

B.E. (Electrical Engineering) Examination, 2023
2nd YEAR 2nd SEMESTER

SUBJECT : BASICS OF NUMERICAL METHODS & PROGRAMMING

Full Marks -100

Time : Three hours

(50 marks for each part)

Part-I

Use a separate Answer-Script for each part

Answer any three Questions [Q.1 carries 18 marks]

Q.1. A) Derive the iterative formula of the False position method (with graphical illustration) to find out real root of non-linear equation.

OR

A) Derive the iterative formula of the Newton-Raphson method (with graphical illustration) to find out real root of non-linear equation.

B) Determine a real root of the following equation by Newton-Raphson method -

$$x^3 + 3x^2 - 3 = 0; \varepsilon = 0.01$$

OR

B) Determine a real root of the following equation by False position method -

$$x^3 - x^2 - 1 = 0; [1,2]; \varepsilon = 0.1$$

10+8=18

Q.2. A) Perform four iterations with the following system of equations by applying the Gauss-Seidel method with the given initial solution $x_1^{(0)} = x_2^{(0)} = x_3^{(0)} = 1$.

$$5x_1 + 2x_2 - x_3 = 6; 2x_1 + 6x_2 - 3x_3 = 5; x_1 - 2x_2 + 5x_3 = 12$$

B) Perform LU decomposition for the following matrix -

$$A = \begin{vmatrix} 5 & -2 & 1 \\ 7 & 1 & -5 \\ 3 & 7 & 4 \end{vmatrix}$$

OR

B) Obtain the inverse of the following matrix by Gauss-Jordan method-

$$A = \begin{vmatrix} 5 & -2 & 1 \\ 7 & 1 & -5 \\ 3 & 7 & 4 \end{vmatrix}$$

8+8=16

Q.3. A) Derive the normal equations, according to the least squares curve fitting procedure, to obtain a linear fit equation for a given set of data.

B) Apply the above equations to obtain the best linear fit for the following data-

x	3.5	4.5	5.5	6.5	7.5
y	4.72	5.81	6.75	7.95	9.55

8+8=16

[Turn over

Q.4. A) Interpolate $f(5)$ by applying Lagrange interpolation formula with the given table-

x	3	4	6	8
$f(x)$	22	53	196	961

B) Construct a difference table for the following data and hence interpolate the value of $f(2)$ using the difference table-

x	-3	-1	1	3
$f(x)$	-90	-18	-2	6

8+8=16

Q.5. A) Apply Simpson's 1/3rd Rule to solve the following integration with four intervals -

$$\int_0^1 \frac{x \, dx}{5+x^2}$$

B) Derive the expression of numerical integration formula according to the Trapezoidal rule.

8+8=16

**BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) SECOND
YEAR SECOND SEMESTER - 2023**

SUBJECT: BASICS OF NUMERICAL METHODS AND PROGRAMMING

Time: Three Hours

Full Marks: 100
(50 Marks for each part)

Use a separate Answer-Script for each part
Two marks for neat and well-organized answers

Question No.	Part-II	Marks
Answer any three questions		
1.	(a) Explain the following operator in C with examples: i. Conditional operators. ii. Modulo division operator. iii. Logical Operator.	9
	(b) Write a C program to test if a number entered from the keyboard is prime.	7
2.	(a) Explain the difference between 'entry' and 'exit' controlled loops in C programming language. Give examples of each of them.	7
	(b) Write a C program to arrange the following numbers in descending order: 11,38,142,96,24,1,37.	9
3.	(a) Write a C program to transpose a 3×3 matrix. Consider the elements of the matrix is given input through keyboard.	6
	(b) With the help of a C program, explain why <i>switch</i> statement is always associated with <i>break</i> statement.	6
	(c) Explain the difference between <i>break</i> and <i>exit()</i> in C programming language.	4
4.	(a) A positive integer is entered through keyboard. Write a C program using recursion to calculate the factorial of the positive number.	8
	(b) Explain the difference between "call by value" and "call by reference" in C programming language with proper example.	8
5.	(a) Write a C program that will perform both writing within a file and reading the content from the file.	7
	(b) Discuss the following library function used in C programming language. (i) <i>strlen()</i> (ii) <i>strcpy()</i> (iii) <i>strcmp()</i>	9