Code No: 07A1BS06 **Set No. 1**

I B.Tech Regular Examinations, May/Jun 2008
MATHEMATICAL METHODS
(Common to Electrical & Electronic Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Mechatronics, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Production Engineering, Instrumentation & Control Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Express the following system in matrix form and solve by Gauss elimination method.
   $2x_1 + x_2 + 2x_3 + x_4 = 6$; $6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$,
   $4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$; $2x_1 + 2x_2 - x_3 + x_4 = 10$.
   (b) Show that the system of equations $3x + 3y + 2z = 1$; $x + 2y = 4$; $10y + 3z = -2$; $2x - 3y - z = 5$ is consistent and hence solve it. [8+8]

2. (a) Find the characteristic roots of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$
   (b) If $A = \begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix}$, find A^{50}. [8+8]

3. Discuss the nature of the quadratic forms and reduce it to canonical form $x^2 + 4xy + 6xz - y^2 + 2yz + 4z^2$. [16]

4. (a) Find a positive root of the following equation by bisection method $x^3 - x^2 - 1 = 0$
   (b) Find the interpolating polynomial f(x) from the table

x	0	1	4	5
f(x)	4	3	24	39

   [8+8]

5. (a) Fit a parabola to the data given below

x:	1	2	3	4	5
y:	10	12	8	10	14

   (b) For the table below:
   find $f'(1.76)$ and $f'(1.72)$.

x:	1.72	1.73	1.74	1.75	1.76
f(x)	0.17907	0.17728	0.17552	0.17377	0.17204

   [8+8]

6. (a) Solve the following using R - K fourth method $y' = y - x$, $y(0) = 2$, $h = 0.2$. Find $y(0.2)$.

(b) Given y' = x^2 - y, y(0) =1, find correct to four decimal places the value of y(0.1), by using Euler's method. [8+8]

7. (a) Obtain the Fourier series expansion of f(x) given that f(x) = $(\pi\text{-x})^2$ in $0 < x < 2\pi$ and deduce the value of $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\ldots = \frac{\pi^2}{6}$.

(b) Find half range Fourier cosine series for f(x) = x in $0 < x < 2\pi$. [8+8]

8. (a) Solve the partial differential equation $x^2p^2 + y^2q^2 = 1$

(b) Solve the difference equation, using Z-transform y(k+2)-5y(k+1)+6y(k)=5^n , given y(0)=0, y(1)= 0. [8+8]

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Code No: 07A1BS06 **Set No. 2**

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MATHEMATICAL METHODS
(Common to Electrical & Electronic Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Mechatronics, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Production Engineering, Instrumentation & Control Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the rank of $\begin{pmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{pmatrix}$

   (b) Solve the system of equations 3x+y+2z =3, 2x-3y-z= -3, x+2y+z=4. [8+8]

2. Find the eigen values and eigen vectors of $\begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix}$ [16]

3. Reduce the quadratic form to canonical form by an orthogonal reduction and state the nature of the quadratic form. $2x^2 + 2y^2 + 2z^2$ - 2xy - 2yz -2zx. [16]

4. (a) Using Lagrange's interpolation formula, find y(10) from the following table

X:	5	6	9	11
Y:	12	13	14	16

   (b) Find the second difference of the polynomial x^4 - $12x^3$ + $42x^2$ - 30x + 9 with interval of differencing h = 2. [8+8]

5. (a) Find a curve $y = ae^{bx}$ to the data:

x:	0	2	4
y:	5.1	10	31.1

   (b) Using the table below, find $f'(0)$ and $\int_0^9 f(x)dx$.

x:	0	2	3	4	7	9
f(x):	4	26	58	110	460	920

   [8+8]

6. Find y(0.1), y(0.2), z(0.1), z(0.2) given $\frac{dy}{dx} = x + z$, $\frac{dz}{dx} = x - y^2$ and y(0) = 2, z(0) = 1 by using Taylor's series method. [16]

7. (a) Find the half range cosine series for f(x)= sinkx for k, not an integer.

   (b) Expand $f(x) = x^2$, $0 < x < 2\pi$ as a Fourier series. [8+8]

8. (a) Solve (x+y)p+(y+z)q=(z+x).
   (b) Solve the difference equation, using Z-transform y(k+2)-2cosα.y(k+1)+y(k)=0, given y(0)=1, y(1)= 1. [8+8]

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Code No: 07A1BS06 **Set No. 3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the rank of $\begin{pmatrix} 1 & 4 & 3 & -2 & 1 \\ -2 & -3 & -1 & 4 & 3 \\ -1 & 6 & 7 & 2 & 9 \\ -3 & 3 & 6 & 6 & 12 \end{pmatrix}$

   (b) Solve the system of equations
   x + y + w = 0, y + z = 0, x + y + z +w = 0, x + y + 2z = 0. [8+8]

2. Determine the characteristic roots and the corresponding characteristic vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ [16]

3. Reduce the quadratic form $3x^2+5y^2=3z^2$-2yz+2zx-2xy to the canonical form and specify the matrix of transformation. [16]

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

   (b) Find the parabola passing through the points (0, 1), (1, 3) and (3, 55) using Lagrange's interpolation formula. [8+8]

5. (a) Using Simpson's $3/8^{th}$ rule evaluate $\int_0^6 \frac{dx}{1+x^2}$, by dividing the range into 6 equal parts.

   (b) Fit a curve of the form $y=ae^{bx}$ to the data

x:	0	1	2	3
y:	1.05	2.10	3.85	8.30

   [8+8]

6. (a) Solve $y' = y - x^2$, y(0) =1, by Picard's method upto the third approximation. Hence, find the value of y(0.1), y(0.2).

   (b) Solve $y' = x + y$, given y(1) = 0. Find y(1.1) and y(1.2) by Taylor's series method. [8+8]

7. (a) Using Parsevals Identity evaluate $\int_0^\infty \frac{x^2 dx}{(a^2+x^2)^2}$, a > 0

(b) Evaluate $\int_0^\infty \frac{dx}{(a^2+x^2)(b^2+x^2)}$. using transforms. [8+8]

8. (a) Solve the difference equation, using Z-transform y(n+2)+3y(n+1)+2y(n)=0, given y(0)=0, y(1)=1.

(b) Solve $x^2(z-y)p + y^2(x-z)q = z^2(y-x)$ [8+8]

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Code No: 07A1BS06 **Set No. 4**

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MATHEMATICAL METHODS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the rank of $\begin{pmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{pmatrix}$

   (b) Solve the system of equations x+2y+3z=1, 2x+3y+8z=2, x+y+z=3. [8+8]

2. (a) Find the characteristic roots of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$

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

3. Find the transformation which will transform $4x^2 + 3y^2 + z^2$ - 8xy - 6yz + 4xz into a sum of squares and find the reduced form. [16]

4. (a) If the interval of differencing is unity, prove that $\Delta\frac{2^x}{x!} = \frac{2^x(1-x)}{(x+1)!}$

   (b) If the interval of differencing is unity, prove that $\Delta[x(x+1)(x+2)(x+3)] = 4(x+1)(x+2)(x+3)$. [8+8]

5. (a) Fit the least square straight lines y=a+bx to the following data.

x:	-5	-3	-1	0	1	2	4
f(x):	0.4	-0.1	-0.2	-0.3	-0.3	0.1	0.4

   (b) Find f (2.36) from the following table:

x:	1.6	1.8	2.0	2.2	2.4	2.6
f(x):	4.95	6.05	7.39	9.03	11.02	13.46

   [8+8]

6. (a) Solve $\frac{dy}{dx} = xy$ using R.K. method for x=0.2 given y(0)=1, $y'(0)$=0 taking h=0.2.

   (b) Solve the equation $\frac{dy}{dx} = x - y^2$ with the conditions y(0)=1and y' (0)=1. Find y(0.2) and y(0.4) using Taylor's series method. [8+8]

7. (a) Obtain the Fourier series expansion of f(x) given that f(x) = kx(π-x) in $0<x<2\pi$ where k is a constant.

   (b) Find the Fourier series of peridiocity 3 for f(x) = 2x-x^2 , in $0<x<3$. [8+8]

8. (a) Solve $(x^2 + y^2 + z^2)p - 2xyq = -2xz$

   (b) Solve the difference equation, using Z-transform y(k+2)-4y(k+1)+4y(k)=π, given x(0)=0, x(1)=0. [8+8]

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