A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U3024

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

Third Semester

Electrical and Electronics Engineering

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

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (10x 1 = 10 Marks)

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 rth 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   CO6- U
   _____ matrix.

   (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 $f(z) = \dfrac{e^z}{z}$ 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.

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

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

<center>Or</center>

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

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) $P(X<3), P(X \geq 3)$

       (iii) $(0 < X < 5)$

       (iv) distribution function.

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

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

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

<center>Or</center>

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

19. (a) Using R-K method of fourth order, solve $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$ with   CO4-App   (16)

y(0) = 1 at $x = 0.2$, $x = 0.4$

Or

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

$y(4.2) = 1.0097$ and $y(4.3) = 1.0143$

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

Or

(b) (i) Evaluate using Cauchy's Integral formula for   CO5- App   (8)

$f(z) = \displaystyle\int_{C} \dfrac{2z - 1}{z(z + 1)(z - 3)} \, dz$, where 'C' : $|z| = 2$.

(ii) Find the Laurent's series of $f(z) = \dfrac{7z - 2}{z(z + 1)(z - 2)}$ valid in   CO5- App   (8)

the region $1 < |z + 1| < 3$

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