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Degree/ Branch: **B. E / CSE** Semester/ Year: **III / II**

Subject Code / Name: **CS3391 Object Oriented Programming**

UNIT I – OOP FUNDAMENTALS

Part - A

1) What is meant by Object Oriented Programming? Nov 2018

OOP is a method of programming in which programs are organized as cooperative collections of objects. Each object is an instance of a class and each class belong to a hierarchy.

2) What is a Class? April 2018, April 2016

Class is a template for a set of objects that share a common structure and a common behavior.

3) What is an Object?

Object is an instance of a class. It has state, behaviour and identity. It is also called as an instance of a class.

4) What are the core OOP's concepts?

Abstraction, Encapsulation, Inheritance and Polymorphism are the core OOP's concepts.

5) What is meant by abstraction? April 2019

Abstraction defines the essential characteristics of an object that distinguish it from all other of objects. Abstraction provides crisply-defined conceptual boundaries relative to the perspective of the viewer. Its the process of focusing on the essential characteristics of an object. Abstraction is one of the fundamental elements of the object model.

6) What is meant by Encapsulation? Nov 2015 , April 2019

Encapsulation is the process of combine the elements of an abstraction that defines the structure and behavior. Encapsulation helps to separate the contractual interface of an abstraction and implementation.

7) What are Encapsulation, Inheritance and Polymorphism?

Encapsulation is the mechanism that binds together code and data it manipulates and

keeps both safe from outside interference and misuse. Inheritance is the process by which one object acquires the properties of another object. Polymorphism is the feature that allows one interface to be used for general class actions.

8) What are methods and how are they defined?

Methods are functions that operate on instances of classes in which they are defined. Objects can communicate with each other using methods and can call methods in other classes. Method definition has four parts. They are name of the method, type of object or primitive type the method returns, a list of parameters and the body of the method. A method's signature is a combination of the first three parts mentioned above.

9) What are different types of access modifiers (Access specifiers)?

Access specifiers are keywords that determine the type of access to the member of a class. These keywords are for allowing privileges to parts of a program such as functions and variables. These are: public**:** Anything declared as public can be accessed from anywhere. private**:** Any thing declared as private can't be seen outside of its class. protected**:** Any thing declared as protected can be accessed by classes in the same package and subclasses in the other package default modifier **:** Can be accessed only to classes in the same package.

10) Explain the usage of Java packages. Nov 2018, April 2016

This is a way to organize files when a project consists of multiple modules. It also helps resolve naming conflicts when different packages have classes with the same names. Packages access level also allows you to protect data from being used by the non-authorized classes.

11) What gives java it's "write once and run anywhere" nature? Nov 2016

All Java programs are compiled into class files that contain bytecodes. These byte codes can be run in any platform and hence java is said to be platform independent.

12) What is a constructor? What is a destructor?

Constructor is an operation that creates an object and/or initialises its state. Destructor is an operation that frees the state of an object and/or destroys the object itself. In Java, there is no concept of destructors. Its taken care by the JVM.

13) What is the difference between constructor and method?

Constructor will be automatically invoked when an object is created whereas method has to be called explicitly

14) What is Static member classes? Nov 2017

A static member class is a static member of a class. Like any other static method, a static member class has access to all static methods of the parent, or top-level, class.

15) What is Garbage Collection and how to call it explicitly?

When an object is no longer referred to by any variable, java automatically reclaims memory used by that object. This is known as garbage collection. System. gc() method may be used to call it explicitly.

16) What is static variable and static method?

static variable is a class variable which value remains constant for the entire class static method is the one which can be called with the class itself and can hold only the staic variables

17) What is finalize() method?

finalize () method is used just before an object is destroyed and can be called just prior to garbage collection.

18) What is a package?

A package is a collection of classes and interfaces that provides a high-level layer of access protection and name space management.

19) Explain working of Java Virtual Machine (JVM)?

JVM is an abstract computing machine like any other real computing machine which first converts .java file into .class file by using Compiler (.class is nothing but byte code file.) and Interpreter reads byte codes.

Part - B

1. Summarize the types of constructors supported by JAVA with example.
2. Explain basic concepts of OOPS.
3. Explain Features and Characteristics of java.
4. Explain static members in java.
5. Explain Polymorphism concept in java.
6. Explain java packages and Access modifiers.
7. Explain Compilation and execution process of java.
8. Explain different Control Statements in java with example.
9. Explain the concepts of arrays in Java and explain its types with examples?
10. Explain in detail about static variable and static method in Java with example?

UNIT II - INHERITANCE AND INTERFACES

Part - A

1) What is meant by Inheritance? Nov 2016

Inheritance is a relationship among classes, wherein one class shares the structure or behaviour defined in another class. This is called Single Inheritance. If a class shares the structure or behaviour from multiple classes, then it is called Multiple Inheritance.

Inheritance defines "is-a" hierarchy among classes in which one subclass inherits from one or more generalised superclasses.

2) what are its advantages of Inheritance? Nov 2017, April 2015

Inheritance is the process of inheriting all the features from a class. The advantages of inheritance are reusability of code and accessibility of variables and methods of the super class by subclasses.

3) What is meant by Polymorphism?

Polymorphism literally means taking more than one form. Polymorphism is a characteristic of being able to assign a different behavior or value in a subclass, to something that was declared in a parent class.

4) What is final modifier? April 2017

The final modifier keyword makes that the programmer cannot change the value anymore. The actual meaning depends on whether it is applied to a class, a variable, or a method.

final Classes- A final class cannot have subclasses.
final Variables- A final variable cannot be changed once it is initialized.
final Methods- A final method cannot be overridden by subclasses.

5) What is an Abstract Class? April 2018

Abstract class is a class that has no instances. An abstract class is written with the expectation that its concrete subclasses will add to its structure and behaviour, typically by implementing its abstract operations.

6) What is an Interface? April 2016

Interface is an outside view of a class or object which emphaizes its abstraction while hiding its structure and secrets of its behaviour.

7) What is the difference between abstract class and interface?

a) All the methods declared inside an interface are abstract whereas abstract class must have at least one abstract method and others may be concrete or abstract.

b) In abstract class, key word abstract must be used for the methods whereas interface we need not use that keyword for the methods.

c) Abstract class must have subclasses whereas interface can't have subclasses.

8) What is interface and its use? April 2017

Interface is similar to a class which may contain method's signature only but not bodies and it is a formal set of method and constant declarations that must be defined by the class that implements it. Interfaces are useful for:

a) Declaring methods that one or more classes are expected to implement

b) Capturing similarities between unrelated classes without forcing a class relationship.

9) What are the methods provided by the object class?

The Object class provides five methods that are critical when writing multithreaded Java programs:

- notify
- notifyAll
- wait

10) What is object cloning? April 2016, Nov 2018

It is the process of duplicating an object so that two identical objects will exist in the memory at the same time.

Part - B

1. Define Inheritance and its benefits. Explain its types with example.
2. Explain Interface concept with example programs.
3. Explain Inner classes in Java with example.
4. Explain final methods and classes in Java.
5. Explain Abstract class with example programs.
6. What is meant by object cloning? Explain it with an example.
7. What is a Package? What are the benefits of using packages? Write down the steps in creating a package and using it in a java program with an example.

UNIT III - EXCEPTION HANDLING AND I/O

Part - A

1) What is the relationship between the Canvas class and the Graphics class?

A Canvas object provides access to a Graphics object via its paint() method.

2) How would you create a button with rounded edges? April 2016

There's 2 ways. The first thing is to know that a JButton's edges are drawn by a Border. so you can override the Button's paintComponent(Graphics) method and draw a circle or rounded rectangle (whatever), and turn off the border. Or you can create a custom border that draws a circle or rounded rectangle around any component and set the button's border to it.

3) What is the difference between the 'Font' and 'FontMetrics' class? April 2018

The Font Class is used to render 'glyphs' - the characters you see on the screen. FontMetrics encapsulates information about a specific font on a specific Graphics object. (width of the characters, ascent, descent)

4) What is the difference between the paint() and repaint() methods? Nov 2016

The paint() method supports painting via a Graphics object. The repaint() method is used to cause paint() to be invoked by the AWT painting thread.

5) Which containers use a border Layout as their default layout?

The window, Frame and Dialog classes use a border layout as their default layout.

6) Difference between Swing and Awt? Nov 2018,

AWT are heavy-weight componenets. Swings are light-weight components. Hence swing works faster than AWT.

7) What is a layout manager and what are different types of layout managers available in java AWT?

A layout manager is an object that is used to organize components in a container. The different layouts are available are FlowLayout, BorderLayout, CardLayout, GridLayout and GridBagLayout.

8) How are the elements of different layouts organized? April 2017, Nov 2016

FlowLayout: The elements of a FlowLayout are organized in a top to bottom, left to right fashion.

BorderLayout: The elements of a BorderLayout are organized at the borders (North, South, East and West) and the center of a container.

CardLayout: The elements of a CardLayout are stacked, on top of the other, like a deck of cards.

GridLayout: The elements of a GridLayout are of equal size and are laid out using the square of a grid.

GridBagLayout: The elements of a GridBagLayout are organized according to a grid.

9) What is an event and what are the models available for event handling?

An event is an event object that describes a state of change in a source. In other words, event occurs when an action is generated, like pressing button, clicking mouse,

selecting a list, etc. There are two types of models for handling events and they are: a) event-inheritance model and b) event-delegation model

10) What is the difference between scrollbar and scrollpane?

A Scrollbar is a Component, but not a Container whereas Scrollpane is a Conatiner and handles its own events and perform its own scrolling.

11) Why won't the JVM terminate when I close all the application windows?

The AWT event dispatcher thread is not a daemon thread. You must explicitly call System.exit to terminate the JVM.

12) What is meant by controls and what are different types of controls in AWT?

Controls are components that allow a user to interact with your application and the AWT supports the following types of controls: Labels, Push Buttons, Check Boxes, Choice Lists, Lists, Scrollbars, and Text Components. These controls are subclasses of Component.

13) What is the difference between a Choice and a List? Nov 2018

A Choice is displayed in a compact form that requires you to pull it down to see the list of available choices. Only one item may be selected from a Choice. A List may be displayed in such a way that several List items are visible. A List supports the selection of one or more List items.

Part - B

1. Explain about Exception handling with example programs.
2. Explain about Exception Hierarchy.
3. What is Stream and give its types? Explain in detail with example.
4. Explain about Reading and Writing Files with programs.
5. Explain about Byte streams and Character streams with programs.
6. Explain in detail about Stack Trace Elements

UNIT IV - GENERIC PROGRAMMING

Part - A

1) What is an exception? Nov 2018,April 2017

An *exception* is an event, which occurs during the execution of a program, that disrupts the normal flow of the program's instructions.

2) What is error?

An Error indicates that a non-recoverable condition has occurred that should not be caught. Error, a subclass of Throwable, is intended for drastic problems, such as OutOfMemoryError, which would be reported by the JVM itself.

3) Which is superclass of Exception?

"Throwable", the parent class of all exception related classes.

4) What are the advantages of using exception handling?

Exception handling provides the following advantages over "traditional" error management techniques:

Separating Error Handling Code from "Regular" Code.
Propagating Errors Up the Call Stack.
Grouping Error Types and Error Differentiation.

5) What are the types of Exceptions in Java? Nov 2017,April 2018

There are two types of exceptions in Java, unchecked exceptions and checked exceptions.

Checked exceptions: A checked exception is some subclass of Exception (or Exception itself), excluding class RuntimeException and its subclasses. Each method must either handle all checked exceptions by supplying a catch clause or list each unhandled checked exception as a thrown exception.

Unchecked exceptions: All Exceptions that extend the RuntimeException class are unchecked exceptions. Class Error and its subclasses also are unchecked.

6) What is the purpose of the finally clause of a try-catch-finally statement?

The finally clause is used to provide the capability to execute code no matter whether or not an exception is thrown or caught.

7) What is the difference between checked and Unchecked Exceptions in Java? Nov 2017

All predefined exceptions in Java are either a checked exception or an unchecked exception. Checked exceptions must be caught using try.. catch () block or we should throw the exception using throws clause. If you dont, compilation of program will fail.

8) What is the catch or declare rule for method declarations?

If a checked exception may be thrown within the body of a method, the method must either catch the exception or declare it in its throws clause.

9) When is the finally clause of a try-catch-finally statement executed? Nov 2017,April 2018

The finally clause of the try-catch-finally statement is always executed unless the thread of execution terminates or an exception occurs within the execution of the finally clause.

10) How to create custom exceptions?

By extending the Exception class or one of its subclasses.

Example**:**

```
class MyException extends Exception {
  public MyException() { super(); }
  public MyException(String s) { super(s); }
  }
```

11) Can we have the try block without catch block?

Yes, we can have the try block without catch block, but finally block should follow the try block.

Note: It is not valid to use a try clause without either a catch clause or a finally clause.

12) What is the use of assert keyword?

Assert keyword validates certain expressions. It replaces the if block effectively and throws an AssertionError on failure. The assert keyword should be used only for critical arguments (means without that the method does nothing).

13) How does finally block differ from finalize() method? Nov 2016,April 2017

Finally block will be executed whether or not an exception is thrown. So it is used to free resoources. finalize() is a protected method in the Object class which is called by the JVM just before an object is garbage collected.

Part - B

1. Explain thread life cycle and two ways to implementation of thread.
2. Explain Inter thread communication in java.
3. Explain Thread synchronization concept with example programs.
4. Explain about Generic classes and methods in detail.
5. Explain about daemon threads and thread groups
6. Explain about Bounded Types and Restrictions and Limitations.

UNIT V- EVENT DRIVEN PROGRAMMING

Part - A

1) Explain different way of using thread? Nov 2018

The thread could be implemented by using runnable interface or by inheriting from the Thread class. The former is more advantageous, 'cause when you are going for multiple inheritance.

2) What are the different states of a thread ? Nov 2017,April 2016

The different thread states are ready, running, waiting and dead.

3) Why are there separate wait and sleep methods?

The static Thread.sleep(long) method maintains control of thread execution but delays the next action until the sleep time expires. The wait method gives up control over thread execution indefinitely so that other threads can run.

4) What is multithreading and what are the methods for inter-thread communication and what is the class in which these methods are defined?

Multithreading is the mechanism in which more than one thread run independent of each other within the process. wait (), notify () and notifyAll() methods can be used for inter-thread communication and these methods are in Object class. wait() : When a thread executes a call to wait() method, it surrenders the object lock and enters into a waiting state. notify() or notifyAll() : To remove a thread from the waiting state, some other thread must make a call to notify() or notifyAll() method on the same object.

5) What is synchronization and why is it important? Nov 2018

With respect to multithreading, synchronization is the capability to control the access of multiple threads to shared resources. Without synchronization, it is possible for one thread to modify a shared object while another thread is in the process of using or updating that object's value. This often leads to significant errors.

6) How does multithreading take place on a computer with a single CPU? April 2016

The operating system's task scheduler allocates execution time to multiple tasks. By quickly switching between executing tasks, it creates the impression that tasks execute sequentially.

7) What is the difference between process and thread?

Process is a program in execution whereas thread is a separate path of execution in a program.

8) How can we create a thread? April 2018, April 2017

A thread can be created by extending Thread class or by implementing Runnable interface. Then we need to override the method public void run().

9) What are three ways in which a thread can enter the waiting state?

A thread can enter the waiting state by invoking its sleep() method, by blocking on I/O, by unsuccessfully attempting to acquire an object's lock, or by invoking an object's wait() method. It can also enter the waiting state by invoking its (deprecated) suspend() method.

10) How can i tell what state a thread is in ?

Prior to Java 5, isAlive() was commonly used to test a threads state. If isAlive() returned false the thread was either new or terminated but there was simply no way to differentiate between the two.

11) What is synchronized keyword? April 2018, Nov 2016

In what situations you will Use it? Synchronization is the act of serializing access to critical sections of code. We will use this keyword when we expect multiple threads to access/modify the same data. To understand synchronization we need to look into thread execution manner.

12) When you will synchronize a piece of your code?

When you expect your code will be accessed by different threads and these threads may change a particular data causing data corruption.

13)What is daemon thread and which method is used to create the daemon thread?

Daemon thread is a low priority thread which runs intermittently in the back ground doing the garbage collection operation for the java runtime system. setDaemon method is used to create a daemon thread.

14) A Thread is runnable, how does that work?

The Thread class' run method normally invokes the run method of the Runnable type it is passed in its constructor. However, it is possible to override the thread's run method with your own.

15) What is a thread group? Nov 2016

A thread group is a data structure that controls the state of collection of thread as a whole managed by the particular runtime environment.

Part – B

1. Explain about AWT event handling with examples.
2. Explain about layout management.
3. Explain about Buttons- Check Boxes – Radio Buttons with example.
4. Explain about Lists and Menus with example.
5. Explain about Windows –Menus – Dialog Boxes.
6. Explain about Event handlers and adapter classes with example.
7. Explain about Graphics programming and Frame Components.