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
- - -

1. Solve the following system by Gauss- Jacobi and Gauss – Seidel method:
$10x - 5y - 2z = 3$,
$4x - 10y + 3z = -3$,
$x + 6y + 10z = -3$

2.a) Apply Gauss-Jordan method to find the solution of the following system:
$10x + y + z = 12$,
$2x + 10y + z = 13$,
$x + y + 5z = 7$.
 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
$$\int_0^h f(x)dx = h\left[a\,f(0) + b\,f\left(\frac{h}{2}\right) + c\,f(h)\right]$$

* * * * * *

Computer Oriented Numerical Methods

Roman Trobec

Computer Oriented Numerical Methods:

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   Computer-oriented Mathematics Ladis D. Kovach,1969   Computer Oriented Numerical Methods Vaidyeswaran Rajaraman,1980   Fundamentals of Numerical Computation (Computer-Oriented Numerical Analysis) G. Alefeld,R. Grigorieff,2012-12-06   Computer Oriented Numerical Methods, 1E Benjamin Bryan,2014-11-01 Numerical Analysis is a way to solve the real life mathematical physical and engineering problems Numerical Analysis can be used to answer the problems for which the analytical solution is not available   **Computer Oriented Numerical Methods** Lance Diaz,2014-11-01 Numerical Analysis is a way to solve the real life mathematical physical and engineering problems Numerical Analysis can be used to answer the problems for which the analytical solution is not available   COMPUTER ORIENTED NUMERICAL METHODS, FOURTH EDITION RAJARAMAN, V.,2018-11-01 This book is a concise and lucid introduction to computer oriented numerical methods with well chosen graphical illustrations that give an insight into the mechanism of various methods The book develops computational algorithms for solving non linear algebraic equation sets of linear equations curve fitting integration differentiation and solving ordinary differential equations OUTSTANDING FEATURES Elementary presentation of numerical methods using computers for solving a variety of problems for students who have only basic level knowledge of mathematics Geometrical illustrations used to explain how numerical algorithms are evolved Emphasis on implementation of numerical algorithm on computers Detailed discussion of IEEE standard for representing floating point numbers Algorithms derived and presented using a simple English based structured language

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Table of Contents Computer Oriented Numerical Methods

1. Understanding the eBook Computer Oriented Numerical Methods
    - The Rise of Digital Reading Computer Oriented Numerical Methods
    - Advantages of eBooks Over Traditional Books
2. Identifying Computer Oriented Numerical Methods
    - Exploring Different Genres
    - Considering Fiction vs. Non-Fiction
    - Determining Your Reading Goals
3. Choosing the Right eBook Platform
    - Popular eBook Platforms
    - Features to Look for in an Computer Oriented Numerical Methods
    - User-Friendly Interface
4. Exploring eBook Recommendations from Computer Oriented Numerical Methods
    - Personalized Recommendations
    - Computer Oriented Numerical Methods User Reviews and Ratings
    - Computer Oriented Numerical Methods and Bestseller Lists
5. Accessing Computer Oriented Numerical Methods Free and Paid eBooks
    - Computer Oriented Numerical Methods Public Domain eBooks
    - Computer Oriented Numerical Methods eBook Subscription Services

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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