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

Paper ID : [A0865]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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. 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 $L[t\, e^{at} \sin at]$.

(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 : $\frac{y^2 z}{x} p + xzq = y^2$.

(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 $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \ldots$

3. Use the concept of Laplace transforms to solve t

$(D^2 + D)x = 2$ 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 $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. 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,

$$L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$$

8. Solve in series the equation,

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

9. Use the concept of contour integration to evaluate

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