

Roll No.

Total No. of Pages : 02

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**B.Tech.(AI&DS/AI&ML/Block Chain/CE/CSE/CS/DS/IOT/
CSDn/ EEE/EE/ECE/IT/ME/R&AI/Internet of Things and Cyber Security
including Block Chain Technology) (Sem.-2)**

ENGINEERING MATHEMATICS - II

Subject Code :BTAM 201-23

M.Code : 93811

Date of Examination : 03-12-2025

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 at least TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on :

a. If $A = \begin{bmatrix} 8 & 4 \\ 3 & 2 \end{bmatrix}$. Hence find A^{-1} .

b. Form the partial differential equation $z = f(x^2 - y^2)$.

c. Explain homogeneous equations.

d. State Gauss-Jordan method.

e. Define vector space.

f. Explain geometric multiplicity.

g. Solve $\frac{d^2y}{dx^2} + 9y = 0$.

h. Explain integrating function.

i. Form the partial differential equation $z = f(x^2 - y^2)$.

j. If $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$. Hence Find A^{-1} .

SECTION - B

2. Find the rank of the matrix $\begin{bmatrix} 1 & -2 & 2 & 3 & 6 \\ 0 & -1 & -3 & 1 & 1 \\ -2 & 4 & -3 & -6 & 11 \end{bmatrix}$.
3. Find linear transformation $T : \mathbb{R}^4 \rightarrow \mathbb{R}^3$ whose null space is generated by $(0,1,2, 3)$ and $(-1,2, 3,0)$.
4. Solve the differential equation $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = e^{3x} \sin 4x$.
5. Solve $y^2p - xyq = x(z - 2y)$.

SECTION - C

6. Determine the value of λ for which the equations $3x - 2y + z = 0$, $\lambda x - 14y + 15z = 0$, $x + 2y - 3z = 0$ have non trivial solutions. Find the solutions.
7. Let V be a vector space of 2×2 matrices over \mathbb{R} and let $M = \begin{bmatrix} 1 & -1 \\ -2 & 2 \end{bmatrix}$. Let $T:V \rightarrow V$ be the linear map defined by $T(A) = MA \forall A \in V$. Find the basis and dimension of
- Null space of T .
 - Range of T .
8. A particle moves with S.H.M. of period 12 secs, travels 8 cm from the position of rest in 2 secs. Find the amplitude, maximum velocity and velocity at the end of 2 secs.
9. Solve $(D^3 - 3D^2D')z = x^2y$.

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