

Roll No.

[2]

BCA-504(N)

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B. C. A. (Fifth Semester)

EXAMINATION, 2022-23

Paper Fourth

NUMERICAL METHODS

Time : Two Hours]

[Maximum Marks : 75

Note : This paper consists of three Sections A, B and C. Carefully read the instructions of each Section in solving the question paper. Candidates have to write their answers in the given answer-copy only. No separate answer-copy (B Copy) will be provided.

P. T. O.

Section—A

(Short Answer Type Questions)

Note : All questions are compulsory. Answer the following questions as short answer type questions. Each question carries 5 marks.

1. (A) Find the function whose first difference is e^x .

(B) Construct a forward difference table for the following data :

x	$f(x)$
0	7
5	11
10	14
15	18
20	24
25	32

- (C) Using Newton's divide difference formula, find $f(x)$ as a polynomial in x using the following table :

x	$f(x)$
0	0
1	1
3	27
4	64
5	125
6	216

- (D) The following table is given :

x	$f(x)$
0	3
1	6
2	11
3	18
4	27

What is the form of function $f(x)$?

- (E) From the following data, estimate the value of $f(9)$ using Lagrange's interpolation :

x	$f(x)$
1	-3
5	10
7	9
10	15

- (F) Prove the relation $E = e^{hD}$.
- (G) Calculate by Simpson's 1/3rd rule an approximate value of $\int_{-3}^3 x^6 dx$ by taking 7 equidistant ordinates.
- (H) Estimate the missing term :

x	$f(x)$
0	1
1	3
2	9
3	?
4	81

- (I) How many steps are there in the Runge-Kutta method ?

Section—B

(Long Answer Type Questions)

Note : This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

2. Find a real root of the equation :

$$f(x) = x^3 - x - 1 = 0$$

using Bisection method.

Or

3. Solve $x^3 - 9x + 1 = 0$ for the root lying between 2 and 4 by Regula-Falsi method.

Or

4. Find the first and second derivative of the function tabulated below at the point $x = 1.1$:

x	$f(x)$
1	0
1.2	0.128
1.4	0.544
1.6	1.296
1.8	2.432
2.0	4.00

Or

5. Apply Gauss' forward formula to find a polynomial of degree four or less such that :

x	$f(x)$
1	1
2	-1
3	1
4	-1
5	1

Section—C

(Long Answer Type Questions)

Note : This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

6. Use the Trapezoidal rule to estimate the integral $\int_0^2 ex^2 dx$ taking the 10 intervals.

Or

7. Use Picard's method to approximate y when $x = 2$, given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = x - y$.

Or

8. From the following table, find the number of students who obtained less than 55 marks :

Marks	No. of Students
30—40	21
40—50	32
50—60	41
60—70	25
70—80	21

Or

9. Apply Gauss Elimination method to solve the following equations :

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

$$x + y - 6z = -12$$

$$3x - y - z = 4.$$