Code No: R10107/R10 **Set No. 1**

I B.Tech I Semester Supplementary Examinations, Jan/Feb 2015
MATHEMATICAL METHODS
(Common to Civil Engineering, Electrical & Electronics Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology and Automobile Engineering)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find rank of matrix using Echelon form $A = \begin{bmatrix} 1 & 2 & -4 & 5 \\ 2 & -1 & 3 & 6 \\ 8 & 1 & 9 & 7 \end{bmatrix}$

   (b) Solve the equations using Gauss Jordan method
   x+5y+z=9 , 2x+y+3z=12, 3x+y+4z=16 [7+8]

2. Verify Cayley – Hamilton theorem and find A^{-1} if $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ [15]

3. Reduce the quadratic form $3x^2 + 3y^2 + 3z^2 + 4xy + 8yz + 8xz$ to canonical form by Diagonalization. Also find its nature, index rank and signature? [15]

4. (a) Evaluate the real root of the equation $x^4 - x - 10 = 0$ by Bisection method

   (b) Compute the real root of the equation $xe^x = 2$ by the method of false position. [8+7]

5. (a) Prove the following. (i) $\triangle \ \nabla = \triangle - \nabla$ (ii) $\triangle E = E\nabla \ = \ \nabla$

   (b) From the following table of values of y = f(x), find f(0.53), using the Newton's backward interpolation formula.

x	0.30	0.40	0.50	0.60
Y=f(x)	0.6179	0.6554	0.6915	0.6915

[8+7]

6. (a) Find the first and second derivative of the function tabulated below at x=0.6.

X	0.4	0.5	0.6	0.7	0.8
Y	1.5836	1.7974	2.0442	2.3275	2.6511

   (b) Evaluate $\int_0^2 e^{-x^2}$ dx using Simpson's rule taking h=0.25. [8+7]

7. (a) Solve $y^1 = xy^{1/3}$, y(1)=1 by Taylor series method and find y(1.1), y(1.2)

   (b) Find an approximate value of y for x=0.1, 0.2 if y^1=x+y and y(1)=1 by Picard's method and compare the solution with exact solution. [8+7]

8. (a) Fit a least square parabola y= a+bx+cx^2 to the data (-1,2),(0,1),(1,4)

(b) By the method of least squares fit a straight line to the following data

x	5	10	15	15	20
y	15	19	23	26	30

[8+7]

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Code No: R10107/R10 **Set No. 2**

I B.Tech I Semester Supplementary Examinations, Jan/Feb 2015
MATHEMATICAL METHODS
(Common to Civil Engineering, Electrical & Electronics Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology and Automobile Engineering)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find rank using Echelon form $A = \begin{bmatrix} 1 & 4 & 3 & -2 & 1 \\ 2 & 3 & 1 & -4 & -3 \\ -1 & 6 & 7 & 2 & 9 \\ -3 & 3 & 6 & 6 & 12 \end{bmatrix}$

   (b) Solve by Gauss Seidal method $6x_1+x_2+x_3=105$, $4x_1+8x_2+3x_3=155$, $5x_1+4x_2-10x_3=65$ [7+8]

2. Find Eigen Vectors of $A = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 4 & 3 \\ 0 & 2 & 0 \end{bmatrix}$ [15]

3. Reduce the quadratic form $2x_1^2+9x_2^2+6x_3^2+8x_1x_2+6x_1x_3+8x_2x_3$ to canonical from by diagonalization and find the corresponding linear transformation. Also find the rank, index and signature. [15]

4. (a) Compute the real root of the equation $e^x \tan x = 1$by Iteration method

   (b) Find a real root of the equation x^3-x=4 using Newton-Raphson's method. [8+7]

5. (a) Evaluate $\triangle^2 \left[\frac{5x+6}{x^2+5x+6}\right]$, given that h = 1

   (b) If u_o =5, u_1 = 11, u_2=40, u_3 =22, u_4 =140, find u_5 given that the general term is represented by a fourth degree polynomial. [8+7]

6. (a)A curve is expressed by the following values of x and y. Find the slope at x=1.5

x	0	0.5	1	1.5	2
y	0.4	0.35	0.24	0.13	0.05

   (b) Evaluate $\int_1^3 \frac{1}{x} dx$ using Simpson's rule with 4 strips and 8 strips. [8+7]

7. (a) Solve y^1=1-y, y(0)=0 by Euler's method and find y at x=0.1, 0.2

   (b) Solve y^1=y-x, y(0)=2,h=0.2 , by fourth order R-K method and hence find y(0.2) [7+8]

8. (a) Fit a least square parabola y= a+bx+cx^2 to the following data

x	1	2	3	4	5
y	5	12	25	44	69

   (b) Fit a straight line of the form y= a+bx to the following data

x	1	2	3	4	5
y	5	12	26	60	90

[8+7]

Code No: R10107/R10

Set No. 2

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Code No: R10107/R10 **Set No. 3**

I B.Tech I Semester Supplementary Examinations, Jan/Feb 2015
MATHEMATICAL METHODS
(Common to Civil Engineering, Electrical & Electronics Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology and Automobile Engineering)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Find rank of matrix using Normal form $A = \begin{bmatrix} 1 & 2 & 3 & -2 \\ 2 & -2 & 1 & 3 \\ 3 & 0 & 4 & 1 \end{bmatrix}$

   (b) Solve system of equations, if consistent 2x-y-z=2 , x+2y+z=2, 4x-7y-5z=2 [7+8]

2. Find Eigen vectors of $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ [15]

3. Using Lagrange's reduction Reduce the quadratic form $x_1^2 + 4x_2^2 + x_3^2 - 4x_1x_2 + 2x_1x_3 - 4x_2x_3$ to canonical form .Also find its nature, rank signature and the linear transformation. [15]

4. (a) Prove that $\sqrt[b]{a}$can be evaluated by using the iterative procedure $x_{n+1}=\frac{1}{b}\{(b-1)x_n + \frac{a}{x_n^{b-1}}\}$and hence find $\sqrt[3]{2}$

   (b) Find the real root of the equation $x^3 - x - 1 = 0$ by Bisection method. [7+8]

5. (a) The values of annuities for certain ages are given for the following ages. Find the annuity at age 27 $\frac{1}{2}$ using Gauss's forward interpolation formula

Age:	25	26	27	28	29
Annuity:	16.195	15.919	15.630	15.326	15.006

   (b) Find f(2.5) using Newton's forward formula from the following table

X	0	1	2	3	4	5	6
Y	0	1	16	81	256	625	1296

[8+7]

6. (a) From the following table, obtain the value of $\frac{d^2y}{dx^2}$ at the point x = 1.04

X:	0.96	0.98	1.00	1.02	1.04
Y:	0.7825	0.7739	0.7651	0.7563	0.7473

   (b) Evaluate $\int_0^4 e^x$ dx , using Simpson's rules. Also compare your result with the value. [8+7]

7. (a) Apply Milne's predictor corrector method to find y(0.4) by obtaining the Solution of $\frac{dy}{dx} = y + x^2$,y(0)=2 and the initial values by Taylor series method

   (b) Solve y^1=3x+y/2 , y(o)=1 , h=0.1 by R-K method and hence find y(o.2) [8+7]

Code No: R10107/R10 **Set No. 3**

8. (a) Fit a second degree polynomial to the following data by the method of least squares

x	10	12	15	23	20
y	14	17	23	25	21

(b) Fit a straight line of the form y= a+bx to the following data

x	1	2	3	4	5
y	14	27	40	55	68

[8+7]

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Code No: R10107/R10 **Set No. 4**

I B.Tech I Semester Supplementary Examinations, Jan/Feb 2015
MATHEMATICAL METHODS
(Common to Civil Engineering, Electrical & Electronics Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Aeronautical Engineering, Bio-Technology and Automobile Engineering)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Find rank of matrix using Echelon form $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$

   (b) Solve the equations using Gauss Jordan method
   $x_1+x_2+x_3=8$, $2x_1+3x_2+2x_3=19$, $4x_1+2x_2+3x_3=23$ [7+8]

2. Find Eigen Vectors of $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ [15]

3. (a) Find the nature of the quadratic form $5x^2 + 5y^2 + 14z^2 + 2xy - 16yz - 8zx$

   (b) If A=$\begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix}$then find A^{50} [8+7]

4. (a) Using Newton- Raphson's method compute $\sqrt{41}$ correct to four decimal places.

   (b) Find a real root of the equation $e^x = x+2$ in the interval [1, 1.4] using bisection method. [8+7]

5. (a) Find the value of y from the following data at x = 0.47

x:	0	1	2	3	4	5
y:	1	2	4	7	11	16

   (b) Use Lagrange's interpolation formula, find f(4) from the following data.

x	1	2	5	6	9
y = f(x)	2	8	17	20	35

[8+7]

6. (a) The population of a certain town (as obtained from census data) is shown in the following table:

Year	1891	1901	1911	1921	1931
Population(in thousand)	46	66	81	93	101

   Estimate the rate of growth of the population in the year 1921

   (b) When a train is moving at 30 m/sec, steam is shut off and brakes are applied. The speed of the train per second after t seconds is given by

Time (t):	0	5	10	15	20	25	30	35	40
Speed(v):	30	24	19.5	16	13.6	11.7	10	8.5	7.0

Code No: R10107/R10 **Set No. 4**

Using Simpson's rule, determine the distance moved by the train in 40 seconds.

[8+7]

7. (a) Solve $y^1=1+y^2$, $y(0)=0$ by Taylor series method and hence find y(0.2), y(0.4)
   (b) Solve $y^1=xy^2$, $y(0)=1$ by Picard's method and compare the solution with exact solution [8+7]

8. (a) Fit a least square parabola $y= a+bx+cx^2$ to the following data

x	1	2	3	4	5
y	2	3	5	8	10

   (b) Fit a straight line of the form y= a+bx to the following data

x	-1	0	1	2	3	4	5	6
y	10	9	7	5	4	3	0	-1

[8+7]

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