

Code No: R10107/R10

Set No. 1

I B.Tech I Semester Supplementary Examinations, Oct/Nov 2013
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

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. Using Cayley – Hamilton theorem find A^{-1} if $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ [15]
3. Reduce the quadratic form $6x_1^2 + 3x_2^2 + 3x_3^2 - 4x_1x_2 + 4x_1x_3 - 2x_2x_3$ to the sum of squares form by diagonalization and find the corresponding linear transformation. Also find the index and signature. [15]
4. (a) Find a real root of the equation $x \sin x + \cos x = 0$, using Newton-Raphson's method
 (b) Evaluate $\sqrt{12}$ and $\frac{1}{\sqrt{12}}$ using fixed point iteration method. [8+7]
5. (a) If the interval of differencing is unity, prove the following: $\Delta \left\{ \frac{1}{f(x)} \right\} = - \frac{\Delta f(x)}{f(x)f(x+1)}$
 (b) Given that $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 48^\circ$. [8+7]
6. (a) Compute $f'(1)$ using the given data:

X	1.0	1.5	2.0	2.5	3.0
f(x)	27	106.75	324	783.75	1621
- (b) Using Simpson's $3/8^{th}$ rule evaluate $\int_0^6 \frac{dx}{1+x^2}$ by dividing the range into 6 equal parts [8+7]
7. (a) Solve $y' = -xy^2$, $y(0)=2$ by modified Euler's method and hence find $y(0.1)$, $y(0.2)$
 (b) Solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$, $y(0)=1$ by fourth order R-K method and hence find $y(0.2)$, $y(0.4)$ [8+7]
8. (a) Fit a least square parabola $y = a + bx + cx^2$ to the data $(-1,2), (0,1), (1,4)$



Code No: R10107/R10

Set No. 1

(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]

firstranker.com
www.FirstRanker.com

Code No: R10107/R10

Set No. 2

I B.Tech I Semester Supplementary Examinations, Oct/Nov 2013
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

- (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]
- Verify Cayley – Hamilton theorem and find A^{-1} if $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ [15]
- (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^{10} [8+7]
- (a) Apply Newton-Raphson's formula to find the cube root of 5 correct up to three decimal places starting from $x_0 = 1$.

(b) Find a real root of $f(x) = x^3 - 3x + 1 = 0$ correct up to three decimal places starting with $x = 1$ by iterative method. [8+7]
- The following table gives the population of a town during the last six censuses. Estimate, using Newton's interpolation formula, the increase in the population during the period 1986 to 1988.

year	1911	1921	1931	1941	1951	1961
Population (in thousands)	12	15	20	27	39	52

[15]

- (a) Given the following data of X and Y

X	1.0	1.2	1.4	1.6	1.8	2.0
Y	2.72	3.32	4.06	4.96	6.05	7.39

 Find the first and second derivatives at $x = 1.0$

- (b) The table below shows the temperature $f(t)$ as a function of time

t	1	2	3	4	5	6	7
f(t)	81	75	80	83	78	70	60

 Use Simpson's 1/3 method to estimate $\int_1^7 f(t) dt$.

[8+7]



Code No: R10107/R10

Set No. 2

7. (a) Solve $y' = 3x^2 + 1$ by Euler's method and find y at $x=2$ by taking $h=0.5$
(b) Solve by fourth order R-K method $y' = x - y$, $y(1)=0.4$ and hence find $y(1.2)$ [8+7]

8. (a) Fit a curve of the type $y = a + bx + cx^2$ to the following data

x	10	15	20	25	30	35
y	35.3	32.4	29.2	26.1	23.2	20.5

- (b) Fit a curve of the type $y = ab^x$ to the following data by the method of least squares

x	1	2	5	10	20	30	40	50
Y	98.2	91.7	81.3	64	36.4	32.6	7.1	11.3

[7+8]



Code No: R10107/R10

Set No. 3

I B.Tech I Semester Supplementary Examinations, Oct/Nov 2013

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

★ ★ ★ ★ ★

1. (a) Define rank and find the rank of matrix $A = \begin{bmatrix} 1 & 3 & 6 & -1 \\ 1 & 4 & 5 & 1 \\ 1 & 5 & 4 & 3 \end{bmatrix}$ using Echelon form
- (b) Find values of x,y and z using Gauss Jordan method $2x+y-z=1$; $x-y+z=2$; $5x+5y-4z=3$ [7+8]

2. Find Eigen Vectors of $A = \begin{bmatrix} 5 & -2 & 0 \\ -2 & 6 & 2 \\ 0 & 2 & 7 \end{bmatrix}$ [15]

3. (a) By Lagrange's reduction reduce the quadratic form X^TAX to sum of squares form for $A = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 6 & -2 \\ 4 & -2 & 18 \end{bmatrix}$.

- (b) Find the values of a, b, c if $\begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ is an orthogonal matrix [8+7]

4. (a) Find a real root of the equation using Newton-Raphson's method $\cos^2 x - x = 0$
 (b) Find a root of the equation $x^3 e^x - x - 1 = 0$ by Bisection method. [8+7]

5. (a) (i) Solve $\Delta(e^{ax} \log bx)$ (ii) Prove that $\nabla^6 y_8 = \Delta^6 y_2$.
 (b) From the following table for find f(3.3) using gauss forward interpolation formula.

x	1	2	3	4	5
Y =	15.30	15.10	15.00	14.50	14.00
f(x)					

[8+7]

6. (a) A curve is expressed by the following values of x and y. Find the slope at the point $x = 0.5$.

X	0.4	0.5	0.6	0.7	0.8
y	1.58	1.80	2.04	2.33	2.65

 Calculate the angular velocity and the angular acceleration of the rod when $t = 0.3$ seconds.



Code No: R10107/R10

Set No. 3

- (b) Evaluate $\int_0^1 \frac{1}{1+x} dx$, by Trapezoidal rule and Simpson's $\frac{1}{3}$ rule. [8+7]
7. Solve $y' = x - y$, $y(0) = 1$, $h = 0.1$ by Milne's predictor corrector method to find $y(0.4)$. Use Euler's modified method to evaluate $y(0.1)$, $y(0.2)$, $y(0.3)$ [15]
8. (a) Fit a power curve $y = ax^b$ to the following data

X	1	2	3	4	5
Y	7.1	27.8	62.1	110	161

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

x	0	1	2	3	4
y	1	5	10	22	38

[7+8]



Code No: R10107/R10

Set No. 4

I B.Tech I Semester Supplementary Examinations, Oct/Nov 2013
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

- (a) Find rank of matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -2 & 0 \\ 3 & 1 & 4 \\ -2 & 3 & 1 \end{bmatrix}$ using Normal form.

(b) Solve system of equations, if consistent $x+y+2z=4$, $2x-y+3z=9$, $3x-y-z=2$ [7+8]
- Show that matrix $A = \begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ satisfies Cayley - Hamilton theorem [15]
- Find the rank, signature and index of the quadratic form $2x_1^2 + x_2^2 - 3x_3^2 + 12x_1x_2 - 4x_1x_3 - 8x_2x_3$ by reducing it to normal form. Also write the linear transformation which brings about the normal reduction [15]
- (a) Find a real root of the equation $x \sin x + \cos x = 0$, using Newton-Raphson's method

(b) Evaluate $\sqrt{12}$ and $\frac{1}{\sqrt{12}}$ using fixed point iteration method. [8+7]
- (a) Evaluate the following, interval of differencing being unity. $\Delta \tan^{-1} ax$ (ii) $\Delta (e^{2x} \log 3x)$

(b) Find $y(25)$, given that $y_{20} = 24$, $y_{24} = 32$, $y_{28} = 35$, $y_{32} = 40$, Using Gauss forward difference Interpolation formula. [8+7]
- (a) For the function $y = f(x)$ given by the following Table, find y' at $x = 0.04$ using the Bessel's formula.

x	0.01	0.02	0.03	0.04	0.05	0.06
y	0.1023	0.1047	0.1071	0.1096	0.1122	0.1148

(b) Evaluate $\int_0^4 e^{1/x} dx$ by using the Simpson's $3/8^{th}$ rule, by dividing the interval into 3 equal parts. [8+7]
- (a) Solve $y' = 3x^2 + 1$ by Euler's method and find y at $x=2$ by taking $h=0.5$

(b) Solve by fourth order R-K method $y' = x - y$, $y(1)=0.4$ and hence find $y(1.2)$ [8+7]



Code No: R10107/R10

Set No. 4

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]

firstRanker.com
www.FirstRanker.com

