No. of Printed Pages : 4

CS-71

BACHELOR OF COMPUTER APPLICATIONS (BCA) (PRE-REVISED)

Term-End Examination

December, 2020

CS-71 : COMPUTER ORIENTED NUMERICAL TECHNIQUES

Time : 3 Hours *Maximum Marks : 75*

Note : *Question* ***No. 1*** *is compulsory. Attempt any* ***three*** *questions from question nos.* ***2*** *to* ***5****. Use of scientific calculator is permitted.*

1. (a) What is Generated Error ? How does generated error differ from propagated error ? Show that $a\ (b - c) \neq ab - ac$ where, 6

$$a = 0.5555 \times 10^1$$

$$b = 0.4545 \times 10^1$$

and $$c = 0.4535 \times 10^1$$

(b) Solve the following system of linear equations using Gauss-Elimination method with partial pivoting : 6

$$X_1 + X_2 + X_3 = 3$$

$$4X_1 + 3X_2 + 4X_3 = 8$$

$$9X_1 + 3X_2 + 4X_3 = 7$$

(c) Determine the missing term in the following data using forward differences : 6

X	f (X)
1	3
2	7
3	?
4	21
5	31

(d) Evaluate the integral $\int_1^4 x^2 dx$ using Simpson's $\frac{1}{3}$ rule with $h = 0.5$. 6

(e) Find the approximate value of the root of the equation $x^3 + x - 1 = 0$, near $x = 1$, using Regula-Falsi method (only two iterations). 6

2. (a) Find the Lagrange's interpolating polynomial of degree 2, by approximating the function $y = \ln x$. Hence determine the value of ln 2.7. Also find the error : 7

X	Y = ln X
2	0.69315
2.5	0.91629
3.0	1.09861

(b) Solve the initial value problem $u' = -2tu^2$ with $u(0) = 1$ and $h = 0.2$ on the interval [0, 1], using fourth order classical Runge-Kutta method. 8

3. (a) Solve the following system of linear equations using Gauss-Seidel iteration method, perform two iterations. 7

$$8x - 3y + 2z = 20$$

$$6x + 3y + 12z = 35$$

$$4x + 11y - z = 33$$

(b) Solve the following system of linear equations by Jacobi method. Determine the result for two approximations : 8

$$3x + 4y + 15z = 54.8$$

$$x + 12y + 3z = 39.66$$

$$10x + y - 2z = 7.74$$

4. (a) Evaluate the integral : 8

$$I = \int_0^1 \frac{dx}{1+x}$$

by using composite trapezoidal rule with 2 and 4 subintervals.

(b) Determine the root of the equation $x^3 - 2x - 5 = 0$ by using Newton-Raphson's method. 7

5. (a) Determine the value of y when $x = 0.1$. Given that $y(0) = 1$ and $y' = x^2 + y$. Use Euler's method. 8

(b) Find root of the equation : 7

$$f(x) = 0.5e^x - 5x + 2$$

using Secant method.