DA-003-001514 Seat No. _____

B. Sc. (Sem. V) Examination

March - 2022

Mathematics : Paper - BSMT-502(A)

(Programming in C & Numerical Analysis - I)

(Old Course)

Faculty Code : 003

Subject Code : 001514

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

Instructions : (1) All questions are compulsory.

(2) Numbers given to the right indicate full marks of the question.

1 Answer the following questions in short : **20**

(1) Explain syntax of goto statement.

(2) What is the range of signed interger in C ?

(3) What is the range of 'double' data type (32 bit computer) ?

(4) Where was the C language invented ?

(5) How many keywords are there in C language ?

(6) Which symbol is used as a statement terminator in C ?

(7) Who invented B language ?

(8) What is the maximum size of a float variable ?

(9) Which operator is used to assigned value to a variable in C program ?

(10) Type specification for double variable is _____.

(11) Gauss-Jacobi method is faster than Gauss-Seidal method. (True / False)

(12) In a Crout's method, every square matrix A can be factorized into form $A = LU$, where L is _____.

(13) Relation between E and δ is _____.

(14) If common difference is $h = 2$, then $E^n f(x)$ = _____.

(15) $\Delta^2 y_5$ = _____.

(16) The algebraic sum of the errors in any differences column is _____.

(17) $\Delta^3\left(x^3 + 2x + 1\right)$ = _____.

(18) If common difference is h, then $\Delta^n e^x$ = _____.

(19) Define shift operator.

(20) Write Gregory-Newton's forward interpolation formula.

2 (a) Answer any **three** : **6**

(1) Explain integer division in C language with example.

(2) Explain syntax of if statement in C language with example.

(3) Explain signed and unsigned integers in C language.

(4) Write a C program to calculate area of a triangle when base and height of the triangle are given.

(5) Explain syntax of if statement in C language with example.

(6) Explain syntax of printf( ) statement in C language.

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

(1) Explain syntax of for statement in C language with example.

(2) Explain type conversion in assignment with proper example.

(3) Explain Macro with arguments in C language with syntax and example.

(4) Explain the difference between while loop and do-while loop.

(5) Explain if-else statement in flow-chart.

(6) Explain syntax to declare and initialize single dimensional array in C language.

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

(1) Write detailed note on data types in C.

(2) Write the syntax of #define as preprocessor. Explain its usage with example in details.

(3) Write detailed note on various primary data types available in C.

(4) Write a C program to determine whether given year is a Leap year or not.

(5) Write a C program to find the addition of 3×3 matrices using array.

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

(1) In usual notations prove that $\delta^2 = \Delta - \nabla$.

(2) In usual notations prove that $\Delta^3 y_2 = \nabla^3 y_5$.

(3) Show that $\Delta^3 [(1-x)(1-2x)(1-3x)] = -36$.
(Take $h = 1$)

(4) Write normal equations to best fit the curve $y = ax + b$.

(5) What is the linear law of the curve $xy = ax + by$?

(6) Write name of four direct methods to solve linear equations.

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

(1) Find a cubic polynomial which takes the following set of values (0, 1), (1, 2), (2, 1) and (3, 10).

(2) Solve the system of equations :

$10x + y + z = 12$

$2x + 10y + z = 13$

$2x + 2y + 10z = 14$

using Gauss elimination method.

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

(4) In usual notation prove that

$$D = \frac{1}{h}\left[\Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + ...\right].$$

(5) Fit a straight line $y = ax + b$ to following set of observations :

x	1	2	3	4	5
y	14	27	40	55	68

(6) Express $f(x) = x^4 - 12x^3 + 42x^2 - 30x + 9$ as factorial polynomial taking common difference $h = 1$.

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

(1) Derive Gregory Newton's backward interpolation formula.

(2) Explain method of Factorization.

(3) Explain principle of least square using it find normal equations of the curve $y = ax^b$.

(4) Prove that n^{th} difference of any polynomial of degree n is constant.

(5) Explain Gauss Jacobi method of iteration.