

S.No. : 126

BCA 3402

No. of Printed Pages : 05

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 31118

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BCA Examination 2021-22

(Even Semester)

NUMERICAL & STATISTICAL TECHNIQUES

Time : Three Hours]

[Maximum Marks : 60

Note :- Attempt all questions.

SECTION - A

1. Attempt all parts of the following : $8 \times 1 = 8$
- (a) What do you mean by errors in computation?
 - (b) What are the pitfalls of floating point representation?
 - (c) Add the floating point numbers $0.3859 E6$ and $0.2525 E5$.
 - (d) What is the order of convergence of Newton Raphson method?

[P. T. O.]

- (e) Write the relation between operators E and ∇ .
- (f) Gauss Jordan method reduces augmented matrix into which form?
- (g) What do you mean by curve fitting?
- (h) Find median of the following distribution :

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

- (a) Find the smallest positive root of the function $3x - e^x = 0$ using bisection method.
- (b) Solve the following system of linear equations by Gauss Seidel method :

$$8x + y + z = 8$$

$$2x + 4y + z = 4$$

$$x + 3y + 5z = 5$$

- (c) From the following table find y at $x = 43$ using Newton forward interpolation formula :

x	40	50	60	70	80	90
y	184	204	226	250	276	304

- (d) Solve the following differential equation by second order Runge-Kutta method :

$$\frac{dy}{dx} = \frac{y - x}{y + x}, y(0) = 1, h = 0.2, \text{ find } y(0.2)$$

SECTION – C

Note :- Attempt all questions from this section.

10×4=40

3. Attempt any two parts of the following :
- (a) Find the value of $x^2 + 2x - 2$ using normalized floating point arithmetic where $x = 0.5999 \text{ E-}2$.
 - (b) An approximation of π is given by 3.1428571 and its true value is 3.1415926. Find relative and percentage errors.
 - (c) Find the root of the equation $e^x = 1 + 2x$ by Newton Raphson method, correct to 3 decimal places.
4. Attempt any two parts of the following :
- (a) Solve the following system of linear equation using Gauss elimination method :

[P. T. O.]

$$2x + 6y + 8z = 24$$

$$5x + 4y - 3z = 2$$

$$3x + y + 2z = 16$$

(b) Prove that :

(i) $(1 + \Delta)(1 - \nabla) = 1$

(ii) $E = e^{hD}$

(c) Find the cubic Lagrange's interpolating polynomial from the following data :

x	0	1	2	5
f(x)	2	3	12	147

5. Attempt any two parts of the following :

(a) Find the $f'(x)$ and $f''(x)$ of $f(x)$ at $x = 1.5$ using the following table :

x	1.5	2	2.5	3	3.5	4
f(x)	3.375	7	13.625	24	38.875	59

(b) Apply Simpson's 1/3 rule to evaluate

$$\int_0^2 \frac{dy}{1+x^3}$$

dividing the limit into eight equal parts.

- (c) Solve the following differential equation by Picard's method :

$$\frac{dy}{dx} = y + x, \quad y(0) = 1, \quad \text{find } y(0.1)$$

6. Attempt any two parts of the following :

- (a) Fit a straight line to the given data :

x	0	1	2	3
y	2	5	8	11

- (b) Calculate A. M. from the following distribution:

3, 5, 7, 9, 12, 15, 18

- (c) Write short notes on the following :

- (i) Histogram
- (ii) Pie chart
