TKSE

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year Examinations, June - 2014
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.a) Expand the function $f(x) = x - x^2; -\pi < x < \pi$ as a Fourier series. Deduce

that $\dfrac{\pi^2}{12} = \dfrac{1}{1} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + ...$

b) Find the Half range cosine series for the function $f(x) = (x-1)^2$ in $0 < x < 1$.

2.a) Using Simpson's $3/8^{th}$ rule Evaluate $\int_0^{0.3} \sqrt{1 - 8x^3}\, dx$, by taking 7 ordinates.

b) Using the following table fit a curve of the form $y = ax^b$ using method of least squares.

x	1	2	3	4	5	6
y	1200	900	600	200	110	50

3.a) Define the rank of the matrix. Find the values of L and M such that the rank of the

matrix $\begin{bmatrix} 2 & 1 & -1 & 3 \\ 1 & -1 & 2 & 4 \\ 7 & -1 & L & M \end{bmatrix}$ is 2.

b) Solve the following equations by LU decomposition method.
x-y+z=1; 2x+y-z=2; 5x-2y+2z=5.

4. Find the Characteristics equation of the matrix A= $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and hence find

the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$

5.a) Solve the partial differential equations $p^2 + q^2 = 4pq$.

b) Solve the partial differential equation $x(y-z)p + y(z-x)q = z(x-y)$.

6.a) If f(0)=1, f(1)=2, f(2)=33 and f(3)=244, find a cubic spline approximation assuming M(0)=M(3)=0. Also find f(2.5).

b) Find an iterative formula to find the reciprocal of a given number N and hence find the value of 1/19.

7.a) Use Runge-Kutta method of fourth order to find y(0.2), given $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$, y(0)=1, taking h=0.2.

b) Given $\dfrac{dy}{dx} = xy + y^2$, y(0)=1, y(0.1)=1.1169, y(0.2)=1.2774, y(0.3)=1.5041. Use Adam's method to estimate y(0.4).

8. Reduce the quadratic form $30xy - 12xz + 8yz - 21x^2 - 11y^2 - 2z^2$ to canonical form by orthogonal transformation and find its index and signature.

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