Code No: R19BS1102 **R19** SET - 1

I B. Tech I Semester Supplementary Examinations, July/August- 2021

MATHEMATICS-II

(Com. to CE, ME, Chem E, Auto E, Min E, Pet E, Agri E**)**

Time: 3 hours Max. Marks: 75

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

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1. a) Find the rank of the matrix 'A' by reducing it to normal form, where (7M)

$$A=\begin{bmatrix} 1 & 4 & 3 & -2 & 1 \\ -2 & -3 & -1 & 4 & 3 \\ -1 & 6 & 7 & 2 & 9 \\ -3 & 3 & 6 & 6 & 12 \end{bmatrix}$$

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b) Solve the system of equations x + 2y + 3z = 1, 2x + 3y + 8z = 2, x + y + z = 3 using Gauss elimination method. (8M)

Or

2. a) Find the eigenvalues and eigen vectors of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. (10M)

b) Provethat the eigenvalues of a real symmetric matrix are always real numbers. (5M)

3. Reduce the quadratic form $3x_1^2 + 3x_2^2 + 3x_3^2 + 2x_1x_2 + 2x_1x_3 - 2x_2x_3$ to canonical form using orthogonal transformation. Also find signature and rank of the quadratic form. (15M)

Or

4. a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$, and find A^{-1} (9M)

b) Find a singular value decomposition for the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$. (6M)

5. a) Using Regula-falsi method, find the real root of $2x - \log x = 6$ correct to three decimal places. (6M)

b) Solve the system of equations *x+y+54z=110; 27x +6y –z =85; 6x+15y +2z =72* using Gauss Seidel method. (9M)

Or

6. a) Solve the system of equations by Newton Raphson method $x^2 + y^2 - 1 = 0$ and $y - x^2 = 0$. (9M)

b) Find a real root of *3x=cosx +1*using iteration method. (6M)
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7. a) Fit a interpolating polynomial in x for the following data. (8M)

x	0	1	2	3	4
y	-3	3	4	27	57

b) Using Lagrange's Interpolation formula find the value of y(10) from the following table. (7M)

x	5	6	9	11
y(x)	12	13	14	16

Or

8. a) Find a polynomial by using Newton's divided difference formula for the data. (10M)

x	-2	0	1	3	6
f(x)	121	135	189	200	225

b) If the interval of differencing is unity, prove that $\Delta \tan^{-1}\left[\frac{n-1}{n}\right] = \tan^{-1}\left[\frac{1}{2n^2}\right]$. (5M)

9. a) Evaluate $\int_0^1 \sqrt{1+x^4}\,dx$ using Simpson's 3/8 rule. (6M)

b) Solve $y^1 = x - y^2$, $y(0) = 1$ using Taylor's series method and compute $y(0.1)$. (9M)

Or

10. a) Using Euler's method ,solve $y^1 = y^2 + x; y(0) = 1$,compute $y(0.1), y(0.2)$. (6M)

b) Using Runge-Kutta fourth order formula, find $y(0.2)$ for the equation $y^1 = \frac{y-x}{y+x}$ (9M)
$y(0) = 1$.