

Code No: 09A1BS04

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech I Year Examinations, May/June-2013

MATHEMATICAL METHODS

(Common to EEE, ECE, CSE, EIE, BME, IT, ETM, ECM, ICE)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Find the value of k such that the rank of A is 2, where $A = \begin{bmatrix} 1 & 1 & -1 & 1 \\ 1 & -1 & k & -1 \\ 3 & 1 & 0 & 1 \end{bmatrix}$
- b) Solve the system of linear equations by matrix method.
 $x + y + z = 6, 2x + 3y - 2z = 2, 5x + y + 2z = 13$
2. Verify Cayley Hamilton theorem and find the inverse of the matrix
 $\begin{bmatrix} 7 & -1 & 3 \\ 6 & 1 & 4 \\ 2 & 4 & 8 \end{bmatrix}$
3. Reduce the following quadratic form to canonical form. Find the matrix of the transformation.
 $6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + 4xz$
- 4.a) Find a real root of the equation $x \log_{10} x - 1.2 = 0$ using Regula Falsi method.
 b) Find the interpolation polynomial for $x = 2.4, 3.2, 4.0, 4.8, 5.6$ and $f(x) = 22, 17.8, 14.2, 38.3, 51.7$ using Newton's forward interpolation formula.
- 5.a) Fit a parabola of the form $y = ax^2 + bx + c$ for the data
- | | | | | | |
|---|------|------|------|------|------|
| x | 1 | 2 | 3 | 4 | 5 |
| y | 1090 | 1220 | 1390 | 1625 | 1915 |
- b) Evaluate $\int_0^{\pi} \sin x dx$ by dividing the range into 10 equal parts using
 i) Trapezoidal rule, ii) Simpson's 1/3 rd rule.
6. Find $y(0.8)$ using Adam's Predictor corrector method by finding the previous values using Euler's modified method, given that $\frac{dy}{dx} = y - x^2, y(0) = 1$.
- 7.a) Obtain the Fourier series for the function $f(x) = x \sin x$ in $[0, 2\pi]$
 b) Find the half range cosine series for $f(x) = x(2-x)$ in $0 < x < 2$.
- 8.a) Solve the partial differential equation $(x-y)p + (y-x-z)q = z$.
 b) Find $z^{-1} \left[\frac{z^2 - z}{(z-2)(z-3)} \right]$.
