I B. Tech I Semester Supplementary Examinations, August/Sep - 2022
MATHEMATICS-II
(Only EEE)

Time: 3 hours   Max. Marks: 70

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

UNIT-I

1. a) Find the rank of the matrix by reducing it to normal form $\begin{bmatrix} 1 & 7 & 8 & 1 \\ 1 & 3 & 4 & 2 \\ 3 & 5 & 6 & 10 \\ -1 & 1 & -2 & -2 \end{bmatrix}$. (7M)

   b) Test for consistency and solve $x + 2v + 2w = 1$, $2x + y + w = 2$, $3x + 2y + 2w = 3$, $y + w = 0$. (7M)

Or

2. a) Test for consistency and solve $2x + 3y + 4z = 0$, $3x + 4y + 2z = 0$, $4x + 2y + 3z = 0$. (7M)

   b) Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$. (7M)

UNIT-II

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

   b) Find a singular value decomposition for the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$. (7M)

Or

4. Reduce the quadratic form $2x^2 + 2y^2 + 2z^2 - 2xy + 2zx - 2yz$ to orthogonal transformation. Also find signature and rank of the quadratic form. (14M)

UNIT-III

5. a) Find a real root for $e^x \sin x = 1$, using Regula-falsi method. (7M)

   b) Solve *sinx –y+1.32=0 and x-cosy -0.85 =0* starting with $x_0=0.6$ and $y_0=1.9$ using Newton Raphson method. (7M)

Or

6. a) Solve $x^3 = 2x + 5$ for a positive root by iteration method. (7M)

   b) Solve the system *10x-2y-z-w=3; -2x+10y-z-w=15; -x-y+10z-2w=15; -x-y-2z+10w= -9* using Jacobi method. (7M)

UNIT-IV

7. a) Find the parabola passing through points (0, 1), (1, 3), (3, 55). Using Lagrange's interpolation formula. (7M)

   b) Find f(32), using f(25) = 0.2707, f(30) = 0.3027, f(35) = 0.3386, f(40) = 0.3794. (7M)

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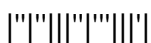
Or

8 a)   Using divided differences find y(x) from the following table: (7M)

X	5	6	9	11
Y	12	13	15	18

    b)   Prove that   i) $\dfrac{\Delta}{\nabla} - \dfrac{\nabla}{\Delta} = \Delta + \nabla$ ii) $\nabla E = E\Delta = \Delta$.   (7M)

UNIT-V

9 a)   Evaluate $\displaystyle\int_0^1 \sqrt{1+x^4}\,dx$ using Simpson's 3/8 rule.   (7M)

    b)   Given $y' = x + \sin y$, y(0) = 1. Compute y(0.2) given that $y^1 = x + y, y(0) = 1$ and y(0.4) with h = 0.2 using Euler's Modified method.   (7M)

Or

10 a)   Solve $y' = y - x^2$, y(0) = 1, by Picard's method up to the fourth approximation. Hence, find the value of y(0.1), y(0.2).   (7M)

    b)   Obtain the values of y at x = 0.1, 0.2 using Runge-Kutta method of fourthorder.   (7M)