Internal Assessment Test 3 - **Solutions**

Sub:	Advanced Java & J2EE					Sub Code:	18CS644	Branch:	CSE
Date:	30.07.2021	Duration:	90 min's	Max Marks:	50	Sem/Sec:	6 / A,B,C		OBE

	Answer any FIVE FULL Questions	MARKS	CO	RBT
1 (a)	Define JSP. Explain different types of JSP tags	[04]	CO4	L2

Java Server Pages (JSP) is a technology for developing Webpages that supports dynamic content. This helps developers insert java code in HTML pages by making use of special JSP tags, most of which start with <% and end with %>.

A Java Server Pages component is a type of Java servlet that is designed to fulfill the role ofa user interface for a Java web application to set the cookies for the user preferences.

JSP tags:

A JSP code consists of a combination of HTML tags and JSP tags.

JSP tags define java code that is to be executed before the output of JSP program is sent tothe browser.

A jsp tag begin with a <%, which is followed by java code , and

ends with %>,A JSP page has an HTML body with Java code

embedded inside the JSP tags.

<%-- and --%> comment tag

<% and %> scriptlet tag

<%! and %> declaration tag

<%= and %> Expression tag

<%@ JSP directive tag

A simple JSP page which includes declarations tag, scriplet tag, expressions tag, commentstag in it is shown here:

JSP CODE WITH ALL JSP TAGS

<html>

<head>

<title>JSP Example</title>

</head>

<body>

%@ page import="java.util.*"%>

<%-- This is a JSP example with scriplets, comments , expressions --%>

<% out.println("This is a JSP Example"); %>

	<% out.println("The number is "); %> <%! int num12 = 12; int num32 = 12; %> <%= num12*num32 %> Today's date: <%= (new Date()).toLocaleString()%> </body> </html>			
(b)	Design a form to obtain two numbers from the user. Upon submission, write JSP code to add, subtract, multiply and divide the two numbers and display output to the user. index.html(form to get two numbers as input from the user) <html> <head> <title>Enter two numbers </title> </head> <body> <form action="./add.jsp"> First number: <input type="text" name="t1"/> Second number: <input type="text" name="t2"/> <input type="submit" value="SUBMIT" /> </form> </body> </html> add.jsp <html> <head> <title>Enter two numbers </title> </head> <body> <%= "<h1> The sum is"+(Integer.parseInt(request.getParameter("t1"))+Integer.parseInt(request.getParameter("t2")))+"</h1>"%> <%= "<h1> The difference is "+(Integer.parseInt(request.getParameter("t1"))-Integer.parseInt(request.getParameter("t2")))+"</h1>"%> <%= "<h1> The product is "+(Integer.parseInt(request.getParameter("t1"))*Integer.parseInt(request.getParameter("t2"))) +"</h1>"%> <%= "<h1> The division result is "+(Integer.parseInt(request.getParameter("t1"))/Integer.parseInt(request.getParameter("t2")))	[06]	CO4	L3

	+"</h1>"%> </body> </html>			

2 (a)	What is a cookie? Which methods are required to create and retrieve a cookie in JSP?
	Cookie is a
	- A small piece of information created by JSP program and stored on the client's hard disk by the browser.
	response.addCookie() and request.getCookies() will be used for adding the cookie to response header and getting the cookies in the request header respectively.
	Example to create and add a cookie is shown next.
	userid.jsp – creates and adds a cookie
	
	<HTML>
	<HEAD>
	<TITLE> JSP Programming </TITLE>
	</HEAD>
	<BODY>
	<%!
	String MyCookieName = "userID"; String MyCookieValue = "JK1234";
	Cookie c=new Cookie(MyCookieName, MyCookieValue);
	%>
	<%
	response.addCookie(c);
	%>
	</BODY>
	</HTML>
	
	readcookie.jsp –Example to read the cookies
	<HTML>
	<HEAD>
	<TITLE> JSP Programming </TITLE>
	</HEAD>
	<BODY>
	<%! String MyCookieName = "userID"; String MyCookieValue;
	String CName, CValue;
	
	int found=0;
	%>
	<%
	Cookie[ ] cookies = request.getCookies(); for(int i=0; i<cookies.length; i++) {
	CName = cookies[i].getName();
	CValue = cookies[i].getValue(); if(MyCookieName.equals(CName)) {
	found = 1; MyCookieValue = CValue;
	}
	}
	if (found ==1) { %>
	<P> Cookie name = <%= MyCookieName %> </P>
	<P> Cookie value = <%= MyCookieValue %> </P>
	<%}%>
	</BODY>
		[03]	CO4	L2

	</HTML>			

(b)	Design a form to obtain user preference on a news page (national, sports, education, entertainment,…) using text field/drop down menu/check boxes.
	Store the preferred choice using a cookie called “newsCookie”.
	Retrieve and display the name and value of the cookie to the user
	How It Works ?
	
	Our server sends some data to the visitor's browser in the form of a cookie. The browser may accept the cookie. If it does, it is stored as a plain text record on the visitor's hard drive. Now, when the visitor arrives at another page on your site, the browser sends the same cookie to the server for retrieval. Once retrieved, our server remembers what was stored earlier.
	Cookies are a plain text data record of 5 variable-length fields −
	• Expires
	• Domain
	• Path
	• Name-Value
	main.jsp
	<%
	// Create cookies for the user preferences on the webpage
	Cookie pref1 = new Cookie("pref1", request.getParameter("pref1"));
	
	Cookie pref2 = new Cookie("pref2", request.getParameter("pref2")); Cookie pref3 = new Cookie("pref3", request.getParameter("pref3"));
	// Set expiry date after 24 Hrs for both the cookies. pref1.setMaxAge(60*60*24); pref2.setMaxAge(60*60*24); pref3.setMaxAge(60*60*24);
	// Add both the cookies in the response header. response.addCookie(pref1); response.addCookie(pref2); response.addCookie(pref3);
	%>
	<html>
	<head>
	<title>Setting Cookies</title>
	</head>
	<body>
	
	 Setting Cookies
	
	 - Preference 1:
	<%= request.getParameter("pref1")%>
	
	 - Preference 2:
	<%= request.getParameter("pref2")%>
	
	 - Preference 3:
	<%= request.getParameter("pref3")%>
	
	<%
	Cookie cookie = null; Cookie[] cookies = null;
	// Get an array of Cookies associated with the this domain
		[07]	CO4	L3

	cookies = request.getCookies(); if(cookies != null) {
	out.println(" Found Cookies Name and Value "); for (int i = 0; i < cookies.length; i++) {
	cookie = cookies[i];
	out.print("Name : " + cookie.getName( ) + ", "); out.print("Value: " + cookie.getValue( )+"
	");
	}
	} else {
	out.println(" No cookies founds ");
	}
	%>
	</body>
	</html>
	hello.jsp
	<html>
	<body>
	<form action = "main.jsp" method = "GET">
	Enter news preference 1: <input type = "text" name = "pref1">
	
	Enter news preference 2: <input type = "text" name = "pref2" /> Enter news preference 3: <input type = "text" name = "pref3" />
	<input type = "submit" value = "Submit" />
	</form>
	</body>
	</html>			

3 (a)	What is HttpSession? Discuss other common techniques for tracking session. The HttpSession interface enables a servlet to read and write the state information that is associated with an HTTP session. Several of its methods are summarized in Table . All of these methods throw an IllegalStateException if the session has already been invalidated. long getCreationTime() Returns the time when this session was created, measured in milliseconds since midnight January 1, 1970 GMT. String getId() Returns a string containing the unique identifier assigned to this session. long getLastAccessedTime() The commonly used methods to track sessions as a client moves between HTML pages and JSP programs are: 1. By using a hidden field 2. By using a cookie 3. By using a JavaBean Hidden Form Fields A web server can send a hidden HTML form field along with a unique session ID as follows : <input type = "hidden" userid = "sessionid" value = "12345"> This entry means that, when the form is submitted, the specified name and value are automatically included in the GET or the POST data. Each time the web browser sends the request back, the session_id value can be used to keep the track of different web browsers.	[03]	CO4	L2

(b)	Create a login form. Check whether the username and password is equal to “admin” and “a123” respectively.
	If login is successful, create a session and set a session attribute called “username” to “admin”.
	Display a customized welcome message to “admin” by retrieving the session attribute.
	
	index.jsp
	For every user there will be a particular session, here we are validating the details of a user and setting the user in a session.
	<html>
	<head>
	<title>Session In JSP</title>
	</head>
	<body>
	 Session in JSP
	 USER LOGIN SESSION
	<form action="validate.jsp" method="post">
	<!-- Here we are taking the values from user and triggering the validate.jsp file -->
	
	<table>
	<tr><td>USER NAME</td><td><input type="text" name="username"></td></tr>
	<tr><td>PASSWORD</td><td><input type="password"
	name="password"></td></tr>
	<tr><td></td>
	<td><button type="submit">LOGIN</button></td></tr>
	</table>
	</form>
	</fieldset>
	</body>
	</html>
	Validate.jsp
	Here we are validating the particular user by getting the input values, and sending them to its respective page.
	<html>
	<head>
	<title>Validate</title>
	</head>
	<body>
	<!-- values given at login page are taken here and checks if the valid details are not -->
	<%
	String username=request.getParameter("username"); String
	password=request.getParameter("password");
	if(username.equals("admin") && password.equals("a123")){
	//if the user is valid, then this block executes and WE ARE KEEPING THE USER IN A SESSION
	session.setAttribute("user", username);
	// WE DECLARE THE USER IN A SESSION
	response.sendRedirect("logged.jsp"); //AND WE REDIRECT TO LOGIN PAGE
	}
	else{
		[07]	CO4	L3

	//IF THE USER IS NOT AUTHORISED THEN AGAIN HE WILL BE REDIRECTED TO THE SAME LOGIN PAGE
	response.sendRedirect("index.jsp");
	
	}
	%>
	</body>
	</html>
	Logged.jsp
	Soon as the validation done, if the user is authorized according to our condition will be redirected to login page else forwarded to the same login page.
	<html>
	<head>
	<title>Success</title>
	</head>
	<body>
	<%
	//HERE WE GETTING THE ATTRIBUTE DECLARED IN VALIDATE.JSP AND CHECKING IF IT IS NULL, THE USER WILL BE REDIRECTED TO LOGIN PAGE
	String uid = (String)session.getAttribute("user"); if (uid == null)
	{
	%>
	<!-- NOT A VALID USER, IF THE USER TRIES TO EXECUTE LOGGED IN PAGE DIRECTLY, ACCESS IS RESTRICTED -->
	<jsp:forward page="index.jsp"/>
	<%
	}
	else
	{
	//IF THE VALUE IN SESSION IS NOT NULL THEN THE IS USER IS VALID
	out.println(" WELCOME ADMIN " ");%>
	<%}
	%>
	</body>
	</html>			

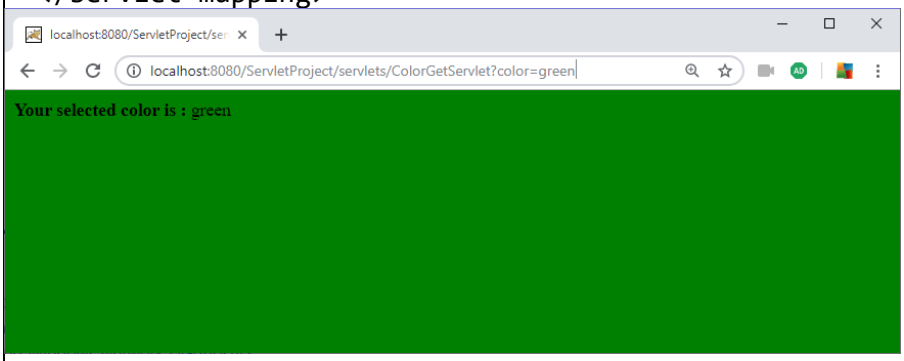
4 (a)	What is a Servlet? Explain the lifecycle of the servlet. A servlet is a small Java program that runs within a Web server. Servlets receive and respond to requests from Web clients, usually across HTTP, the HyperText Transfer Protocol. 3 methods: init(), service() and destroy() These are implemented with every servlet that is invoked at specific times by the server. user enters URL (Uniform Resource Locator) to a web browser. browser generates HTTP request for this URL. request is sent to server HTTP request is received by web server o server maps request to a particular server -servlet is dynamically retrieved and loaded into address space of the server server invokes init() - invoked only when servlet is first loaded into memory. - possible to pass initialization parameters to the servlet. • service() method is invoked	[05]	CO4	L2

	- called to process HTTPRequest. - it may also have to formulate a HTTP response. - called for each HTTPRequest • sever calls destroy() - returns any resources allocated to servlets - memory allocated for servlet and objects are garbage collected.			
(b)	Create an html form that requests user for their preferred choice of color. Create an HttpServlet that handles the request and changes the background color of the page. **getColor.html** `<!DOCTYPE html>` `<html>` `<head>` `<meta charset="ISO-8859-1">` `<title>Color Servlet Demo</title>` `</head>` `<body>` `<div style= "width:350px; height:200px; padding: 10px; background-color:#ccccff; color: #333388">` `<form name = "form1" method="get" action="servlets/ColorGetServlet">` `<label>Choose a Color : </label>` `<select name ="color">` `<option value = "red">Red</option>` `<option value = "blue">Blue</option>` `<option value = "green">Green</option>` `</select>` `  ` `<input type = submit value = "Submit" />` `</form>` `</div>` `</body>` `</html>` **ColorGetServlet.java** `import java.io.*;` `import javax.servlet.*;` `import javax.servlet.http.*;` `public class ColorGetServlet extends HttpServlet {` `private static final long serialVersionUID = 1L;` `protected void doGet(HttpServletRequest req, HttpServletResponse res) throws ServletException, IOException {` `String color = req.getParameter("color");` `res.setContentType("text/html");` `PrintWriter pw = res.getWriter();` `pw.println("<body bgcolor = "+color+ ">");`	[05]	CO4	L3

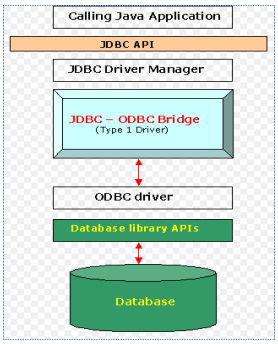
```
            pw.println("<strong> Your selected color is :
</strong>");
            pw.println(color); pw.println("</body>");
            pw.close();
        }
}
```

web.xml entry

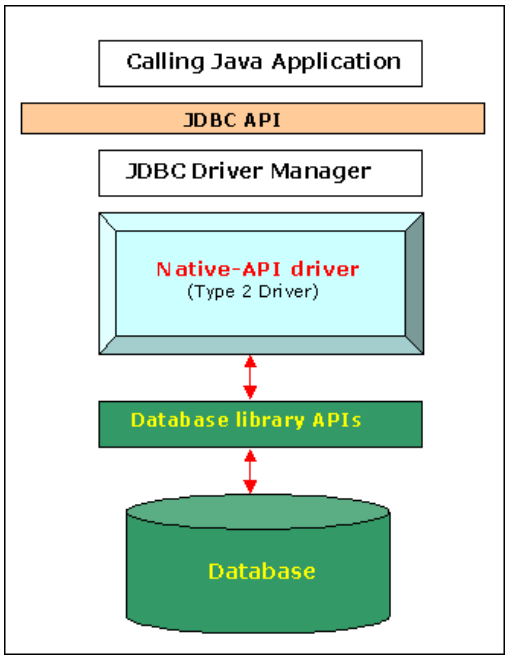
```
<servlet>
    <description></description>
    <display-name>ColorGetServlet</display-name>
    <servlet-name>ColorGetServlet</servlet-name>
    <servlet-class>sp.ColorGetServlet</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>ColorGetServlet</servlet-name>
    <url-pattern>/servlets/ColorGetServlet</url-pattern>
  </servlet-mapping>
```



When user submits the ColorGet.htm page the *query string* will be attached to the URL: http://localhost:8080/servlets/ColorGetServlet?color=green

5 (a)	List and explain various JDBC driver types
	• JDBC driver specification classifies JDBC drivers **into four groups.**
	• Each group is referred to as a JDBC driver type and addresses a specific need forcommunicating with various DBMSs.
	 
	• Type 1 JDBC – to – ODBC Driver
	  • Also known as JDBC/ODBC Bridge used to translate DBMS calls betweenthe JDBC specification.
	  • Those messages are translated by the JDBC – to – ODBC driver into the ODBC message format, which is then translated into the message format understood by the DBMS.
		[06]	CO5	L2

- Type 2 Java/Native Code Driver



  - Uses Java classes to generate platform specific code – that means, code only understood by the specific DBMS.
- Type 3 JDBC Driver
  - Also known as Java Protocol, which converts SQL queries into JDBCformatted statements.
  - The JDBC formatted statements are translated into the format required by theDBMS.
- Type 4 JDBC Driver
  - Also known as Type 4 database protocol, which converts SQL queries intothe format required by the DBMS.

(b) Assume there exists a table called “books” with fields isbn(String), title(String), author(String), publisher(String), price(Real)
Assume the Connection object “conn” holds a connection to the database in which the table is present.
Write code snippet to display all records in the table “books” in tabular format.

[04] CO5 L3

```
mysql> use test;
Database changed
mysql> create table books(ISBN VARCHAR(30),TITLE VARCHAR(30),AUTHOR VARCHAR(30),PUBLISHER VARCHAR(30),PRICE REAL);
mysql> insert into books values('Book1','Taming the dragon','chetan bhagat','tata mcgraw hill',300.50);
CODE:
import java.sql.*; public class Odbc {
public static void main(String[] args)throws ClassNotFoundException,SQLException {

Class.forName("com.mysql.jdbc.Driver"); Connection con = null;
```

	con=DriverManager.getConnection("jdbc:mysql://localhost/test","root","shashi");
	PreparedStatement pstmt;
	ResultSet rs; String title;
	pstmt = con. prepareStatement("SELECT Price, ISBN, TITLE, AUTHOR, PUBLISHER FROM BOOKS WHERE PRICE<?");
	pstmt.setInt(1,500);
	// Create a PreparedStatement object
	rs = pstmt.executeQuery(); // Get the result table from the query while (rs.next()) { // Position the cursor
	title = rs.getString(3); // Retrieve the Second column value
	System.out.println("Book title= " + title);
	// Print the column values
	}
	rs.close(); // Close the ResultSet
	pstmt.close();// Close the PreparedStatement
	}
	}			

6 (a)	Explain the basic steps involved in a database connection with code snippets. Assume you are connecting to a database named customerDB, username =root and password=”root123” The process used by J2EE components for interacting with a DBMS is divided into the following steps: 1. Loading the JDBC driver • The jdbc driver must be loaded before the J2EE component can be connected to the database. The Class.forName() method is used to load the JDBC driver. • Driver is loaded by calling the method and passing it the name of driver. Eg. If a developer’s J2EE component interacts with Microsoft Access,the routine must load the JDBC/ODBC Bridge driver. Eg. for loading ODBC Driver, Class. forName(“sun:jdbc.odbc.JdbcOdbcDriver”); For loading mysql driver, Class. forName(“com.mysql.jdbc.Driver”); 2. Connecting to the DBMS. • Once the driver is loaded , J2EE component must connect to the DBMS using DriverManager.getConnection() method. • The java.sql.DriverManager class is the highest class in hierarchy and is responsible for managing driver information. getConnection() method, takes three arguments ,the URL of the database, User, Password of the DBMS. • It returns a Connection interface object that is used through out the process to reference a database . The java.sql.Connection interface object sends the statements to the DBMS for processing.	[7]	CO5	L2

	Class. forName("com.mysql.jdbc.Driver"); Connection con= DriverManager.getConnection("jdbc:mysql://localhost/user","root",“tiger"); Here user is database name, root is username of DBMS tiger is password of DBMS Once a connection is obtained, we can interact with the database. The JDBC Statement, CallableStatement, and PreparedStatement interfaces define the methods and properties that help to send SQL or PL/SQL commands and receive data from our database. They also define methods that help bridge data type differences between Java and SQL data types used in a database. Summary of each interface's purpose to decide on the interface to use. Statement Use this for general-purpose access to your database. Useful when you are using static SQL statements at runtime. The Statement interface cannot accept parameters. PreparedStatement Use this when you plan to use the SQL statements many times. The PreparedStatement interface accepts input parameters at runtime. CallableStatement Use this when you want to access the database stored procedures. The CallableStatement interface can also accept runtime input parameters Step 3: Creating and Executing a statement. • The next step after the JDBC is loaded and connection is successfully made with a particular database managed by the DBMS is to send a SQL query to the DBMS for processing. • SQL query consists series of SQL commands that direct DBMS to do something ,For Example Return rows of data to the J2EE component. A Statement is an interface that represents an SQL statement. The Connection object's createStatement( ) method is used to create a Statement object to execute a SQL statement. • Connection.createStatement() method is used to create a Statement Object. • The Statement object is then used to execute a query and return a ResultSet object that contains the response from the DBMS .			
(b)	What is a connection pool? Discuss advantages of a connection pool. In a connection pool, connecting to a database is performed on a per – client basis. That is, each client must open its own connection to a database and the connection cannot beshared with unrelated clients. • For example, a client that needs to frequently interact with a database must either open a connection and leave the connection open during processing, or open or closeand reconnect each time the client needs to access the database. • Leaving a connection open might prevent another client from accessing the databaseshould the DBMS have available a limited number of connections. • Connecting and reconnecting a simply time – consuming and causes performancedegradation.	[03]	CO5	L2

7 (a)	List and explain various statement objects in JDBC Once a connection to the database is opened, the J2EE component creates and sends a query to access data contained in the database. Once a connection to the database is opened, the J2EE component creates and sends a query to access data contained in the database. There are three Statement objects: Statement Executes a query immediately. PreparedStatement Used to execute a compiled query. CallableStatement Used to execute store procedures. The Statement object is used whenever a J2EE component needs to immediately execute a query without first having the query compiled. The Statement object contains the executeQuery( ) method, which is passed the query as an argument. The query is then transmitted to the DBMS for processing. The executeQuery( ) method returns one ResultSet object that contains rows, columns, and metadata that represent data requested by query. The ResultSet object also contains methods that are used to manipulate data in the ResultSet. The execute( ) method of the Statement object is used when there may be multiple results returned. A third commonly used method of the Statement object is the executeUpdate( ) method. The executeUpdate( ) method is used to execute queries that contain UPDATE and DELETE SQL statements, which changes values in a row and removes a row respectively. The executeUpdate( ) method returns an integer indicating the number of rows that were updated by the query. The executeUpdate( ) is used to INSERT, UPDATE, DELETE statements. A SQL query can be precompiled and executed by using the PreparedStatement object. The query is constructed similar to the queries in previous object. A question mark is used as a placeholder for a value that is inserted into the query after the query is compiled. The callable Statement object is used to call a stored procedure from with in J2EE object. A stored procedure is block of code and is identified by unique name. the code can be written in Transact-C ,PL/SQL. Stored procedure is executed by invoking by the name of procedure. The callableStatementuses three types of parameter when calling stored procedure. The parameters are IN ,OUT,INOUT	[06]	CO5	L2
(b)	Assume there exists a table called “books” with fields isbn(String), title(String), author(String), publisher(String), price(Real) Assume the Connection object “conn” holds a connection to the database in which the table is present.	[04]	CO5	L3

Write a parameterized query to retrieve and display all books whose price is below Rs. 500 (Use PreparedStatement)

```
import java.sql.*; public class Odbc {
public static void main(String[] args)throws ClassNotFoundException,SQLException {
Class.forName("com.mysql.jdbc.Driver");
Connection con = null;
con=DriverManager.getConnection("jdbc:mysql://localhost/test","root","shashi");
PreparedStatement pstmt; ResultSet rs; String title;
pstmt = con. prepareStatement("SELECT Price, ISBN, TITLE, AUTHOR, PUBLISHER FROM BOOKS WHERE PRICE<?");
pstmt.setInt(1,500);
// Create a PreparedStatement object
rs = pstmt.executeQuery(); // Get the result table from the query while (rs.next()) { // Position the cursor
title = rs.getString(3); // Retrieve the Second column value System.out.println("Book title= " + title );
// Print the column values
}
rs.close(); // Close the ResultSet
pstmt.close();// Close the PreparedStatement
}
}
```