Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐ **Total No. of Pages : 03**

Total No. of Questions : 09

B.Tech. (CE/ECE/EE/EEE/ETE/Electronics & Computer Engg.)
(Sem.–3rd) (2011 Batch)

ENGINEERING MATHEMATICS-III

Subject Code : BTAM-301

Paper ID : [A1128]

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 has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

l. Write briefly :

a. State by giving reasons whether cotx can be expanded in the fourier series in the interval $-\pi \le x \le \pi$?

b. Find half range sine series for x in \

c. State the sufficient condition for existence of Laplace transform.

d. Find Laplace transform of $\dfrac{e^{-t}\sin t}{t}$.

e. Define ordinary and singular point for a second order Linear differential equation.

f. Express $2 + 3x - x^2$ in terms of Langendre polynomials.

g. Form the Partial Differential Equation by eliminating arbitrary function from $z = x^n f(y/x)$.

h. Solve the Partial Differential equation $yzp - xzq = xy$, where

$$p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}$$

i. Show that f (z) = sin z is analytic, in the finite z-plane.

j. Evaluate the integral $\int_C \frac{dz}{z^2 - 1}$ **;** where C is the circle |z| = 2.

SECTION-B

2. Find Fourier series for $f(x) = \frac{\pi - x}{2}$ in the interval (0, 2π). Also deduce

that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + ...$

3. Solve the following differential equation **by** Laplace Transform method

$$\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = e^t, \qquad x = 2, \frac{dx}{dt} = -1 \text{ at } t = 0$$

4. Solve $\frac{\partial^2 z}{\partial x^2} - 6\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = 6x + 2y$

5. Prove that $(n+1)P_{n+1}(x) = (2n+1)xP_n(x) - nP_{n-1}(x)$

6. Find the analytic function whose imaginary part is cos x cosh y

SECTION-C

7. Find series solution of the function

$$\left(1-x^2\right)\frac{d^2y}{dx^2}-2x\frac{dy}{dx}+2y=0$$

8. A tightly stretched string has its ends fixed at $x = 0$ and $x = l$. At time t = 0 the string is given a shape defined by $f(x)=\mu x(l-x)$ where μ is a constant, if it is released from rest from this position, find the displacement of any point x of the string at any time $t > 0$.

9. (a) If f(z) = u + iv is an analytic function . Find f(z) if

   $u + v = e^x$ (cos y–sin y)

   (b) Show that circles are mapped on to circles under the mapping $w=\frac{1}{z}$.