Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

May / June - 2017

Mathematics : BSMT - 502 (A)

(Programming in C and Numerical Analysis - I)

Faculty Code : 003

Subject Code : 001514

Time : $2\frac{1}{2}$ Hours]   [Total Marks : 70

Instructions : (1) All the questions are compulsory.

(2) Figures written to the right indicate marks of the question.

1 Write answers in short :   **20**

(1) Give general form of conditional operator.

(2) State Hierarchy of operation.

(3) Give geneal form of DO WHILE loop.

(4) What is meant by Relational Operators ?

(5) Give the list of relational operators being used in C language.

(6) Explain the syntax of the one dimensional array with proper example.

(7) Write format specification for long double data type.

(8) Write range of unsigned integer.

(9) Which statement is used to jump out of a loop instantly ?

(10) Explain syntax of declarator of user defined function.

(11) If the interval of differencing is unity, prove that

$$\Delta \sin x = 2\sin\frac{1}{2}\cos\left(x+\frac{1}{2}\right)$$

(12) Find $\Delta^2\left[\dfrac{1}{x(x+3)(x+6)}\right]$.

(13) Find the value $(2-3x)^{[2]}$.

(14) Write n^{th} difference of a polynomial of degree n

(15) Define " Interpolation.

(16) When the solution to a system of linear equatins will exist by iterative procedure ?

(17) What is central differences ?

(18) Find value of $(1+\Delta)(1-\nabla)$.

(19) Write the algebraic sum of the errors in any difference column.

(20) According to Crout's method, what is U ?

2 (a) Attempt any three :   6
    (1) Write any six key words.
    (2) Explain single line comments.
    (3) Draw flow chart for if else statement.
    (4) Write logical operators with meaning.
    (5) Write a C program to calculate area of a circle when radius of the circle is given.
    (6) Explain usage of the break statement in C.

(b) Attempt any three :   9
    (1) Explain in short : Preprocessor.
    (2) Write the rules to make variable names (identifiers) in C. Give proper example.
    (3) Explain "nested if-else statement".
    (4) Write a C-program to determine whether the given number is divisible by 5 or not.
    (5) Explain difference between while and do while loops.
    (6) Explain initialization of two dimensional array.

(c) Attempt any two :   10
    (1) Write a C-program to pick up largest of n given numbers entered through keyboard.
    (2) Explain meaning and give syntax of Macro expansion without and with arguments. Also give proper example.
    (3) Explain the "if-else statement" in C language with example.
    (4) Explain UDF declaration with example.
    (5) Write a detailed note on arrays.

3   **(a)   Attempt any three :**   **6**

      (1)   Explain interpolation and extrapolation.

      (2)   Prove that $\Delta = E - 1$

      (3)   Define : Forward and backward differences.

      (4)   In usual notations prove that $\left(\dfrac{\Delta^2}{E}\right) x^3 = 6x$.

      (5)   Explain Linear Law.

      (6)   Prove that $(n+1)^{th}$ difference of a polynomial of degree n is constant.

   (b)   Attempt any three :   **9**

      (1)   Explain error propagation in difference table.

      (2)   Prove that every polynomial can be expressed as a Factorial Polynomial.

      (3)   In usual notations prove that

$$\frac{\Delta}{\nabla} - \frac{\nabla}{\Delta} = E - E^{-1}$$

      (4)   Explain how to fit an exponential function $y = ac^{bx}$ to the given data using the method of least square.

      (5)   Solve the following equations by Gauss-elimination method :

         x – y + z = 1

         –3x + 2y – 3z = –6

         2x – 5y + 4z = 5

      (6)   Show that $y_3 = y_2 + \Delta y_1 + \Delta^2 y_0 + \Delta^3 y_0$

   (c)   Attempt any two :   **10**

      (1)   Explain Crout's method to solve a system of simultaneous linear algebraic equations.

      (2)   Explain Jacobi Method of iteration.

      (3)   Derive Gregory Newton Forward interpolation formula,

      (4)   Explain least squares principle obtain normal equation to to "Best Fit" a straight line.

      (5)   Find and correct a single error in y in the following table

x	0	1	2	3	4	5	6	7
$f(x)$	0	0	1	6	24	60	120	210