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

Total No. of Questions : 09

B.Tech.(CE/ECE/EE/Electrical & Electronics/Electronics & Electrical/ ETE)/(Electronics & Computer Engg.)(2011 Onwards)

B.Tech. (Electrical Engineering & Industrial Control)/Electronics Engg. (2012 onwards) (Sem.–3)

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

1. **Write briefly :**

(a) Find , L $(4^t + t \sin t)$.

(b) State and prove the change of scale properties of Laplace transforms.

(c) Find the residue at z = 0 of $f(z) = z \cos \frac{1}{z}$.

(d) State any one important property of analytic functions.

(e) State the three possible solutions for the Heat equation,

$$\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2}$$

(f) Write the formulae for finding the half range cosine series for the function f(x) in the interval (0,2).

(g) State Dirichlet's conditions for the expansion of f(x) as a Fourier series in the interval $(0, 2\pi)$.

(h) Expand e^z in Taylor's series about the point z = a.

(i) Form the partial differential equation from, $(x - a)^2 + (y - b)^2 = z^2 \cot^2\alpha$ where α is a parameter.

(j) Write the solution of the differential equation,

$P_0(x)\, y'' + P_1(x)\, y' + P_2(x)\, y = 0$, when the roots of the indicial equation are equal.

SECTION-B

2. Solve $y''' - 3y'' + 3y' - y = t^2e^t$ where $y(0) = 1$, $y'(0) = 0$ and $y''(0) = -2$ by using Laplace transforms.

3. Expand, $f(z) = \dfrac{1}{(1-z)(z-2)}$ in Laurent's series valid for the regions,

   (i) 1 < ? z ? < 2

   (ii) ?z ? > 2

4. Find the Fourier series of, $f(x) = x + x^2$ in the range $[-\pi, \pi)$.

5. With usual notation , prove that, $J_{\frac{1}{2}}(x) = \sqrt{\dfrac{2}{\pi x}} \sin x.$

6. Solve the partial different equation, $(y + zx)p - (x + yz)q = x^2 - y^2$.

SECTION-C

7. Use the concept of residues to evaluate, $\int_0^{2\pi} \dfrac{dx}{a + b\sin x'}\; a > b.$

8. A string of length l is stretched and fastened to two fixed points. Find the solution of the one dimensional wave equation when initial displacement,

   $y(x, 0) = f(x) = b \sin \dfrac{\pi x}{l}.$

9. Solve in series , $x\dfrac{d^2y}{dx^2} - 3\dfrac{dy}{dx} + xy = 0$.