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

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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]

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