



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc. DEGREE EXAMINATION – STATISTICS**

**THIRD SEMESTER – NOVEMBER 2022**

**UPH 3401 – NUMERICAL METHODS AND C++ PROGRAMMING**

Date: 01-12-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

## SECTION - A

**Answer ALL the Questions**

<b>1. Fill in the blanks</b>		<b>(5 x 1 = 5)</b>
a) The bisection method is used to find the <u>roots of a</u> equation.	K1	CO1
b) Simpson's 1/3 <sup>rd</sup> rule is an extension of the _____ rule.	K1	CO1
c) C++ language was developed by _____.	K1	CO1
d) The formula for Newton's forward interpolation is _____.	K1	CO1
e) Character-manipulation functions are declared in _____ library.	K1	CO1
<b>2. Multiple Choice Questions</b>		<b>(5 x 1 = 5)</b>
a) The memory locations in the array are known as _____ of array. i) functions ii) elements iii) data iv) sets	K1	CO1
b) Using which of the following data type can 19.54 be represented? i) void ii) double iii) int iv) None	K1	CO1
c) The principle behind bisection method is _____ theorem for continuous functions. i) dichotomy ii) intermediate iii) root-finding iv) interval-halving	K1	CO1
d) Simpson rule can be derived from _____ divided difference polynomial. i) Newton's ii) Lagrange's iii) Gauss iv) Trapezoidal	K1	CO1
e) Variable is a location in memory, referenced by _____. i) tokens ii) keywords iii) an identifier iv) functions	K1	CO1
<b>3. Answer the following</b>		<b>(5 x 1 = 5)</b>
a) What is regulafalsi method?	K2	CO1
b) What is a structure?	K2	CO1
c) List the tokens of C++ language.	K2	CO1
d) What is a loop in C++?	K2	CO1
e) What is a function in C++?	K2	CO1
<b>4. Match the following</b>		<b>(5 x 1 = 5)</b>
a) Structure	i) Collection of information	K2 CO1
b) Data	ii) Collection of variables	K2 CO1
c) Newton's method	iii) Instance of class	K2 CO1
d) Object	iv) Set of statements	K2 CO1
e) Function	v) Iterative Procedure	K2 CO1

**SECTION - B**

**Answer any TWO of the following in 100 words (2 x 10 = 20)**

5.	Apply bisection method to determine the root of the given equation $x^2 - 3 = 0$ for $x \in [1, 2]$ .	K3	CO2
6.	Solve $\int_0^{10} \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule. Use $h = 1$ .	K3	CO2
7.	Illustrate about structure in C++.	K3	CO2
8.	Elucidate conditional and loop statements in C++ with examples.	K3	CO2

**SECTION - C**

**Answer any TWO of the following in 100 words (2 x 10 = 20)**

9.	Evaluate the positive root lying between 0 and 1 of the equation $x^3 + x^2 - 1 = 0$ by iteration method.	K4	CO3
10.	Using Runge-Kutta IV order method, estimate $y$ at $x = 0.2$ if $y' = \frac{y+x}{y-x}$ Given: $h = 0.2$ and $y(0) = 1$ .	K4	CO3
11.	Discuss about the constant and variable in C++ programming.	K4	CO3
12.	Describe calling a function by reference and by value with sample programs.	K4	CO3

**SECTION - D**

**Answer any ONE of the following in 250 words (1 x 20 = 20)**

13.	<p>i) Solve the following equations using Gauss elimination method.  <math>-7x - 3y + 3z = 12</math>; <math>2x + 2y + 2z = 0</math>; <math>-x - 4y + 3z = -9</math> (10 marks)</p> <p>ii) Using the given table evaluate <math>f(8)</math> and <math>f(15)</math> by Lagrange's interpolation formula. (10 marks)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td><math>x</math></td> <td>4</td> <td>5</td> <td>7</td> <td>10</td> <td>11</td> <td>13</td> </tr> <tr> <td><math>f(x)</math></td> <td>48</td> <td>100</td> <td>294</td> <td>900</td> <td>1210</td> <td>2028</td> </tr> </table>	$x$	4	5	7	10	11	13	$f(x)$	48	100	294	900	1210	2028	K5	CO4
$x$	4	5	7	10	11	13											
$f(x)$	48	100	294	900	1210	2028											
14.	Bring out the importance of operators in C++ programming. Give examples.	K5	CO4														

**SECTION - E**

**Answer any ONE of the following in 250 words (1 x 20 = 20)**

15.	<p>i) Integrate the equation <math>\int_0^1 e^x dx</math> by Trapezoidal rule. Divide the range into 4 equal parts (8 marks)</p> <p>ii) By modified Euler's method, find <math>y</math> when <math>x = 0.1</math> for <math>y' = x^2 + y</math>; Given <math>h = 0.05</math>, <math>y(0) = 1</math> (12 marks)</p>	K6	CO5
16.	With relevant examples discuss in detail (i) switch ii) break iii) continue and iv) go to statement in C++.	K6	CO5

@@@@@@