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

Total No. of Questions : 09

B.Tech.(CE)/(ECE)/(EE)/(Electrical & Electronics)/
(Electronics & Computer Engg.)/(Electronics & Electrical)/(ETE)
(2011 Onwards)
B.Tech.(Electrical Engg. & Industrial Control) (2012 Onwards)
B.Tech.(Electronics Engg.) (2012 Onwards)
(Sem.–3)

ENGINEERING MATHEMATICS – III

Subject Code : BTAM-301
Paper ID : [A1128]

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. Write briefly :

a) Write half range sine series of the function $f(x) = x$, in $0 < x < 2$.

b) Find Laplace transform of the function $t^2 \cos 2t$.

c) Define analytic function. Give an example of the same..

d) Find the general integral of the equation from $\frac{\partial^2 z}{\partial x^2} - 7\frac{\partial^2 z}{\partial x \partial y} + 12\frac{\partial^2 z}{\partial y^2} = 0$

e) Form a differential equation from $z = (x + a)(y + b)$.

f) Find the value of $\int_{-1}^{1} x^3 P_3(x)dx$, where $P_3(x)$ is a Legendre's polynomial of degree 3.

g) An infinitely long metal plate of width 1 with insulated surfaces has its temperature zero along both the long edges $y = 0$ and $y = 1$ at infinity. If the edge $x = 0$ is kept at fixed temperature T_0 and if it is required to find the temperature T at any point (x, y) of the plate in the steady state, then state the boundary conditions for the same.

h) State Cauchy's Theorem.

i) Find $L^{-1}\left(\frac{1}{\sqrt{s+3}}\right)$.

j) State any one property of "conformal mapping".

SECTION-B

2. Expand the function $f(x) = x^2$ as a fourier series in the interval $-\pi \le x \le \pi$. Hence show that $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+........=\frac{\pi^2}{6}$.

3. Solve $y'' + 2y' - 3y = \sin t$, where $y(0) = 0$ and $y'(0) = 0$, using Laplace Transforms.

4. Find the Laurent's expansion of, $\frac{1}{(z+1)(z+3)}$ valid for

i) $1 < |z| < 3$,

ii) $|z| > 3$,

iii) $0 < |z + 1| < 2$.

5. Solve the partial differential equation $(y + z)\, p - (x + z)\, q = (x - y)$.

6. With usual notations, prove that, $\frac{2n}{x}J_n(x) = J_{n-1}(x) + J_{n+1}(x)$.

SECTION-C

7. A tightly stretched string of length l with fixed ends is initially in equilibrium position. It is set vibrating by giving each point a velocity $v_0 \sin^3\frac{\pi x}{l}$. Find the displacement $y(x, t)$.

8. Evaluate $\int_C \frac{z-3}{z^2+2z+5}\,dz$, where C is the circle

i) $|z| = 1$,

ii) $|z + 1 - i| = 2$,

iii) $|z + 1 + i| = 2$.

9. Solve in series the differential equation $(1+x^2)\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=0$.