CT Inst. of E

Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (AE)/(IE-2008 Batch)/(ME-2005 to 2010 Batches) (Sem.-4th)

MATHEMATICS-III Subject Code : AM-201

Subject Code : AM-201

Paper ID : [A0865]

Time: 3 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES :

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

#### SECTION-A

## 1. Answer briefly:

- (a) Write the Euler's formulae for the fourier series of a function f(x) in  $(-\pi, \pi)$ .
- (b) What can you say about the period of a constant function?
- (c) Find L[t eat sin at].
- (d) State the change of scale property for Laplace transforms.
- (e) What is the Generating function for  $J_n(x)$ ?
- (f) Define a partial differential equation.
- (g) Solve :  $\frac{y^2z}{x}p + xzq = y^2$ .
- (h) Show that an analytic function with constant real part is constant.
- (i) Define a conformal mapping.
- (j) Find the residue of  $\frac{z}{z^2+1}$  at the pole Z=i.

# SECTION-B

- 2. Expand  $f(x) = \sqrt{(1-\cos x)}$ ,  $0 < x < 2\pi$  in evaluate  $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \dots$
- 3. Use the concept of Laplace transforms to solve t  $(D^2 + D)x = 2 \text{ when } x_0 = 3, x_1 = 1.$
- 4. With usual notations, show that,

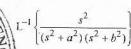
$$J_n(x) = \frac{x}{2n} [J_{n-1}(x) + J_{n+1}(x)]$$

- 5. A tightly stretched string with fixed end points x in a position given by  $y = y_0 \sin^3 \left(\frac{\pi x}{I}\right)$ . If it is this position, find the displacement y(x, t).
- 6. If f(z) = u + iv is an analytic function, prove tha

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \log |f(z)| = 0.$$

### SECTION-C

7. State the convolution theorem for Laplace tr evaluate,



. Solve in series the equation.

$$9x(1-x)\frac{d^2y}{dx^2} - 12\frac{dy}{dx} + 4y = 0$$

Use the concept of contour integration to evaluate

$$\int_{0}^{\infty} \frac{x^2 - x + 2}{x^4 + 10x^2 + 9} \, dx$$

[N-(S-2) 9A