

12/12/2013 M.



COMP 3 – 4 (RC)

S.E. (Comp.) (Sem. – III) (RC) Examination, Nov./Dec. 2013 COMPUTER ORIENTED NUMERICAL TECHNIQUES

Duration : 3 Hours

Total Marks : 100

- Instructions :** 1) Answer **any 05** questions, selecting atleast **01** question from **each** Module.
2) **Assume** necessary details.

MODULE – I

1. a) What are inherent errors ? How do they arise ? Discuss. 4
b) Provide flowchart for Bisection method of finding roots. Trace your flow chart. 8
c) Find real root of the equation $x e^x = \cos x$ in the interval (0, 1) using Regula Falsi method correct to 4 decimal places. 8
2. a) What is pivoting ? What is the difference between partial and complete pivoting explain ? 5
b) Solve the full system of eqns. using Gauss elimination method : 8
$$x_1 + x_2 + x_3 = 6$$
$$3x_1 + 3x_2 + 4x_3 = 20$$
$$2x_1 + x_2 + 3x_3 = 13.$$

c) Write an algorithm to implement Gauss-Jordan method of finding roots verify your algorithm. 7

MODULE – II

3. a) Determine by Lagrange's method, the percentage no. of patients over 40 yrs. 7

Age over (x) years	:	30	35	45	55
% no. (y) of patients	:	148	96	68	34

b) Derive Newton's forward Interpolation formula. 6

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- c) Explain the suitability of interpolation methods which use central differences, forward differences and backward differences. Provide appropriate examples to justify your approach.

7

4. a) Determine eigen values and eigen vector for the foll. matrix.

6

$$\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

- b) Describe Gauss-seidal method for iterative solutions of simultaneous equations. Contrast this with Jacobi method.

8

- c) Solve the following system of eqns. by Jacobi's method.

6

$$10x_1 + 2x_2 + x_3 = 9$$

$$x_1 + 10x_2 - x_3 = -22$$

$$-2x_1 + 3x_2 + 10x_3 = 22.$$

MODULE - III

5. a) Derive Simpson's 1/3 rule to evaluate an integral.

5

- b) Evaluate $\int_0^6 \frac{e^x}{1+x} dx$ using Simpson's 3/8 rule on integration.

8

- c) Write a C/CH program to implement trapezoidal rule for numerical integration.

7

6. a) What is Boundary Value Problem ? Solve the Boundary value problem

$$y'' - 64y + 10 = 0 \text{ with } y(0) = y(1) = 0 \text{ by finite difference method. Compute value of } y(0.5).$$

10

- b) Write an algorithm to find derivative at particular point using Numerical differentiation, trace your algorithm.

10



MODULE – IV

7. a) Given $\frac{dy}{dx} = y^2 - x^2$, obtain $y(0.4)$ using Milne's Predictor – Corrector method. 7
- | | | | | |
|---|---|------|------|------|
| x | 0 | 0.1 | 0.2 | 0.3 |
| y | 1 | 1.11 | 1.25 | 1.42 |
| f | 1 | 1.22 | 1.52 | 1.92 |
- b) Write an algorithm to implement Runge-Kutta method Trace your algorithm. 7
- c) Explain practical uses of parabolic equations with exmaples. 6
8. a) Solve $\frac{dy}{dx} = x^2y - y$ and $y(0) = 1$ using Picard's method. Estimate y at $x = 0.25$ and $x = 0.75$. 7
- b) Explain trapezoidal method of integration with aproprate algorithm. provide an example. 8
- c) Explain practical applications of differential equations. 5