Code No.: MA304BS | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) -February- 2024
LAPLACE TRANSFORMS, NUMERICAL METHODS & COMPLEX VARIABLES
(ECE)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) Find the Laplace transform of $\cos^2 2t$. [2M]
b) Solve $L\left\{\frac{\sin t}{t}\right\}$. [2M]
c) Write the newton's backward interpolation formulae. [2M]
d) Write Lagrange's interpolation formulae. [2M]
e) Write the formula for fourth-order runge-kutta method. [2M]
f) Given $\frac{dy}{dx} = -xy^2$,y(0)=2. Compute y(0.2) in steps of 0.1 using Euler's method. [2M]
g) State Cauchy-Riemann equations. [2M]
h) Define analytic function. [2M]
i) Expand $f(z) = sinz$ in Taylor's series about $z = \frac{\pi}{4}$. [2M]
j) State Cauchy's Residue theorem. [2M]

PART-B **(50 Marks)**

2. Find $L^{-1}\left[\log\left(\frac{s+3}{s+4}\right)\right]$. [10M]

OR

3. Using Convolution theorem $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$. [10M]

4. Find a real the real root of the equation $x^3 - 6x + 4 = 0$ by Newton Raphson method. [10M]

OR

5. Using Newton Forward interpolation formula, compute the value of $\sqrt{5.5}$, given that $\sqrt{5}$=2.236 , $\sqrt{6}$=2.449 , $\sqrt{7}$=2.646 and $\sqrt{8}$=2.828. Correct up to three decimal places. [10M]

6. Evaluate $\int_0^6 \frac{1}{1+x^2}dx$ by Trapezoidal, Simpson's $\frac{1}{3}$ Rule and Simpson's $\frac{3}{8}$ Rule. [10M]

OR

7. Using Runge Kutta method of fourth order Solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$, y(0)=1. compute y(0.2) and y(0.4). [10M]

8. Verify whether the function f(x)= $\frac{x-iy}{x+iy}$ is analytic or not. [10M]

OR

9. Show that both real and imaginary parts of an analytic function are harmonic. [10M]

10. Evaluate $\oint \frac{e^{2z}}{(z+1)^4}dz$ around C:|z-1|=3 using Cauchy's integral formula. [10M]

OR

11. Find the Laurent series expansion of f(z) = $\frac{z^2-1}{(z+2)(z+3)}$ if 2<|z|<3. [10M]

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