

Suggested Teaching Guidelines for
Java Technologies-II (Web Based Java)–PG-DAC February 2020

Duration: 46 classroom hours + 44 lab hours **(90 hrs)**

Objective: To introduce the student to Java Technologies

Prerequisites: Knowledge of object oriented programming

Evaluation method: Theory exam– 40% weightage
Lab exam – 40% weightage
Internal exam– 20% weightage

List of Books / Other training material

Text Book:

1. Core and Advanced Java, Black Book by Dreamtech Press .

Reference:

1. Java 8 Programming Black Book by Dreamtech Press
2. Core Java : Fundamentals - Volume 1 Gary Cornell, Cay S. Horstmann/ Pearson
3. Programming in Java by Sachin Malhotra, Saurabh Choudhary / Oxford University Press
4. Core Java : Advanced Features - Volume 2 Gary Cornell, Cay S. Horstmann/ Pearson
5. Beginning Java 2 by Ivor Horton; Wrox Publication
6. The Complete Reference Java Eight Edition, Herbert Schidt/ TMH
7. Object-Oriented Analysis and Design with applications by Booch
8. Core Java 8 for Beginners by Sharanam Shah, Vaishali Shah / Shroff Publishers & Distributors
9. Murach's Java Programming 4th edition by Joel Murach / Shroff Publishers & Distributors
10. Advanced Java programming by Uttam K Roy / Oxford University press
11. Sun Certified Enterprise Architect For Java EE Study Guide by Cade, 2nd Edition (Paperback)
12. Programming in Java by Sachin Malhotra, Saurabh Choudhary / Oxford University Press
13. **Professional Java EE Design Patterns by Murat Yener, Alex Theedom, Reza Rahman (Paperback)**

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Session 1: J2EE Overview**Lecture**

- J2EE Container
- Packaging Web applications
- J2EE compliant web application
- Deployment tools.
- Web application life cycle
- Deploying web applications.
- Web Services Support

Session 2,3,4**Lecture**

- Servlets : Dynamic Content Generation
- Advantages of Servlets over CGI
- Servlet Life cycle
- Servlet API & Deployment
- Servlet Annotations
- The Servlet interface
- The HttpServlet, HttpServletRequest, HttpServletResponse
- Exception Handling
- Servlet , DAO , POJO DB Layers
- Session
- Session Management
- Session Tracking with
 - Cookies
 - HttpSession
- Request Dispatcher
- Page Navigation
- Complete Case study Servlet Based

Assignment – Lab:

Implement exception handling in Servlet.

Use Java Servlets technology in designing and implementing an Air Ticket reservation system.
Incorporate Sessions in the Air Ticket reservation system.

Assignment – Reading:

Know more about the HTTP protocol at www.w3c.org

Assignment – Tutorial:

Compare which way of session tracking is better Cookies or HttpSession.

Session 5:**Lecture**

- Internationalization and Localization: Basics
- Read and set the locale by using the locale object
- Create and read Properties file
- Build a resource bundle for each locale and load a resource bundle in an application

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Assignment – Lab:

Deploy structured web application.

Session 6 & 7:**Lecture**

- JSP: Separating UI from Content generation code
- MVC architecture
- Life cycle of a JSP page
- Directives, Implicit and Explicit Objects, Scriptlets, Expressions, Expression Language
- Scope
- JSP Error Page handling
- Session Tracking
- JSP Using JavaBeans
- Custom Actions and Tag Libraries in JSP

Assignment – Lab:

Separate UI code from the controller code in your Air Ticket reservation system by incorporating JSP and Servlets. Complete the implementation of Air-ticket reservation system

Session 8 :**Lecture****JavaBeans**

- JavaBean Component
 - Model of MVC architecture
- Writing JavaBeans Components
 - Properties
 - Methods
 - Events
- JavaBeans Component Design Conventions
- Creating and Using a JavaBeans Component
- Setting JavaBeans Component Properties
- Retrieving JavaBeans Component Properties
- JSP Using JavaBeans

Assignment – Lab:

1. Creating a Project by Simple Bean code
2. Implement MVC based web application using servlet, JSP, JavaBeans

Session 9 & 10 : JNDI , Annotations ,Transaction Management**Lecture**

- JNDI API
- JNDI Overview
- Java Annotations : Purpose, Basics, Annotation Elements
- Retention Policy
- Built-in Annotations

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- Java Custom Annotations
- Using Custom Annotation
- **Transaction Management**
- Transaction Timeouts , Transactions in Web Components
- Transactions and Concurrency
- Transaction Management example

Assignment – Lab:

Develop Courier Tracking system implementing annotation.

Session 11:**Lecture**

- Design Patterns in Java: Overview, Usage, Types of Design Patterns
- Creational: Factory, Singleton, Builder, Prototype
- Structural: Adapter, Composite, Proxy, Facade, Bridge, Decorator
- Behavioral: Template method, Mediator, Chain of Responsibility, Observer, Strategy, Command, State, Visitor
- MVC Pattern, Data Access Object Pattern
- Front Controller Pattern
- Service Locator Pattern
- Transfer Object Pattern

Assignment – Lab:

Develop candidate examination system implementing above design pattern.

Session 12 & 13:**Lecture**

- Apache Maven: Overview, Environment Setup, Ant vs Maven
- POM, Build Life Cycle, Build Profiles
- Maven Repository
- Create, Build and Test Project & Build Automation
- Manage Dependencies, Deployment Automation

Assignment – Lab:

Configure Apache Maven in web application.

Develop a web application using Apache Maven.

Session 14 & 15:**Lecture**

- Hibernate Framework
 - Introduction to Hibernate Framework
 - Architecture
- Hibernate in IDE
 - Creating web application using Hibernate API
 - Life-cycle of Hibernate Entities
- HB with annotation example

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- Hibernate Mappings and Relationships
- Collection and Component Mapping
- HQL ,Named Queries , Criteria Queries
- Introduction to Struts 2 Architecture
- Building web pages using Struts 2 , Action Classes & Interceptors

Assignment – Lab:

Develop a web application (Online Bookshop) using Hibernate Persistence

Study Hibernate architecture from www.hibernate.org/docs

Session 16 :**Lecture**

- Introduction to JSF 2.0
- Discussion on benefits of JSF
- JSF UI component model
- JSF Architecture
- Life cycle of a JSF
- First application of JSF
- Introduce basic JSF Tags
- Various Navigation methods
- JSF Event Handling

Assignment – Lab

- Create simple JSF applications for practice.
- Create a test JSF application to test all navigation

Session 17 & 18 :**Lecture**

- Overview of Spring4/5 Architecture.
- AOP Overview
- Spring Modules Overview
- Spring MVC architecture
- Understanding Spring 4 annotations
- Spring Application
- Spring in IDE
- Spring in Eclipse
- Dependency Injection

Assignment Reading

Understand key features of Spring Architecture & design simple Java application to test dependency injection.

Session 19 & 20:**Lecture**

- What is IoC(Inversion of Control)
- IOC container

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- Dependency Injection
- Spring AOP
- AOP Concepts
- Spring ORM
- Spring MVC
- Model, Model & View , HandlerMapping, ViewResolver, Front Controller
- Deployment of web application using Spring MVC Form with CRUD, File Upload example
- Integration of Spring MVC with Hibernate
- Spring Boot Basics , Overview & Demo

Assignment – Lab

Design & deploy online stock trading system using spring MVC module
Modify earlier assignment to support persistence via Hibernate

Session 21 & 22:**Lecture****Building REST services with Spring**

- Introduction to web services
- SOAP Vs RESTful web services
- RESTful web service introduction
- Create RESTful web service in java using Spring framework
- RESTful web service JSON example
- RESTful web service CRUD example
- AngularJS and Spring based RESTful web service CRUD Integration

Assignment – Lab

Design & deploy online stock trading system using spring MVC module
Modify earlier assignment to support persistence via Hibernate

Session Added in place of JSF

Lecture**Spring Boot Essentials**

- Why Spring Boot
- Spring Boot Overview
- Building web application with Spring Boot
- Building RESTful web service using Spring Boot
- Overview of Spring Data JPA

Assignment – Lab

- Design & deploy online stock trading system using spring Boot MVC

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Session 23:

Lecture

- Testing in Spring
- Unit Testing of Spring MVC Controllers
- Unit Testing of Spring Service Layer
- Integration Testing of Spring MVC Applications: REST API
- Unit Testing Spring MVC Controllers with REST

Assignment – Lab

Design & test Spring Application.