

## End Term (Back) Even Semester Examination May-June 2025 Batch 2023-2027

Roll ne

Name of the Program and semester: B.Tech

Name of the Course: Engineering Mathematics II

Paper Code: TMA 201

Time: 3:00 hour

Note:

(i) All questions are compulsory.

- (ii) Answer any two sub parts of a question among a, b & c.
- (iii) Total marks of each question are twenty.
- (iv) Each sub part of a question carries ten marks.

Q1.

 $(10 \times 2 = 20)$  Marks CO:1

Semester: II

**Maximum Marks: 100** 

- a. Solve:  $\left(x^2 + y^2\right)dx + 2xydy = 0$
- b. Solve:  $(D^2 2D + 1)y = x \sin x$ .
- c. Solve by the method of variation of parameters:  $\frac{d^2y}{dx^2} + y = \cos ecx.$

Q2.

 $(10 \times 2 = 20)$  Marks CO:2

- a. Evaluate  $L[t^2e^{2t}\sin t]$ .
- $\text{Using convolution theorem prove that } L^{-1} \left\{ \frac{s^2}{\left(s^2 + a^2\right)\left(s^2 + b^2\right)} \right\} = \frac{a \sin at b \sin bt}{a^2 b^2}$
- c. Solve the differential equation using Laplace transform method.

$$\frac{d^2x}{dt^2} + 9x = \cos 2t$$
,  $x(0) = 1$ ,  $x(\frac{\pi}{2}) = -1$ 

Q3.

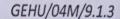
 $(10 \times 2 = 20)$  Marks CO:3

- a. Form a partial differential equation from  $x^2 + y^2 + (z c)^2 = a^2$ .
- b. Solve the following differential equation yq xp = z, where  $p = \frac{\partial z}{\partial x}$ ,  $q = \frac{\partial z}{\partial y}$
- c. Solve px + qy = pq by using Charpit's method.

Q4.

 $(10 \times 2 = 20)$  Marks CO:4

- a. Solve  $\frac{\partial^2 z}{\partial x^2} 3 \frac{\partial^2 z}{\partial x \partial y} + 2 \frac{\partial^2 z}{\partial y^2} = e^{2x-y} + e^{x+y} + \cos(x+2y)$ .
- b. Solve  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$ ;  $u(x,0) = 6e^{-3x}$
- c. Find the temperature in a bar of length 2 whose ends kept at zero and lateral surface insulated if initial temperature is  $\sin \frac{\pi x}{2} + 3\sin \frac{5\pi x}{2}$ .





## End Term (Back) Even Semester Examination May-June 2025 Batch 2023-2027

Q5.

 $(10 \times 2 = 20)$  Marks CO:5

Expand the function  $f(x) = x \sin x$ , as a Fourier series in the interval  $-\pi \le x \le \pi$ . b. Find the Fourier series expansion of the periodic function of period  $2\pi$ .

$$f(x) = e^x, \quad 0 < x < 2\pi$$

Solution Obtain the Fourier series expansion of 
$$f(x) = \begin{cases} x, & 0 < x < \pi \\ -x, & -\pi < x < 0 \end{cases}$$