Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Computer Oriented Numerical Methods

Subject Code: 4CS02ICN2 **Branch: B.Sc.IT**

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.

Q-1 Attempt the following questions: **(14)**

a) If $A=\begin{bmatrix}1 & 0\end{bmatrix}$ and $B=\begin{bmatrix}1\\0\end{bmatrix}$ then $AB=$ _____. **(01)**

a) $\begin{bmatrix}1 & 1\end{bmatrix}$ b) $\begin{bmatrix}0 & 0\end{bmatrix}$ c) $\begin{bmatrix}0\end{bmatrix}$ d) $\begin{bmatrix}1\end{bmatrix}$

b) If $A=\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$ is a square matrix then $A'=$ _____. **(01)**

a) $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$ b) $\begin{bmatrix}2 & 1\\3 & 4\end{bmatrix}$ c) $\begin{bmatrix}4 & 3\\2 & 1\end{bmatrix}$ d) none of these

c) If $A=\begin{bmatrix}1 & 2 & -1\\0 & 1 & 2\end{bmatrix}$ and $B=\begin{bmatrix}5 & 1\\0 & 3\end{bmatrix}$ are two matrices then $A+B$ is _____. **(01)**

a) $\begin{bmatrix}6 & 3\\0 & 4\end{bmatrix}$ b) $\begin{bmatrix}2 & 1\\0 & 3\end{bmatrix}$ c) $\begin{bmatrix}1 & 3\\1 & 5\end{bmatrix}$ d) not possible

d) If $A=\begin{bmatrix}0 & -2\\3 & 1\end{bmatrix}$ is a square matrix then $adjA=$ _____. **(01)**

a) $\begin{bmatrix}1 & 2\\3 & 0\end{bmatrix}$ b) $\begin{bmatrix}0 & -2\\-3 & 1\end{bmatrix}$ c) $\begin{bmatrix}1 & 2\\-3 & 0\end{bmatrix}$ d) none of these

e) Iterative methods are fast than direct methods. – True or False? **(01)**

f) Define: Forward Difference **(01)**

g) One root of the given equation $x^2+3x-5=0$ is between _____. **(01)**

a) 0 and 1 b) 1 and 2 c) -1 and 0 d) none of these

h) The degree of the differential equation $\frac{d^2y}{dx^2}-1+\left(\frac{dy}{dx}\right)^3=\left(\frac{d^2y}{dx^2}\right)^3$ is **(01)**

(a) 1 (b) 2 (c) 3 (d) 6

i) Runge-Kutta method is a self-starting method. – True or False? **(01)**

j) The Gauss elimination method in which the set of equations are transformed into triangular form. – True or False? **(01)**

k) Write the formula of Gaussian quadrature for n=2. **(02)**

l) What is the full form of IVP and BVP? **(02)**

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

Q-2 Attempt all questions:

a) Solve the system of equation by Gauss-Jacobi method upto four iteration. **(05)**
$27x+6y-z=85;\ \ 6x+15y+2z=72;\ \ x+y+54z=110$

b) Find the roots of equation $x^3-9x+1=0$ by using False position method correct up to three decimal places. **(05)**

c) If $A=\begin{bmatrix}4 & -1\\ -2 & 3\end{bmatrix}$ and $B=\begin{bmatrix}-2 & 3\\ 5 & 4\end{bmatrix}$ then find matrix $A+2B$ and $3A-B$. **(04)**

Q-3 Attempt all questions:

a) If $A=\begin{bmatrix}1 & -2 & 2\\ 0 & 1 & 0\\ 1 & 0 & 1\end{bmatrix}$ and $B=\begin{bmatrix}2 & 0 & 1\\ 1 & 2 & 0\\ 0 & 1 & 0\end{bmatrix}$ are two matrices then find AB, BA. **(07)**

b) Find adjoint and inverse of the matrix $A=\begin{bmatrix}3 & -1 & 2\\ 4 & 1 & -1\\ 5 & 0 & 1\end{bmatrix}$ by using co-factors. **(07)**

Q-4 Attempt all questions:

a) Solve the following system of equations by Gauss elimination method: **(05)**
$x+2y-z=1;\ \ x+y+2z=9;\ \ 2x+y-z=2$

b) Solve the following system of equation by Gauss-Seidel method: **(05)**
$4x+y+z=8;\ \ 2x+4y+z=1;\ \ x+y+4z=5$

c) Solve the following system of equation by Gauss-Jordan method: **(04)**
$x+y+z=7;\ \ 3x+3y+4z=24;\ \ 2x+y+3z=16$

Q-5 Attempt all questions:

a) Compute $f(0.56)$ by using Newton's forward difference formula for the following table: **(05)**

x	0.5	0.6	0.7	0.8
$f(x)$	1.127625	1.185465	1.255169	1.337435

b) Use Lagrange interpolation formula to find the value of $f(10)$ from the following data **(05)**

x	5	6	9	11
$f(x)$	12	13	14	16

c) Find $y(4.25)$ by using Newton's backward difference formula for the following table: **(04)**

x	2.5	3	3.5	4	4.5
y	11.5	13.56	15.89	18.25	20.56

Q-6 Attempt all questions:

a) Find the root of the equation $x^3 - 2x + 5 = 0$ by bisection method up to three decimal places. **(05)**

b) Find the roots of equation $\cos x - xe^x = 0$ by using secant method correct up to four decimal places. **(05)**

c) Find the root of the equation $x^3 - 6x + 4 = 0$ by Newton-Raphson method up to three decimal places. **(04)**

Q-7 Attempt all questions:

a) Evaluate $\int_0^1 e^x dx$ by trapezoidal rule with n = 10. **(05)**

b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $\frac{3}{8}$ rule taking $h = \frac{1}{6}$. **(05)**

c) Consider the following values and find $\int_0^1 x\,dx$ by sinpson's $\frac{1}{3}$ rule. **(04)**

Q-8 Attempt all questions:

a) Use Runge-Kutta second order method to find the approximate value of **(05)**
$y(0.2)$ given that $\frac{dy}{dx} = x - y^2, y(0) = 1$ and h = 0.1.

b) Use Runge-Kutta fourth order method to find the approximate value of **(05)**
$y(0.1)$ given that $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ and h = 0.1.

c) Using Euler's method to find $y(0.2)$ with h = 0.1 given $\frac{dy}{dx} = y - \frac{2x}{y}, y(0) = 1$. **(04)**