

## U.G. 5th Semester Examination - 2021

### BCA

Course Code : BBCADSHC3 [DSE 3]

Course Title : Numerical Methods

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **ten** questions: 1×10=10
- a) What type of function is used in Trapezoidal rule?
  - b) Define Interpolation.
  - c) What is the relation between forward and Backward differences?
  - d) Show  $\Delta = E - 1$ .
  - e) Correct to four significant figures 2.13789, 1.02376.
  - f) Define shift operator E.
  - g) Find the order of Convergence in Newton-Raphson method.

[Turn over]

- h) Prove that  $\Delta C = 0$  where C is a constant function.
  - i) What is Extrapolation?
  - j) Prove that  $\Delta \nabla = \Delta - \nabla$ .
  - k) Write down Trapezoidal formula.
- l) Find the value of  $\int_2^6 x^3 dx$  by Simpson's  $\frac{1}{3}$  rule.
  - m) The points where the Newton-Raphson method fails are called \_\_\_\_\_.
  - n) The Newton-Raphson method is also known as \_\_\_\_\_.
  - o) Find the values of x, y, z in the following system of equations by Gauss Elimination Method:

$$2x + y - 3z = -10$$

$$-2y + z = -2$$

$$z = 6$$

2. Answer any **five** of the following : 2×5=10

- a) Construct the forward difference table for

$$x: \quad 2 \quad 4 \quad 6 \quad 8$$

$$f(x): \quad 5 \quad 10 \quad 17 \quad 29$$

- b) Define Simpson's  $\frac{1}{3}$  rule.
- c) Show that  $\Delta \log f(x) = \log \left\{ 1 + \frac{\Delta f(x)}{f(x)} \right\}$ .

- d) Find the real root of the equation  $x^3 - 4x - 9 = 0$  using the bisection method correct to three decimal place.
- e) What is the condition for the convergence of the Newton-Raphson method?
- f) Calculate  $\Delta(x + \cos x)$ .
- g) What is Quadrature?
- h) Consider the below data:

x :	0	1	2
f(x) :	4	3	12

Find out the value of  $\int_0^2 f(x)dx$  by Trapezoidal rule.

3. Answer any **two** of the following :  $5 \times 2 = 10$
- a) The values of y are 7, 21, 43, and 73 corresponding to the value of x are 2, 4, 6, and 8. Find the value of y when x=7 by suitable method of interpolation.
  - b) Write short note on Lagrange's Interpolation formula.
  - c) Using Newton-Raphson method, find the real roots of the equation  $x^2 - 5x + 2 = 0$ . Correct to three places of decimals.

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