Code No: R07A1BS06 **Set No. 1**

I B.Tech Supplimentary Examinations, Aug/Sep 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) Solve the system 2x - y + 3z = 0, 3x + 2y + z = 0 and x - 4y + 5z = 0.
   (b) Find all the solutions of the system of equations: x + 2y - z = 0, 2x + y + z = 0, x - 4y + 5z = 0. [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. Find the transformation that will transform $10x^2+2y^2+5z^2+6yz-10zx-4xy$ into a sum of square and find its reduced form. [16]

4. (a) Solve the equation $x^3 + x^2 - 1 = 0$ for a positive root by iteration method.
   (b) Using Newton-Raphson method, find a positive root of $\cos x - xe^x = 0$. [8+8]

5. (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) Fit a straight line to the data given below:

x:	1	3	5	7	9
y:	1.5	2.8	4.0	4.7	6.0

[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) Prove that F^n (xf(x))=$^d/_{ds}$ (F_s(s)).
   (b) Find the Fourier sine and cosine transform of f(x)= e^{-ax}, a > 0. [8+8]

8. (a) Solve the difference equation, using Z-transform x(n+2)-3x(n+1)-10x(n)=0, given x(0)=1, x(1)=0.

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

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Code No: R07A1BS06 **Set No. 2**

I B.Tech Supplimentary Examinations, Aug/Sep 2008
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) 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. Verify Cayley-Hamilton Theorem for the matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$. Hence find A^{-1}. [16]

3. Reduce the quadratic form $3x^2 - 2y^2 - z^2 + 12yz + 8zx - 4xy$ to canonical form by an orthogonal reduction and state the nature of the quadratic form. [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) Calculate $\int_1^2 \frac{dx}{x}$ using Simpson's rule and trapezoidal rule. Take h=0.25 in the given range.
   (b) Find by the method of least squares the straight line that best fits the following data:

x:	0	5	10	15	20
y:	7	-11	16	20	26

   [8+8]

6. (a) Use Eulers method to find y(0.1), y(0.2) given $y' = (x^3 + xy^2)\, e^{-x}$, y(0)=1.
   (b) Solve $y = x^2 + y^2$ given y(0)=0 using Picard's method correct to three places of decimals. [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 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: R07A1BS06 **Set No. 3**

I B.Tech Supplimentary Examinations, Aug/Sep 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) Test for consistency and hence solve the system: x + y + z = 6, x - y + 2z = 5, 3x + y + z = 8, 2x - 2y + 3z = 7.
   (b) Show that the equations x - 4y + 7z = 14, 3x + 8y - 2z = 13, 7x - 8y + 26z = 5 are not consistent. [8+8]

2. Determine the eigen values and the corresponding eigen vectors of the matrix A, where $A = \begin{bmatrix} 1 & 0 & -2 \\ 0 & 0 & 0 \\ -2 & 0 & 4 \end{bmatrix}$ [16]

3. Reduce the quadratic form $8x^2 + 7y^2 + 3z^2$ - 12xy - 8yz + 4zx into a 'sum of squares' by an orthogonal transformation and give the matrix of transformation. Also state the nature. [16]

4. (a) Find a positive root of x^4 - x^3 - $2x^2$ - 6x - 4 =0 by bisection method.
   (b) Find an approximate root of x $\log_{10}$x - 1.2 = 0 by Regula False method. [8+8]

5. (a) Fit a second degree parabola to the following data:

x:	0	1	2	3	4
f(x):	1	1.8	1.3	2.5	6.3

   (b) The velocity v of a particle moving in a straight line covers a distance x in time t. They are related as follows: Find f′ (15).

x:	0	10	20	30	40
v:	45	60	65	54	42

[8+8]

6. (a) Obtain y(0.1) given $y' = \frac{y-x}{y+x}$, y(0)=1 by Picard's method.
   (b) Using Taylors series method solve $y' = xy+y^2$, y(0) = 1 at x= 0.1, 0.2, 0.3. [8+8]

7. (a) Expand f(x) = e^{ax} in a Fourier series in 0 < x < 2π
   (b) Obtain sine series for f(x) = πx- x^2, in 0 < x <π. [8+8]

8. (a) Form the partial differential equations by eliminating the arbitrary functions
   i. z= f($x^2 + y^2$)
   ii. z=yf(x)+xg(y).
   (b) Find the Z-transform of the sequences $\{x(n)\}$ where x(n) is
   i. n.2^n
   ii. an^2+bn+c. [8+8]

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Code No: R07A1BS06 **Set No. 4**

I B.Tech Supplimentary Examinations, Aug/Sep 2008
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) Solve by matrix method the equations
   3x + y + 2z = 3; 2x - 3y - z = - 3 ; x + 2y + z = 4.
   (b) Test for the consistency of
   x + y + z = 1, x - y + 2z =1, x - y + 2z = 5, 2x - 2y +3z = 1,
   3x + y + z = 2. [8+8]

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

3. Reduce the quadratic form $8x^2 + 7y^2 + 3z^2$ - 12xy - 8yz + 4zx into a 'sum of squares' by an orthogonal transformation and give the matrix of transformation. Also state the nature. [16]

4. (a) Find a positive root of x - cos x = 0 by bisection method.
   (b) Using Newton-Raphson method, find a real root of x^3 - x - 2 = 0. [8+8]

5. Fit a straight line and a parabola to the following data and find out which one is most appropriate. Give your reason for the conclusion.

x:	1	2	3	4	5
y:	4	3	6	7	11

[16]

6. (a) Obtain y(0.1) given $y' = \frac{y-x}{y+x}$, y(0)=1 by Picard's method.
   (b) Using Taylors series method solve $y' = xy+y^2$, y(0) = 1 at x= 0.1, 0.2, 0.3. [8+8]

7. (a) If $f(x) = \begin{cases} kx; & 0 < x < \frac{\pi}{2} \\ k(\pi - x); & \frac{\pi}{2} < x < \pi \end{cases}$.
   Find the half-range sine series.
   (b) Find the Fourier expansion of f(x)= x cosx; 0 < x < 2π. [8+8]

8. (a) Find $Z^{-1}\left(\frac{z^2-3z}{(z+2)(z-5)}\right)$
   (b) Solve $y^2p-xyq=x(z-2y)$. [8+8]

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