X < 5)

(iv) distribution function.

(ii) State and Prove the memory less property for an Exponential distribution. CO2 -App (8)

18. (a) (i) Solve the equation e^x -3x = 0 by iteration method CO3- App (8)

(ii) Solve 27x + 6y – z = 85, 6x + 15y +2z = 72, x + y + 54z =110 by Gauss Jacobi Method. CO3- App (8)

Or

(b) (i) Using Power method find numerically largest Eigen value of CO3- App (8)

$$\begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix}$$

(ii) Solve 27x + 6y – z = 85, 6x + 15y +2z = 72, x + y + 54z =110 by Gauss Seidel method. CO3- App (8)

19. (a) Using R-K method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $\mathbf{y(0) = 1}$ at $x = 0.2$, $x = 0.4$ — CO4-App (16)

Or

(b) Using Adam's Bash forth Predictor-Corrector method, find y(4.4) given that $5xy' + y^2 = 2$, $y(4) = 1$, $y(4.1) = 1.0049$, $y(4.2) = 1.0097$ and $y(4.3) = 1.0143$ — CO4-App (16)

20. (a) Evaluate: $\int_{-\infty}^{\infty} \frac{\mathbf{x^2}}{\mathbf{(x^2+4)(x^2+9)}}\mathbf{dx}$, using contour integration. — CO5- App (16)

Or

(b) (i) Evaluate using Cauchy's Integral formula for f(z) = $\int_C \frac{2z-1}{z(z+1)(z-3)}dz$, where 'C' : $|z| = 2$. — CO5- App (8)

(ii) Find the Laurent's series of f(z) = $\frac{7z-2}{z(z+1)(z-2)}$ valid in the region $1 < |z+1| < 3$ — CO5- App (8)