Source book of
C-DAC Certificate Course in Java Programming

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1. **Course Objective:** The objective of this course is to provide the student with an expertise in Java Programming. This includes both the Core Java and Advanced Java programming. After doing the course the student will be able to design, develop and maintain web-based enterprise applications effectively.

2. **Eligibility Criteria:** Any Engineering /Science graduate with mathematics up to 10+2 level

3. **Prerequisite:** Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

4. **Teaching Schema:**

Sl. No.	Module Name	Hours
1	Fundamentals of Computer & OOPs Concepts	26
2	Software Development Life Cycle	12
3	Database Technologies	30
4	Foundations of Web Technologies	32
5	Core Java	50
6	Enterprise Java	70
7	Management Development Program	60
8	Project	40
	Total	**320**

5. Suggested Schedule

	Suggested Schedule for Java programming	
Week	**Session 1**	**Session 2**
1	Fundamentals of Computer & OOPs Concepts **(26 hrs)**	Fundamentals of Computer & OOPs Concepts
2	Software Development Life Cycle **(12 hrs)**	Database Technologies **(30 hrs)**
3	Database Technologies	Foundations of Web Technologies **(32 hrs)**
4	Foundations of Web Technologies	Core Java **(50 hrs)**
5	Core Java	Core Java
6	Core Java , **Enterprise Java (70 hrs)**	Enterprise Java
7	Enterprise Java	Enterprise Java
8	Enterprise Java	Management Development Program **(60 hrs)**
9	Management Development Program	Management Development Program
10	Management Development Program	Project **(40 hrs)**
11	**Exam Break and Course End E x a m**	
12	Project	Project and Project evaluation, **Re-Course End E x a m**

Note: 30 hrs of training will be considered in one week.

6. **Session wise Breakup**

Note: Each session will be 2 hrs.
    Abbreviation: T - Theory, L-Lab.

Fundamentals of Computer & OOPs Concepts (16 T + 10 L hrs)
Session 1:
*   Functional blocks of a computer system: CPU, RAM, ROM, peripherals
*   Processor's communication with other elements of the computer system
*   Bus system: data, address and control buses
*   Organization of central processing unit: accumulator, CPU registers, the command queue, control unit, cache memory, FPU unit
*   Memory addressing modes.
*   Instruction set architecture. RISC and CISC architectures
*   Von Neumann instruction cycle. The encoding of the processor instructions
*
Session 2:
*   Integer representation and number conversions, bases 10, 2, and 16
*   Binary and hex addition and subtraction (NOT binary mult and div) 2.4 Signed integers
*   Complement systems and negative numbers, esp. two's complement Signed vs unsigned values (NOT Booth's algorithm)
*   Operating System (Introduction, The Need of Operating System, Functions of Operating System User Interface)
Session 3:
*   Introduction to Linux
*   Additional Features of Linux
*   Getting Started to Linux
*   Basic Commands
*   Root
*   Who/why/what is root
*   Basic commands
*   mkdir
*   touch
*   ls
*   pwd
*   cd
*   chmod
*   df
*   du
*   dd
*   adduser
*   sort
*   passwd
*   rm/rmdir
*   date

- tar
- gzip
- top
- Editors
- Vi Editor

Session 4:
- Notion of an Algorithm
- Fundamentals of Algorithmic
- Problem Solving
- Important Problem Types
- Fundamentals of the Analysis of Algorithm Efficiency
- Analysis Framework
- Asymptotic Notations and its properties
- Mathematical analysis for Recursive and Non-recursive algorithms.

Session 5
- Procedural, Functional and Object Oriented Programming
- OOP Concepts
- Class and Objects
- Constructors and Destructors
- Namespaces

Session6:
- Copy Constructors
- Polymorphism
- Overloading functions
- Overloading Operators

Session 7:
- Inheritance
- Type of Inheritances

Session 8:
- Run Time Polymorphism
- Virtual Functions

Lab Assignments:
1. Getting Acquainted with the Linux Environment
2. Use various commands in Linux system.
3. Write a program which accept two numbers and print their sum.
4. Write a program which accept principle, rate and time from user and print the simple interest.
5. Write a program to check whether the given number is even or odd (using ? : ternary operator)
6. Write a Student class and use it in your program. Store the data of ten students and display the sorted data according to their roll numbers, date of births, and total marks.
7. Write the definition for a class called time that has hours and minutes as integer. The class has the following member functions:
   void settime(int, int) to set the specified value in object void showtime() to display time object time sum(time) to sum two time object and return time.
   a. Write the definitions for each of the above member functions.

b. Write main function to create three time objects. Set the value in two objects and call sum() to calculate sum and assign it in third object. Display all time objects.

8. Write a program using basic concept of objects and classes to check whether given number is prime or not.

9. Using virtual and pure virtual functions implement hierarchy of computer printers.

10. Design a hierarchy of computer printers. Use multiple inheritances in your hierarchy. Also use friend functions and classes in your program.

11. Write Date and Time classes that allows you to add, subtract, read and print simple dates in dd/mm/yyyy and time in hh:mm:ss forms. Use function overloading in your program.

Software Development Life Cycle (12 T Hrs)

Session 1:
- Introduction to Software and Software Engineering
- Software Process

Session 2:
- SDLC and Process Models
- Comparing plan-driven vs. Agile methodologies
- Transitioning to Agile processes like XP and Scrum
  - Mapping Agile principles and values to testing

Session 3:
- Requirement analysis
- Use case approach
  - Use cases & usage scenarios
  - Identifying use cases
  - Use cases & functional requirements
  - Benefits of Use cases

Session 4:
- Design concepts

Session 5:
- Software testing
  - Unit testing
  - Integration testing
  - Acceptance testing
  - Performance testing
- Overview of Testing Tool

Session 6:
- Project Planning
- Case Study using agile methodologies on Provident fund calculation

Database Technologies (16 T + 10 L hrs)

Session 1:
- Introduction to DBMS – What is DBMS, Its need
- Areas where DBMS are used
- Types of DBMS: Introduction to Hierarchical Model, Network and Relational Models,
- Object Oriented Database

Session 2:
- Data models (conceptual physical and logical)
- Data Integrity & integrity rules
- Codd's 12 rules for a Relational Database (conclusion)
- Need for Normalization.

Session 3:
- Various normalization forms1st normal form, 2nd normal form
- 3rd normal form,
- Introduction to 4th, BCNF, etc
- Need for De-normalization

Session 4:
- DDL Commands
- DML & DCL Commands
- Inbuilt Functions

Session5:
- Grouping Things Together (Group By, Having Clause)
- Advance Sub-queries (Correlated Sub query, Outer Joins)
- Set Operators (UNION, UNION ALL, INTERSECT, MINUS)

Session 6:
- Types of Views
- Creating Complex View

Session 7:
- Using Temporary Tables
- Family Trees & Connect BY

Session 8
- Introduction to PL/SQL
- Writing PL/SQL Programs

Lab Assignments:
1. Write a program that computes the perimeter and the area of a rectangle. Define your own values for the length and width. (Assuming that L and W are the length and width of the rectangle, Perimeter = 2*(L+W) and Area = L*W. Display the output on the screen using dbms_output.put_line.
2. Write a program that declares an integer variable called num, assigns a value to it, and computes and inserts into the tempp table the value of the variable itself, its square, and its cube.
3. Convert a temperature in Fahrenheit (F) to its equivalent in Celsius (C) and vice versa. The required formulae are:-

C= (F-32)*5/9
F= 9/5*C + 32
Display the output on the screen using dbms_output.put_line. Data has to be input by the user.

4. Convert a number of inches into yards, feet, and inches. For example, 124 inches equals 3 yards, 1 foot, and 4 inches. Display the output on the screen using dbms_output.put_line. Data has to be input by the user.

5. Write a program that enables a user to input an integer. The program should then state whether the integer is evenly divisible by 5. (Use decode instead of IF statement where required). Display the output on the screen using dbms_output.put_line. Data has to be input by the user.

6. Your block should read in two real numbers and tell whether the product of the two numbers is equal to or greater than 100. Display the output on the screen using dbms_output.put_line. (Use decode instead of IF statement where required). Data has to be input by the user.

7. In a PL*SQL block, create a datatype by the name of addr_type. It should contain the following components:-
   - name varchar2 (20)
   - street varchar2 (30)
   - city varchar2 (20)
   - state varchar2 (15)

8. Your block should accept the names and addresses of 4 employees in 4 different variables of datatype addr_type. Output the names and addresses of the 4 employees on the screen in the form of Labels as shown below:-

```
**************************************************************
* Name:-      Jack                **   Name:-     Scott          *
* Street:-    M.G. Road           **   Street:-   Bhosale Marg  *
* City:-      Mumbai              **   City:-     Chennai         *
* State:-     Maharashtra         **   State:-    Tamil Nadu      *
**************************************************************

**************************************************************
* Name:-      King                **   Name:-     Adams          *
* Street:-    Lane No:-2          **   Street:-   P. M. Road     *
* City:-      Nagpur              **   City:-     Bangalore      *
* State:-     Maharashtra         **   State:-    Karnataka      *
**************************************************************
```

9. Input a number and determine whether it is within a given range (for example, between 1 and 10). The low and high values of the range may be input by the user rather than be fixed by the program. Display the output on the screen using dbms_output.put_line.

10. Input three positive integers representing the sides of a triangle, and determine whether they form a valid triangle. Hint: In a triangle, the sum of any two sides must always be greater than the third side. Display the output on the screen using dbms_output.put_line.

11. Check if a given a year is a leap year. The condition is:-
    year should be (divisible by 4 and not divisible by 100) or (divisible by 4 and divisible by 400.) Display the output on the screen using dbms_output.put_line. The year should be input by the user.

12. Write a program that examines all the numbers from 1 to 999, displaying all those for which the sum of the cubes of the digits equal the number itself. Display the output on the screen using dbms_output.put_line.

13. Write a PL*SQL block that reads in a minimum and maximum value for a radius, along with an increment factor, and generates a series of radii by repeatedly adding the increment to the minimum until the maximum is reached. For each value of the radius, compute and display the circumference, area, and volume of the sphere. (Be sure to include both the maximum and the minimum values.). Validate each of the input values to be sure they are positive. If the minimum is typed in place of the maximum, swap the values within the program, and continue execution. Display the results on the screen using dbms_output.put_line.

14. A table consists of the following fields:-

Invoice Number	Varchar2	4
Invoice Date	Date	
Customer Code	Number	1
Product Code	Number	1
Quantity Sold	Number	3

    There are ten customers with codes 0 to 9 and five products with codes 0 to 4. The rates of products are Rs. 15, 35, 42, 51 and 60 respectively. Write a program to find the total purchase in Rs. of each customer and total sale of each product using this table and insert these values in two other tables.

15. Write a PL*SQL block to accept a character string from the user. The user should enter a number spelt out. With the help of PL*SQL arrays, write a program for Word to number conversion up to 99 crores. The program should cater to Rs. and paise also.
    For example, if the user enters:-
    Rs. Twelve crores, Thirty Four lakhs, Fifty One thousand, Two hundred and Fifty and Seventy five paise only
    The output of your program should be: -   123451250.75
    If the user enters:-
    Rs. Nine thousand, Seven hundred and Twenty Eight only
    The output of your program should be: -   9728

Foundations of Web Technologies(20 T + 12 L hrs)

Session 1:
- Brief history of the Internet
- How the internet works
- Internet protocol; HTTP protocol; Domain names; Domain Names Service Servers
- Web servers; IIS; Apache server
  - Introduction to basic HTMLAligning the Headings
  - Anchor Tag
  - Paragraph
  - Images and Pictures
  - Tables
- Framesets
- New features in HTML5
  - New element
  - New attribute
  - Link relations
  - Microdata
  - ARIA accessibility
  - Multimedia
  - 2D and 3D drawing Support

Session 2:
- Forms
- HTML Controls
  - INPUT
  - Text Area
  - Radio Button
  - Check Box
  - Dropdown
  - List box
  - Submit button
  - Set button
  - Button
- Cascading style sheet
- Linking a style to an HTML document
- In line style
- External style sheet
- Internal style sheet
- Multiple styles

Session 3 & 4
- CSS Introduction
- CSS Syntax
- CSS Id & Class
- CSS How To
- CSS Styling
- CSS Box Model
- CSS Summary

Session 5 & 6
- Java Scripting
- JS Introduction
- JS Statements
- JS Comments
- JS Variables
- JS Operators
- JS Comparisons
- JS Popup Boxes
- JS Functions
- JS Events
- JS Special Text
- JS Objects
- JS RegExp

Session 7 & 8
- jQuery
- Introducing to jQuery
- Selecting the elements
- Bringing pages to life with jQuery
- JQuery Events
- Energizing pages with animations and effects
- DOM with jQuery utility functions

Session 9 & 10
- The Purpose and Nature of XML
- XML Syntax and Structure rules
- XML Document Type Declaration
- XML and Data Binding XML linking mechanisms
- XML style language
- XML parsers

Lab Assignments:
1. Create your bio-data in an HTML Page. Divide it into following sections – Personal information, Family Background, Academic Qualifications, and Experience. Now divide a HTML page into three frames as upper, left and right (main) frames. Write a Heading in the upper frame and put the bio-data sections links in the left frame and on click the section links the respective detail information should be displayed into the right main frame.
2. Write a CSS rule that will change the color of all the elements with attribute CLASS ="Green-Move" to green and shift them down 25 pixels and right 15 pixels
3. reate a form to submit a resume
4. Display a complete date with the name of the month.
5. Create some basic XML documents and check them out in the IE browser for validity.
6. Create a XML document and write DTD for it
7. Create a XML document and validate it
8. Create a DTD and an XSD Schema for a markup language of your own.
9. Create an HTML page with two frames using XML document
   - The top frame should have input text boxes for search criteria. The textboxes are:
     Marks greater than, Marks less than

- o The lower frame will contain a grid, which will load the results of the above query.

10. Create an HTML page representing a departmental store bill:

        Header info: Name of customer
                        Date
                        Bill No.
                        Bill Details

Consider a purchase of the following items:

Name	Qty	Rate	Amount
Apples	1	24	
Lux Soap	4	15	
Room freshener	1	200	

Prepare a single XML representing the above data. Use databinding to display it. Calculate the total amount through javascript and assign it to the total amount label at bottom.

```
<order>
  <customer>
    <name>Fidelma McGinn</name>
    <phone_number>425-655-3393</phone_number>
  </customer>
  <item>
    <number>5523918</number>
    <description>shovel</description>
    <price>39.99</price>
  </item>
  <date_of_purchase>1998-10-23</date_of_purchase>
  <date_of_delivery>1998-11-03</date_of_delivery>
</order>
```

Create a XSL sheet for the billing XML.

11. Create a registration form using jQuery.

Core Java   (26 T + 24 L hrs)

Session 1:
- Java Language and its features
- How Java is different from C++?
- The Java Language
- Data types, Variables, Constants, operators, Control Statements (if, for, while, switch etc.), Classes in java

Session 2:
- Constructors, finalize, instance data and methods, the new operator
- Methods, overloading, parameter passing, objects as parameters
- Memory management, garbage collection
- The first Java Program

Session 3:
- The this facility, static data and methods, block, scope, lifetime
- JDK and its usage (Java Compiler, Java Runtime, Java Debugger, Java doc)
- Difference between applications and applets
- Inner classes, Abstract Classes & wrapper classes.

Session 4:
- Interfaces, Packages
- Access Control Rules

Session 5:
- Exception Handling
- Exceptions as objects
- Exception hierarchy, Try, catch and finally
- Different exception classes

Session 6:
- The java. Lang package, Object, Number, Math, System
- The String class
- The java.util Package
- Arrays, Vectors, Stack, Hash table, Property, Collections

Session 7:
- The Java Collection Framework
- Multithreaded programming in Java
- Multithreading: advantages and issues

Session 8:
- The Thread class, thread groups
- The Runnable interface
- Thread synchronization
- Inter-Thread communication

Session: 9:
- The java.io Package
- Files
- Byte Streams and Unicode Character Streams
- Persistence of objects
- Object Serialization Methods

Session: 10:
- Swing
- Using Basic Swing Components
- Event handling
- Components and layout managers
- JFrame, JPanel, JOptionPane, JLabel, JButton, JList, JCheckBox, JRadioButton, JScrollBar, JMenuItem, JMenu, JmenuBar.

Session: 11:
- Advanced swing components
- The Model-View-Controller Architecture
- JScrollPane, JTable,

Session: 12:
- The Applet class
- Applet context, paint (), repaint (), update (), get Graphics ()
- Passing parameters, embedding in HTML, Integrating into distributed application

Session: 13:
- Inter applet communication, Communication with JavaScript
- Security Issues while running in clients desktop

Lab Assignments:
1. Create a class Emp, which contains details about the employee and compile and run its instance.
2. Create an inner class for a manager, which contains information about the manager. Use the appropriate interfaces. Create an anonymous inner class for Technical skills.
3. Create an appropriate data structures to store employee object and use the java.util.package properties.
4. Create a user defined exception to check whether your employee exist in your data structure and using the catch and finally block. Redeem an appropriate solution.
5. Using the collection framework define an appropriate interface to user registration application.
6. Using Multi-Threading create objects for Create a clock & synchronize application.
7. Create Employee & manager classes and make Employee, manager classes objects persistent.
8. Design the interface of the Employee, manager classes using applets.
9. Create a new array, whose size and component type are not known until runtime, and then modify the array's components
10. Write a multithreaded chat server and a GUI client.
11. Implement simple calculator using RMI.
12. Implement GUI application for ban account simulation
13. Write a method draw various simple national flags. Each method should ask the user how wide the flag is, and then draw it on the graphics pane.
14. Implement following scenario :
Many of you are probably familiar with the electronic toy named ``Simon''. Simon is a simple solitaire memory game. The toy is composed of a plastic base with four colored plastic buttons on top. Each button has a different color and a different musical note is associated with each button. The toy ``prompts'' the player by playing a sequence of randomly each note is played, the corresponding button is illuminated. The player must then try to play the same ``tune'' by depressing the appropriate buttons in the correct order. If the player succeeds, the game plays a new sequence identical to the preceding sequence except that one additional note is added to the end. As long as the player can correctly reproduce the sequence played by the machine, the sequences keep getting

longer. Once the player makes a mistake, the machine makes an unpleasant noise and restarts the game with a short sequence.

Enterprise Java   (36 T + 34 L hrs)

Session 1:
- Introduction to J2EE
- Distributed Multi-tiered Applications
- J2EE Container.
- Packaging.
- Deployment tools.
- Web application life cycle
- Deploying web applications.
- Web Services Support

Session 2:
- Database Access Methods,
- ODBC, JDBC, JDBC architecture
- The java. Sql package

Session 3:
- Driver Manager,
- Driver, Connection Statement,
- Result Set
- Writing database applications

Session 4:
- Connector interface,
- Creating new classes, applications
- Advanced topics in JDBC
- Transactions
- Locking & Isolation

Session 5:
- Servlets : Dynamic Content Generation
- Advantages of Servlets over CGI
- The Servlet interface
- The HttpServlet,
- HttpServletRequest,
- HttpServletResponse classes

Session 6:
- Exception Handling
- Session
- Session Management
- Session Tracking with
  - Cookies
  - HttpSession
- Request Dispatcher

Session 7:
- JSP: Separating UI from Content generation code
- Life cycle of a JSP page
- Directives, Implicit and Explicit Objects,
- Scriptlets,
- Expressions,
- Expression Language

Session 8

- Scope
- JSP Error Page handling
- Session Tracking
- JSP Using JavaBeans
- Custom Actions and Tag Libraries in JSP

Session 9
- Hibernate Framework
  - o Introduction to Hibernate Framework
  - o Creating web application using Hibernate API
  - o Life-cycle of Hibernate Entities

Session 10
- Advanced Hibernate topics
  - o Caching
  - o Hibernate Query Language
  - o Handling Date , Time , Timestamp
  - o Hibernate Mappings and Relationships
  - o Deploying Hibernate based complete web application on web server.

Session 11& 12
- MVC Architecture
  - o Implement MVC based web application using servlet, JSP, JavaBeans
- Introduction to Struts 2 Architecture
- Building web pages using Struts 2
- Struts Tag Library

Session 13 & 14:
- Handling Struts Validations
- Internationalization and Localization support
- Using Struts 2 Interceptors.
- Integrating Struts2 with Hibernate & its deployment on web server.

Session 15 & 16:
- Introduction to EJB 3 Architecture
- Major changes from EJB 2 architecture.
- Types of EJBs
- Understanding life- cycle of Stateless Session Bean
- Deployment of Stateless Session Bean on Application Server using JSP client

Session 17 & 18:
- Understanding life- cycle of Stateful Session Bean
- Deployment of Stateful Session Bean on Application Server using JSP client , Servlet Client
- Writing application client for Stateful Session Bean

Lab Assignments:
1. Develop static pages (using Only HTML) of an online Bookstore. The pages should resemble:
   www.flipkart.com
   The website should consist the following pages.
   - Home page
   - Registration and user Login
   - User Profile Page
   - Books catalog

- Shopping Cart
- Payment By credit card
- Order Conformation

Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

2. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
3. Create a Java Bean which gives the exchange value of INR (Indian Rupees) into equivalent American/Canadian/Australian Dollar value.
4. Create a simple Bean with a label - which is the count of number of clicks. Than create a Bean Info class such that only the "count" property is visible in the Property Window.
5. Create two Beans-a) Key Pad .b) Display Pad. After that integrate the two Beans to make it work as a Calculator.
6. Create two Beans Traffic Light (Implemented as a Label with only three background colors-Red, Green, Yellow) and Automobile (Implemented as a Text Box which states its state/movement). The state of the Automobile should depend on the following Light Transition Table. Light Transition Automobile State

    Red ---> Yellow Ready
    Yellow ---> Green Move
    Green --> Red Stopped

7. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
8. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.
9. Implement the "Hello World!" program using JSP Struts Framework.
10. Write an application to create a XML document from a university employee database. The XML document should contain the following:
    i) Employee code
    ii) Employee Name
    iii) Designation
    iv) Address
    v) Department
    vi)The last twelve month performance summary
11. Assume there is a student database in Oracle with the following fields:
    I. Student enrollment No.
    II. Student Name
    III. Program
    IV. Address
    V. School of Study

    Write a code for Servelet which will display all the fields of the student database in the tabular manner.
12. **Car Configuration Application**
    We will build Ford's model with these options:
    Color - Fort Knox Gold Clearcoat Metallic, Liquid Grey Clearcoat Metallic, Infra-Red Clearcoat,

Grabber Green Clearcoat Metallic, Sangria Red Clearcoat Metallic, French Blue Clearcoat Metallic, Twilight Blue Clearcoat Metallic, CD Silver Clearcoat Metallic, Pitch Black Clearcoat, Cloud 9 White Clearcoat

Transmission - automatic or manual
Brakes/Traction Control - Standard, ABS, or ABS with Advance Trac
Side Impact Air Bags - present or not present
Power Moonroof - present or not present

Configuration options and cost data:
Base Price: $20,000
Color: No additional cost
Transmission: 0 for automatic, $-815 for standard (this is a "negative option")
Brakes/Traction Control: $0 for standard, $400 for ABS, $1625 for ABS with
Advance Trac: Side Impact Air Bags $0 for none, $350 if selected
Power Moonroof: $0 for none, $595 if selected

13. Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women. BMI can be used to indicate if you are overweight, obese, underweight or normal.

    Women tend to believe they look their best at BMI values between 20 to 22 and men are usually satisfied with a BMI of 23 to 25.

    If your BMI is 30 or more, that's not good. However, the simple BMI calculation tends to overestimate BMI in people who are muscular or athletic. Therefore, if your BMI score seems too high, you're not too fat, you're just too athletic.

$$BMI = \frac{weight(lb) \times 703}{(height(in))^2}$$

    BMI is calculated based on a person's weight and height. The math formula for calculating BMI is shown at right
    Simple BMI categories include
    Underweight when BMI is less than 18.5
    Normal weight when BMI is between 18.5 and 25
    Overweight when BMI is between 25 and 30
    Too Muscular (Obese) when BMI is 30 or greater

14. Write a program that allows its user to play the dice game "Doubles"
    Rules of the game
    Player begins with $100.00
    - The player places a bet amount and a pair of dice are rolled
       o If the two values showing on the pair of dice are the same (they rolled doubles), the player wins **twice** their bet amount
       o If the two values showing on the dice are not equal, then the player loses their bet amount
    - The game ends when the player is out of money

Management Development Program (30 T + 30 L hrs)

    Session 1:
- Introduction to communication,
- Barriers to communication, Kind of communication,
- Confidence building Non-verbal Communication

    Session 2:
- Fluency and vocabulary
- Synonyms
- Antonyms
- Grammar, Noun Pronoun,
- Verb, Adjective, Preposition, Conjunction

    Session 3:
- Words of Idioms & phrases
- Sentence Construction
  Pronunciation,

    Session 4:
- Greeting,
- Conversation practice,
- Polite Conversation,

    Session 5:
- Resume Writing,
- Covering letter,
- Email,

    Session 6:
- Presentation Skill,
- What is group discussion?
- Interview skills, Mock interview

    Session 7:
- Analogy, Series Completion (Number, Alphabet, Letter Series)
- Coding-Decoding for Number
- Alphabet and Letter
- Blood Relations

    Session 8:
- Puzzle Test: Classification Type questions
- Compression Type questions
- Sequential order questions
- Section based on given conditions
- Questions involving family members

    Session 9:
- Alphabet test
- Order of words
- Letter words problems
- Rule detection
- Alphabetical quibble
- Word formation
- Number
- Ranking
- Time Sequence Test

- Mathematical operations
- Logical sequence of words

Session 10:
- Arithmetic reasoning
- Logical reasoning
- Statement-Arguments
- Statement-Assumptions
- Statement-courses of Action
- Statement-Conclusions
- Deriving conclusion from passages

Session 11:
- General Aptitude
- Addition
- Multiplication
- Divisibility
- Squaring
- Cube
- HCF and LCM
- Fraction

Session 12:
- Number system
- Permutation & combination
- Probability
- Ratio & Preparation

Session 13:
- Partnership
- Percentage
- Average
- Problem on Ages
- Profit and loss

Session 14:
- Simple Interest
- Compound Interest
- Time and work
- Work and Wages

Session 15:
- Trains
- Streams Pronoun
- Alligation
- Clock
- Pipes and cisterns

Lab Practice:
- Faculty needs to conduct GD, presentation for speaking, conducting mock interviews etc.
- Faculty needs to conduct tests, Surprise tests, assignments etc.

7. List of Text/Reference Books

Module Name	Title of the Book	Author/Publication	Edition	ISBN
Fundamentals of Computer & OOPs Concepts	Fundamentals of Computers	V. Rajaraman / PHI Learning	5th Edition	9788120340114
	Computer Fundamentals (With CD)	Pradeep Sinha, Priti Sinha / BPB Publication	6th Edition	9788176567527
	Computer Fundamentals	Anita Goel / Pearson	2010	9788131733097
	Foundations of Computing (With CD)	Pradeep K. Sinha, Priti Sinha / BPB Publication	3rd Edition	9788176566636
	Thinking in C++ : Introduction to Standard C++ Vol – 1	Bruce Eckel / Pearson	2nd Edition	9788131706619
	The C++ Programming Language	Bjarne Stroustrup / Pearson	3rd Edition	9788131705216
	Object-oriented Programming Using C++	Dehuri Satchidananda, Jagadev Alok Kumar, Rath Amiya Kumar / PHI Learning	1st Edition	9788120330856
Software Development Life Cycle	Software Engineering: A Practitioner's Approach	Roger S. Pressman / Tata McGraw – Hill Publication	7th Edition	9780071267823
	Software Engineering	Ian Sommerville / Pearson Publication	9th Edition	9788131762165
	Succeeding with Agile: Software Development Using Scrum	Mike Cohn / Pearson Publication	2010 Printing	9788131732267
	Software Engineering: A Precise Approach	Pankaj Jalote / Wiley Publication	2010 Printing	9788126523115
	Fundamentals of Software Engineering	Rajib Mall / PHI Learning	3rd Edition	9788120338197
Database Technologies	Oracle Database 11g The Complete Reference, 1st Edition	Kevin Loney / Tata McGraw - Hill Education	2008 Printing	9780070140790
	Mastering Database Technologies	Ivan Bayross / BPB Publication	2005 Edition	9788183331302
	Database Management Systems	Raghu Ramakrishnan, Johannes Gehrke / Tata McGraw - Hill Education	3rd Edition	9780071231510
Foundations of Web Technologies	HTML5 Black Book: Covers Css3, Javascript,XML, XHTML,	Kogent Learning Solutions Inc. / DreamTech Press	Year 2011 Edition	9789350040959

	Ajax, PHP And Jquery (With CD)			
	Internet and World Wide Web : How to Program	Harvey M. Deitel, Paul J. Deitel / Pearson Education	4th Edition	9788131725221
	XML - How to Program XML : How to Program (With CD)	H. M. Deitel, P. J. Deitel / Pearson	1st Edition	9788131716854
Core Java	Beginning Java 2 Jdk	Ivor Horton / Wiley India Pvt Ltd	5th Edition	9788126505708
	Java : The Complete Reference	Herbert Schidt/Tata McGraw Hill	8th Edition	9781259002465
	Core JAVA : An Integrated Approach	R. Nageswara Rao / Dreamtech Press	1st Edition	9788177228366
	Head First Java	Kathy Sierra, Bert Bates / Shroff O Reilly	2nd Edition	9788173666025
	Core Java : Fundamentals - Vol 1	Gary Cornell, Cay S. Horstmann / Pearson	9th Edition	9789332514676
Enterprise Java	Java Server Programming (J2EE 1.6 Edition) Black Book	Dreamtech Press	2010	9788177229370
	Mastering Enterprise JavaBeans 3.0	Rima Patel Sriganesh, Gerald Brose, Micah Silverman/Wiley Publisher	1st	9788126509218
	Java EE 6 Server Programming for Professionals : DVD	Ivan Bayross, Sharanam, Shah, C. Bayross, V, Shah/ Shroff Publication	2010	9788184049411
Management Development Program	Quantitative Aptitude For Competitive Examinations	R. S. Aggarwal / S. Chand Publishing	17th Edition	9788121924986
	A Modern Approach To Verbal and Non-Verbal Reasoning	R. S. Aggarwal / S. Chand Publishing	Year 2012 Edition	9788121905510
	How to Prepare for GD and Interview (With CD) 3rd Edition	Hari Mohan Prasad, Rajnish Mohan/TMH	2010	9780070706347
	High School English Grammar & Composition Revised Edition	Wren, Martin / S. Chand Publisher	2011 Edition	9788121900096
	Communication Skills Publication Year 2011	Sanjay Kumar, Pushp Lata / Oxford University Press	2011 Edition	9780198069324
	Professional Communication Skills	Praveen S R Bhatia / S.Chand Publishing	2011 Edition	9788121920926

8. Evaluation Guidelines

8.1. Evaluation

Evaluation is a necessary and essential part of conducting the C-DAC Certificate Course in Java programming, as it provides important feedback and inputs to both the institute as well as the student. The institute gets an idea about the relative performance of each student, which also serves as feedback about the design and conduct of the programme. The student gets a clear picture of his academic standing, individually and in comparison to his fellow students.

In order to ensure timely and efficient evaluation and certification of all students, the following guidelines are being issued and should be followed religiously.

8.2. Evaluation Methodology

8.2.1 Each centre should have a Designated Responsible Member (DRM) for Evaluation.

8.2.2 The DRM Evaluation would be responsible for coordinating all activities relating to evaluation at the training centre and for communicating with CDAC ACTS, Pune.

8.2.3 Evaluation is a compulsory part of the process of obtaining C-DAC Certificate Course in Java Programming. All students are required to pass in each subject of the course in order to be eligible to receive the C-DAC Certificate.

8.2.4 The faculty of every subject should outline the objectives of the evaluation to be conducted for that particular subject, so as to enable the student to prepare himself/ herself properly.

8.2.5 The performance of students is constantly evaluated through surprise quizzes, hourly examinations, assignments throughout the term, submission of term reports, presentations and final examinations at the end of the course.

8.2.6 Mode of exams will be in online / offline, but prior information will be given by C-DAC, ACTS about the mode of the exam and it will be final.

8.3. EVALUATION METHODS

8.3.1 Course End Evaluation

After completion of the all subjects, a written examination CEE (Course End Examination) will be held, which will test the knowledge of the students of each subject and it is a compulsory part of the evaluation. Conducting CEE involves performing duty with responsibility. A small mistake in the process may hamper the whole system. Everyone has to play their role in an effective manner. It is a joint effort work which has to be carried out in a combined way. Right from receiving question paper from ACTS, C-DAC to sending the OMR answer sheet (in case of offline exam) and the response file (in case of online exam) for evaluation dealt with lot of responsibility.

ACTS, C-DAC in its pursuit of excellence, believes in providing a congenial atmosphere to the students during all exams in order to get them to perform at their optimum level. However, there are certain norms which the students are expected to be aware of and observe both in letter and spirit. These norms are:

8.3.1.1 Impersonation may lead to permanent expulsion from the Institute.

8.3.1.2 Cell phones are strictly prohibited in the exam hall/room.

8.3.1.3 Valid ID card is mandatory for entry to the exam room / hall.

8.3.1.4 Punctuality is most important at all times. Students are expected to check their exam location and be seated at least 10 minutes prior to the exam time.

8.3.1.5 In case of offline exam, as per ACTS, C-DAC policy all question papers are to be returned along with the answer script.

8.3.1.6 Students are required to bring their own stationary as no lending or borrowing is permitted during examination.

8.3.1.7 Programmable calculators or any other kind of electronic devices are strictly prohibited inside the exam area.

8.3.1.8 Indiscipline in the exam hall/ room will not be tolerated.

8.3.1.9 Possession of any written material related to the subject or communication with their fellow students, will result in disciplinary actions.

8.3.1.10 A student must score a minimum of 40 percent marks, in order to successfully clear the course.

8.3.1.11 It is recommended that the students should ensure 100% attendance for each course. 10% absences are permissible, only in case of illness, or emergencies. These have to be approved by the Centre Head. Approval is contingent upon the evidence provided.

8.3.1.12 There will be 150 questions to answer in 3 hours duration in CEE as per the following distribution mentioned in Table – 1.

Sl. No.	Module Name	Hours	No. of Questions
1	Fundamentals of Computer & OOPs Concepts	26	15
2	Software Development Life Cycle	12	5
3	Database Technologies	30	15
4	Foundations of Web Technologies	32	15
5	Core Java	50	35
6	Enterprise Java	70	35
7	Management Development Program	60	30
8	Project	40	Grade
Total		**320**	**150**

Table-1

8.3.2   GENERAL GUIDELINES FOR AWARD OF GRADES:

The marks of obtained in the CCEE shall be calculated to get total marks out of 100. The rounding off shall be done on the higher side. The grades shall be awarded on the basis of cut off in the absolute marks, as mentioned in Table – 2.

Lower range of marks	Grade	Upper range of marks
91	≤ A+ <	100
81	≤ A <	90
71	≤ B+ <	80
61	≤ B <	70
51	≤ C+ <	60
41	≤ C <	50
0	≤ F <	40

Table 2

8.3.3 Guidelines of CEE:

CEE will be conducted normally before the commencement of Project work of the course. The written examination should be of 180 minutes duration. It should consist of objective questions. A typical objective type exam paper should contain the following types of questions: –

º Multiple choice
º Yes or No
º True or False

Objective questions are useful in testing the recognition and recall abilities of students. They also help in keeping the exam short and easier to evaluate.

For the pure objective type question papers, there will be 40 objective type questions with 4 maximum answer options having only one correct option. The value of each objective type question is of one mark only. There will not be any negative marks for the wrong answers given by the students.

8.3.4 Guidelines for setting Question Papers:

While setting the question papers for theory Exam the following weightages should be assigned as per the difficulty level of the questions.

Levels	Requirements	Weightage
Level A – Easy	Requires elementary knowledge which may be obtained by attending all lectures and completion of mandatory lab assignments	25%
Level B – Intermediate	Requires thorough study of all course material, attendance at all lectures and completion of mandatory assignments	50%
Level C – Difficult	Requires study and lab work beyond the prescribed course material and mandatory assignments	25%

8.4. Guidelines for generating questions:

8.4.1 Question paper setter has to use sample paper format provided by C-DAC, ACTS Pune

8.4.2 Mention the subject name without fail.

8.4.3 Language of the question should be easy to understand.

8.4.4 The answers must have relevant objective type choices and "only one" correct answer.

8.4.5 The questions must be prepared by referring appropriate books, reference books, reference material, and course material having good information.

8.4.6 The question must be created by the domain expert afresh and should not be copied directly from any book, website, existing previous question papers etc.

8.4.7 The question should be unique and should have not been published anywhere.

8.4.8 Please mention the source of the question wherever possible, as it may help us in referring the same for detailing if required.

8.4.9 The caliber of the question should suffice the growing need of competition.

8.4.10 The question paper should have questions covering the entire syllabus.

8.4.11   The questions have to be typed in MS Word with "Arial" having letter size 12 point. Do not bold any letter, word or sentence in any part of the question paper.

8.4.12   It is essential to give password to the word document and send/tell the password separately.

8.4.13   It is essential that utmost care is taken at your end to maintain the secrecy of the soft copy at all time.

8.4.14   An expert team will review all questions. The questions will be filtered as per following:

   o   If the question is incomplete
   o   If the answer of the question is wrong
   o   If the question is not there in the syllabus
   o   If the question appears more than once
   o   If the question is too lengthy
   o   If the question is irrelevant
   o   If the options to the questions are irrelevant

8.5.   Template for generation of Questions

Date:

Question generated by: Mr. /Ms.

Subject Name:

Q. No.
Question: <Text of the question>

Answer Choices
A:
B:
C:
D:

Difficulty Level: Easy / Intermediate / Difficult

Reference: (Name of books)
(If question taken from book) (Mention name of the book, author, ISBN)
Total Number of Questions Generated: _____

8.6.   **Template for Answer Key:**

Module name:				
Question No.	**Answer Keys**	**Question No.**	**Answer Keys**	
1				
2				
3				
4				
5				
6				
7		145		
8		146		
9		147		
10		148		
		149		
		150		

8.7.   **Evaluation of answer papers:**
For Offline mode: Use of OMR sheets will be useful for processing the result of multiple choice exams. OMR is an effective way to collect data, process for the result and also it takes less time with greater accuracy in less effort. Centres need to follow the best way for scanning the OMR sheets, process the result and publish the result. Centres which are not using OMR can user OCR to conduct the exams and evaluate the students. Centre which are not using OMR or OCR can evaluate the students manually and process the result.
For Online mode: Course end exam will be through online s/w. Evaluation will be through that Exam s/w.
If a student requests for re-evaluation then the student has to pay Rs 150/- and it should be routed through training centre. The Re-evaluation fee should be paid to respective C-DAC training Centres, in case of Authorized Training Centres associated to C-DAC, Pune, payment to be made in favour of "C-DAC, ACTS" and payable at Pune. (This is applicable only for theory exam)

8.8.   **Moderation:**
Grace marks would be awarded as per the methodology below:
8.8.1.   Maximum of 4% of total term end theory exam marks can be awarded to a candidate.

Sr. No.	Name of the course	Total Marks	Maximum grace marks for the course
1	C-DAC Certificate Course in java Programming	150	6

On completion of the moderation exercise the revised marks should be updated in the marks database.

8.9.   Re-examinations:

The following conditions will be applicable for the course end re-exam:

8.9.1.   Students who do not appear for an exam on the scheduled date will not have an automatic right to re-examination. Only those students who, in the opinion of the centre/course coordinator have a genuine reason for being absent may be allowed to appear for a re-exam.

8.9.2.   Students who have failed an exam may be allowed to appear for a re-exam.

8.9.3.   The re-exam should be conducted following the same process as the regular examination.

8.9.4.   Students, who failed/remained absent in the Course End Examination conducted by C-DAC, shall be allowed to appear in the re-examination only once.

8.9.5.   Students who remain absent or fail in the re-examination will not get any further chance for appearing for a third attempt or further. In such case the candidate can receive the Performance Statement and the certificate of participation   without any grade.

8.9.6.   On evaluation of their answer sheets 20% of the marks obtained by the students will be deducted (towards de-rating for re-examination) for arriving at the final score, i.e. in order to clear the module test the student has to score a minimum of 50% marks instead of 40%.

8.10.   Project Module:

8.10.1.   Project work should be start as soon as possible.

8.10.2.   After that students should be ready with all mandatory documents with database design and then completion of all teaching modules they can do the project.

8.10.3.   Performance in the Project module will be awarded in grade. The Project grade will be mentioned separately on the certificate & will have no effect on the overall grade obtained by a student.

8.10.4.   Students may do industry-sponsored projects, but will be required to do the project work within the centre.

8.10.5. Evaluation of the Project module will take place as following:

8.10.5.1.   Internal evaluation will be take place at mid of the module

8.10.5.2.   External evaluation will take place at the end of the module

Based on both evaluations, final grade will be awarded & communicated to C-DAC ACTS, Pune

8.11.   Guidelines for Project Evaluation

Evaluation of Project work needs to be carried out as per the following guidelines:

a.   Literature study.

b.   Submission of abstract for their colloquium/seminar/project work along with the references.

c.   Submission of the detailed work report

d.   Two presentations each for 15 minutes on the work done restricted to 15 – 20 slides followed by evaluation.

e.   The evaluation for 100 marks will be splited up as follows:

    i.   Literature survey   – 10
    ii.   Contents of the project work   – 20
    iii.   Contents Flow of Presentation   – 15
    iv.   Communication and Presentation Skills   – 20
    v.   Depth of Knowledge in the topic   – 15
    vi.   Viva Voce   – 15

vii. Attendance	– 5

f. Soft copy of the presentation should be submitted to C-DAC.

8.12   Ensuring Security of Evaluation data/records:

8.12.1.   Ensure that all data relating to evaluation of students is stored in a secure place that cannot be accessed by unauthorized personnel.

8.12.2.   All question papers must be prepared and stored in a separate area specifically designated for the purpose.

8.12.3.   Whenever any external faculty sets a question paper, ensures that he should follows the guidelines given by C-DAC ACTS Pune.

8.12.4.   Ensure that only one copy of any question paper is prepared in physical (printed) form for review and revision.

8.12.5.   When the question paper is finalized, print out one master copy and gets it signed by the paper setter, Reviewer and DRM Evaluation.

8.12.6.   Prepare required number of photocopies of the question paper and store them in a safe and secure location before the exam.

8.12.7.   The data relating to evaluation of students, such as soft copies of question papers and answer keys, student marks database and performance statements etc. must be kept in a separate domain/directory which is accessible only to authorized personnel. Ensure that the data is regularly backed up.

8.12.8.   The question papers for the theory as well as the laboratory examinations at all the centres will be set by CDAC, ACTS Pune. The centres according to guidelines provided by C-DAC, ACTS Pune, will conduct the evaluation of the laboratory and assignments locally.

Note: The Evaluation Guidelines, Rules and Regulations issued by C-DAC, ACTS – Pune from time to time shall be binding on all the centers and all the students. C-DAC, ACTS, Pune reserves the right to add, modifies or deletes any or entire contents of this document at any point of time without giving any notice. It's the responsibility of the centre coordinator to inform such changes to the students in form of a formal notice with a duly signed copy to C-DAC, ACTS, Pune.

9. Requirements (S/W and H/W)

Computing Facilities for Java Programming	
A. Servers	
1. Unix / Linux / Server	
2. Windows 2003 / Windows Server 2008	
3. Application / Dummy Servers Configured for various modules	
Severs Configuration	
1. Processor (min 3.2 Ghz)	
2. RAM (min 4 GB)	
3 HDD (min 500 GB)	
4. Network Card	
5. AGP Card with 4/8 MB VRAM	
6. 2 Serial ports, 1 parallel port, 104 Keys Keyboard.	
7. CD Drive / DVD Drive	
B. Clients Machines Configuration	
1. Processor (Min 3.2 Ghz)	
2. RAM (Min 2 GB)	
3. HDD IDE / EIDE (min 250 GB)	
4. AGP-64 bit Card with 8 MB / 4MB VRAM	
5. PCI Network Card 10/100 Base T, UTP Ethernet	
6. Multimedia Kit	
C. Network	
1. 10/100 Base T UTP Hub(s)	
2. UTP CAT-5 Cabling with RJ-45 connectors	
3. UTP Patch Cables	
D. Communication and Internet	
1 Internet Access	
2. ISDN Connectivity	
3. Modem 28.8/ 33 / 512 KBPS	
E. Printers	
1. Laser Printer	
F. Additional Lab Equipments	
1. Amplified Speakers, Headphones & Mikes	
2. Hi-Lumen OHP	
G. Module Specific Software Environments, Operating Systems and Hardware	
1. Fundamentals of Computer & OOPs Concepts	gcc 4.8.0 compiler
2. Database Technologies	Oracle 11g Server and Client
3.Foundations of Web Technologies	MS Frontpage, Visual Interdev
4. Core Java and Enterprise Java	Java SDK 7, Weblogic 12 J2EE SDK, Eclipse 4.4/ Netbeans 8.0,
H. Operating System Software Common For all Course modules	
1. Windows NT 4.0 Server along with Windows NT workstations/ Windows or latest	Yes / No
2. Linux (Open SUSE) latest version	Yes / No