Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(ME) (Sem–5)

MATHEMATICS-III

Subject Code : BTAM-500

M.Code : 70601

Date of Examination : 06-06-2023

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.**

SECTION-A

1. Write briefly :

a) Define periodic function with the help of an example.

b) When a function is said to be odd? Give an example.

c) Find inverse Laplace transformation of $f(s) = \frac{1}{s-2}(e^{-35})$.

d) Define convolution theorem related to Laplace transformation.

e) Define Bessel differential equation of order n .

f) Find the partial differential equation by eliminating arbitrary function f from $z = f(x^2 - y^2)$

g) Write Cauchy- Riemann equations in cartesian form.

h) Show that $u = e^x \cos y$ is a harmonic function.

i) Evaluate $\int_0^{1+3i} z^2 dz$

j) Discuss the singularities of $\frac{\sin z}{(\pi - z)^2}$

SECTION-B

2. Express Sin x as half range cosine series when $0 < x < \pi$.

3. Solve $(2D^2 - 5DD' + 2D'^2)\, z = 24(y - x)$

4. Expand $\log (1 + z)$ in a Taylor series about $z = 0$.

5. Verify that the Bessel function $J_{\frac{1}{2}}(x)$ satisfies the Bessel equation of order ½.

6. Solve the initial value problem $y' + 3y = e^{2t}$, $y(0) = 1$ by Laplace transformation.

SECTION-C

7. Under the transformation $w = \frac{1}{z}$ find the image of $|z - 2i| = 2$.

8. Solve $(D^2 - 2DD' + D'^2)\, z = e^{x+2y} + x^3$

9. Find the residue of $\frac{z^3}{(z-2)(z-3)(z-1)^4}$ at $z = 1, 2, 3$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.