Bachelor of Computer Applications 3rd Semester

Computer Oriented Numerical Methods

Time : Three Hours] [Maximum Marks : 65

Note . Attempt five questions in all, including Question No. 9 in Section-E, which is compulsory and taking one question each from Section-A to Section-D.

SECTION-A

1. (a) How to store floating point numbers in memory ? Give example.
   (b) What do you understand by significant Digits? How to compuls error ? What is the relationship between relative error and significa digits ?
2. (a) What are different types of errors? How error is propagated addition and subtraction operations ?
   (b) Discuss consequences of normalization.

SECTION-B

3. (a) Solve the following non-linear equation using Birge-Vieta method:
   $x^3 - x^2 - x + 1 = 0$
   (b) Derive equation for False Position method and discuss convergence.
4. (a) How to solve a set of simultaneous linear equations using Gauss Elimination Method with Pivoting ? Explain with the help of example.
   (b) Solve the following set of equations using Gauss Jordan method :
   $2x_1 + 3x_2 + 4x_3 = 20$
   $4x_1 + 2x_2 + 3x_3 = 17$
   $X_1 + 4x_2 + 2x_3 = 17$

SECTION-C

5. (a) What are finite differences ? How to find forward, backward, divided differences and the difference tables ?
   (b) Derive Newton's Backward Difference Interpolation Formula.
6. (a) Derive formula for Simpson's 1/3th rule.
   (b) Find integral of f(x) for the following points using Trapezoidal rule and Simpson's 3/8th rule:

	y
0.1	1.01
0.2	1.04
0.3	1.09
0.4	1.16
0.5	1.25
0.6	1.36
0.7	1.49
0.8	1.64
0.9	1.81

SECTION-D

7. (a) How to approximate a function using Taylor series representation? Give example.
   (b) What is an ordinary differential equation? How is it different from partial differential equation? What do you understand by order and degree of a differential equation? Explain the concepts with the help of suitable examples.
8. Discuss Runge-Kutta 2nd and 4th order methods. Solve the following: differential equation using both the methods and analyze the result $dy/dx = 3x + y \; for \; 0.1 <= x <= 0.5$
   Given that y=0 when x = 0 and *h*=0.1.

SECTION-E

(Compulsory Question)

9. (a) What is Round-off Error ? Give example.
   (b) When to terminate an iterative procedure ?
   (c) What do you understand by exact and approximate numbers ? Give example.
   (d) What do you understand by convergence of a method ?
   (e) What are predictor corrector methods ? Give example.
   (f) What is Interpolation and Inverse Interpolation? Give example.