BCA Sixth Semester Syllabus

Advance Java with Web Application | BCAC601

MODULES	TOPICS	MARKS

1	**Introduction to Java EE**:
	• Overview of **Java EE** Architecture
	• Difference between **Java SE** and **Java EE**
	• **Role of ... in Web Applications**
	  ○ **JDBC:** Java Database Connectivity.
	  ○ **JSP:** JavaServer Pages.
	  ○ **Servlets:** Java Servlets.
		5

2	**JDBC (Java Database Connectivity):** • Introduction to **JDBC** • **JDBC Drivers and Architecture** • Connecting to Databases • **Executing SQL Queries** (`SELECT`, `INSERT`, `UPDATE`, `DELETE`) • Use of Statement and Prepared Statement • Result set and Metadata • Transaction management • Batch Processing • `Commit`, `Rollback`, `Save-Point`	12

3	**Java Sever Pages:**
	• Introduction to JSP
	• JSP Lifecycle
	• JSP Syntax and Directives
	• **Scriplet**, **Expression** and D**eclaration**
	• JSP Implicit Objects
	• JSP Directives
	• JSP Action Element
	• Java Beans in JSP
	• Introduction to JSP Expression Language
	• **Introduction to JSTL Core Tags:**
	  ○ `<c:if>`,
	  ○ `<c:choose>`,
	  ○ `<c:when>`,
	  ○ `<c:otherwise>`,
	  ○ `<c:forEach>`,
	  ○ `<c:forTokens>`,
	  ○ `<c:param>`,
	  ○ JSTL Functions
	• Custom Tag Library
		15

4	**Servlet:** • Introduction to **Servlets** • **Servlet Life Cycle** • Handling **HTTP Request** and **Responses** • **Purpose** and **Use** of **Servlet Deployment Descriptor File** • `ServletContext` and `ServletConfig` • **Session Management** and **Cookie** • Servlet **Chaining** and **Filters** • **File Upload** and **Download** in **Servlet**	15
5	**JSP and Servlet** • Combining **JSP** and **Servlets** • **Model-View-Controller** Architecture • Forwarding requests between **JSP** and **Servlet**	12

6	**Overview of Hibernate Framework**
	• Advantages of ORM over JDBC
	• Hibernate Architecture and Core Components
	• Setting Up Hibernate in a Java Application
	• Mapping Java Classes to Database Tables
	• Hibernate Configuration (**XML and Annotations**)
	• Basic **CRUD** Operations:
	  ○ **Save**
	  ○ **Update**
	  ○ **Delete**
	  ○ **Retrieve**
	• Hibernate Query Language (**HQL**) Basics
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Advance Java with Web Application LAB | BCAC691

Suggested Lab Question:

Case Study 1: Online Bookstore Application

You are tasked to develop an Online Bookstore web application. The application should allow users to browse books, search for books by title or author, view details, and place orders. Admin users should be able to add, update, or delete book records.

Lab Questions:

1. **Servlet Basics**:
   - Create a servlet to display the list of books from a database on a web page.
   - Implement a servlet to handle user searches by book title or author.
2. **Session Management**:
   - Implement session tracking to maintain the user's cart.
   - Use `HttpSession` to store the list of books added to the cart.
3. **JDBC Integration**:
   - Write a Java program to connect to a database and fetch book records.
   - Use Prepared Statement to insert, update, and delete book details securely.
4. **JSP for Dynamic Pages:**
   - Create a JSP page to display the shopping cart's content dynamically.
   - Use JSTL (Java Server Pages Standard Tag Library) for iteration and conditional rendering.
5. **MVC Architecture**:
   - Implement the **Model-View-Controller** pattern for the application.
   - Separate business logic (**Model**) from the presentation (**View**) and control logic (**Controller**).
6. **Form Validation and Error Handling:**
   - Create a user registration form with validation (*e.g., email, password strength*) using JSP and servlets.
   - Implement error handling for invalid user input or database connection issues.

Case Study 2: Employee Management System

Develop a web-based Employee Management System where employees can log in to view their profiles, and administrators can manage employee records.

Lab Questions:

1. **Login Authentication:**
   - Create a login servlet to authenticate users based on username and password stored in a database.

- Redirect users to different pages based on their roles (**e.g., Employee or Admin**).

2. **CRUD Operations with JDBC:**
   - Write servlets to add, update, view, and delete employee records in a database.
   - Ensure proper validation and error handling for all database operations.
3. **Pagination and Sorting:**
   - Implement pagination to display employee records on the admin dashboard. Add sorting functionality for columns like Name, Department, and Salary.
4. **Email Notification:**
   - Use `JavaMail` API to send an email notification to employees upon record creation or updates.
5. **Deployment on Apache Tomcat**:
   - Package the application as a WAR file and deploy it on the Apache Tomcat server.
   - Test the application's functionality in a live environment.

UNIX and Shell Programming | BCAC602

MODULES	TOPICS	MARKS
1	**Introduction to UNIX** • Introduction to UNIX • Discuss About POSIX • Discuss About Linux • Most Popular Distributions of Linux • Compare Between the UNIX and Linux • UNIX System Architecture • Discuss About the UNIX Kernel and System Call Interface • UNIX Directory Structure	5
2	**UNIX File Commands** • Create Directory • Change Directory • Move and Copy Directory • Create File • Remove File • Remove Directory • Listing Directory Information • Discuss About the Types of Files • Change File Security • Creating the Empty File and Change the Timestamp • Discuss the Access Time, Modification Time and Change Time • Touch With `d` and `t` Option • Finding the Files and Directories • Soft Link and Hard Link • Discuss About i Node • Size of File System • Use of > and >> • Use of Pipe and Tee Command	12
3	**Row Wise and Column Wise Selection** • Row Wise and Column Wise Selection from the File with Different Options • Merge Lines of Files Horizontally with Different Options • Split Large Files into Smaller Files • Counting Number of Lines, Words, Characters • Sorting the Content of the File According to the Specific Column • Numerical Sorting • Comparing Two Files Line by Line • Compare Two Files Character by Character	14

	• Compare Two Sorted Files • Join the Two Files • The Uniq Command • The Transformation Command	
4	**Utility Command** • `cal` • `date` • `pr` • `who` • `bc` • `echo` • `zip` • `unzip` • `gzip` Commands • Archiving the File	

5	**VI Editor:**
	• Overview of VI Editor as a text editor in Unix/Linux
	• Basic mode operations in VI (*Command mode, Insert mode, and Last-line mode*)
	• **Basic Operations in VI Editor:**
	  ◦ **Starting VI**: Opening and editing files using vi filename
	  ◦ **Navigation**: Moving the cursor (`h, j, k, l, arrow keys`, etc.), Moving by word, line, or page
	• **Text Editing:**
	  ◦ Inserting text in insert mode (`i, I, a, A, o, O`)
	  ◦ Deleting text (`x, dd, dw, D`, etc.)
	  ◦ Copying and pasting (`yy, pp, p, P`)
	  ◦ Undo and redo changes (`u, Ctrl+r`)
	• **Working with Files:**
	  ◦ Saving and Exiting
	  ▪ Saving files: `:w, :w` filename
	  ▪ Exiting: `:q, :q!` (force quit without saving)
	  ▪ Saving and quitting together: `:wq, ZZ`
	• **File Operations:**
	  ◦ Opening a new file: `:e filename`
	  ◦ 2 5 (kept exactly as given)
	• **Search and Replace:**
	  ◦ Searching forward and backward, using regular expressions for searching
	• **Replace:**
	  ◦ Replacing text using `:s/old/new/g`
	  ◦ Global search and replace in a file
		5

6	**Advanced File Searching Using `GREP` and `AWK`:** • Searching the file with pattern using `grep` and `awk` command	15

	• Advance searching the file with `grep` • `awk` command with print and printf • `awk` with comparison operator • `awk` with arithmetic operator • `awk` begin and else section • Begin and end section • if else statement • Built in variable `fs` and `ofs` • `awk` with string and arithmetic functions • Use of loops • Use of searching and substitute function	
7	**Process in UNIX** • Process in UNIX • Discuss the Process Command with Different Options • Discuss About the `init` Process and **UNIX** Login Process • Discuss Briefly the `fork()`, `getpid()`, `getppid()`, `wait()`, Zombie Process • `pipe()` and `message()` • Discuss **UNIX** Process States and the Diagram • Discuss About the Scheduler Used in **UNIX** • Swapped Memory • Discuss About the `vmstat` and `top` Command • Discussion About the `nice` Command	9
8	**Shell Programming** • Introduction of Shell and Types of Shell • Use of Shell • System Variables and User Defined Varibles • Use of Single and Double Quote and Backslash • Command Substitution • `let:` Assigning and Evaluation the Expression • Take Input from the User • Command Line Parameters • Use of if Statement • Use of for, while and until Loop • Observe the Exit Status	10

Unix and Shell Programming LAB | BCAC692

Direct Lab Questions

1. **Basic UNIX Commands**
   - List all files in a directory along with their permissions and ownership.
   - Display the top 10 largest files in a directory using `du` and `sort`.
   - Find and replace a specific word in a file using `sed`.
2. **File and Directory Management**
   - Write a shell script to create a directory structure for a project (e.g., Project/Docs, Project/Src, Project/Bin) and verify the structure.
   - Create a script to back up all .txt files in the current directory into a new directory named Backup_<date>.
3. **Process Management**
   - Write a script to list all processes owned by the current user.
   - Create a script to monitor CPU usage and alert the user if it exceeds a specific threshold.
4. **Text Processing**
   - Use awk to extract and display the second and fourth columns from a CSV file.
   - Use grep to find all lines in a file that contain a specific pattern and count the occurrences.
5. **Shell Scripting Basics**
   - Write a shell script to calculate the factorial of a number entered by the user.

Case Study-Based Lab Questions

System Monitoring Tool

Scenario:

Build a shell script-based tool to monitor and report system performance, including disk usage, memory usage, and active processes.

Lab Questions:

1. Write a script to display the following system details:
   - Total and free memory.
   - Disk usage percentage of each mounted partition.
   - Number of active processes.
2. Implement a feature to save the report to a file with a timestamp in the filename (*e.g., System_Report_<date>.txt*).
3. Extend the script to alert the user if disk usage exceeds **80%** or memory usage goes below **10%**.

NETWORKING | BCAC603

MODULES	TOPICS	MARKS
1	**Introduction** • **Definition** of **Networking** • **Importance** of **Networking** • **Components** of the **Network** • **Network Topology**: **LAN**, **MAN**, **WAN** • **Network Topologies** (**Star, Ring, Bus, Mesh**) • **Reference Models**: **OSI** and **TCP/IP Reference Model** • A **Comparison** of the **OSI** and **TCP/IP Reference Models**	6

2	**Physical Layer**
	• Data Transmission Concepts
	• **Transmission Media**:
	  ○ **Guided Media:**
	  ▪ Twisted Pair,
	  ▪ Co-axial Cable,
	  ▪ Optical Fiber
	  ○ **Unguided Media**:
	  ▪ Radio,
	  ▪ VHF,
	  ▪ Microwave,
	  ▪ Satellite,
	  ▪ Infrared
	• **Encoding Schemes**:
	  ○ NRZ,
	  ○ Manchester,
	  ○ Differential Manchester
	• **Multiplexing Techniques**: **FDM**, **TDM**, **WDM**
	• **Switching Techniques**:
	  ○ Circuit Switching,
	  ○ Packet Switching,
	  ○ Message Switching
		12

3	**Data Link Layer**
	• Data Link Layer Issues
	• **Flow Control**:
	  ○ Stop-and-Wait Protocol,
	  ○ Sliding Window Flow Control
	• **Error Detection Algorithms**:
	  ○ Parity Check,
	  ○ CRC,
		15

	○ Checksum • **Error Correction**: Hamming Code • **Error Control** (***Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Reject ARQ***) • **HDLC** • **Multiple Access Protocols** (*ALOHA, Collision-Free Protocols*) • **IEEE Standards for LAN:** ○ IEEE 802.3, ○ IEEE 802.4, ○ IEEE 802.5	
4	**Network Layer** • **Routing Algorithms:** ○ Shortest Path Algorithm, ○ Flow-Based Routing, ○ Distance Vector Routing, ○ Broadcast Routing, ○ Multicast Routing • **IP Addressing**: ○ IPv4, IPv6 • **Subnetting** and **CIDR** • **Routing Protocols**: ○ **RIP**, ○ **OSPF**, ○ **BGP** • **NAT** and **ICMP**	12
5	**Transport Layer** • Functions of Transport Layer • **Protocols**: TCP (*3-Way and 4-Way Handshaking*), UDP • Port Addressing • **Congestion Control Mechanisms**: Leaky Bucket, Token Bucket	10
6	**Application Layer Protocols** • `DNS, HTTP, HTTPS, FTP, SMTP, POP3, IMAP` • **Network Applications**: ○ **Remote Login** (**Telnet, SSH**) ○ **File Sharing** (**NFS, SMB**) • Domain Name Server • Simple Network Management Protocol	10
7	**Emerging Networking Concepts** • Cloud Networking Basics • Internet of Things (**IoT**) • **Networking Protocols**: ○ **MQTT, CoAP** • Software-Defined Networking (**SDN**) Concepts	5

CUSTOMER RELATIONSHIP MANAGEMENT | MIM601

UNIT	TOPICS	% QA
1	**Evolution of Customer Relationship Management** • Evolution of Customer Relationship Management • CRM – Definition • Emergence of CRM Practice • Factors Responsible for CRM Growth • CRM Process • Framework of CRM • Benefits of CRM • Types of CRM • Scope of CRM • Customer Profitability • Features and Trends in CRM • CRM and Cost–Benefit Analysis • CRM and Relationship Marketing	15
2	**CRM Concepts** • Customer Value • Customer Expectation • Customer Satisfaction • Customer Centricity • Customer Acquisition • Customer Retention • Customer Loyalty • Customer Lifetime Value • Customer Experience Management • Customer Profitability • Enterprise Marketing Management • Customer Satisfaction Measurements • Web-Based Customer Support	20

3	**Planning for CRM**
	• Planning for CRM
	• **Steps in Planning**
	  ○ Building Customer Centricity
	  ○ Setting CRM Objectives
	  ○ Defining Data Requirements
	  ○ Planning Desired Outputs
	  ○ Relevant Issues While Planning the Outputs
	• Elements of CRM Plan
	• **CRM Strategy**
		15

	○ The Strategy Development Process ○ Customer Strategy Grid	
4	**CRM and Marketing Strategy** • CRM and Marketing Strategy • CRM Marketing Initiatives • Sales Force Automation • Campaign Management • Call Centres • Practice of CRM ○ CRM in Consumer Markets ○ CRM in Services Sector ○ CRM in Mass Markets ○ CRM in Manufacturing Sector	25
5	**Implementation of CRM** • Implementation of CRM • Issues and Problems in Implementing CRM • Information Technology Tools in CRM • Challenges of CRM Implementation • CRM Implementation Roadmap • Road Map (RM) Performance • Measuring CRM Performance • CRM Metrics	25

Career Planning and Management | MIM602A

UNIT	TOPICS	% QA
1	**Introduction to Career Planning** • Define the Starting Point • Career Anchors • Behavioural Models • Personality Typology	20
2	**Behavioural Traits** • Identification of Behavioural Traits • Understanding Key Traits such as Adaptability, Leadership, and Communication • Organizational Culture • Fostering Teamwork and Enhancing Workplace Harmony • Corporate Competencies • Problem-Solving with Competencies that Drive Career Success and Organizational Performance	30
3	**Choosing Your Career** • Researching and Clarifying Company Preferences • Creating a Company Profile • Making Contact with Companies • Understanding Company Functions • Developing the Resume • Preparing Yourself for Interview	20
4	**Career Development** • Theories and Models of Career Development • Career Counselling and Decision-Making • Conceptualizing the Interrelationships Among Work, Mental Well-Being, Relationships, and Other Life Roles • Utilizing Career and Vocational Information Resources, Technologies, and Systems • Strategies for Career Development Program Planning, Organization, Implementation, and Administration	30