CSE201 Advanced Programming

End-Semester Examination

Indraprastha Institute of Information Technology, Delhi

3rd December, 2023

Duration: 4:00 pm - 5:30 pm

**Marks: 35**

**Exam Requirements**

* Phones and other network sources are strictly prohibited. Invigilators will monitor available networks, and cheating will result in removal from the examination hall and award of F grade in the course.
* Keep your screen focused on the IDE during the exam. Any deviation will be regarded as misconduct and an appropriate action will be taken immediately.
* Your code must compile to receive any marks.

**Submission Guidelines**

* Name your final folder as **<RollNo>\_<Name>.zip**. Failure to follow this naming convention will result in a score of zero.
* Create **separate sub-folders** inside the main folder **for each question**, naming them as Question\_1, Question\_2, etc.
* Please submit your **.java files** inside the sub-folder corresponding to the question.

**Note: No need to submit pom.xml files.**

**Please follow the good programming practices given below.**

* All the fields in the class should be private unless there is a good reason to have otherwise.
* A field should have a getter and a setter in general.
* All the methods of a class should be public unless there is a good reason to have otherwise (for example, helper methods need not be public).
* #Every class and interface should be public.
* Follow the naming conventions for classes, fields, methods and objects. Classes and interfaces should follow the upper camel case (eg., RotateAndFly). Fields, methods and objects should follow the lower camel case (eg., fullName).

**Please make sure your code compiles. Zero marks will be given in case of compilation error.**

**We will be testing the submissions on ChatGPT specific plagiarism detectors also. In case any plagiarism case is detected, it will be dealt with as per IIITD plagiarism policy and without any relaxations.**

**Submission Link: https://forms.gle/1eX16jJmkApbeXbQ9**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Q1) Create a file manager class with two fields – fileID and fileName. Ensure that there will be only one file manager in the system. Use an appropriate design pattern to design and implement this scenario. Mention the name of the pattern along with the reason to use it as a comment on top of the file manager class. Along with this, implement the equals() method in the file manager class. Use this to test whether there is only one file manager in the system.

Q2) Implement a complex numbers class that has two fields – real and imaginary. This class will have the following methods – conjugate, add, subtract, multiply, and divide. While dividing two complex numbers, ensure that you make use of conjugate and multiply methods. Generate two sets of complex numbers with 10 in each set. Perform the element-wise addition, subtraction, multiplication, and division of these sets. Save the resultant sets as objects into four separate files, one for each operation.

Example of element-wise operation

A = {a1, a2, a3, …}

B = {b1, b2, b3, …}

A \* B = {a1 \* a2, b1 \* b2, c1 \* c2, …}

**Code snippet for random number generation**

Random random = new Random();

random.nextInt(100); // generates random number between 0 and 100