UNIT-IV

8. a. The following table gives angular displacement θ at different intervals of time t. **8M**

θ	0.052	0.105	0.168	0.242	0.327	0.408	0.489
t	0	0.02	0.04	0.06	0.08	0.1	0.12

Find $\frac{d\theta}{dt}, \frac{d^2\theta}{dt^2}$ at $t = 0$.

b. Find the value of $\int_0^1 \left(\frac{1}{1+x^2}\right) dx$ taking 5 sub intervals by Trapezoidal rule correct to 4 decimal places. Also compare it with its exact value. **7M**

(or)

9. a. Given $\frac{dy}{dx} - \sqrt{xy} = 2$ and $y(1) = 1$. Find the value of $y(1.5)$ in steps of 0.25 using Euler's modified method. **7M**

b. Use Runge - Kutta method to solve $10\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ for the interval $0 < x \leq 0.4$ with $h = 0.2$. **8M**

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 Reg. No: | | | | | | | | | | |

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, MARCH, 2021

Third Semester

17MA1301A COMPLEX ANALYSIS AND NUMERICAL METHODS

(CE/EC/EI/IT)

Time: 3hours ***Max. Marks: 70***

Part-A is compulsory

Answer One Question from each Unit of Part-B

Answer to any single question or its part shall be written at one place only

PART-A

10 x 1 = 10M

1. a. Define analytic function.
   b. Show that $f(z) = z$ is analytic function.
   c. Write Cauchy's integral formula.
   d. Expand e^z about $z = 0$ in Taylor's series expansion.
   e. Find the fixed points for the function $w = \frac{1+z}{1-z}$.
   f. Find the relation between Δ and E.
   g. Define algebraic and transcendental equations.
   h. Find $y(0.2)$ by Euler's method, given $\frac{dy}{dx} = x + y$, $y(0) = 0$, choose $h = 0.2$.
   i. Define Laplace equation.
   j. Write Simpson's -1/3 rule formula.

PART-B

4 x 15 = 60M

UNIT-I

2. a. Show that $f(z)=\sqrt{|xy|}$ is not analytic at z = 0, although the C-R equations are satisfied at the origin. **8M**

   b. Find the analytic function f(z) whose real part is $u(x, y) = x^3 - 3y^2$. **7M**

(or)

3. a. Evaluate $\int_C (z+1)\,dz$, where c is the boundary of the square whose vertices are at the points z = 0, z = 1, z = 1 + i, z = i. **8M**

   b. Evaluate $\int_C \frac{z}{z^2+1}\,dz$, where c is the circle $\left|z+\frac{1}{2}\right|=2$. **7M**

UNIT–II

4. a. Find Laurent's series of $f(z)=\frac{1}{z^2-4z+3}$ for

   i) $1<|z|<3$ ii) $|z|>3$ **8M**

   b. Evaluate $\int_C \frac{z\sec z}{(1-z)^2}\,dz$ where C is the circle $|z|=2$. **7M**

(or)

5. a. Evaluate $\int_0^{2\pi} \frac{1}{2+\cos\theta}\,d\theta$. **8M**

   b. Find the bilinear transformation which maps the points z = -1, i, 1, into the points w = 1, i, -1. **7M**

UNIT-III

6. a. Find the real root of the equation $x^3 - x - 2 = 0$ by Newton-Raphson method. **7M**

   b. Solve the system of equations
   -20x + y - 2z = 17, 3x + 20y + z = 18, 2x - 3y + 20z = 25 using Gauss-Seidel iteration method. **8M**

(or)

7. a. Use Gauss forward formula to find y when x = 3.75 from the following data **8M**

x	2.5	3	3.5	4	4.5	5
y	24.145	22.043	20.225	18.644	17.262	16.047

   b. Using Lagrange's interpolation formula, find the form of the function f(x) from the following table **7M**

x	0	1	3	4
f(x)	-12	0	12	24