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

**I B.Tech Examinations,December-January, 2011-2012**
**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**

⋆ ⋆ ⋆ ⋆ ⋆

1. Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$. [15]

2. (a) Find the value of k such that the rank of A = $\begin{bmatrix} 1 & 1 & -1 & 1 \\ 1 & -1 & k & -1 \\ 3 & 1 & 0 & 1 \end{bmatrix}$ is 2.

   (b) Find whether the following system of equations are consistent. If so solve them. 2x - y +z =5, 3x + y - 2z = - 2, x - 3y - z = 2. [7+8]

3. (a) Solve $(z^2 - 2yz - y^2)$p+(xy+zx)q=xy-zx.

   (b) Find the integral surface of $x(y^2 + z)p - y(x^2 + z)q = (x^2 + y^2)z$. [7+8]

4. Given $y^{|} = x+siny$ and y(0)=1 compute y(0.2) and y(0.4) with h=0.2 using Euler's modified method. [15]

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

6. Obtain the half-range sine and cosine series for the function f(x)=$\frac{\Pi x}{8}(\Pi - x)$ in the range $0 \leq x \leq \Pi$. [15]

7. (a) Derive the formula to evaluate $\int_a^b y$ dx using Simpson's $\frac{1}{3}$ rule.

   (b) Evaluate $\int_{0.6}^{2} y\, dx$ using Trapezoidal rule . [8+7]

8. (a) Find a real root of the equation 3x = Cos x + 1 by bisection method.

   (b) Given that y(3) = 6, y(5) = 24, y(7) = 58, y(9) = 108, y(11) = 174 find x when y = 100, Using Lagranges formula. [8+7]

⋆ ⋆ ⋆ ⋆ ⋆

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

**I B.Tech Examinations,December-January, 2011-2012**
**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**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Solve $y^{|} = x^2 + y^2$, y(0)=1 using picard's method.
   (b) Solve $y^{|} + y = e^x$, y(0)=0 using picard's method. [7+8]

2. (a) Fit a straight line y=a+bx from the following data:

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 1.8 | 3.3 | 4.5 | 6.3 |

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

| x | 0 | 5 | 10 | 15 | 20 | 25 |
|---|---|---|---|---|---|---|
| y | 12 | 15 | 17 | 22 | 24 | 30 |

   [8+7]

3. (a) Find a real root of the equation 2x - log x = 7 using iteration method
   (b) Find y(54) given that y(50)=205, y(60)=225, y(70)=248 and y(80)=274 Using Newton's forward difference formula. [8+7]

4. (a) Find the rank of the Matrix by reducing it to the normal form. $\begin{bmatrix} 4 & 3 & 2 & 1 \\ 5 & 1 & -1 & 2 \\ 0 & 1 & 2 & 3 \\ 1 & -1 & 3 & -2 \end{bmatrix}$.
   (b) Solve the following tridiagonal system 3x - y = 4, 2x - y + z = 6, 2y + 3z +2w = 11, z - 2w = -1. [8+7]

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

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

7. (a) Solve $(p^2 - q^2)z = x - y$.
   (b) Solve $px - qy = y^2 - x^2$. [8+7]

8. If f(x)= $\begin{cases} \frac{\Pi x}{4} & for \ \ 0 < x < \frac{\Pi}{2} \\ \frac{\Pi}{4}(\Pi - x) & for \ \ \Pi/2 < x < \Pi \end{cases}$. Show that
   (a) $f(x) = \sin x - \frac{1}{3^2}\sin 3x + \frac{1}{5^2}\sin 5x - \frac{1}{7^2}\sin 7x + - - -$.
   (b) $f(x) = \frac{\Pi^2}{16} - \frac{1}{2}\left(\frac{1}{1^2}\cos x + \frac{1}{3^2}\cos 6x + --\right)$. [15]

⋆ ⋆ ⋆ ⋆ ⋆

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

**I B.Tech Examinations,December-January, 2011-2012**
**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**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Form the partial differential equation by eliminating f from xyz=f($x^2+y^2+z^2$).
   (b) Form the partial differential equation by eliminating f from z=(x+y)f($x^2-y^2$). [7+8]

2. (a) Prove that the eigen vectors corresponding to two different eigen values are linearly indepndent.
   (b) Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 3 & 2 & 2 \\ 1 & 2 & 2 \\ -1 & -1 & 0 \end{bmatrix}$. [6+9]

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

4. (a) Find a real root of the equation Cos x- $x^2$- x = 0 using Newton Raphson method.
   (b) Find the second difference of the polynomial $x^4$-12$x^3$+ 42$x^2$- 30 x + 9, given that the interval of difference is 2. [7+8]

5. Given $\frac{dy}{dx}$=-x$y^2$ and y(0)=2. Compute y(0.2) in steps of 0.1 using modified Euler's method. [15]

6. (a) Find the Rank of the Matrix ,by reducing it to the normal form. $\begin{bmatrix} 2 & 1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$
   (b) Solve the following equations by expressing the coefficient matrix as a product of a lower triangular and upper triangular matrices. x + y - z = 5, 2x + y + 2z = 5, 3x + 2y - 4z = 7. [7+8]

7. (a) Find the half-range sine series of f(x)=1 in [0, $l$].
   (b) Find the half-range cosine and sine series for f(x)=x in (0, $l$). [7+8]

8. (a) Derive the formula to evaluate $\int_a^b y$ dx using trapesoidal rule.
   (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 $\frac{1}{3}$ method to estimate $\int_1^7 f(t)$ dt. [8+7]

⋆ ⋆ ⋆ ⋆ ⋆

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

**I B.Tech Examinations,December-January, 2011-2012**
**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**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find the Fourier Series to represent the function f(x) given
$f(x) = \begin{cases} 0 & for \quad -\Pi \le x \le 0 \\ x^2 & for \quad 0 \le x \le \Pi \end{cases}$
(b) Find the Fourier Series in [- Π, Π] for the function
$f(x) = \begin{cases} \frac{-1}{2}(\Pi + x) & for \quad -\Pi \le x \le 0 \\ \frac{1}{2}(\Pi - x) & for \quad 0 \le x \le \Pi \end{cases}$. [8+7]

2. (a) Find the nature of the quadratic form $x^2$+$2y^2$+$2y^2$- 2xy+2yz.
(b) Find the nature of the quadratic form $2x^2$ +$2y^2$ + $2z^2$ +2yz. [8+7]

3. Evaluate y(0.2) and y(0.4) correct to four decimal places by taylor's series method if y(x) satisfies $y^{|}$=1-2xy and y(0)=0. [15]

4. (a) Solve $p^2 + q^2 = x^2 + y^2$
(b) Solve pq+qx=y. [7+8]

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

6. Evaluate $\int_0^1 \frac{1}{1+x} dx$
(a) By Trapezoidal rule and Simpson's $\frac{1}{3}$ rule.
(b) Using Simpson's $\frac{3}{8}$ rule. [8+7]

7. (a) Find a real root of the equation $x^3 - 2x^2 - 4 = 0$using iteration method.
(b) Find the polynomial which fits the data in the following table using Gauss forward formula.

| x | 3 | 5 | 7 | 9 | 11 |
|---|---|---|---|---|---|
| y | 6 | 24 | 58 | 108 | 174 |

. [8+7]

8. (a) Find the Rank of the Matrix ,by reducing it to the normal form. $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$
(b) Solve the following equations by expressing the coefficient matrix as a product of a lower triangular and upper triangular matrices. 2x + y - z = 3, x - 2y - 2z = 1, - x + 2y - 3z = 9. [7+8]

⋆ ⋆ ⋆ ⋆ ⋆