Code No: 09A1BS04 **R09** **Set No. 2**

I B.Tech Examinations,June 2011
MATHEMATICAL METHODS
Common to BME, IT, ICE, E.COMP.E, ETM, EIE, CSE, ECE, EEE
Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive the normal equation to fit the parabola y=a+bx+cx^2.
   (b) By the method of least square, find the straight line that best fits the following data:

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

   . [8+7]

2. (a) Find the Fourier Series to represent the function f(x)=$|\sin x|$ in $-\Pi < x < \Pi$
   (b) Find the Fourier Series for the function f(x) is given by
   $f(x) = \begin{cases} -\frac{1}{2}(\Pi + x) & for \quad -\Pi < x \leq 0 \\ \frac{1}{2}(\Pi - x) & for \quad 0 \leq x < \Pi \end{cases}$. [7+8]

3. Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$. [15]

4. (a) Given $\frac{dy}{dx}$=xy and y(0)=1 find y(0.1) using Euler's method.
   (b) solve by Euler's method $\frac{dy}{dx}=\frac{2y}{x}$ given y(1)=2 and find y(2). [8+7]

5. (a) Solve $\frac{x^2}{p} + \frac{y^2}{q} = z$.
   (b) Solve $x^2p^2 + xpq = z^2$. [7+8]

6. Reduce the quadratic form to the canonical form $6x^2$+ $3y^2$ + $3z^2$- 4xy + 4zx- 2yz. [15]

7. (a) Reduce the Matrix A to its normal formWhere A=$\begin{bmatrix} 1 & 2 & -2 & 3 \\ 2 & 5 & -4 & 6 \\ -1 & -3 & 2 & -2 \\ 2 & 4 & -1 & 6 \end{bmatrix}$ and hence find the rank.
   (b) Find whether the following system of equations are consistent. If so solve them. [8+7]

8. (a) Establish the formula $x_{i+1} = \frac{1}{2}\left(x_i + \frac{N}{x_i}\right)$ and hence compute the value of upto four decimal places.
   (b) Find y(25) given that y(20) = 24, y(24) = 32, y(28) = 35, y(32) = 40 using Gauss forward difference formula. [8+7]

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Code No: 09A1BS04 **R09** **Set No. 4**

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

Answer any FIVE Questions
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1. Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$. [15]

2. Reduce the quadratic form to the canonical form $3x^2$-$3y^2$- $5z^2$ - 2xy - 6yz -6xz.[15]

3. (a) From the following table, find the value of x for which y is maximum and find this value of y.

x	1.2	1.3	1.4	1.5	1.6
y	0.9320	0.9636	0.9855	0.9975	0.9996

(b) From the following table find x, correct to four decimal places for which y is minimum and find this value of y.

x	0.60	0.65	0.70	0.75
y	0.6221	0.6155	0.6138	0.6170

[8+7]

4. (a) Solve px+qy=pq.
(b) Solve z^2=pqxy. [8+7]

5. Find y(0.1) and y(0.2) using Euler's modified formula given that $\frac{dy}{dx}$=x^2-y and y(0)=1. [15]

6. If f(x) $\begin{matrix} = x \ \ for \ \ 0 < x < \Pi/2 \\ = \Pi - x \ \ for \ \ \Pi/2 < x < \Pi \end{matrix}$. then prove that

(a) f(x)=$\frac{4}{\Pi}[\sin x - \frac{1}{3^2}\sin 3x + \frac{1}{5^2}\sin 5x - --]$.
(b) f(x)=$\frac{\Pi}{4} - \frac{2}{\Pi}[\frac{1}{1^2}\cos 2x + \frac{1}{3^2}\cos 6x + \frac{1}{5^2}\cos 10x + --]$. [8+7]

7. (a) Find a real root of the equation, log x = cos x using regula falsi method.
(b) Given that f(20) = 24, f(24) = 32, f(28)=35, f(32) = 40, find f(25) using Gauss forward interpolation formula. [7+8]

8. a) Find the Value of k it the Rank of Matrix A is 2 were A= $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & k & 0 \end{bmatrix}$

(b) Determine whether the following equations will have a solution, if so solve them. $x_1 + 2x_2 + x_3 = 2$, $3x_1 + x_2 - 2x_3 = 1$, $4x_1 - 3x_2 - x_3 = 3$, $2x_1 + 4x_2 + 2x_3 = 4$. [7+8]

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Code No: 09A1BS04 **R09** **Set No. 1**

I B.Tech Examinations,June 2011
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Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
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1. Reduce the quadratic form to the canonical form $2x^2 + 5y^2 + 3z^2 + 4xy$. [15]

2. (a) Find the Values of Rank of the Matrix ,by reducing it to the normal form.
$$\begin{bmatrix} 1 & 2 & 1 & 2 \\ 1 & 3 & 2 & 2 \\ 2 & 4 & 3 & 4 \\ 3 & 7 & 5 & 6 \end{bmatrix}$$
(b) Find the valves of p and q so that the equations 2x + 3y + 5z = 9, 7x + 3y 2z = 8, 2x+3y + pz = q have
   i. No solution
   ii. Unique solution
   iii. An infinite number of solutions. [7+8]

3. Find y(0.1), z(0.1) given $\frac{dy}{dx}$=z-x, $\frac{dz}{dx}$=x+y and y(0)=1, z(0)=1 by using taylor's series method. [15]

4. (a) Express f(x)=x^3 as Fourier sine series in (0,Π).
(b) find the Fourier sine series of e^{ax} in (0,Π). [7+8]

5. (a) Derive a formula to find the cube root of N using Newton Raphson method hence find the cube root of 15.
(b) Find the interpolation polynomial for x, 2.4, 3.2, 4.0, 4.8, 5.6, f(x) = 22, 17.8, 14.2, 38.3, 51.7 using Newton's forward interpolation formula. [8+7]

6. (a) Prove that if the eigen values of a nonsingular square matrix are $\lambda_1, \lambda_2, \lambda_3 ..... \lambda_n$, then the eigen values of A - KI are $\lambda_1 - K, \lambda_2 - K, \lambda_3 - K...., \lambda_n - K$.
(b) Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$. [6+9]

7. (a) Solve $z(p^2 - q^2) = x - y$.
(b) Solve $p^2z^2 \sin^2 x + q^2z^2 \cos^2 y = 1$. [7+8]

8. (a) Use the trapezoidal rule with n=4 to estimate $\int_0^1 \frac{dx}{1+x^2}$ correct to four decimal places.

(b) Evaluate $\int_0^{\pi} \left(\frac{\sin x}{x}\right) dx$ by using

i. Trapezoidal rule.

ii. Simpson's$\frac{1}{3}$ rule taking n = 6. [8+7]

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Code No: 09A1BS04 **R09** **Set No. 3**

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

Answer any FIVE Questions
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1. By the method of least squares, fit a second parabola y=a+bx+cx^2 to the following data:

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

[15]

2. (a) Find a real root of the equation $e^x Sinx = 1$, using regula falsi method.
   (b) Find f(22), from the following data using Newton's Backward formula.

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

[8+7]

3. (a) f(x)=x-Π as Fourier series in the interval $-\Pi < x < \Pi$.
   (b) Find the fourier series to represent f(x)=x^2 in (0,2Π). [8+7]

4. (a) Find the Rank of the Matrix ,by reducing it to the normal form. $\begin{bmatrix} 1 & 2 & -2 & 3 \\ 2 & 5 & -4 & 6 \\ -1 & -3 & 2 & -2 \\ 2 & 4 & -1 & 6 \end{bmatrix}$
   (b) Find whether the following system of equations are consistent. If so solve them. x+2y-z=3, 3x-y+2z=-1, 2x-2y+3z=2, x-y+z=-1. [8+7]

5. Find y(0.5), y(1) and y(1.5) given that $\frac{dy}{dx}$=4-2x and y(0)=2 with h=0.5 using modified Euler's method. [15]

6. Verify Cayley Hamilton theorem and find the inverse of $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$. [15]

7. (a) Solve $p - x^2 = q + y^2$.
   (b) Solve $q^2 - p = y - x$.
   (c) Solve $q = px + p^2$. [5+5+5]

8. Compute the full SVD for the following matrix $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$. [15]

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