Code No: C2001 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I - Semester Examinations, April/May -2012
COMPUTER ORIENTED NUMERICAL METHODS
(STRUCTURAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1. Solve the following system by Gauss- Jacobi and Gauss – Seidel method:
   10 x -5y -2 z = 3;
   4 x -10y +3z = -3;
   x + 6y +10z = -3.

2.a) Apply Gauss-Jordan method to find the solution of the following system:
   10 x + y + z = 12;
   2 x +10 y + z = 13;
   x + y + 5 z = 7.

b) Reduce the matrix to the tridiagonal form by Householder's method

$$\begin{bmatrix} 1 & 3 & 4 \\ 3 & 1 & 2 \\ 4 & 1 & 2 \end{bmatrix}$$

3. Fit the quadratic splines with **M(0)=f $''$(0)=0** . Hence find an estimate of f(2.5) data as given below.

x	0	1	2	3
f(x)	1	2	33	244

4. Solve the following by means of Euler method
   y' = x + y , y(0) = 1.0. Find y (0.1), y (0.5).

5. The following table of values are given for a function f(x,y)

y/x	0.1	0.2	0.3
0.1	2.0200	2.0351	2.0403
0.2	2.0351	2.0801	2.1153
0.3	2.0403	2.1153	2.1803

a) Estimate the values of $\delta f/\delta x$ at (0.2, 0.1) and $\delta f/\delta y$ at (0.2, 0.2) by first order and second order formulas.

b) Estimate the values of $(\delta^2 f/\delta x\, \delta y)$ at (0.2, 0.2) using second order formula.

6.a) Explain Richardson's extrapolation method.

b) What is beam deflection? Explain.

7.a) Describe how the definition of double integral can be used to find approximations of double integrals over coordinate rectangles.

b) Explain how Simpson's Rule solves double integrals.

8. Find out the undetermined coefficients a, b and c such that the formula is exact for polynomials as higher order as possible and determine the order of truncation error

$$\int_0^h f(x)dx = h\left\{a\, f(0) + b\, f\left(\frac{h}{3}\right) + c\, f(h)\right\}$$

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