Ref. No. Ex/CE/5/T/104/2024

BACHELOR OF ENGINEERING (CIVIL ENGINEERING) FIRST YEAR SECOND SEMESTER EXAM 2024

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
	Answer Question **No.1** and any **Two** from the rest.	
1.	Answer any one question	
	a) Write a FORTRAN 77 program using Newton-Raphson method to estimate a root of the equation $x^2 - 6x + 8 = 0$ up to three decimal places, assuming initial value of x = 6.0.	10
	b) Write a computer program in FORTRAN 77 using Secant method that finds a root of the equation $\exp(x) - 3x^2 = 0$ between 3.00 and 4.00, using tolerance of 0.0001.	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 =4.5 and y = 1.00. $x^3 - y^3 = 56$ $2x^2 + x - y^2 = 32$	12
	b) Using Secant method, using two iterations, find a root of the equation $f(x) = \cos(x) - x\exp(x) = 0$, in the range $0.00 \le x \le 1.00$.	4
	c) What are the differences among Secant method, Regula-Falsi Method and Newton-Raphson Method?	4
3.	a) Describe how Taylor's theorem of expansion can be used to solve a differential equation.	3
	b) State the formula of Euler's method. Illustrate its concept graphically.	3
	c) Using Runge-Kutta method of order four find y at x = 1.40 and 1.60 by solving $y' = x^2 + y$, $y(1.20) = 1.50$. Assume step size (h) =0.20.	8
	d) Illustrate why Heun's method is classified as one-step Predictor – Corrector method?	6
4.	a) Write an algorithm to find a root of a non-liner equation f(x) = 0 using False Position method.	4
	b) Explain why Bisection method is called half-interval search technique?	3
	c) What is interpolation? Given a set of n+1 points, state the general form of n^{th} degree Lagrange interpolation polynomial.	4
	d)) For the following table of values: x: 2.0, 3.0, 4.0, 5.0 f(x): 7.0, 26.0, 63.0, 124.0 Find f(x) for x = 3.5 using Lagrange interpolation .What order of polynomial would you use in the above problem?	9

[Turn over

Form A: Paper –Setting Blank Ref No. –**Ex/CE/5/T/104/2024**

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SUBJECT: COMPUTER PROGRAMMING-I

Full Marks 100

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No. of Question	PART – II	
1.(a)	Write the equivalent FORTRAN expression for the following arithmetic statement: $Y=1-\|X\| e^{-y}$	2
(b)	Write the equivalent arithmetic expression for the following FORTRAN statement: Y=a**b/c+d**e*f-h/p*r+q	2
(c)	What will be the printed output, at the end of the following program segment? m= -398 a=-5.999 WRITE(*,8) m,a 8 FORMAT(2X,I8,/,F8.2) END	2
(d)	What will be the value of the variable n, at the end of the following program segment? X=0 DO I=1,7,2 Do J=2,3 X=X+1.0 END DO END DO WRITE (*,*) X END	2
2.	Write short notes on the following. i) While and do while loop. ii) Break and continue statement. iii) Switch statement. iv) Function sub program and Subroutine sub program	4x3=12

No. of Question		
	Answer any two Questions.	15x2=30
3)	1) Write a FORTRAN program to print ascending order form given input as N number integer.	7
	ii) Write a FORTRAN program, to sum of diagonal of two Matrices [A] and [B], both of size (3x3) and store the result in a separate matrix [C] having size (3x1)	8
4)	i) 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].	9
	ii) Write step-wise Algorithm and draw the flow chart to find big number from given three integer number.	6
5)	i) Write a FORTRAN program to the sum of following series for the first N terms, using function subprogram. $$y = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} \ldots\ldots\ldots\ldots$$	8
	ii) Write a FORTRAN program to find the value of ${}^{n}c_{r}$, using subroutine subprogram.	7