National Institute of Technology, Kurukshetra

Subject- Object oriented Programming using Java — Course Code- ITPC 205

B Tech -IIIrd — MM: 20, Duration- 50 minutes

1) Write program on the below questions with explanations (5)

i. What is constructor chaining in Java? Illustrate your answer with a code example that demonstrates both this() and super() in action.

ii. What is race condition in multithreading ?

iii. Program: Demonstrate using wrapper classes with ArrayList. Output: List: [10, 20, 30]

iv. Use a base class reference to hold a derived class object and call an overridden method.

```
class Parent {
    void show() {
        System.out.println("Parent class show method.");
    }
}

class Child extends Parent {
    void show() {
        System.out.println("Child class show method.");
    }
}

public class DynamicMethodLookupExample {
    public static void main(String[] args) {
        Parent obj = new Child();
        obj.show();
    }
}
```

v. Explain Thread transition.

2) Write a Java program that implements: (5)

- A base class Shape with a method area().
- A derived class Circle that overrides the area() method.
- An interface Drawable with a method draw().
- Implement Drawable in the Circle class.
- Show the use of polymorphism by using a Shape reference to refer to a Circle object and call its methods

3) Discuss the role of interfaces in Java. What are the differences between an interface and an abstract class? Provide an example of an interface and a class implementing it, highlighting how polymorphism is achieved. (5)

4) Create a program with a shared resource (e.g., a counter). Implement synchronization to ensure that two threads increment this counter safely. Include a mechanism to demonstrate the result of thread interference without synchronization and the correct result with synchronization. (5)