BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING EXAMINATION, 2018

(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

(Two marks are reserve for neatness

and well organized answers)

1. a) Using Taylor series expansion obtain the general expression of Newton-Raphson iterative formula for finding the real root of a transcendental equation. Explain the obtained formula with graphical plot   **6**

   b) Solve the following linear simultaneous equations by LU decomposition procedure -   **10**
   $$2x + 3y + z = 9$$
   $$x + 2y + 3z = 6$$
   $$3x + y + 2z = 8$$

2. a) Find the real root of the equation $f(x) = x^3 - 9x + 1$ in the interval (2, 4) by Bisection method. Perform at least four iterations.   **6**

   b) Find the inverse of the following **B** matrix by Gauss-Jordan Method -   **10**
   $$B = \begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$$

3. a) The population of a country for various years in millions is provided. Estimate the population for the year 1898 using suitable interpolation method   **8**

Year (x)	1891	1901	1911	1921	1931
Population (y)	46	66	81	93	101

   b) An experimentation yields the following table of values for the dependent variable of y for a set of known values of x. Obtain the linear regression of for y on x **8**

x	1	2	3	4	5	6	7	8	9
y	4.5	6.0	7.6	8.5	10.6	12.3	13.4	15.6	17.5

4. a) Briefly explain the Gauss Quadrature 2 - point method of numerical integration.　　6

   b) The following table gives the values of x and $f(x)$. Find the area under the curve $y = f(x)$, with the following two methods and compare results.

   i) Trapezoidal rule
   ii) Simpson's one-third rule　　5+5

x	0	1	2	3	4	5	6
y	0.333	0.25	0.1429	0.1	0.0526	0.0357	0.0256

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

   $$\frac{dy}{dx} = x^2 + y^2$$

B.E. ELECTRICAL ENGINEERING SECOND YEAR FIRST SEMESTER EXAMINATION, 2018

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PART - II
Answer any three questions.
Two marks are reserved for neat and well organized answers.

1.a) Write a program to calculate the L.C.M of two given numbers.   6

 b) Write a program to calculate the sine of a given angle using an appropriate series. The value of the angle in degree should be considered as input.   10

2.a) Write a program to transpose an array.   7

 b) With the help of a small program explain why switch statement is always associated with break statement.   5

 c) Distinguish between # include<stdio.h> and # include"stdio.h"   4

3.a) What is recursion – explain with the help of a program.   6

 b) Write program using recursion to print the sum of the digits of any positive integer using recursion.   10

4.a) Explain the terms (i) Inheritance (ii) Constructors and (iii) Destructors.   6

 b) Write a program to read 15 data from a one dimensional array and to store square of the first ten data in an output file. The remaining five data are to be raised to the power 1.5 and to be stored in another file.   10

5.a) How can you gather different data types using structure in C? Explain your answer with a small program.   6

 b) Explain with the help of program how more than one value can be returned from the called function to the calling function using pointer.   6

 c) Explain what you mean by 'dynamic memory allocation'. State the difference between malloc( ) and calloc( ) functions.   4