



QP CODE: 24020234



24020234

Reg No :

Name :

**B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE
EXAMINATIONS, MAY 2024**

Second Semester

B.Sc Electronics Model III

**Complementary Course - MM2CMT07 - MATHEMATICS-LINEAR ALGEBRA AND
DIFFERENTIAL EQUATIONS**

2017 ADMISSION ONWARDS

7C150215

Time: 3 Hours

Max. Marks : 80

Part A

Answer any ten questions.

Each question carries 2 marks.

1. Define dimension of a vector space.
2. Explain the concept of linear transformation.
3. Define rank of a matrix.
4. What do you mean by normal form of a matrix?
5. Define characteristic equation.
6. Explain Cayley Hamilton theorem.
7. Write the nature of characteristic roots of diagonal matrix.
8. Explain the concept of an exact differential equation with an example.
9. Define integrating factor. Write the integrating factor of a linear differential equation $\frac{dy}{dx} + Py = Q$.
10. Find the order and degree of the partial differential equation $(\frac{\partial \theta}{\partial x})^2 + \frac{\partial \theta}{\partial t} = 0$.
11. Solve the differential equation $dx=dy=dz$.
12. Let $f(x,y,z,a,b)=0$ be an equation of surface. Eliminate the arbitrary constants and write the partial differential equation.

(10×2=20)

Part B

Answer any six questions.

Each question carries 5 marks.





13. Find a coordinate representation for the vector $V=4t^2+3t+2$ in P^2 with respect to the basis $C=\{t^2+t, t+1, t-1\}$.
14. Write the co-factor matrix of $A = \begin{bmatrix} 2 & 1 & 0 \\ -3 & 5 & -2 \\ 6 & 9 & 4 \end{bmatrix}$.
15. Check whether $A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$ is an orthogonal matrix.
16. Calculate the eigen value of $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.
17. Find the eigen vector of the matrix $A = \begin{bmatrix} 4 & -5 \\ 1 & -2 \end{bmatrix}$.
18. Find a differential equation that represents the family of a straight line parallel to $y=3x$.
19. Solve $(\frac{dy}{dx})^2 + \frac{dy}{dx}x + \frac{dy}{dx}y + xy = 0$.
20. Explain different types of first-order differential equations.
21. Find the extreme values of the function $f(x, y, z) = 2x + 3y + z$ subject to $x^2 + 2y^2 + 3z^2 = 1$.

(6×5=30)

Part C

Answer any two questions.

Each question carries 15 marks.

22. a) Define vector space b) Determine whether $S = \{(x, y, z) \in \mathfrak{R}^3; y = 0\}$ is a vector space under regular addition and scalar multiplication.
23. a) Define the determinant of a matrix b) Show that the value of a determinant
- $$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0.$$
24. Check whether the consistency of equations,
- $$x+y+z=3$$
- $$x+2y+3z=4$$
- $$x+4y+9z=6$$
25. Use substitution to solve the following differential equation $1 + \frac{dy}{dx} = (x + y)^2$.

(2×15=30)

