**A**  Reg. No. : ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

## Question Paper Code: 93024

B.E./B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Electrical and Electronics Engineering

19UMA324- Probability, Statistics, Complex Analysis and Numerical Methods

(Regulation 2019)

Duration: Three hours                                    Maximum: 100 Marks

Answer All Questions

PART A - (10x 1 = 10 Marks)

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

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

2.  Large sample size is                                                        CO6- U

    (a) 30               (b) >30             (c) <30             (d) none of these

3.  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

4.  Which of the following discrete distribution has equal mean and variance?    CO6- U

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

5.  Iteration method converges if $|g^1(x)|$ _____                          CO6- U

    (a) >1               (b)<1               (c)=0               (d) >0

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

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

7.  Taylor Series method will be very useful to give some _____ values for RK,   CO6- U
    Milne's and Adam's methods

    (a) initial          (b)final            (c)intermediate     (d) two

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

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

9. If f(z) is analytic at all points inside and on a simple closed curve c, then $\qquad$ CO6- U

$$\int_c f(z)\,dz = \text{------}$$

(a) 2πi        (b) -2πi        (c) 4πi        (d) 0

10. The poles of z cot z is _____        CO6- U

(a) 0        (b) ± nπ        (c) 1        (d) π

### PART – B (5 x 2= 10Marks)

11. Define Chi-square test of goodness of fit.        CO1- R

12. For Binomial distribution mean is 6 and variance is 2,Find P[X=x].        CO2- App

13. Write the condition of convergence of Newton's method.        CO3- U

14. Using Taylor's series method find $y(1.1)$ given $y' = x + y$ with $y(1) = 0$        CO4- App

15. Evaluate $\int_c \frac{z}{z-2}\,dz$ where C is $|z| = 2$        CO5 App

### PART – C (5 x 16= 80Marks)

16. (a) (i) The following data are collected on two characters.        CO1- Ana        (8)

|  | Smokers | Non Smokers |
|---|---|---|
| Literates | 83 | 57 |
| Illiterates | 45 | 68 |

Using chi-square test to find is there any relation between smoking and literacy.

(ii) A random sample of 16 values from a normal population showed a mean of 41.5 inches and the sum of squares of deviations from this mean equal to 135 square inches. Show that the assumption of a mean of 43.5 inches for the population is not reasonable. Obtain 95 percent and 99 percent fiducial limits for the same.        CO1- Ana        (8)

Or

**93024**

(b) (i) A group of 10 rats fed on diet A and another group of 8 rats   CO1 - Ana   (8)
fed on diet B, recorded the following increase in weight.

| Diet A | 5 | 6 | 8 | 1 | 12 | 4 | 3 | 9 | 6 | 10 |
|--------|---|---|---|---|----|---|---|---|---|----|
| Diet B | 2 | 3 | 6 | 8 | 10 | 1 | 2 | 8 | | |

Find the variances are significantly different.

(ii) Two researchers A and B adopted different techniques while   CO1 -Ana   (8)
rating the student'slevel. Can you say that the techniques adopted
by them are significant?

| 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 |

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 | a | 2a | 2a | 3a | $a^2$ | $2a^2$ | $7a^2+a$ |

Find (i) The value of '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 ' $\lambda$ 'such that $P(X \leq \lambda ) > \frac{1}{2}$.

Or

(b) Define Poisson distribution. Find the moment generating function   CO2 -App   (16)
and Hence find mean and variance.

18. (a) (i) Using Newton's Raphson method find the real positive root of   CO3- App   (8)
$x^4 - x - 10 = 0$.

(ii) Solve $4x + 2y + z = 14$, $x + 5y - z = 10$, $x + y + 8z = 20$ by   CO3- App   (8)

Gauss Elimination method.

Or

(b) (i) Solve 4x + 2y +z = 14, x + 5y -z = 10, x + y + 8z =20 by Gauss Seidel method.     CO3- App    (8)

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

$$\begin{pmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{pmatrix}$$

19. (a) (i) Using Taylor's series method find y(0.1) for $\dfrac{dy}{dx} = x^2 y - 1$, y(0) = 1     CO4-App    (8)

(ii) Given $\dfrac{dy}{dx} = 1 + y^2$, y(0) =0 , y(0.2) = 0.2027 , y(0.4) =0.4228, y(0.6) = 0.6841 evaluate y( 0.8 ) by Adams – Bash forth Method.     CO4-App    (8)

Or

(b) (i) Using R-K method of fourth order, solve $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2$     CO4 -App    (8)

(ii) Using Milne's method find y(4.4) given $5xy' + y^2 - 2 = 0$ given

y (4) = 1, y(4.1) = 1.0049, y(4.2)= 1.0097 and y(4.3)= 1.0143     CO4 -App    (8)

20. (a) (i) Evaluate using Cauchy's Integral formula for     CO5- App    (8)

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

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

Or

(b) (i) Evaluate: $\displaystyle\int_{-\infty}^{\infty} \dfrac{x^2}{(x^2 + 4)(x^2 + 9)} dx$ , using contour integration.     CO5- App    (8)

4

**93024**

(ii) Evaluate $f(z) = \dfrac{1}{(z+1)(z+3)}$ in Laurent series valid for the region

$1 < |z| < 3.$

CO5- App     (8)

**93024**