

Code.No: 09A1BS04

R09

SET-2

**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

- - -

- 1.a) Find the Rank of the Matrix,  $\begin{bmatrix} 2 & 3 & 7 \\ 3 & -2 & 4 \\ 1 & -3 & -1 \end{bmatrix}$  by reducing it to the normal form.
- b) Find all the non-trivial solutions of  $2x - y + 3z = 0$ ,  $3x + 2y + z = 0$ ,  $x - 4y + 5z = 0$ . [7+8]
2. Find the eigen values and the corresponding eigen vectors of  $\begin{bmatrix} 1 & 3 & 7 \\ 1 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$ . [15]
- 3.a) Prove that  $\frac{1}{2} \begin{bmatrix} 1+i & -1+i \\ 1+i & 1-i \end{bmatrix}$  is unitary.
- b) Prove that the eigen values of a real skew symmetric matrix are either zero or purely imaginary. [8+7]
- 4.a) Find a real root of the equation  $3x = e^x$  by bisection method.
- b) Using Lagrange's formula find  $y(6)$  given: [7+8]
- |   |   |    |    |     |    |
|---|---|----|----|-----|----|
| x | 3 | 5  | 7  | 9   | 11 |
| y | 6 | 24 | 58 | 108 | 74 |
- 5.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: [7+8]
- |   |    |    |    |    |    |    |
|---|----|----|----|----|----|----|
| x | 0  | 5  | 10 | 15 | 20 | 25 |
| y | 12 | 15 | 17 | 22 | 24 | 30 |
6. Find  $y(0.1)$ ,  $y(0.2)$ ,  $z(0.1)$ ,  $z(0.2)$  given  $\frac{dy}{dx} = x + z$ ,  $\frac{dz}{dx} = x - y^2$  and  $y(0) = 2$ ,  $z(0) = 1$  by using Taylor's series method. [15]
- 7.a) Express  $f(x)=x$  as a Fourier Series in  $(-\Pi, \Pi)$ .
- b) Expand the function  $f(x) = x^2$  as a Fourier series in  $(-\Pi, \Pi)$ . [8+7]

- 8.a) Form the partial differential equation by eliminating a and b from  $\log(az-1) = x + ay + b$   
b) Find the differential equation of all spheres whose centres lie on z-axis with a given radius r. [7+8]

**-oOo-**

*HowToExam.com*