Indian Institute of Information Technology Sri City, Chittoor

(An Institute of National Importance under Act of Parliament)

Mid Semester Examination - Monsoon 2021

[20 September 2021 - 11:00 AM - 01:00 PM]

Course: **Object Oriented Programming [Section C]**
Category: **Set C01**

Total Marks: **20 + 20 (MCQs) Marks**
Time: **70 + 20 (MCQs) Minutes**

Instructions:

a) The actual examination is scheduled for 60 minutes and another 30 minutes would be given for organizing the answer scripts, scanning and submitting over online.
b) Precisely answer the questions with relevant details. Avoid writing unnecessary explanations.
c) The file to be uploaded should be named as follows:
ABCD-**YYYY**-midsem-OOPC2021-**AYCOY**.pdf Where **ABCD** is the last 4 digits of your roll number; **YYYY** - year of admission (probably either 2018 or 2019); **AYCOY** - any 5 characters in CAPITAL letters (this may act as a secret key - Do not share with others). Please use hyphen (-) and NOT the "underscore" (_).
d) Submission portal: **http://smartmiss.iiits.ac.in/upload** and choose "**Object Oriented Programming (C-Section)**" as the course name.

Descriptive Questions: You must use C++ for solving these two problems.
[Please state your assumptions, if any, explicitly in your answer sheet]

1. [10 Marks] Let arr be an array of n (= 15) integers:

124	147	12	28	181	142	98	58	42	83	32	112	110	150	55

a. Create a class **PrimeFactor** with the following members:
num - stores a given number (integer)
factors[] - an array of unique prime factors and
Sum - to store the sum of unique prime factors

b. Create an array of PrimeFactors, each stores num and its unique prime factors.

c. **Function 1:** Create a public method with scope resolution operator to find the unique prime factors of a given number. (for example take the third num of the above array is 12 and its factors are 2, 2, 3 and the unique factors are: 2, 3)

d. **Function 2:** Create a method to get the sum of the unique prime factors of each number of the above array

2. [10 Marks]
Define classes as: **Line** and **Triangle** with the following attributes:
Point: x, y: float - two endpoints;
Line: a, b: Point - two endpoints; linewidth**:** int (1-2); Linecolor**:** int (1 = Green, 2 = Pink, 3 = Blue)

Triangle: p, q, r: three line segments;

Write methods to do the following:

a) Write a method to randomly generate a line segment in the given grid [0, 0] - [50,50]; Print the endpoints of the line segment and the length of the line segment

b) Write two methods each to find the area and perimeter of a given triangle (three points or three lines) (Hint: Use Method Overloading)

c) Write a method to randomly generate 5 points and create two triangles in such a way that any one point (only one point) is common to both the triangles. This method should compute and print the sum of the areas covered by each triangle. (You may use the above method to compute the area of a triangle)