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Department of Computer Science and Engineering

2nd Year 1st Semester Final B.Sc. Engineering Examination-2021

Course Code: CSE205 **Course Title: Java Technology**

Total Marks: 60 **Time: 3 (Three) Hours**

N.B.:

i. Answer **SIX** questions taking any **THREE** from each section.

ii. All parts of a question must be answered sequentially.

Section-A

1. a) What do you mean by container and component in java? Give some example of container and component class in java. **3**

b) Explain class and objects in java. **3**

c) What happens if the static modifier is not included in the main method signature in Java? What is the component used for compiling, debugging and executing java programs? **4**

2. a) Write 2 (two) different ways to convert an **int** value to a **String**. Write a Java program that takes N integers from command line and prints the maximum and the minimum of them. **4**

b) Write short notes on the following with example: **3**

1) super and static keyword
2) class and object

c) Differentiate between the following two statements: **3**

i) **int** [ ]**c**, **x** ii) **int c**[ ], **x**

Write Java code to create the following array in Java.

0			
1	2		
3	4	5	
6	7	8	9

3. a) What is garbage collector? Explain it's working with examples. **4**

b) In computer science, a Queue is a FIFO (first in, first out) data structure. Objects inserted first into a queue are the first objects removed from the queue. One way to design a queue data structure is to build it as a chain of node objects (like a linked list). Now write a java program to implement above FIFO with the use of all the methods. **4**

c) When we say "a class is final" or "a method is final" what does that mean? Show example codes to make a class and a method final. **2**

4. a) What is an abstract class? Write the restrictions imposed on an abstract class. Point out and fix the problems in the following code snippet. **4**

```
final class X{
  final void show(){
    System.out.println("Printed from a method");
  }
)
class Y extends X{
  void show(){
    System.out.println("In subclass method"); '
  }
}
```

b) **4**

```
interface interface1 {
  default void f1() {
  }
  void f2();
}
interface interface2 {
  void f3();
  void f4();
}
abstract class class1 implements interface1 {
  abstract void f5();
  final void f6() {
  }
}
class myclass extends class1 implements interface2 {
  // your code
}
```

Write minimum code for **myclass** for successful compilation. You can't define myclass as abstract.

c) Briefly explain the differences between class and instance variable with examples. **2**

Section-B

5. a) Consider a **MyStack** class implemented with array and with the following functions: **4**

void push(**Object ob**) - this method pushes an Object ob into the stack
Object pop( ) - this method pops an Object from the stack
Object top( ) - this method returns the Object in the top of the stack without modifying the stack
boolean isEmpty( ) - this method returns true if the stack is en1pty, otherwise false.

MyStack class has the following instance variables:
final int CAPACITY = 100 - capacity of the stack
Object [ ] **s** - the array to hold the stack
int top - the top of the stack
Here are the restrictions:
1. In **MyStack**, pop() and top() cannot be performed if the stack is empty. In that case it will trigger StackEmptyException with the message 'Stack is Empty'.
2. In **MyStack**, push() cannot be perfonned if the stack is full. In that case it will trigger StackFullException with the message 'Stack is full'.

Write Java code for the custom exceptions mentioned above. You also need to write the **MyStack** class to trigger these exceptions when needed.

b) Write about network programming in java with proper examples **4**

c) Describe java socket. **2**

6. a) Write two different ways to create Threads in Java with short code examples. Which one is better and why? What is the difference between synchronized method and synchronized statement? **4**

b) **4**

```
class Product {
 private String name;
 private double price;
 Product (String name, double price) {
   this.name = name;
   this.price = price;
 }
 public String getName () {
   return this.name;
 }
 public double getPrice () {
   return this.price;
 }
}
```

Write Java code for the following:
1) Define an ArrayList named myProducts that can store a list of Product.
2) Generate 5 Product with 'A' to 'E'. and random prices and add them to myProducts.
   The following code generates random integers between 0 to 500
   `Random r = new Random( ); r.nextInt(500);`
3) Add a new Product with name 'F' and price 1000 at index 1 of myProducts
4) Sort myProducts based on Product's price in ascending order.

c) Write the differences between ArrayList and Hashmap with examples. **2**

7. a) What is Iterator? Describe the methods of Iterator interface in Java. Suppose you have a LinkedList of string objects. Now using iterator you have to find out maximum length string object. **4**

b) With Java threads, it is very easy to parallelize computations. Suppose you are in a job interview and the interviewer asks you to write Java code to find out summation of 1 to 10000000. You can't use any simple equation; you can only use loops. But you are asked to divide the work equally among 10 different threads. Write complete Java code to compute the summation of 1 to 10000000 by dividing the work equally among 10 different threads. The main thread will wait for the 10 threads to finish and will only print the final summation. **4**

c) Briefly describe the methods that Java uses for inter thread communication. **2**

8. a) Suppose conside a file named List.txt is formatted so that each line has the following format: **6**

Gender FirstName LastName Status

Gender will be either an “F” or a “M” and Status will be either “Good” or “Bad”.
An example List.txt file would be formatted as follows:
M Jack Frost Bad
F CindyLou Who Good
M Rudolph Rednose-Reindeer Good

Now generate ShoppingList.txt file should be formatted such that each line has “lastName, firstName toyName” where toyName will be as following.

- toyName will be "Coal" if the status of the child is "Bad"
- toyName will be "Pony" if the gender of the child is "F" and the status of the child is "Good"
- toyName will be "Bicycle" if the gender of the child is "M" and the status of the child is "Good"

In addition, the last three lines of the file should print the number of coals, bicycles, and ponies to buy. An example resulting ShoppingList.txt file for the above List.txt should be:
Frost, Jack Coal
Who, CindyLou Pony
Rednose – Reindeer, Rudolph Bicycle
Coals: 1
Bicycles: 1
Ponies: 1

In order to do this you should create a complete class called **ToyHelper** which will read List.txt and produce ShoppingList.txt. Do not make any assumptions about the length of the list, but you can assume that it is formatted correctly. If the List.txt file does not exist, you should catch any exception that might be thrown.

b) Differentiate between: **4**

1) Checked and Unchecked exceptions
2) Byte based and Character based stream