B.C.A.-V Sem.

18024

B.C.A. Examination, Dec.-2024

Numerical Methods

(BCA-504)

Time : Three Hours] *[Maximum Marks : 75*

Note : Attempt questions from **all** sections as per instructions. Calculator is allowed.

Section-A

(Very Short Answer Type Questions)

Note : Attempt **all** the five questions of this section. Each question carries **3** marks. Very short answer is required. 3×5=15

1. Obtain a real root of the equation f(x) $x^3+x^2-1=0$ using bisection method correct to three decimal places.
2. Define backward differences. Make backward difference table for the following ordered pairs :

   (x_0,y_0), (x_1,y_1), (x_2,y_2), (x_3,y_3), (x_4,y_4), (x_5,y_5), (x_6,y_6).

P.T.O.

3. Find the value of dy/dx at x= 1.2 for the following ordered pairs : (1.0, 2.7183), (1.2, 3.3201), (1.4,4.0552), (1.6, 4.9530), (1.8, 6.0496), (2.0,7.3891), (2.2, 9.0250).
4. Solve the following system of linear equations using Gauss elimination method :

   $10x+y+z=12$

   $2x+10y+z=13$

   $x+y+3z=5$

5. Solve the equation $\frac{dy}{dx}=x+y^2$; $y=1$ when $x=0$ using Picard's method.

Section-B

(Short Answer Type Questions)

Note : This section contains three questions. Attempt any **two** questions. Each question carries 7½ marks. Short Answer is required. 7½×2=15

6. Find a real root of the equation : $2x=\log_{10}x+7$ lying between 3 and 4 using method of false position. 7½

7. Find the missing terms in the following table :

x	0	5	10	15	20	25	30
y	1	3	-	73	225	-	1153

8. Evaluate

$I = \int_3^7 x^2 \log x \, dx$

using Simpson's $\frac{1}{3}$ rule with n = 1

Section-C

(Detailed Answer Type Questions)

Note : This section contains five questions., attempt any **three** questions. Each question carries 15 marks. Answer is required in detail. 15×3=45

9. Use Newton-Raphson method to find a real root of the equation $\sin x = \frac{x}{2}$ correct to 3 decimal places, given that the root lies between $\pi/2$ and π. 15

10. Find the Lagrange Interpolating polynomial of degree 2 approximating the function $y = \log_e x$ defined by the following table of values. Hence determine the value of $\log_e 2.7$. 15

x	2	2.5	3.0
$y = \log_e x$	0.69315	0.91629	1.09861

11. Use Simpson's $\frac{3}{8}$-rule to evaluate $\int_0^1 \frac{1}{1+b} \, dx$ with

$h = \frac{1}{6}$. 15

12. Solve the system of linear equations given below by Gauss's Siedel Iterative method 15

$$6x + y + z = 20$$
$$x + 4y - z = 6$$
$$x - y + 5z = 7$$

13. Using Fourth-order Ranger-Kutta method find $y(0.1)$ and $y(0.2)$ correct to four decimal places, given $\frac{dy}{dx} = y - x$ where $y(0) = 2$. 15