2021
Bachelor of Computer Application
Third Semester
BCA-16-304: Computer Oriented Numerical Methods

Time allowed: 3 Hours

Max. Marks: 65

NOTE: *Attempt* <u>*five*</u> *questions in all, including Question No. 9 (Unit-V) which is compulsory and selecting one question each from Unit- I-IV. Use of non-programmable calculator and log tables are allowed.*

x-x-x

UNIT-I

Q1. a) Discuss significant digits with the help of suitable example. (4)
   b) Discuss about 1's and 2's complement with the help of suitable examples. (4)
   c) How to represent integers in memory? Give suitable examples. (5)

Q2) a) Discuss about error propagation in arithmetic operations. (7)
   b) Discuss Normalization and its consequences. (6)

UNIT-II

Q3) a) How to solve a non-linear equation using Newton Raphson method? Discuss analytical and geometric derivation of the method. (7)
   b) Find root of the following equation using False position method: (6)
      $x^3 - 5x + 3 = 0$

Q4) a) Solve the following system of linear equations using Gauss Elimination method: (7)
      $2x_1 + 8x_2 + 2x_3 = 14$
      $x_1 + 6x_2 - x_3 = 13$
      $2x_1 - x_2 + 2x_3 = 5$
   b) Discuss the convergence of False position method. (6)

UNIT-III

Q5) a) Discuss about difference tables with the help of suitable examples. (7)
   b) For the given table of values, find $y(22)$ (6)

x	20	25	30	35
y(x)	0.34	0.42	0.5	0.65

Q6) a) Derive Newton's backward difference interpolation formula. (7)
   b) Derive Simpson's 1/3 rule. (6)

UNIT-IV

Q7) a) How to approximate a function using Taylor Series representation. (7)
   b) Discuss the following terms: (6)
      i) Ordinary differential equations
      ii) Partial differential equations
      iii) Order and degree of a differential equation.

Q8) a) What are Chebyshev polynomials? How to approximate a function using Chebyshev Polynomials. (7)

   b) Solve the following differential equation using Runga Kutta 2nd order method in the interval $[0, 0.3]$ using step size h =0.1 and y(0) = 0: (6)
      $dy/dx = x + y$

UNIT-V

Q9) a) Give examples of exact and approximate numbers. (2)
   b) How to calculate relative and percentage errors? (2)
   c) When to terminate an iterative procedure (2)
   d) What is pivoting? Give example. (2)
   e) What is extrapolation? Give example. (2)
   f) What do you understand by Predictor Corrector method? Give an example (3)

x-x-x