

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING) FIRST YEAR SECOND SEMESTER EXAM 2023**

**SUBJECT: COMPUTER PROGRAMMING- I**

Time: Three Hours

Full Marks 100  
(50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I	Marks							
<b>Answer Question No.1 and any Two from the rest.</b>									
1.	Answer any one question								
	a) Write a computer program in FORTRAN 77 using False position method that finds a root of the equation $x^2 - 5x + 6 = 0$ , with initial guess 1.00 and 4.00, using tolerance of 0.001.	10							
	b) Write a FORTRAN 77 program to estimate a value y at a point x from a given table of values of x and y by using n <sup>th</sup> order Lagrange interpolation polynomial.	10							
2.	a) Using Newton-Raphson method, using two iterations, determine the roots of the following non-linear simultaneous equations, close approximation to start with $x = 1.50$ and $y = 3.00$ . $x^2 + y^2 = 17$ $y^2 - 4x = 12$	12							
	b) Solve the following system of equations by simple Gauss elimination method. $x - y + 4z = 16$ $3x + 2y + z = 18$ $x + 4y - 2z = 20$	8							
3.	a) What is an initial-value problem? How it differs from a boundary value problem?	3							
	b) Using Runge-Kutta method of order four, find y at $x = 0.50$ and $1.00$ by solving $y' = y - x^2$ , $y(0) = 1.00$ . Assume step size (h) = 0.50.	9							
	c) Explain Predictor – Corrector method for solving initial-value problem for the type $\frac{dy}{dx} = f(x,y)$ with initial condition $y = y_1$ at $x = x_1$ .	8							
4.	a) Write an algorithm to find a root of a non-linear equation $f(x) = 0$ using Bi-section method.	4							
	b) Explain the limitation of using Newton-Raphson method.	4							
	c) Using Secant method, using two iterations, find a root of the equation $f(x) = (x-2)^2 - \ln(x) = 0$ , in the range $1.25 \leq x \leq 2.00$ .	4							
	d) For the following table of values: <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>x</td> <td>1.50</td> <td>2.00</td> <td>2.50</td> </tr> <tr> <td>f(x)</td> <td>1.676</td> <td>2.301</td> <td>2.898</td> </tr> </tbody> </table> Find f(x) for $x = 1.80$ using Lagrange interpolation. What order of polynomial would you use in the above problem?	x	1.50	2.00	2.50	f(x)	1.676	2.301	2.898
x	1.50	2.00	2.50						
f(x)	1.676	2.301	2.898						

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No. of Question	PART – II	
1.(a)	Write the equivalent FORTRAN expression for the following arithmetic statement: $Y = \frac{1 - e^{-\sqrt{x}}}{1 + xe^{- x }}$	1
(b)	Write the equivalent arithmetic expression for the following FORTRAN statement: $Y = a * b / (c + d ** k / m + k)$	1
(c)	Find the value of the following FORTRAN expression using I=2, J=5, K=-2, $m = J ** I / J * K$	1
(d)	What will be the printed output, at the end of the following program segment? <pre>           m= - 567           a=2.337           WRITE(*,8) m,a           8  FORMAT(2X,I8,2X,F8.2)           END         </pre>	1
e)	What will be the value of the variable n, at the end of the following program segment? <pre>           X=0           DO I=1,5,3             Do J=2,3               X=X+I/3             END DO           END DO           WRITE (*,*) X           END         </pre>	1
2.	Write short notes on the following. <ol style="list-style-type: none"> <li>Function subprogram and subroutine subprogram</li> <li>Rules to be followed in written DO-Loop.</li> <li>Library function in FORTRAN</li> </ol>	3x3=9

No. of Question		
	Answer any three Questions.	12x3=36
3)	i) Write step-wise Algorithm and draw the flow chart to find out roots of given a quadratic equation.	6
	ii) Write a FORTRAN program to the sum of following series for the first N terms, using function subprogram. $y = 1 - \frac{x^2}{2!} + \frac{x^3}{4!} - \frac{x^6}{6!} \dots\dots\dots$	6
4)	i) Write a FORTRAN program to print ascending order form given input as N number integer.	6
	ii) Write a FORTRAN program, to product of two Matrices [A] and [B], both of size (2x3) and (3X2) respectively and store the result in a separate matrix [C].	6
5)	i) Write a FORTRAN program to the sum of following series for the first N terms, using function subprogram. $Y=1+ 2/2! - 3/3! + \dots\dots\dots$	6
	ii) Write a C program to interchange the elements of two diagonal of two square matrix.	6
6)	i) Given four-digit integer number, write a FORTRAN program to print it in reverse and also find sum of the digits.	6
	ii) Write a FORTRAN program to find number of days from given input as month and year.	6