B.E. Electrical Engineering (Part Time) EXAMINATION, 2018
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 Q.No.1 AND ANY TWO QUESTIONS
(Q.No. 1 carries 20 marks)

Q.1. A) Write down the expression of Simpson's $1/3^{rd}$ Rule for single interval and apply it to solve the following integration with six intervals -

$$\int_{0}^{\pi/2} x^2 * Sin(x)\, dx$$

B) Solve the following Ordinary Differential Equation by 2nd order Runge-Kutta method-

$$\frac{dy}{dx} = x^2 + y^2, \quad y(1) = 1 \text{ for } 1.2 <= x <= 1.4, \text{ with increment (h)} = 0.2$$

10+10=20

Q.2. A) Explain the Bi-Section method (with graphical illustration) to find out real root of non-linear equation.
B) Determine the root of the following equation by Newton-Raphson method -

$$e^x - x^2 = 0$$

7+8=15

Q.3. A) Perform 4 iterations with the following system of equations by applying the Gauss-Seidel method with the given initial value: $x_1^{(1)} = x_2^{(1)} = x_3^{(1)} = 1.3$.

$$6x_1 - x_2 + 2x_3 = 11; \quad x_1 - 10x_2 + x_3 = -15; \quad x_1 + x_2 - 3x_3 = -7$$

B) Perform LU decomposition for the following matrix --

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

8+7=15

Q.4. A) Calculate tan(0.13) and tan(0.28) using Newton's interpolation method with the given table-

x	0.10	0.15	0.20	0.25	0.30
y — tan(x)	0.1003	0.1511	0.2027	0.2553	0.3093

B) Write down the theory of Least Square method to obtain best fit curve for a given set of data and hence derive the expression of normal equations for a best fit straight line.

8+7=15

Q.5. A) Write down short note on any one from the followings-
i) Numerical differentiation; ii) Modified Euler's method for 1st order ordinary differential equation;
B) Derive (i) Newton's forward difference interpolating polynomial from divided difference polynomial;
OR (ii) Trapezoidal rule of numerical integration.

8+7=15

BACHELOR OF ENGINEERING IN

ELECTRICAL ENGINEERING (EVENING) EXAMINATION, 2018

(2nd Year, 2nd Semester)

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

PART-II

Answer *any three* questions

Two marks are reserved for neatness and well organized answer script

1. a) What are the uses of character set in C? Explain how the character sets are grouped. Give examples.   8

   b) Give an example of variable used in C. How the variables are named? Can the type of a variable be changed in C programming? What is the nature of language in C?   8

2. a) What are constants in C? Give an example. Briefly state the different type of constant in C with examples.   8

   b) How many common operators are used in C programming? Explain with examples. What is "unary" and "ternary" operator?   8

3. a) Give short programming examples of input and output statement in C. Give the logical reasoning behind the program steps.   8

   b) Carefully read the following program and explain the step by step execution in your language. What is the output of the program?   8

```
#include <stdio.h>

int main()
{
    int n, i, flag = 0;
    printf("Enter a positive integer: ");
    scanf("%d",&n);
```

```
for(i=2; i<=n/2; ++i)
{
    if(n%i==0)
    {
        flag=1;
        break;
    }
}

if (flag==0)
    printf("%d is a prime number.",n);
else
    printf("%d is not a prime number.",n);

return 0;
}
```

4. a) What is "branching" in C? Write a short program to show the "branching" operation in C. Explain the steps.   8

    b) What is "looping" in C? Write a short program to show the "looping" operation in C. Explain the steps.   8

5. a) Give the differences between C and C++ with suitable example.   8

    b) (i) Write a program in C++ showing the declaration and initialization of "local" variables. (ii) Write a program in C++ showing the application of a few arithmetic operators. Explain the steps of both the programs.   8

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