

BCA-504(N)

B. C. A. (Fifth Semester)
EXAMINATION, Dec., 2019

(New Course)

Paper Fourth

NUMERICAL METHODS

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt questions from all Sections as directed.

Inst. : The candidates are required to answer only in serial order. If there are many parts of a question, answer them in continuation.

Section—A

(Short Answer Type Questions)

Note : Attempt all questions from this Section. Each question carries 3 marks.

1. (A) Show that :

$$\mu = \sqrt{1 + \frac{\delta^2}{4}}$$

(B) Find a real root of :

$$f(x) = x^2 - x + 1 = 0$$

by Bisection method.

(C-69) P. T. O.

(C) Write note on the following :

- (i) Stirling's formula
- (ii) Bessel's Interpolation Formula

(D) Obtain the first two approximation of :

$$y' = x + y^2$$

subject to $y = 0$ when $x = 0$ by Picard's method.

(E) Construct a linear interpolating polynomial given the points (x_0, y_0) and (x_1, y_1) .

(F) What are the errors in Trapezoidal and Simpson's rules of numerical integration ?

(G) Find the error in the derivative of $f(x) = \cos x$ by computing directly and using the approximation :

$$f(x) = \frac{f(x+h) - f(x-h)}{2h}$$

at $x = 0.8$, choosing $h = 0.01$.

(H) Express $\Delta^2 f_0$ and $\Delta^3 f_0$ in terms of the values of the function f .

(I) Prove that :

$$\Delta - \nabla = \Delta \nabla$$

Section—B

(Long Answer Type Questions)

Note : Attempt any two questions. Each question carries 12 marks. http://www.csjmuonline.com

2. (a) Find the cubic polynomial in x , which takes on the values : 6

-3, 3, 11, 27, 57 and 107

when $x = 0, 1, 2, 3, 4$ and 5 respectively.

(b) Using Newton's forward difference formula, find the sum : 6

$$S_n = 1^3 + 2^3 + 3^3 + \dots + n^3$$

http://www.csjmuonline.com

3. Using Gauss forward formula, find the value of $e^{1.17}$, tabulated as below : 12

x	e^x
1.00	2.7813
1.05	2.8577
1.10	3.0042
1.15	3.1582
1.20	3.3201
1.25	3.4903
1.30	3.6693

4. (a) Find the interpolating polynomial by Newton's divided difference formula for the following table and then calculate $f(2.1)$: 6

x	f(x)
0	1
1	1
2	2
4	5

(b) Given :

$$f(2) = 9$$

and

$$f(6) = 17$$

Find an approximate value for $f(5)$ by the method of Lagrange's interpolation. 6

5. (a) Compute $f'(2.2)$ and $f''(2.2)$ from the following tabular data : 8

x	f(x)
1.4	4.0552
1.6	4.9530
1.8	6.0496
2.0	7.3981
2.2	9.0250

(b) Evaluate :

$$\int_0^4 \frac{1}{3+x^2} dx$$

using Simpson's three-eighth rule.

Section—C

(Long Answer Type Questions)

Note : Attempt any two questions. Each question carries 12 marks.

6. Using Runge-Kutta method of 4th order, solve :

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$$

with $y(0) = 1$ at $x = 0.2$.

12

7. (a) Obtain the root of $f(x) = 0$ by Lagrange's inverse interpolation formula, given that : 6

$$f(30) = -30$$

$$f(34) = -13$$

$$f(38) = 3$$

$$f(42) = 18$$

[5]

BCA-504(N)

6

(b) Solve the system :

$$0.0004 x_1 + 1.402 x_2 = 1.406$$

$$0.4003 x_1 - 1.502 x_2 = 2.501$$

by Gauss elimination :

(i) without pivoting

(ii) with partial pivoting

8. Find a root of :

$$x \log_{10} x - 1.2 = 0$$

by Newton-Raphson's method correct to three decimal places.

12

9. Solve :

12

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$x + y + 5z = 7$$

Gauss-Seidel's method.

http://www.csjmuonline.com

Whatsapp @ 9300930012

Your old paper & get 10/-

पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

http://www.csjmuonline.com