Suggested Teaching Guidelines for

Java Technologies-II (Web Based Java)–PG-DAC February 2019

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)**

Session 1: J2EE Overview

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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

- 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

- 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

Session 23:
Lecture

- Testing in Spring
- Unit Testing of Spring MVC Controllers:

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- 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.