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

I B. Tech II Semester Regular/Supplementary Examinations, August-2022

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

Unit-I

1. a) Find the Eigen values and Eigen vectors of A= $\begin{bmatrix}1 & 1 & 3\\1 & 5 & 1\\3 & 1 & 1\end{bmatrix}$ (7M)

   b) Solve the system of equations $x + 3y - 5z = 0, 3x - y + 5z = 0, 3x + 2y - z = 0$ (7M)

Or

2. a) Find the values of 'a' and 'b' such that the system of equation $2x + 3y + 5z = 9, 7x + 3y - 2z = 8, 2x + 3y + az = b$ have(i) No solution (ii) A unique solution (iii) Infinite number solutions. (7M)

   b) Prove that the Eigen values of BA^{-1} & $A^{-1}B$ are same. (7M)

Unit-II

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

   b) Reduce the quadratic form in to sum of squares of terms using diagonalization method $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ (7M)

Or

4. a) Find the singular value decomposition of $A = \begin{bmatrix}1 & 0\\0 & 1\\1 & 0\end{bmatrix}$ (7M)

   b) Diagonalize the matrix A = $\begin{bmatrix}8 & -6 & 2\\-6 & 7 & -4\\2 & -4 & 3\end{bmatrix}$ (7M)

Unit-III

5. a) Find the real root of the equation $2x = 3sinx + 5$ using Bisection method (7M)

   b) Find the real root of the equation $xsinx = 1$ using Iteration method (7M)

Or

6. a) Find the real root of the equation $2x = 3sinx + 5$ using False position method (7M)

   b) Evaluate $\sqrt[3]{24}$ using Newton -Raphson method (7M)

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Unit-IV

7. a) Find y(21) using Newton's forward formula for the following table (7M)

x	20	25	30	35	40	45
y	354	332	291	260	231	204

b) Using Lagrange's formula find f (1) from the following data (7M)

x	-1	0	2	3
y	-8	3	1	2

Or

8. a) Using Newton's divided difference formula evaluate f (x) from the following data (7M)

x	0	1	3	4
y	-12	0	6	12

b) Find the missing terms in the following data. (7M)

x	0	1	2	3	4	5	6
y	200	220	260	-	350	-	430

Unit-V

9. a) Find y(0.2) by Picard's method given that $\frac{dy}{dx} = x - y, y(0) = 1$ (7M)

b) Evaluate y (0.1) by Euler's method for $\frac{dy}{dx} = \frac{x+y}{y-x}$, $y(0) = 1$. For h = 0.1 (7M)

Or

10 a) By RK method of Fourth order find y (0.2) given that $\frac{dy}{dx} = y^2 - x, y(0) = 1$ (7M)

b) Evaluate $\int_0^1 \frac{x^p}{1+x^3} dx$ by taking p =1 using Simpson's 3/8th rule (7M)

Code No: R19BS1202 **R19** SET - 1

I B. Tech II Semester Supplementary Examinations, August- 2022
MATHEMATICS-II
(Com. to EEE, ECE, CSE, EIE, IT)

Time: 3 hours Max. Marks: 75

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

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UNIT III

5. b) Find the Real root of the equation $x^3-6x-4=0$ by false position method. (7M)
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Code No: R201201 **R20** SET - 2

I B. Tech II Semester Regular/Supplementary Examinations, August -2022

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

Unit-I

1. a) Find the values of 'a' and 'b' such that the system of equation $x + y + z = 6, x + 2y + 3z = 10, x + 2y + az = b$ have (i) No solution (ii) A unique solution (iii) Infinite number solutions. (7M)

   b) Solve the equations $2x - 6y + 8z = 24, 5x + 4y - 3z = 2, 3x + y + 2z = 16.$ by Gauss-Elimination method (7M)

Or

2. a) Find the Eigen values and Eigen vectors of $A = \begin{bmatrix} -3 & -7 & -5 \\ 2 & 4 & 3 \\ 1 & 2 & 2 \end{bmatrix}$ (7M)

   b) Find the rank of $\begin{bmatrix} 1 & 4 & 3 & -2 & 1 \\ -2 & -3 & -1 & 4 & 3 \\ -1 & 6 & 7 & 2 & 9 \\ -3 & 3 & 6 & 6 & 12 \end{bmatrix}$ using Echelon form. (7M)

Unit-II

3. a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ and hence find A^4 (7M)

   b) Reduce the quadratic form in to sum of squares of terms using orthogonal diagonalization $7x^2 + 7y^2 + 6xy$ (7M)

Or

4. a) Find the singular value decomposition of $A = \begin{bmatrix} -105 & 92 \\ -76 & -18 \end{bmatrix}$ (7M)

   b) Diagonalize the matrix $A = \begin{bmatrix} 4 & 6 \\ 6 & -1 \end{bmatrix}$ (7M)

Unit-III

5. a) Find the real root of the equation $x^3 - x - 11 = 0$ using Bisection method (7M)

   b) Find the real root of the equation $x = \frac{1}{2} + sinx$ using Iteration method (7M)

Or

6. a) Find the real root of the equation $2x - logx_{10} = 7$ using False position method (7M)

   b) Find the real root of the equation $2x = 3 + cosx$ using Newton -Raphson method (7M)

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Code No: R201201

R20

SET - 2

Unit-IV

7. a) Find y(46) using Newton's Back word formula for the following table (7M)

x	20	25	30	35	40	45
y	354	332	291	260	231	204

b) Using Lagrange's formula find f (3) from the following data (7M)

x	0	1	4	5
y	4	3	24	39

Or

8. a) Prove that $\Delta = E\nabla = \nabla E = \delta E^{1/2}$ (7M)

b) Using Newton's divided difference formula find f (x) from the following data (7M)

x	-1	0	2	3
y	-8	3	1	2

Unit-V

9. a) Find y(x) by Picard's method given that $\frac{dy}{dx} = x + y, y(0) = 1$ (7M)

b) By RK method of second order find y(0.1), y(0.2) given that $\frac{dy}{dx} = 1 - 2xy^2, y(0) = 1$ (7M)

Or

10 a) Evaluate $\int_1^2 e^{-\frac{1}{2}} dx$ by taking n =10 using Trapezoidal rule (7M)

b) By Taylor's series method find y(0.2) given that $\frac{dy}{dx} = 3x + y^2, y(0) = 1$ (7M)

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Code No: R201201 **R20** SET - 3

I B. Tech II Semester Regular/ Supplementary Examinations, August -2022

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

Unit-I

1 a) If the Eigen values of A are -1 , 1 , 3 then Find the Eigen values of $(i)AdjA$ $(ii)A-3I$ $(iii)\,A^3$ (7M)

b) Find the rank of $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ using Echelon form. (7M)

Or

2 a) Test the consistency and solve the system of equations $5x+3y+7z=4,3x+26y+2z=9,7x+2y+10z=5$ (7M)

b) Prove that Eigen values of triangular matrix are it's diagonal elements. (7M)

Unit-II

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

b) Find the singular value decomposition of $A=\begin{bmatrix} 10 & -5 \\ 2 & -11 \\ 6 & 8 \end{bmatrix}$ (7M)

Or

4 a) Diagonalize the matrix $A=\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ (7M)

b) Find the nature, index and signature of the quadratic form $2x^2+2y^2+2z^2+2yz$ (7M)

Unit-III

5 a) Find the real root of the equation $x^4-x-10=0$ using Bisection method (7M)

b) Solve the following system of equations using Gauss-Seidel method (7M)
$8x-3y+2z=20,4x+11y-z=33,6x+3y+12z=36$

Or

6 a) Find the real root of the equation $e^x tanx=1$ using Iteration method (7M)

b) Solve the following system of equations using Gauss-Jacobi method (7M)
$10x+y+z=12,2x+10y+z=13,2x+2y+10z=14$

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Code No: R201201 **R20** SET - 3

Unit-IV

7 a) Using Newton's divided difference formula evaluate f (15) from the following data (7M)

x	5	6	9	11
y	12	13	14	16

b) Evaluate (i) $\Delta(x+2)$ $(ii)\Delta^2 cos2x$ by taking h = 1 (7M)

Or

8 a) Using Lagrange's formula find f (4) from the following data (7M)

x	1	2	2.5	3
y	-6	-1	5	16

b) Find the number of students whose weight is between 60 and 70 from the following data (7M)

Weight	0-40	40-60	60-80	80-100	100-120
N0.of students	250	120	100	70	50

Unit-V

9 a) Find y(0.2),y(0.4) by Taylor's method given that $\frac{dy}{dx} = x - y^2, y(0) = 1$ (7M)

b) Evaluate y(0.1) ,y(0.2) by RK method second order given (7M)

$\frac{dy}{dx} = ½ (1+x)y^2 , y(0) = 1.$

Or

10 a) Evaluate $\int_0^6 \frac{e^x}{1+x} dx$ by taking n =6 using Simpson's 3/8th rule (7M)

b) by RK method 4th order formula find y(0.1) given that $\frac{dy}{dx} = x^2 - y^2, y(0) = 1$ (7M)

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Code No: R201201 **R20** SET - 4

I B. Tech II Semester Regular/ Supplementary Examinations, August -2022

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

Unit-I

1. a) If the Eigen values of A are 1 ,2 , 3 then Find (7M)
(i)detA (ii) Trace of A (iii) Eigen values of $A^3 - 5A + 6I$

b) Solve the system of equations using Gauss-Elimination method:$x - 3y + 7z = 2, 2x + 4y - 3z = -1, -3x + 7y + 2z = 3$. (7M)

Or

2. a) Solve the system of equations $3x + 8y + 2z = 0, 2x + y + 3z = 0, 5x - y + z = 0$ (7M)

b) Find the rank of the matrix $A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$ by reducing it to the normal form (7M)

Unit-II

3. a) Diagonalize the matrix $A = \begin{bmatrix} 3 & 1 \\ 1 & 3 \end{bmatrix}$ (7M)

b) Find the nature, index and signature of the quadratic form $2x^2 + 2y^2 + 2z^2 + 2yz + 2zx$ (7M)

Or

4. a) Find the singular value decomposition of $A = \begin{bmatrix} 8 & 6 \\ 16 & 12 \\ 16 & 12 \end{bmatrix}$ (7M)

b) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 1 & -2 & 4 \\ 0 & -1 & 2 \\ 2 & 0 & 3 \end{bmatrix}$ and hence find A^{-1} (7M)

Unit-III

5. a) Solve the following system of equations using Gauss-Seidel method (7M)
$10x + y + z = 12, 2x + 10y + z = 13, 2x + 2y + 10z = 14$

b) Find the real root of the equation $x = \cos x$ using Newton -Raphson method (7M)

Or

6. a) Find the real root of the equation $x \log x_{10} = 1.2$ using False position method (7M)

b) Solve the following system of equations using Gauss-Jacobi method (7M)
$8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 36$

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Code No: R201201 **R20** SET - 4

Unit-IV

7. a) Evaluate (i) $\Delta\tan^{-1}(x)$ (ii)$\Delta^2 e^{2x}$ by taking h = 1 (7M)

b) Compute the value at y(2.5) from the following data using Lagrange's interpolation formula. (7M)

x	1	2	3	4
y	1	8	27	64

Or

8. a) Find the number of people whose deaths between the age 50 and 55 from the following data (7M)

people	25-35	35-45	45-55	55-65
N0.of deaths	13229	18139	24225	31496

b) Using Newton's divided difference formula evaluate f (140) from the following data (7M)

x	110	130	160	190
y	10.8	8.1	5.5	4.8

Unit-V

9. a) Evaluate $\int_1^2 \frac{dx}{x}$ by taking n =10 using Simpson's 1/3rd rule (7M)

b) By Runge kutta method of second order find y(0.2) given that $\frac{dy}{dx} = 2xy^2, y(0) = 1$ (7M)

Or

10 a) By Runge kutta method of Fourth order find y(0.1) given that $\frac{dy}{dx} = \frac{y-x}{x+y}, y(0) = 1$ (7M)

b) Find y(1) by Euler's method given that $\frac{dy}{dx} = \frac{x^2}{1+y^2} y(0) = 1$ by taking h = 0.1 (7M)

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