

BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING EXAMINATION, 2019

(2nd Year, 1st Semester)

BASICS OF NUMERICAL METHODS & PROGRAMMING

Time: Three Hours

Full Marks: 100

(50 marks for each part)

Use a separate Answer-script for each Part

PART-I**Answer any three questions**

(Question number 1 carries 18 marks)

1. a) Using Taylor series expansion, obtain the general expression of Newton-Raphson iterative formula to determine the real root of a transcendental equation. Explain the obtained formula with graphical plot. 6
- b) Explain the procedure to solve a set of linear simultaneous equations by LU decomposition method. 6
- c) A real root of the equation $f(x) = x^3 + x - 1 = 0$ lies in the interval (0, 1). Perform five iterations using false position method. 6

2. a) Derive Newton's backward difference interpolating formula.
The annual sales in a particular shop for the last ten years are given in the following table:

Year (x)	2008	2010	2012	2014	2016
Annual Sales in Rs. (lakhs) (y)	46	66	81	93	101

Estimate the sales for the year 2013 using Newton's backward difference interpolating formula. 10

- b) Solve the following system of equations using Gauss Siedel iteration. Perform five iterations with the initial approximation $[1 \ 1 \ 1]^T$ 6

$$10x + y + z = 6$$

$$x + 10y + z = 6$$

$$x + y + 10z = 6$$

[Turn over

3. a) Determine the values of a and b to fit the curve $y = ae^{bx}$ with the following data by Least Square Approximation method. 8

x	1	3	5	7	9
y	3.75	6.25	10.75	17.50	28.25

- b) Derive the expression of 1st order and 2nd order derivative formulae from Newton's forward difference polynomial. 8
4. a) Briefly explain the Gauss Quadrature 3 - point method of numerical integration. 6

- b) Evaluate

$$\int_0^{\pi} x^3 \sin(2x) dx$$

By using

5+5

- i) Simpson's one-third rule
ii) Two-point Gauss Quadrature Rule.

5. a) Derive the expression of the second order Runge-Kutta formula. 8
- b) Evaluate $y(0.2)$ for the following equation with the initial condition $y(0) = 0$, take $h = 0.1$. 8

$$\frac{dy}{dx} = 1 - y$$

B.E. ELECTRICAL ENGINEERING SECOND YEAR FIRST SEMESTER - 2019**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
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Answer any three questions

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| 1. | (a) | Explain with examples different methods of looping in C. | 7 |
| | (b) | Write a C/C++ program to calculate the L.C.M of two given numbers. | 9 |
| 2. | (a) | Explain with example the use of increment and decrement operators in C. | 6 |
| | (b) | Write a C program to print first 25 terms of the series: x, x^2, x^3, x^4, \dots , where x is to be considered as input. The developed program must be able to compute the sum up to first 25 terms of the series. | 10 |
| 3. | (a) | With the help of a C program, explain why <i>switch</i> statement is always associated with <i>break</i> statement. | 6 |
| | (b) | Write a C program to transpose of a 3×3 matrix. | 7 |
| | (c) | Explain with examples, the usage of modulo division operator in C. | 3 |
| 4. | (a) | Explain the difference between "call by value" and "call by reference" in C programming language with proper example. | 8 |
| | (b) | A positive integer is entered through keyboard. Write a C program using recursion to print the digits of the number in reverse order. | 8 |
| 5. | (a) | Explain the terms (i) Class, (ii) Object and (iii) Encapsulation in relation to C++ programming language. | 6 |
| | (b) | Explain what you mean by 'dynamic memory allocation'. State the difference between <code>malloc()</code> and <code>calloc()</code> functions. | 2+2 |
| | (c) | A multi word string is entered through keyboard. Write a C program that takes the string as input and prints it out in a file. | 6 |