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PAQ-003-001514 **Seat No. _____**

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

October / November - 2018

Mathematics : BSMT-502(A)

(Theory) [Old Course]

(Programming in C & Numerical Analysis - 1)

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 ALGOL language ? In which year it was invented ?

(2) Which file is required to be included into the C - programme while using pow( ) and sqrt( ) ?

(3) Write the output of printf("\n\t\t\tAlways\n\t\tThink\n\tPositive");.

(4) What is the range of double data type (in a 16 bit computer) ?

(5) What is the meaning of a- - in C language ?

(6) How much memory space is required for float data type ?

(7) Give one example of ONE dimensional array in C language.

(8) What is the format code for unsigned short integer ?

(9) What is the numerical output of the following code in C - language ?

```
int a = 17, b =3, C;
c = a/b;
printf("\n\t c = %d", c);
```

(10) Give an example to explain break statement in brief.

(11) What is L in Crout's method ?

(12) Define translation operator.

(13) Write Gregory Newton backward interpolation formula.

(14) Write normal equations for fitting a second degree curve.

(15) Write relation between backward difference operator and shift operator.

(16) Which method is a modification of Gauss elimination method ?

(17) Define averaging operator.

(18) In which method the coefficient matrix is converted into a diagonal matrix ?

(19) Write linear form of the exponential curve $y = ae^{bx}$.

(20) Write name of any two indirect methods to solve simultaneous linear algebraic equations.

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

(1) Explain general form of Arithmetic statement with examples.

(2) Explain the meaning and provide list of LOGICAL 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 without any argument and without a return value.

(5) Write rules for constructing variable names in C language.

(6) Write a C - program to find the area of a rectangle when length and width of the rectangle are input by user.

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

(1) Explain the "printf() statement" in C language with example.

(2) Explain "for loop" in C language.

(3) Explain what is the meaning of the FORMAL ARGUMENTS (with respect to user defined functions in C) with example program ?

(4) Explain Macro substitution Expansion in C language with syntax and examples.

(5) Write a C - program to input a 3×3 matrix and output its diagonal.

(6) Write a C - program to find the value of the series $S = 1 + x + x \wedge 2 + x \wedge 3 + ... + x \wedge n$.

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

(1) State the syntax of the scanf( ) statement including 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 in detail primary data types in C.

(5) Write a C - program to list of all Armstrong numbers up to 999.

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

(1) Define :

(i) Central difference operator

(ii) Backward difference operator.

(2) In usual notation prove that $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$.

(3) Explain interpolation and extrapolation.

(4) In usual notation prove that

$$\Delta \tan^{-1} x = \tan^{-1}\left(\frac{h}{1+x(x+h)}\right).$$

(5) In usual notation prove that

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

(6) Explain linear law.

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

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

(2) Find a cubic polynomial which takes the following set of values :

$(0,1), (1,2), (2,1), (3,10)$.

(3) Explain error propagation in difference table.

(4) If $P_n(x) = a_0 x^n + a_1 x^{n-1} + ... + a_n$, then prove that

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

(5) Explain Jacobi's method.

(6) In usual notation prove that

$$\Delta^3 (3x+1)(3x+4)..... .....(3x+19) = 5670(3x+19)$$
$$(3x+16)(3x+13)(3x+10)$$

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

(1) Explain : Gauss-Jordan method.

(2) Derive Gregory-Newton forward interpolation formula.

(3) Explain : Trianguelarisation method.

(4) Find the missing values in the following table.

x	0	1	2	3	4	5	6
y	–4	–2	–	–	220	546	1148

(5) Explain : Principle of least squares and obtain normal equations for fitting a straight line.