Syllabus for Bachelor of Technology

Computer Engineering

Subject Code: 01CE0502

Subject Name: Advanced Java Programming

B.Tech. Year - III

Objective: This course develops programming ability of students to create dynamic web applications using server side technology with Java Database Connectivity. Students can learn networking and remote method invocation using Java API. Different Java frameworks like Spring, Java Server Faces and Hibernate will increase ability of students in web application development.

Credits Earned: 5 Credits

Course Outcomes: After completion of this course, student will be able to

- Describe the components of J2EE Architecture, MVC Framework and Multi-tier Application and Various Network Protocol. (Understand)
- To make use of Servlet and JSP API in the process of enterprise application deployment. (Apply)
- Implement components such as Session, Filters, JSTL, Beans. (Apply)
- Distinguish Application Server, Web Container, JDBC and ORM tools.(Analyze)
- Design and Development of web application having collaboration of Servlets, JSPs, JSF, Spring and Hibernate base upon the requirement. (Create)

Pre-requisite of course: Core Java

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
4	0	2	5	50	30	20	25	25	150

Contents:

Sr. No.	Content	Contact Hours
1	**Advance Networking** Networking Basics, Introduction of Socket, Types of Socket, Socket API, TCP-IP: Client/Server Sockets, URL,UDP: Datagrams, java.net package classes: Socket, ServerSocket, InetAddress, URL, URLConnection, RMI Architecture, Client Server Application using RMI.	6

2	**JDBC Programming** JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, Creating simple JDBC Application, Types of Statement (Statement Interface, PreparedStatement, CallableStatement), Exploring ResultSet Operations, Batch Updates in JDBC, Creating CRUD Application, Using Rowsets Objects, Managing Database Transaction.	**8**
3	**J2EE and Web Development** J2EE Architecture Types, J2EE Containers, Types of Servers in J2EE Application, HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers and Web Architecture Models.	**2**
4	**Servlet API and Overview** Servlet Introduction, Servlet Life Cycle(SLC), Types of Servlet, Servlet Configuration with Deployment Descriptor, Working with ServletContext and ServletConfig Object, Attributes in Servelt,, Response and Redirection using Request Dispacher and using sendRedirect Method, Filter API, Manipulating Responses using Filter API, Session Tracking: using Cookies, HTTPSession, Hidden Form Fields and URL Rewriting,Types of Servlet Event: ContextLevel and SessionLevel.	**8**
5	**Java Server Pages** Introduction to JSP , Comparison with Servlet, JSP Architecture, JSP: Life Cycle, Scripting Elements, Directives, Action Tags, Implicit Objects, Expression Language(EL), JSP Standard Tag Libraries(JSTL), Custom Tag, Session Management, Exception Handling, CRUD Application.	**10**
6	**Hibernate** Introduction to Hibernate, Exploring Architecture of Hibernate, Object Relation Mapping(ORM) with Hibernate, Hibernate Annotation, Hibernate Query Language (HQL), CRUD Operation using Hibernate API.	**6**
7	**Java Web Frameworks: Spring MVC** Spring: Introduction, Architecture, Spring MVC Module, Life Cycle of Bean Factory, Explore: Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean, Bean Scopes, Spring Annotations, Spring AOP Module, Spring DAO, Database Transaction Management, CRUD Operation using DAO and Spring API.	**10**
8	**Java Server Faces** Features of JSF, JSF: Architecture, Request processing Life cycle, Elements, Expression Language (EL), Standard Component, Facelets Tag, Convertor Tag, Validation Tag, Database Access, PrimeFaces.	**6**
		56 hrs

References:

1. Black Book "Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath"
2. Complete Reference J2EE by James Keogh mcgraw publication
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication
4. SCWCD, Matthew Scarpino, Hanumant Deshmukh, Jignesh Malavie, Manning publication
5. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication
6. Java Persistence with Hibernate by Christian Bauer, Gavin King
7. Spring in Action 3rd edition , Craig walls, Manning Publication
8. Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication
9. Java Server Faces in Action, Kito D. Mann, Manning Publication
10. JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley
11. Beginning JSP, JSF andTomcat, Giulio Zambon, Apress
12. JSF2.0 CookBook, Anghel Leonard, PACKT publication

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	20%	50%	10%	0%	10%

Suggested List of Experiments:

Experiment# 1 Java Networking

Sr. No.	Practical Name
1	Write an application which will retrieve IP address for given website.
2	Write an application which will retrieve the content of the given URL with different web-page related information.
3	Write a two – way network based chat application. It will use TCP/IP protocol and it will do communication in serial manner.
4	Write an application which will retrieve file from server machine and save that file on client machine. File name will be provided by client.
5	Write a client program to send any string from its standard input to the server

	program. The server program reads the string, finds number of characters and digits and sends it back to client program. Use connection-oriented communication.
6	Write a client program to send any string from its standard input to the server program. The server program reads the string, finds number of characters and digits and sends it back to client program. Use connection-less communication.

Experiment# 2 JDBC Programming

Sr. No.	Practical Name
1	Write down Five Basic steps to establish JDBC connection from Java Application. Also mention sample code for each step.
2	Write a JDBC application which will interact with Database and perform the following task. 1) Create Student Table with RollNo, Name, and Address field and insert few records. 2) Using Statement Object display the content of Record. 3) Using Statement Object Insert Two Record. 4) Using Statement Object Update One Record. 5) Using Statement Object Delete One Record. 6) Using Statement Object display the content of Record.
3	Write a JDBC application which will interact with Database and perform the following task. 1) Create Student Table with RollNo, Name, and Address field and insert few records. 2) Using PreparedStatement Object display the content of Record. 3) Using PreparedStatement Object Insert Two Record. 4) Using PreparedStatement Object Update One Record. 5) Using PreparedStatement Object Delete One Record. 6) Using PreparedStatement Object display the content of Record.
4	Write a JDBC application which will interact with Database and perform the following task. 1) Create a store procedure which will insert one record into employee table. 2) Create a store procedure which will retrieve salary for given employee id. 3) Write a java application which will call the above procedure and display appropriate information on screen.
5	Design a JDBC application which will demonstrate Scrollable ResultSet functionality.
6	Design a JDBC application which will demonstrate Updatable ResultSet functionality.
7	Design a JDBC application which will demonstrate Transaction management functionality.

Experiment# 3 Servlet

Sr. No.	Practical Name
1	Write down the Program for testing the Servlet and study deployment descriptor.
2	Write down the program for testing the include action for servlet collaboration.
3	Write down the program for testing the forward action for servlet collaboration.
4	Create login form and perform state management using Cookies, HttpSession and URL Rewriting.
5	Create Servlet file which contains following functions: 1. Connect 2. Create Database 3. Create Tabe 4. Insert Records into respective table 5. Update records of particular table of database 6. Delete Records from table. 7. Delete table and also database.
6	Write down the Program in which error is handled by the deployment descriptor file (web.xml).
7	Implement Authentication filter using filter API.
8	Write down the Program for testing the servlet context interface.

Experiment# 4 JSP

Sr. No.	Practical Name
1	Write down the Program which displays the simple JSP file.
2	Write down the program in which input the two numbers in an html file and then display the addition in JSP file.
3	Write down the program in which display the error by common file for all general pages.
4	Perform Database Access through JSP.
5	Write down the Program for testing the include action tag in jsp.
6	Write down the Program for testing the forward action tag.
7	Write down a program which demonstrates the core tag of JSTL.
8	Write down a program which demonstrates the Format tag of JSTL.
9	Write down a program which demonstrates the Function tag of JSTL.
10	Write down a program which demonstrates the SQL tag of JSTL.
11	Write down a program which demonstrates the XML tag of JSTL.
12	Write down a program which demonstrates the Tag Handler with appropriate output.
13	Create database of student subject-wise data and retrieve all data using JSP and generate xml structure along with DTD and XML Schema definition.

Experiment# 5 Hibernate Framework

Sr. No.	Practical Name
1	Study and implement Hibernate.
2	Study and Implement Hibernate Annotations.
3	Use Hibernate Query Language to insert, update and delete records in database.

Experiment# 6 Spring Framework

Sr. No.	Practical Name
1	Study and Implement MVC using Spring Framework
2	Inject Service using Aspect Oriented Programming.
3	Using Spring Template manages Database and Transaction.

Experiment# 7 JSF

Sr. No.	Practical Name
1	Use JSF Standard Components and Facelets Tags.
2	Implement JSF Converter Tag and Validation Tags.

Instructional Method:

a) The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
b) The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
c) Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
d) Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

a) http://www.oracle.com/technetwork/java/javase/downloads/index.html
b) https://docs.oracle.com/javaee/6/tutorial/doc/
c) https://javaee.github.io/tutorial/
d) http://docs.oracle.com/javase/tutorial/java/index.html
e) https://spring.io/guides