

**SEMESTER EXAMINATION-2021**  
**BSC III SEMESTER – COMPUTER SCIENCE**  
**BCS-C301: NUMERICAL COMPUTING**

**Time: 3 hour**

**Max. Marks: 70**

**Min. Pass: 40%**

**Note:** Question Paper is divided into two sections: **A and B**. Attempt both the sections as per given instructions.

**SECTION-A (SHORT ANSWER TYPE QUESTIONS)**

**Instructions:** Answer any five questions in about 150 words each. Each question carries six marks. (5 X 6 = 30 Marks)

Question-1: Write a short note on Runge-Kutta (RK) methods.

Question-2: Define a cubic spline  $S(x)$  which is commonly used for interpolation.

Question-3: Find the polynomial which takes the following values

X	0	1	2
Y	1	2	1

Question-4: State two-point Gaussian quadrature formula to evaluate  $\int_{-1}^1 f(x)dx$

Question-5: Write a short note on methods for finding complex roots.

Question-6: Evaluate  $\int_0^1 \frac{dx}{1+x}$  by using trapezoidal rule, taking  $h = 0.5$  and  $h = 0.25$

Question-7: Use Lagrange's formula to find a polynomial which takes the values  $f(0) = -12$ ,  $f(1) = 0$ ,  $f(3) = 6$  and  $f(4) = 12$ . Hence find  $f(2)$ .

Question-8: Discuss initial and boundary value problems.

Question-9: Explain Rayleigh method of approximation.

Question-10: Find  $y(0.2)$  given that  $y' = x + y$ ,  $y(0) = 1$  using Euler's method.

**SECTION-B (LONG ANSWER TYPE QUESTIONS)**

**Instructions:** Answer any FOUR questions in detail. Each question carries 10 marks. (4 X 10 = 40 Marks)

Question-11: Explain Iteration method. Also find a real root of the equation  $\cos x = 3x - 1$  correct to three decimal places using Iteration method.

Question-12: What do you understand by Jacobi's Iteration Method? Solve, by Jacobi's iteration method, the equations  
 $20x + y - 2z = 17$ ;  $3x + 20y - z = -18$ ;  $2x - 3y + 20z = 25$ .

Question-13: Explain the bisection method. Also find a root of the equation  $x^3 - 4x - 9 = 0$ , using the bisection method in four stages.

Question-14: The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface:

Height	100	150	200	250	300	350	400
Distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of  $y$  when  $x = 218$  ft and  $x = 410$  ft

Question-15: Using Picard's process of successive approximation, obtain a solution upto fifth approximation, of the equation  $\frac{dy}{dx} = y + x$ , such that  $y = 1$  when  $x = 0$ . Check your answer by finding the exact particular solution.

Question-16: Give the meaning of systems of linear equations. And apply the Crout's method to solve the equations:  
 $3x + 2y + 7z = 4$ ;  $2x + 3y + z = 5$ ;  $3x + 4y + z = 7$ .

Question-17: Given that

X	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at (a)  $x = 1.1$  (b)  $x = 1.6$

Question-18: Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  using (i) Simpson's 1/3 rule (ii) Simpson's 3/8 rule

**Paper Code: BCS-C301**