Code No: R201201 **R20** SET - 1

I B. Tech II Semester Regular Examinations, September-2021

MATHEMATICS-II

(Com. to All Branches)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

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UNIT-I

1. a) Reduce the matrix $A=\begin{bmatrix}0 & 1 & 2 & -2\\ 4 & 0 & 2 & 6\\ 2 & 1 & 3 & 1\end{bmatrix}$ to its normal form and hence find the rank. (7M)

   b) Show that the only real value of λ for which the following equations have non-trivial solution is 6 and solve them, when λ=6. x+2y+3z=λx; 3x+y+z=λy; 2x+3y+z=λz. (7M)

Or

2. a) Prove that the product of the Eigen values is equal to determinant of the matrix. (7M)

   b) Test the consistency of the system x+ y+ z = 6, x-y+2z=5, 3x+y+z=-8, hence solve. (7M)

UNIT-II

3. a) Verify Cayley -Hamilton theorem for the matrix $A=\begin{bmatrix}8 & -8 & -2\\ 4 & -3 & -2\\ 3 & -4 & 1\end{bmatrix}$ also find A^{-1} (7M)

   b) Find the nature, rank, index and signature of the quadratic from by reduce in to canonical form $x^2+y^2+2z^2+2xy-4xz+4yz$ (7M)

Or

4. a) Find the orthogonal matrix P such that A is diagonalize where A = $\begin{bmatrix}2 & 0 & 4\\ 0 & 6 & 0\\ 4 & 0 & 2\end{bmatrix}$ (7M)

   b) Find the nature, rank, index and signature of the quadratic from by reduce in canonical form $2x^2+y^2-3z^2+12xy-4xz-8yz$. (7M)

UNIT-III

5. a) Find the real root of the equation x = sinx using bisection method. (7M)

   b) Find the real root of the equation x^3-x-1 =0 using iteration method. (7M)

Or

6. a) Find the real root of the equation tanx = x using Newton Raphson method . (7M)

   b) Solve the following system of equations using Gauss-Jacobi method (7M)

$$8x-3y+2z=20,\ 4x+11y-z=33, 6x+3y+12z=35$$

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UNIT-IV

7. a) Fit a polynomial for the following data (7M)

$$y_0 = -5,\ y_1 = -1,\ y_2 = 9,\ y_3 = 25,\ y_4 = 55,\ y_5 = 105$$

b) Find the y(4) for the following data (7M)

x	0	2	3	6
y	707	819	866	966

Or

8. a) Prove that $1 + \mu^2\delta^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$ (7M)

b) Interpolate by means of Gauss's backward formula, the population of a town for the year 1974, given that (7M)

year	1939	1949	1959	1969	1979	1989
population	12	15	20	27	39	52

UNIT-V

9. a) Evaluate $\int_0^1 x^3\,dx$ using Simpson's 1/3rd and Simpson's 3/8th Rules. (7M)

b) Find y(0.1) using Picard's If $\frac{dy}{dx} = 2e^x + y$,y(0) = 1 (7M)

Or

10 a) Find y(0.1), y(0.2) using Taylor's series method If $\frac{dy}{dx} = e^x - 2y$,y(0) = 1 (7M)

b) Find the solution of $\frac{dy}{dx} = x - y$, y (0) =1at x=0.1, 0.2, 0.3, 0.4& 0.5 using Euler's method. (7M)