GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Integrated Master of Computer Applications, 5th Semester
Subject Name: Advanced Java (AJ)
Subject Code: 2658601

With effective from academic year 2018-19

1. Learning Objectives:

- To interpret the concepts of Servlet basics, Listener and Filers and easily use these concepts in Java technology.
- To develop proficiency in creating web based robust applications using the Java Server Pages (JSP).
- To understand concepts of Model View Controller (MVC), Java Database Connectivity (JDBC) applications and to implement them.

2. Prerequisites:

Programming Language of JAVA, HTML and JavaScript.

3. Course Contents:

Unit	Course Content	Weightage Percentage
Unit I	**Java Networking Overview** The Networking Classes and Interfaces: InetAddress, Factory Methods, Instance Methods, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI Class, Cookies, TCP/IP Server Sockets, Datagrams, DatagramSocket A Datagram Example	15%
Unit II	**Servlet API and Overview** Servlet Basics, Basic Servlet structure, Servlets Generating text/html content, Packaging Servlets, The servlet life-cycle. Handling Client Request Form Data, Reading Form Data from Servlets, Handling Client Request, Reading Request Headers, Understanding HTTP/1.1 Request Headers, Changing the page according to how the user got there, Accessing the Standard CGI Variables. Generating the Server Response, HTTP Status Codes, Specifying Status Codes, HTTP / 1.1 Status Codes, Using Redirections, HTTP Response Headers, Setting Response Headers from Servlets, Understanding HTTP / 1.1 Response Headers,. Handling Cookies, Remembering Usernames and Passwords, Deleting Cookies, Sending and Receiving Cookies, Using Cookie Attributes, Differentiating Session Cookies from Persistent Cookies, Using Cookies to Remember User Preferences, Session Tracking, Need for Session Tracking, Session Tracking API, Encoding URLs Sent to the Client, Accumulating a List of User Data.	25%
Unit III	**Listeners and Filters** Using ServletContextListener, HttpSessionListener, Understanding of all the other Listeners viz. ServletRequestListener, ServletContextAttributeListener, ServletRequestAttributeListener, HttpSessionAttributeListener Using Filters for pre and post processing of request.	20%
Unit IV	**Java Server Pages and MVC**	20%

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	JSP Basic Syntax, HTML Text, HTML comments, Template Text, JSP Comment, JSPExpression, JSP Scriptlet, JSP Declaration, JSP Directives, JSP Action, JSP Expression Language Element, Custom Tag (Custom Action), Escaped Template Text, Using JSP Scripting Elements, Using Predefined Variables, XML syntax for Expressions, Scriptlets, Declarations and Directives, Using Scriptlets, Using Declarations, Using Page Directive, Using Standard Actions Tags – <jsp:plugin>, <jsp:forward>, <jsp:include>, Using JavaBeans in JSP pages – <jsp:useBean>, <jsp:getProperty>, <jsp:setProperty>, Sharing Beans, Use of Scopes and their Attributes. **Model View Controller(MVC)** Integrating Servlets and JSP in a Web Application (MVC Architecture for Web Applications), Implementing MVC with Request Dispatcher, Understanding Data Sharing Between Servlets and JSP, JSP Expression Language, Accessing Scoped Variables, Bean Properties, Collections and Implicit Objects Using EL, Using EL Operators.	
Unit V	**Java Web Frameworks**: Spring MVC Overview of Spring, Spring Architecture, bean life cycle, XML Configuration on Spring, Aspect – oriented Spring, Managing Database, Managing Transaction	**20%**
Unit VI (*)	**Database Programming** The Design of JDBC, JDBC Driver Types, SQL, JDBC Configuration: URL, driver jar files, starting the database, registering the driver class, connecting to the database, Working with JDBC Statements: executing SQL statement, managing connections, statements, resultsets, SQL exceptions, Query Execution: prepared statement.	**-**

(*) **Question to be asked in practical exam only.**

Desirable:
   a) Hibernate 4.0 Overview of Hibernate, Hibernate Architecture, Hibernate Mapping Types, Hibernate O/R Mapping, Hibernate Annotation, Hibernate Query Language
        a. Book: Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication (Chapter 1,2,3)
   b) Java Server Faces2.0
   c) Using Servlets to Generate JPEG Images

4. **Text Book:**
   1)   Herbert Schildt , Java™:The Complete Reference, Seventh Edition
   2)   Marty Hall, Larry Brown, "Core Servlets and JavaServer Pages Volume – 1: Core Technologies", Pearson Education, 2nd Edition.
   3)   Marty Hall, Larry Brown, "Core Servlets and JavaServer Pages Volume – 2: Advanced Technologies", Pearson Education, 2nd Edition.
   4)   Spring in Action 3rd edition , Craig walls, Manning Publication

5. **Reference Books:**
   1)   Black Book "Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008.

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2) Beginning JSP, JSF andTomcat, Giulio Zambon, Apress.
3) Complete Reference J2EE by James Keogh mcgraw publication.
4) Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication.
5) JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley.
6) "Web Technologies Black Book", Dreamtech Press, Edition 2010.

Web Resources: http://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html

6. Chapter wise Coverage from the Text Book:

Unit #	Book#	Chapter
I	1	Chapter 20
II	2	Chapter 3 (except 3.5, 3.7, 3.8), Chapter 4 (only 4.2), Chapter 5 (only 5.1, 5.3, 5.6 and 5.7), Chapter 6 (except 6.4), Chapter 7 (only 7.1, 7.2 and 7.5), Chapter 8 (only 8.1, 8.3, 8.4, 8.6, 8.7, 8.11), Chapter 9 ((only 9.1, 9.3, 9.5, 9.7).
III	3	Chapters 5, 6
IV	2	Chapters 10 (only10.6), 11, 12, 13, 14,15,16
V	4	Chapter 1,2
VI	2	Chapter 17

7. Accomplishment of the student after completing the course:
1) The student should be comfortable with developing web applications using Java technology.

8. Laboratory

Part I: Networking
1. Write a program which will send DatagramPacket using DatagramSocket.
2. Write a program to display IP Address and host name for local machine.
3. Write TCP and UDP program for two way communication.
4. Write a client-server program using UDP socket. Client send list of N strings and server responds the concatenation of those strings.
5. Write a client server program using TCP where client sends a string and server checks whether that string is palindrome or not and responds with appropriate message.
6. Write a TCP client program to display the server date and Time details.
7. Implement TCP Server for transferring files using Socket and ServerSocket
8. Implement any one sorting algorithm using TCP/UDP on Server application and Give Input On Client side and client should sorted output from server and display sorted on input side.
9. Implement Concurrent TCP Server programming in which more than one client can connect and communicate with Server for sending the string and server returns the reverse of string to each of client

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Part II: JDBC, Servlet, JSP, JavaBean, EL

10. Write a Servlet to display "Hello World" on browser.
11. Write a Servlet to implement Servlet Life Cycle.
12. Write a Servlet to display all the headers available from request.
13. Write a Servlet to display parameters available on request.
14. Write a Servlet to display all the attributes available from request and context.
15. Write a Servlet which displays a message and also displays how many times the message has been displayed (how many times the page has been visited).
16. Assume that we have got three pdf files for the MCA-1 Syllabus, MCA-2 Syllabus and MCA-3 Syllabus respectively, Now write a Servlet which displays the appropriate PDF file to the client, by looking at a request parameter for the year (1, 2 or 3).
17. Assume that the information regarding the marks for all the subjects of a student in the last exam are available in a database, Develop a Servlet which takes the enrollment number of a student as a request parameter and displays the marksheet for the student.
18. Develop a Servlet which looks for cookies for username and password, and forwards to a home.jsp in case the cookies are valid and forwards to login.jsp, in case the cookies are not found or the cookies are not valid.
19. Develop a Servlet to authenticate a user, where the loginid and password are available as request parameters. In case the authentication is successful, it should setup a new session and store the user's information in the session before forwarding to home.jsp, which displays the user's information like full name, address, etc.
20. Write a simple JSP page to display a simple message (It may be a simple html page).
21. Write a JSP page, which uses the include directive to show its header and footer.
22. Create a listener that notifies (through System.out) whenever a user adds a product to **a** shopping cart (i.e. adds an object to the session object) or removes it again. Hint: check out the class HttpSessionAttributeListener. Make it print the name and price of the object (hint: access the session through the HttpBindingEvent object). Also, let the listener print the total price of all objects saved in the session so far (one way to accomplish this could be to keep a collection of all objects saved to the session – or just their keys – in the listener or an associated class).
23. Create a servlet filter that logs all access to and from servlets in an application and prints the following to System.out:
    1. the time the request was received
    2. the time the response was sent
    3. how much time it took to process the request
    4. the URL of the resource requested
    5. the IP address of the visitor
24. Develop a interest calculation application in which user will provide all information in HTML form and that will be processed by servlet and response will be generated back to the user.
25. Develop an application to demonstrate how the client (browser) can remember the last time it visited a page and displays the duration of time since its last visit. (Hint: use Cookie)
26. Develop an application to keep track of one user across several servlet invocations within the same browser session.
27. Develop an application to write a "page-composite" JSP that includes other pages or passes control to another page. (Hint: Use <jsp:include> or <jsp:forward>).
28. You want to reduce the amount of Java coding in your JSP using a JavaBean component. (Hint: Use <jsp:useBean> with the name of your bean).

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29. Update the JSP page from above exercise to use tags availabe from the standard tag library JSTL.
30. Develop a JSP Page to display the personal information and result information of the student in two different tabular formats.
31. Create the filter that can add the time at which above jsp file called with appropriate message.
32. Design a Listener that loads the name of company as an init-parameter in context.
Use this name on the JSP – product.jsp and contactus.jsp of the website. (HINT: Implement ServletContextListener interface)
33. Create a filter to maintain the log of suspicious access of a particular JSP.
Access to the JSP on Sundays is suspicious.
iiAlso design the JSP for the application. The JSP should display the details about sales history of the company for past 7 years.
The output should be shown in excel format.
34. Create Servlet program which contains following functions:
1. Connect 2. Create Database 3. Create Table 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.
35. User can create a new database and also create new table under that database. Once database has been created then user can perform database operation by calling above functions. Use following Java Statement interface to implement program:
1. Statement 2. Prepared statement 3. Callable statement 4. Transaction
36. Design an application where a user enters username and password, and requests for a servlet. Use filter to validate the password use database. If password is valid servlet is given as response, otherwise give appropriate message through filter.
37. Design an application which implement shopping cart with operations to add an item, update item, delete item from cart and display content of cart.
38. Design an application which implement Banking with operations to add an account, Deposit Money, Debit Money and display passbook.

Part III: Design Based Problems (Desirable)

39. Using J2EE JSP/Servlet API develop student's management system required to manage student's academic activity such as student's profile, student's day to day assignment submission as per instructions and assignment given by teacher . Provide MVC based interface using spring framework and do the database design using Hibernet framework and also provide two login roles one for teachers providing assignment and notification for class and other for students to submit their assignments and can view notices published by teachers
40. Develop the student's blog and online forum where various group of students can do discussion on various academic and non-academic but technical topics discussions group where all of college teachers can provide comments and likes and dislikes. Use Spring base and Hibernet technology for MVC framework and database design respectively