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20MC104 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Description and Objectives:

This course aims at applying the concepts of Object-Oriented programming in Java, its importance in finding solutions for specific problems. The properties of Object-Oriented systems can be experienced by designing Object-Oriented applications.

Course Outcomes:

The student will be able to:

- Apply OOP concepts and basics of Java programming.
- Use the concepts of Java programming in problem solving.
- Extend the knowledge of Java programming in developing futuristic applications.

Skills:

- Design of classes using concepts of inheritance.
- Create new packages and interfaces.
- Develop multi-threaded applications.
- Handling run time errors using exceptional handling functionality.

Activities:

ACTIVITY – 1: LIBRARY MANAGEMENT SYSTEM (LMS)

Our University wants to provide a Library management system (LMS) interface to the students and staff for the purpose of self issue and returns. If any user (student or staff) wants to take book from library, he must interact with Library management system by providing the credentials (username and password) of user. Then, LMS allows the user to get issues and returns by their own.

Activity – 2 : EMPLOYEE MANAGEMENT SYSTEM

In this project, we maintain the details of all employees and their children using nesting of structures. Consider each employee has four children and all are studying same number of subjects in same class. These are the structure members of Employee, Children, and Subjects.

Employee	**Children**	**Subjects**
ID	name	sub1
Name	age	sub2
Age	gender	sub3
Gender	struct subjects	total
Salary		
Struct children		

ACTIVITY – 3: HOTEL MANAGEMENT SYSTEM

Develop an application for Hotel management system with the following modules using structures, pointers to structure variables, passing structure pointers to function.

1. Get availability
2. Features of room

3. Room allocation
4. Show customer details
5. Room de-allocation
6. Restaurant
7. Billing.

Make your own assumptions for this project, design and implement Hotel management system.

ACIVITY – 4 : CALENDER APPLICATION

Develop a calender application that uses many windows properties to make it colorful, for example, to indicate the vacation, it uses the red foreground color. The calendar can be used for two purposes. First to see the date and month as usual calendars and second to find out the day corresponding to given date. Some of the silent features of the project are

- It uses various windows properties to make the program colorful although it has lack of graphics.
- It entirely uses C code which is written in simple manner with lots of comments and important notes can be added.
- The date with such notes appears different than others with red background color.
- The months can be navigated using arrow keys.

ACTIVITY – 5: CRICKET SCORE SHEET

Developing a real-time cricket score sheet which displays a welcome screen that fades up to display the main menu.The main menu comprises three options namely:

- New Score Sheet
- View Score Sheet
- Exit

ACTIVITY – 6: BANK APPLICATION

Develop a Banking project in C language which will implement the following features and functionality in the program.

- Account Creation
- Deposit Amount
- Withdraw Amount
- View Details
- Foreign Exchange
- Exit

ACTIVITY – 7: CALENDER 1900 - 2100

The simple Project should accept the date, month and year between 1900 to 2100 and should display the calendar of that particular month.

Syllabus

UNIT – 1 **9 Hours**

JAVA CONCEPTS: Creation of Java, Byte code, Java buzzwords, OOP Principles-Encapsulation, Inheritance and Polymorphism, Compiling and running of simple Java program, Data types, Variables, declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements.

UNIT – 2 **9 Hours**

CLASSES AND OBJECTS: Class fundamentals, Declaring objects, Assigning object reference variables, Introducing methods, Constructors, the 'this' keyword, Garbage collection, 'finalize' method, Overloading methods and Constructors, Call by value, Recursion.

UNIT – 3 **9 Hours**

INHERITANCE AND PACKAGES: Access control, Usage of 'static' with data and methods, Usage of 'final' with data, exploring the String class, using command line arguments; Basic concepts of inheritance - Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class; Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages.

UNIT – 4 **9 Hours**

INTERFACES AND EXCEPTION HANDLING: Defining an interface, Implementing interfaces, Applying interfaces, Variables in Interfaces, Extending Interfaces; Exception handling concepts - Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own exception sub-classes.

UNIT – 5 **9 Hours**

MULTITHREADING: Thread Introduction, Thread class, Runnable Interface, Extending Thread, Creating Multiple Threads, Is Alive(),Join(), Thread priorities, Synchronization. Inter thread communication, Deadlock, Suspending, resuming and stopping Threads.

LAB EXPERIMENTS:

(Note: All the students need to know the installation process in both Windows and Linux environments. They should get familiarity on how to set the environment for running specific programs, JVM, across different editors like notepad, wordpad, edit plus etc…)

1. Understanding the JAVA environment (i.e. compiler and interpreter). Usage of Integrated Development Environments (IDE) such as Net beans or Eclipse. Executing basic java programs which demonstrate all data types and simple arithmetic operations with the data types.
2. A) Find the factorial of given number
   b) Find whether given number is prime or not
   c) Find the sum of individual digits of a number
   d) Find N Fibonacci numbers
3. Arrange the given array elements in to sorted order when an unsorted array elements are given
4. Find the sum and product of given 2 nxn matrices.
5. Read a text file and number of characters, words and lines of that file
6. Develop a java program which implements the following
   a) Basic inheritance and multilevel inheritance concepts
   b) How to implement multiple inheritance using interfaces
7. Write a program that illustrates method overloading and overriding

8. Illustrate the dynamic/runtime polymorphism using a java program
9. Develop a java program which illustrates the following
    a) Creating of a simple package
    b) Accessing a package
10. Develop a java program for creating multiple threads using
    a) Thread Class
    b) Runnable Interface

Text Book:

Herbert Schildt, "The Complete Reference Java J2SE", 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.

Reference Books:

1. Cay Horstmann, "Big Java", 2nd ed., John Wiley and Sons, 2006.
2. Joe Wiggles worth and Paula McMillan, "Java Programming Advanced Topics", 3rd ed., TMH, 2009.