

R09

Code No: 09A1BS04

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, November/December - 2013

MATHEMATICAL METHODS

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

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1. Find the values of λ for which the equations
 $(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0$
 $(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$
 $2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$
are consistent and find the ratio of $x : y : z$ when λ has the smallest of these values.
When happens when λ has the greater of these values. [15]
- 2.a) Show that the two matrices $A, C^{-1}AC$ have the same latent roots. [15]
- b) For a matrix $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 3 & 2 \\ 0 & 0 & -2 \end{bmatrix}$ find the Eigen values of $3A^3 + 5A^2 - 6A + 2I$.
3. Reduce the following quadratic form to canonical form and find its rank and signature $x^2 + 4y^2 + 9z^2 + t^2 - 12yz + 6zx - 4xy - 2xt - 6zt$. [15]
- 4.a) By using method false position, find the root of the equation $\cos x - xe^x = 0$.
b) Fit the cubic spline for the data (0, 1), (1, 2), (2, 9) and (3, 28). [15]
- 5.a) Fit a straight line to the following data giving weights to x as 1, 1, 2, 1, 1 by the method of least square:
- | | | | | | |
|-----|---|-----|-----|-----|-----|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 1 | 1.8 | 3.3 | 4.5 | 6.5 |
- b) From the following table, find the value of x for which y is maximum and find this value of y . [15]
- | | | | | | |
|-----|--------|--------|--------|--------|--------|
| x | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| y | 0.9320 | 0.9636 | 0.9855 | 0.9975 | 0.9996 |
- 6.a) Solve the initial value problem $\frac{dy}{dx} = x - y^2, y(0) = 1$ to find $y(0.2)$ by Adam's method.
b) Find the successive approximate solution of the differential equation $y' = y, y(0) = 1$ by Picard's method and compare it with exact solution. [15]
7. Find the Fourier series for $f(x) = \cos \alpha x$ in the range $(-\pi, \pi)$, where α is not an integer. [15]
- 8.a) Solve $p \cos(x + y) + q \sin(x + y) = z$.
b) Solve $p\sqrt{x} + q\sqrt{y} = z$. [15]
