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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - February- 2023
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 $L\{e^{at}\}$ [2M]
   b) Find $L^{-1}\left\{\frac{s}{(s^2+a^2)(s^2+b^2)}\right\}$ [2M]
   c) Apply bisection method find a positive root of the equation $x^3-4x-9=0$. [2M]
   d) Explain Central difference interpolation. [2M]
   e) Explain Simpson s 1/3 rd rule. [2M]
   f) Summarize the formula for Picard's method. [2M]
   g) Explain Analytical function. [2M]
   h) Show that $f(z) = Z + 2\bar{z}$ is not analytic anywhere in the complex plane. [2M]
   i) Illustrate Laurent's Series. [2M]
   j) Explain Liouville's theorem. [2M]

PART-B **(50 Marks)**

2. State convolution theorem and apply convolution theorem to evaluate $L^{-1}\left[\frac{1}{(s^2+1)(s^2+4)}\right]$ [10M]

OR

3. Solve $(D^2-3D+2)y=1-e^{2t}, y=1, \frac{dy}{dt}=0$ when t=0 using Laplace transforms. [10M]

4. Write the difference between Newton's forward and Newton's backward interpolation formula and also find f(22) from gauss forward formula. [10M]

x	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

OR

5. Write Lagrange's interpolation formula? Using Lagrange's interpolation formula, find the value of y(3) from the following table. [10M]

x	0	1	2	4
y	580	556	520	385

6. Evaluate [10M]

$$\int_0^4 e^x \, dx$$

using Trapezoidal and Simpson's rule.

OR

7. Using R-K method of order 4 find y for x = 0.1,0.2 given that $y' = xy + 1, y(0) = 1$ [10M]

8. Show that the function $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}$ if $z \neq 0$ [10M]

and f(z)= 0 if z=0 is continuous and the Cauchy – Riemann equations are satisfied at the origin, yet derivative of f does not exist.

OR

9. Find k such that $f(x,y) = x^3 + 3k\,x\,y^2$ may be harmonic and find its conjugate. [10M]

10. State Cauchy s integral formula and also find [10M]

$$\int \frac{z}{z^2 + 1} dz$$

Where c is $|z + 1/z| = 2$.

OR

11. Expand f (z) =sin z in Taylor s series about $z = \pi/4$ and $z = \pi/2$. [10M]

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