**Code No: 09A1BS04** R09

**B. Tech I Year Examinations, May/June -2012**
**MATHEMATICAL METHODS**
**(Common to EEE, ECE, CSE, EIE, BME, IT, ETM, ECC, ICE)**

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

**Answer any five questions**
**All questions carry equal marks**
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1. a) Reduce the matrix into normal form, find its rank. $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$.

   b) Find the values of 'a' and 'b' for which the equations, x + y + z = 3, x + 2y + 2z = 6, x + 9y + az = b have
   i) No solution
   ii) A unique solution
   iii) Infinite number of solutions. [8+7]

2. a) Find the Eigen values and the corresponding eigen vectors of the matrix
$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

   b) If $\lambda$ is an Eigen value of a non-singular matrix A, then S.T. $\frac{|A|}{\lambda}$ is an Eigen value of Adj.A. [10+5]

3. Reduce the quadratic form $8x^2 + 7y^2 + 3z^2 - 12xy - 8yz + 4xz$ into a sum of squares by an orthogonal transformation and give the matrix of transformation. Also state the nature of the quadratic from. [15]

4. a) Find a real root of the equation 3x-cosx-1= 0 using Newton Raphson method.
   b) Find f(1.6) using Lagranges formula from the following table. [8+7]

| x | 1.2 | 2.0 | 2.5 | 3.0 |
|---|---|---|---|---|
| F(x) | 1.36 | 0.58 | 0.34 | 0.20 |

5. a) Derive the normal equation to fit the parabola $y = a + bx + cx^2$.
   b) Given

| x | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
|---|---|---|---|---|---|---|---|
| Y=f(x) | 7.989 | 8.403 | 8.781 | 9.129 | 9.451 | 9.750 | 10.031 |

   Find $y^1$ and $y^{11}$ at x = 1.2. [7+8]

6. Find y(0.1) and y(0.2) using Runge Kutta fourth order formula given that $\frac{dy}{dx} = x + x^2 y$ and y(0) = 1. [15]

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

b) Obtain Fourier cosine series for f(x) = x sin x $0 < x < \pi$ and show that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + ........ = \frac{\pi - 2}{4}$. [7+8]

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

b) Form the partial differential equations by eliminating the arbitrary functions

i) $z = f(x^2 + y^2)$

ii) $z = yf(x) + xg(y)$. [7+8]

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