



MCQ-003-001514 Seat No. _____

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

May / June - 2018

Mathematics : BSMT - 502 - A

(Programming in C & Numerical Analysis - I)

(Theory) (New Course)

Faculty Code : 003

Subject Code : 001514

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All the questions are **compulsory**.
(2) Numbers written to the **right** indicate full marks of the question.

1 Answer all the following 20 short answer questions : **20**

- (1) Who invented BCPL language ? In which year it was invented ?
- (2) Which file is required to be included into the C - programme while using clrscr() and getch() ?
- (3) Write the printf statement to obtain the following output :
Principal = 10000 Rate = 6.75 Type of Account = 'S'
- (4) What is the range of real constant (in a 16 bit computer) ?
- (5) What is the meaning of j-- ?
- (6) How much memory space is required for long integer data type ?
- (7) Give one example of a macro without arguments in C language.
- (8) What is the break statement in C language ? Explain in brief.
- (9) What is the integer division in C - language ? Explain in brief.

- (10) What is the syntax of return statement with respect to user defined functions ?
- (11) Write name of any two iterative method.
- (12) What is L and U in Factorization method ?
- (13) Which method is more rapid in convergence than Jacobi method ?
- (14) What is the value of $\Delta^4 x^{[3]}$ if $h = 1$?
- (15) In which method coefficient matrix is converted into diagonal matrix ?
- (16) Expression terms of Δ and ∇ .
- (17) Write normal equations to best fit the straight line $y = b + cx$.
- (18) In which method Back substitution is used ?
- (19) Write Gregory-Newton forward interpolation formula.
- (20) What is the value of $(2 - 3x)^{[2]}$; $x = 4$?

- 2 (a) Attempt any **three** : **6**
- (1) Explain meaning of mixed mode arithmetic statement with examples.
 - (2) Explain the meaning and provide list of Relational Operators being used in C.
 - (3) Explain the meaning of continue statement in C, also give proper examples for the same.
 - (4) Give an example of a user defined function with two arguments and with one return value.
 - (5) Explain the character data type in C language specifying keyword, memory size, format Specifier and range.
 - (6) Write a C - program to find the area of a circle when radius of the circle is input by user.
- (b) Attempt any **three** : **9**
- (1) Explain the "else-if ladder" in C language with example.
 - (2) Write a short note on float and double data type in C language.

- (3) Give two different examples of single dimensional array declaration and initialization.
- (4) Explain Macro with arguments in C language with syntax and examples.
- (5) Write a C - program to input a 3×3 matrix and output its diagonal matrix.
- (6) Write a C - program to find the factorial of a number entered through keyboard.

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

- (1) State the syntax of the scanf() statement including at least three different examples of usage of scanf() to explain the syntax.
- (2) Explain the syntax and usage of while loop in C ? Give proper examples with output.
- (3) Explain the methods to declare and initialize the two dimensional array.
- (4) Explain primary data types in C language specifying keyword, memory size, format Specifier and range.
- (5) Write a C - program to determine whether the number entered through the key board is a prime number or not.

3 (a) Attempt any **three** : **2+2+2=6**

- (i) In usual notation prove that $E = e^{hD}$.
- (ii) Explain linear law.
- (iii) Express $p(x) = x^4 - 12x^3 + 24x^2 - 30x + 9$ as a factorial polynomial. Also find its differences.
- (iv) In usual notation prove that

$$\Delta \tan^{-1} \left(\frac{n-1}{n} \right) = \tan^{-1} \left(\frac{1}{2n^2} \right).$$

- (v) Define reciprocal polynomial and prove that

$$\Delta x^{[-r]} = -rx^{[-r-1]}.$$

(vi) In usual notation prove that

$$\Delta[x(x+1)(x+2)(x+3)] = 4(x+1)(x+2)(x+3).$$

(b) Attempt any **three** : **3+3+3=9**

(i) Prove that every polynomial can be expressed as a factorial polynomial.

(ii) Form a table of backward differences of the function $F(x) = x^3 - 3x^2 - 5x - 7$ for $x = -1, 0, 1, 2, 3, 4, 5$.

(iii) If $P_n(x) = a_0x^n + a_1x^{n-1} + \dots + a_n$ then prove that

$$\Delta^n P_n(x) = a_0 h^n n!.$$

(iv) Explain error propagation in difference table.

(v) Obtain normal equations to best fit the curve $y = ae^{bx}$.

(vi) Explain: Gauss - Seidel method.

(c) Attempt any **two** : **5+5=10**

(i) Explain : Gauss elimination method.

(ii) Derive Gregory-Newton backward interpolation formula.

(iii) Explain Crout's method.

(iv) Explain principle of least squares and obtain normal equations for parabola.

(v) In the following table one value is incorrect and y is a cubic polynomial in x :

$x :$	0	1	2	3	4	5	6	7
$y :$	25	21	18	18	27	45	76	123