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)
(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 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) Evaluate, $\int \frac{e^z}{z-2}\,dz$ along the circle , $|z| = 3$.

b) Under what condition or conditions the general linear partial differential equation of second order is parabolic.

c) State the three possible solutions of the one dimensional heat equation, $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$.

d) Write the formulae for finding the half range sine series for the function $f(x)$ in the interval (0, c).

e) Find, L $\left(\frac{e^{4t}\cos 3t}{t}\right)$.

f) Expand e^{-z} in Taylor's series about the point $z = 0$.

g) Form a partial differential equation from $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$.

h) 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 distinct and differ by an integer.

i) What are Dirichlet's conditions for the expansion of $f(x)$ as a Fourier series in $(-\pi, \pi)$.

j) What are the Bessel's functions of the first and second kind?

SECTION-B

2. Solve $y'' + 4y' + 3y = e^{-t}$ where $y(0) = 1$ and $y'(0) = 1$ by using Laplace transform method.

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

(i) $1 < |z| < 2$

(ii) $0 < |z - 1| < 1$.

4. Find the Fourier series of, $f(x) = x$ for $0 \le x \le \pi$.

$= 2\pi - x$ for $\pi \le x \le 2\pi$.

Hence find the value of the series, $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \ldots$

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

6. Solve the partial different equation, $(x^2 - y^2 - z^2)p + 2xyq = 2xz$.

SECTION-C

7. Use the concept of residues to evaluate, $\int_0^{2\pi} \dfrac{dx}{2 + \cos x}$.

8. Find series solution of the function $\left(1 - x^2\right)\dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} + 2y = 0$

9. Solve in series, $8x^2 \dfrac{d^2y}{dx^2} + 10x \dfrac{dy}{dx} - (1 + x)y = 0$.