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**PRESIDENCY UNIVERSITY,
BENGALURU**



SCHOOL OF ENGINEERING

MAKE UP EXAMINATION- JAN 2023

Course Code: MAT102

Course Name: Engineering Mathematics-II

Branch & Sem: B.TECH

Date: 20-Jan-2023

Time: 9:30AM -12:30PM

Max Marks: 80

Weightage: 40%

Instructions:

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **FIVE** marks.

(4Qx5M=20)

1. Form the partial differential equation by eliminating the arbitrary constants 'a' and 'b' from

$$(x-a)^2 + (y-b)^2 + z^2 = r^2 .$$

2. Solve: $\frac{\partial^2 u}{\partial x^2} = x + y$.

3. Obtain the Laplace Transform of *Coshat* .

4. Find $L^{-1} \left[\frac{1}{s+2} + \frac{3}{2s+5} + \frac{s+2}{s^2+36} \right]$

Part B

Answer **all** the Questions. **Each** question carries **TEN** marks.

(3Qx10M=30)

5. Solve $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$ given that $u = 0$ when $t = 0$ and $\frac{\partial u}{\partial t} = 0$ at $x = 0$.

6. Find $L[f(t)]$, if $f(t) = \begin{cases} t & 0 < t < 4 \\ 5 & t > 4 \end{cases}$.

7. Using Convolution theorem obtain Inverse Laplace Transform of $\frac{s^2}{(s^2 + a^2)^2}$.

Part C

Answer **any two** Questions. **Each** question carries **FIFTEEN** marks. (2Qx15M=30)

8. Express the function $f(t) = \begin{cases} \sin t & 0 < t < \pi \\ \sin 2t & \pi < t < 2\pi \\ \sin 3t & t > 2\pi \end{cases}$ in terms of Heaviside unit step function and

hence find its Laplace Transform.

9. Solve the Initial value problem by using Laplace Transform :

$$\frac{d^2 y}{dt^2} + 4 \frac{dy}{dt} + 4y = e^{-t} \quad \text{given that } y(0) = 0 \text{ and } y'(0) = 0.$$

10.a) Find $L \left[\frac{\cos at - \cos bt}{t} \right]$.

b) Find $L^{-1} \left[\frac{s+5}{s^2 - 6s + 13} \right]$.