Roll No. | | | | | | | | | | | | |

Total No. of Questions: 09 **Total No. of Pages: 02**

B. Tech. (ELECTRONICS) (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 ea**
2. **Section B contains FIVE questions carrying FIVE marks each and student attempt any FOUR questions.**
3. **Section C contains THREE questions carrying TEN marks each and students ha attempt any TWO questions.**

SECTION A

1.

a) Evaluate $\int \frac{z^2+5}{z-3}$ dz along the circle, |z| = 1

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

c) Define the term "an indicial equation".

d) Find, L [(e^{3t} sin2t)/t].

e) Form a partial differential equation from z = $f(x + y + z^2, x^2 + y^2 + z^2)$.

f) Expand sin z in Taylor's series about the point z = 0.

g) Find the sum of the residues at each pole of the function $f(z)$ lying inside the circle |z| = 2 where $f(z)$ is given by,

$$f(z) = \frac{\sin z}{z \cos z}$$

h) If it is required to find the Fourier series of an odd function in $(-\pi, \pi)$ then which formulae you will use?

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

j) State and prove the first shifting property of Laplace transforms

SECTION B

2. Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x \partial y} = \cos x \cos 2y$

3. State and prove the Cauchy's integral formula.

4. Using Laplace transforms, solve the differential equation,

$$\frac{d^2 x}{dt^2} + 2\frac{dx}{dt} + 5x = e^{-t} \sin t \text{ where } x(0) = 0,\ x'(0) = 1$$

5. Find the Fourier series to represent, $f(x) = x^2 - 2$, where $-2 \le x \le 2$

6. Find the inverse Laplace transform of the function, $\log\left(\frac{ss+1}{ss}\right)$

SECTION C

7. Use the concept of residues to evaluate, $\int_0^{\pi\pi} \frac{ddxx}{aa+bb\cos xx}$, where $a \geq |b|$

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,

   $y(x, 0) = f(x) = k(Lx - x^2)$.

9. Solve in series, $(1 + x^2)\frac{d\partial\partial}{ddx^2} + xx\frac{dd\partial\partial}{ddxx} - \partial\partial = 0$