

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

Subject Name : Computer Oriented Numerical Methods

Subject Code : 4CS02BCO2/4CS02ICO1

Branch: B.C.A./B.Sc.I.T.

Semester : 2

Date : 04/05/2017

Time : 02:00 To 05:00

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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**Q-1 Attempt the following questions: (14)**

- a) What is Boolean Expression? 1
- b) The Gauss – Jordan method in which the set of equations are transformed into diagonal matrix form. 1  
(a) True (b) False
- c) What is linear Equation? 1
- d) What is non-linear Equation? 1
- e) The convergence in the Gauss – Seidel method is faster than Gauss – Jacobi method. 1  
(a) True (b) False
- f) A graph is a collection of \_\_\_\_ 1  
(a) Row and columns (b) Vertices and edges (c) Equations (d) none of these
- g) A graph G is called a ..... if it is a connected acyclic graph 1  
(a) Cyclic graph (b) Regular graph (c) Tree (d) Not a graph
- h) A tree with n vertices has \_\_\_\_ edges. 1  
(a) n (b) n + 1 (c) n – 2 (d) n – 1
- i) The order of convergence in Newton – Raphson method is 1  
(a) 2 (b) 3 (c) 0 (d) none of these
- j) A tree with n vertices has \_\_\_\_ edges. 1  
(a) n (b) n + 1 (c) n – 2 (d) n – 1
- k) The order of convergence in Bisection method is 1  
(a) linear (b) quadratic (c) zero (d) none of these
- l) Write down the formula for Euler Method. 1
- m) Write down the formula for Rung-Kutta 2<sup>nd</sup> Order Method. 1
- n) Write down the formula for Rung-Kutta 4<sup>th</sup> Order Method. 1

**Attempt any four questions from Q-2 to Q-8**

**Q-2 Attempt all questions (14)**

- (A) Solve the ODE  $dy/dx = 1 + y^2$ ,  $y(0) = 1$ , at  $x = 0.2$  using the modified Euler's method. Choose  $h = 0.1$ . (7)
- (B) Solve the ODE  $dy/dx = x + y^2$ ,  $y(0) = 0$ , at  $x = 0.2$  using the Runge-Kutta method of 4<sup>th</sup> order. Choose (7)



- h = 0.2.
- Q-3 Attempt all questions (14)**
- (A)  $\int_2^6 \log x \, dx$  Evaluate by Simpson's 3/8 rule and taking n = 6. (7)
- (B)  $\int_0^1 \frac{dx}{1+x}$  Evaluate Trapezoidal rule and taking n = 4. (7)
- Q-4 Attempt all questions (14)**
- (A)  $\int_0^{\frac{\pi}{2}} e^{\sin x} \, dx$  Evaluate by Simpson's 1/3 rule and taking n=6. (7)
- (B) Find a root of the equation  $x^3 - 9x + 1 = 0$  correct up to three decimal places using the Bisection method. (7)
- Q-5 Attempt all questions (14)**
- (A) Find a root of the equation  $e^x - 10x = 0$  correct up to three decimal places using the False-position method. (7)
- (B) Find a root of the equation  $x \sin x + \cos x = 0$  correct up to three significant figures using the Newton-Raphson method. (7)
- Q-6 Attempt all questions (14)**
- (A) Prove that  $\langle N, D \rangle$  is a poset, where D denotes divides relation. (7)
- (B) Prove that  $\langle S_{42}, D \rangle$  is a complemented lattice, where D denotes divides relation. (7)
- Q-7 Attempt all questions (14)**
- (A) Use Lagrange's Interpolation Formula to find the value of y when x = 10, if the following values of x and y are given: (7)
- |   |    |    |    |    |
|---|----|----|----|----|
| x | 5  | 6  | 9  | 11 |
| y | 12 | 13 | 14 | 16 |
- (B) Solve the ODE  $dy/dx = 1 + y^2$ ,  $y(0) = 1$ , at  $x = 0.3$  using the modified Euler's method. Choose  $h = 0.1$ . (7)
- Q-8 Attempt all questions (14)**
- (A) Solve the following system of linear equations by the Gauss-Siedel method. (7)
- $$8x + 2y - 2z = 8; \quad x - 8y + 3z = -4; \quad 2x + y + 9z = 12.$$
- (B) Solve the following system of linear equations by the Gauss-Elimination method. (7)
- $$x + 3y - 2z = 5; \quad 2x + y - 3z = 1; \quad 3x + 2y - z = 6.$$

