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Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech. (AI & ML) (AI & DS) (CE) (CSE) (CSDn) (DS) (IOT) (EEE) (EE)
(ECE) (ETE)(ECS)(IT)(Robotics & Artificial Intelligence)(Cyber Security)
(Internet of Things and Cyber Security including Block Chain
Technology)(Block Chain)(ME)(FT)(Cyber Security) (Sem.–1)**

ENGINEERING MATHEMATICS-I

Subject Code : BTAM101-23

M.Code : 93796

Date of Examination : 02-01-2026

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 & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION - A

1. Answer briefly :

- a) Define sequence and series with the help of an example.
- b) Prove that the sequence $\left\{ \frac{2n-7}{3n+2} \right\}$ is bounded.
- c) What do you mean by absolutely convergent series?
- d) State Comparison test for infinite series.
- e) Test for convergence of integral $\int_1^{\infty} \frac{\sqrt{x}}{(1+x)^2} dx$.
- f) State any one property of Beta function.
- g) Define homogeneous function with the help of an example.
- h) Show that $\lim_{\substack{x \rightarrow 0 \\ y \rightarrow 0}} \frac{x+y}{x-y}$ does not exist.

i) Evaluate $\int_1^2 \int_1^3 dx dy$.

j) Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x+y+z) dy dx dz$.

SECTION - B

2. Prove that the sequence $\{a_n\}$ where $a_n = \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)}$ is convergent.
3. Discuss the convergence or divergence of the series $\sum \frac{x^{n+1}}{(n+1)\sqrt{n}}$.
4. Find the length of the loop of the curve $9ay^2 = x(x-3a)^2$, $a > 0$.
5. By using the definition of Gamma function, Evaluate $\int_0^{\frac{\pi}{2}} \sin^3 x \cos^{\frac{5}{2}} x dx$.

SECTION - C

6. If $V = e^{xyz}$, show that $\frac{\partial^3 V}{\partial x \partial y \partial z} = (1 + 3xyz + x^2 y^2 z^2) e^{xyz}$.
7. Find the maximum and minimum values of the function $f(x, y) = x^3 + y^3 - 3axy$.
8. Evaluate $\int_0^1 \int_{3y}^3 e^{x^2} dx dy$, by change of order of integration.
9. Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.