Code.No: 09A1BS04 | R09 | SET-1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
I B.TECH – REGULAR EXAMINATIONS, JUNE - 2010
MATHEMATICAL METHODS
(COMMON TO EEE, ECE, CSE, EIE, BME, IT, ETE, E.COMP.E, ICE)

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

Answer any FIVE questions
All questions carry equal marks
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1.a) Find the Rank of the Matrix, by reducing it to the normal form $\begin{bmatrix} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & k \end{bmatrix}$.

b) Solve the system of linear equations by matrix method.
x + y + z = 6, 2x + 3y - 2z = 2, 5x + y + 2z = 13. [8+7]

2. Verify Cayley Hamilton theorem and find the inverse of $\begin{bmatrix} 1 & 0 & 3 \\ 2 & -1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ [15]

3. Prove that the following matrix is Hermitian. Find the eigen values and the corresponding eigen vectors of the matrix $\begin{bmatrix} 4 & 1-3i \\ 1+3i & 7 \end{bmatrix}$ [15]

4.a) Find a real root of the equation x^3 - x - 4 = 0 by bisection method.

b) Use Newton's forward difference formula to find the polynomial satisfied by (0, 5), (1, 12), (2, 37) and (3, 86). [8+7]

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

b) By the method of least squares, find the straight line that best fits the following data: [7+8]

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

6. Using Taylor series method, find an approximate value of y at x=0.2 for the differential equation $y' - 2y = 3e^x$ for $y(0) = 0$. [15]

7.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 $[-\Pi, \Pi]$ 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]

8.a) Form a partial differential equation by eliminating a,b,c from $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.

b) Form the partial differential equation by eliminating the constants from $(x - a)^2 + (y - b)^2 = z^2 \cot^2 \alpha$ where α is a parameter. [8+7]

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