LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

U.G. DEGREE EXAMINATION – **ALLIED**

THIRD SEMESTER – **NOVEMBER 2023**

UPH 3401 – NUMERICAL METHODS AND C++ PROGRAMMING

Date: 08-11-2023   Dept. No.   Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

SECTION A - K1 (CO1)

	Answer ALL the Questions -	**(10 x 1 = 10)**
1.	**Fill in the blanks**	
a)	The Bisection method is used to find the roots of a _____ equation.	
b)	Simpson's rule is an extension of _____ rule.	
c)	The class declaration of C++ is placed in _____ file.	
d)	Data is a collection of _____.	
e)	C++ language is shipped with a lot of functions which are known as _____ functions.	
2.	**True or False**	
a)	Newton's method starts with a function 'f' defined over the imaginary numbers.	
b)	Simpson's 3/8 rule is completely based on the cubic interpolation.	
c)	A real constant must have at least one digit.	
d)	While loop in a program continues until the evaluating condition becomes correct.	
e)	Array is collection of single memory locations.	

SECTION A - K2 (CO1)

	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**Match the following**	
a)	Newton's method i) data and function	
b)	Simpson's rule ii) ASCII	
c)	Variables iii) Index	
d)	Class iv) real valued function	
e)	Array element v) Accurate method	
4.	**Answer the following**	
a)	Write the formula and its expansion of Newton-Raphson method.	
b)	What is Regula Falsi method?	
c)	Illustrate the general format of C++ structure.	
d)	Define a loop in C++?	
e)	Distinguish shortly between calling a function by reference and value in C++.	

SECTION B - K3 (CO2)

	Answer any TWO of the following	**(2 x 10 = 20)**
5.	Solve the equation, $x^3 + x^2 - 1 = 0$ for the positive root by successive approximation method.	
6.	Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by Trapezoidal rule. Use h=1.	
7.	Briefly discuss identifiers and keywords.	

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8.	Describe the different loop statements briefly in C++.

SECTION C – K4 (CO3)

Answer any TWO of the following (2 x 10 = 20)

9.	Find the real root of the equation, $f(x) = x^3 - 2x - 5 = 0$ using Regula Falsi method.
10.	Solve $\frac{dy}{dx} = \frac{y-x}{y+x}$ by Euler's method. Initial values y =1; x =0. h= 0.02. Find y at 0.1.
11.	Elaborate on the control flow and conditional statements in C++ programming.
12.	Using an example program, explain how to call a function by value in C++.

SECTION D – K5 (CO4)

Answer any ONE of the following (1 x 20 = 20)

13.	Find the values of $f(8)$, $f(12)$ and $f(15)$ of the following table using Newton's forward interpolation formula.

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028

14.	Give a detailed explanation about constant and variable in C++ programming.

SECTION E – K6 (CO5)

Answer any ONE of the following (1 x 20 = 20)

15.	Find y at $x = 1.2; f(x,y) = xy; x_0 = 1; y_0 = 2; h = 0.1$ using Runge-Kutta 2nd & 4th order method.
16.	Describe in detail about arithmetic, relational, logical and conditional operators in C++ programming.

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