VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

JNANASAGARA CAMPUS, BALLARI-583 105

Department of Studies in Computer Science

SEP: Credits Structure under Choice based Credit System [CBCS]

Syllabus of III & IV Semester

Bachelor of Science

With effect from 2024-25 Onwards

Approved in the BOS dated 25.03.2025

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VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Semester	Major 1 (A)	Major 2 (B)	Major 3 (C)	Elective /Optional	Language	Compulsory / Skill Courses	Total Credits
1	-	-	Programming in C (6) (L:T:P = 4:0:4)	-	-	Constitution of India (2) (L:T:P = 2:0:0)	26
2	-	-	Data Structures Using C (6) (L:T:P = 4:0:4)	-	-	Environmental Science (2) (L:T:P = 2:0:0)	26
3	-	-	OOPS Oriented Programming using Java (6) (L:T:P = 4:0:4)	-	-	SEC-1 (2) Web Development using JSP:C1 (L:T:P = 1:0:2)	26
4	-	-	Database Management Systems (6) (L:T:P = 4:0:4)	-	-	SEC-2 (2) ETL Tool:C2 (L:T:P = 1:0:2)	26
5	-	-	Python Programming(6) (L:T:P = 4:0:4)	Software Engineering: C1 (2) (L:T:P = 2:0:0)	-	SEC-3 (2) Elementary Research Methodology (L:T:P = 2:0:0)	22
6	-	-	R-Programming (6) (L:T:P = 4:0:4)	Cyber Security: C2 (2) (L:T:P = 2:0:0)	-	Elementary Research Project (2)	22
Total	**-**	**-**	**36**	**04**	**-**	**12**	**148**
						Total 148 Credits	

Note:

1. The curriculum for all Courses except L1, L2, Constitutional Values, Environmental values and Elementary Research Methodology will be framed by the respective Board of Studies (A/B/C). Here for example A – Physics, B – Chemistry and C – Mathematics.

2. The Curriculum for Languages L1 & L2 will be framed by respective Board of Studies (BoS) (Example Kannada/ English/ Hindi/ Sanskrit/ Telugu etc.).

3. The curriculum for Constitutional values will be framed by Board of Studies (BoS) in Political Science.

4. The curriculum for Environmental Science will be framed by special/common Board of Studies (BoS) set up by the University.

5. The curriculum for Elementary Research Methodology will be set by special/common Board of Studies (BoS - Faculty of Science & Applied Science) set up by the University.

Semester - III

Course Title: Object Oriented Programming Using Java	Course Code: 24MJCS3L
Total Contact Hours: 56	No. of Credits: 04
L:T:P:4-0-0	Duration of SEE: 03
Internal Assessment Marks: 20	Semester End Exam Marks: 80

Course Outcomes (COs):
• Understand the features of Java and the architecture of JVM
• Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done
• Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
• The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
• Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

Unit	Description	Hours
1	**Introduction to Java:** Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.	10
2	**Objects and Classes:** Basics of objects and classes in java, Constructors, Finalize, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	10
3	**Inheritance and Polymorphism:** Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	12
4	**Event and GUI programming:** Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.	12
5	**I/O programming:** Text and Binary I/O, Binary I/O classes, Object I/O,RandomAccess Files.**Multithreading in java:**Thread life cycle andmethods, Runnable interface,Threadsynchronization,Exception handling with try catch-finally,Collections in and java Introduction to JavaBeans NetworkProgramming	12

References:

1. Programming with Java, By E Balagurusamy – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall
3. Object Oriented Programming with Java : Somashekara, M.T., Guru, D.S., Manjunatha, K.S
4. Java 2 - The Complete Reference – McGraw Hill publication.

Java - The Complete Reference, 7th Edition, By Herbert Schildt– McGraw Hill publication

Course Title: Object Oriented Programming Using Java (LAB)	Course Code: 24MJCS3P
L:T:P: 0-0-4	Duration of SEE: 03
Internal Assessment Marks: 10	No. of Credits: 02
Semester End Exam Marks: 40	

Course Outcomes (COs):
• Apply Java programming concepts to real-world problems and scenarios.
• Develop Java applications for various domains, including web development, mobile app development, and desktop applications.
• Integrate Java with other technologies, including databases, web services, and messaging systems.

List of Programs

Sl.No	**Experiment / Program**
1	Program to assign two integer values to X and Y. Using the 'if' statement the output of the program should display a message whether X is greater than Y.
2	Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)
3	Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
4	Program to perform mathematical operations. Create a class called Add Sub with methods to add and subtract. Create another class called MulDiv that extends from Add Sub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.
5	Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values
6	Program a. To find the area and circumference of the circle by accepting the radius from the user. b. To accept a number and find whether the number is Prime or not
7	Program to create a student class with following attributes; Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.
8	In a college first year class are having the following attributes Name of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class
9	Program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority.

10	Create a package ‘student. Fulltime. B.Sc ‘in your current working directory a. Create a default class student in the above package with the following attributes: Name, age, sex. b. Have methods for storing as well as displaying
11	Demonstrate the various mouse handling events using suitable example.
12	Program to handle Null Pointer Exception and use the “finally” method to display a message to the user.
13	Program to handle Null Pointer Exception and use the “finally” method to display a message to the user
14	Program which create and displays a message on the window
15	Program to draw several shapes in the created window
16	Program to create an applet and draw grid lines

Course Title: Web Development using JSP	Course Code: 24MJCS3S
Total Contact Hours: 26	No. of Credits: : 02
L:T:P: 1-0-2	Duration of SEE: 01
Internal Assessment Marks: 10	Semester End Exam Marks: 40

Course Outcomes (COs):
• Develop dynamic, data-driven web applications using JSP, incorporating its syntax, directives, and actions effectively.
• Able to process user input through forms, manage sessions, and handle cookies and client-server interactions proficiently.
• Implement file uploads, data handling, page redirects, and dynamic features such as auto-refresh and hits counters in JSP applications.
• Ensuring security in JSP applications, using JSTL for efficient tag handling, and applying best practices in email handling and session tracking.

Unit	Description	Hours
1	**Introduction to JSP**: Overview, Environment set up of JSP, Architecture of JSP,Life cycle of JSP, Syntax of JSP, Directives of JSP, Actions of JSP	6
2	**Overview of JSP Form**: Implicit objects of JSP, Client response, Server response, HTTP Status Code, Form Processing, Writing Filters, Cookies Handling, Session Tracking. **File Handling with JSP**: File uploading, Handling Data, Page re-direct, Hits counter, Auto refresh, Sending E-mail, Standard Tags library, Security.	7
3	**JSP Environment Setup:** Ensure **JDK**, **Tomcat**, and **Eclipse/NetBeans** are installed. Place .jsp files in Tomcat's webapps/ROOT folder**.** 1. Write a simple JSP program to create Syntax. 2. Write a simple JSP program to create JSP Actions. 3. Write a simple JSP program to create a Form Handling (GET/POST). 4. Write a JSP progam to create Client & ServerResponse 5. Write a simple JSP program to create Client & Server Response. 6. Write a simple JSP program for cookies Handling . 7. Write a simple JSP program for file Handling File Upload . 8. Write a simple JSP program for file Handling Hit Counter 9. Write a simple JSP program for file Handling Auto Refresh. 10. Write a simple JSP program for Session Tracking. 11. Write a simple JSP program for Writing Filters.	

References:

1. JSP: The Complete Reference, Phil Hanna, McGraw-Hill.
2. Head First Servlets and JSP, Bryan Basham, Kathy Sierra, Bert Bates, O'Reilly Media, 2008

Semester - IV

Course Title: DATABASE MANAGEMENT SYSTEM	Course Code: 24MJCS4L
Total Contact Hours: 56	No. of Credits: 04
L:T:P: 4-0-0	Duration of SEE: 03
Internal Assessment Marks: 20	No. of Credits: 04
Semester End Exam Marks: 80	

Course Outcomes (COs):
• Explain the various database concepts and the need for database systems.
• Identify and define database objects, enforce integrity constraints on a database using DBMS.
• Demonstrate a Data model and Schemas in RDBMS.
• Identify entities and relationships and draw ER diagram for a given real-world problem.
• Convert an ER diagram to a database schema and deduce it to the desired normal form.
• Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
• Explain the transaction processing and concurrency control techniques.

Unit	Description	Hours
1	**Database Architecture:** Introduction to Database system applications. Characteristics and Purpose of database approach. People associated with Database system. Data models. Database schema. Database architecture. Data independence. Database languages, interfaces, and classification of DBMS.	10
2	**E-R Model:** Entity-Relationship modeling: E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationship between the entities. Relationship types, roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E – R diagram.	10
3	**Relational Data Model:** Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. **Relational Algebra:** Basic Relational Algebra operations. Set theoretical operations on relations. JOIN operations Aggregate Functions and Grouping. Nested Sub Queries-Views. Introduction to PL/SQL & programming of above operations in PL/SQL	12
4	**ata Normalization:** Anomalies in relational database design. Decomposition. Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	12
5	**Query Processing Transaction Management:** Introduction Transaction Processing. Single user & multiuser systems. Transactions: read & write operations. Need of concurrency control: The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of transactions. Concurrency Control Techniques: Locks and Time stamp Ordering. Deadlock & Starvation.	12

References:

- Fundamentals of Database Systems, RamezElamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
- An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
- Introduction to Database System, C J Date, Pearson, 1999.
- Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
- Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002.

Course Title: DATABASE MANAGEMENT SYSTEM (DBMS) LAB	Course Code: 24MJCS4P
L:T:P:0-0-4	Duration of SEE: 03
Internal Assessment Marks: 20	No. of Credits: 02
Semester End Exam Marks: 80	

Course Outcomes (COs):
• Develop conceptual, logical, and physical database models using ER diagrams and relational schemas**.**
• Write and execute **SQL queries** for creating, modifying, and retrieving data using **DDL, DML, DCL, and TCL commands**.
• Apply primary keys, foreign keys, unique, check, and not null constraints to enforce data integrity.
• Use indexes for improving query performance.
• Design and implement a real-world database project using a front-end and back-end integration**.**

List of Programs

Sl.No	Experiment / Program
1	Execute a single line query and group functions.
2	Execute DDL commands.
3	Execute DML commands.
4	To execute DCL and TCL commands.
5	Implement the nested queries
6	Implement join operations in SQL.
7	Execute view table in SQL
8	In a college first year class are having the following attributes Name of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class
9	Write a PL/SQL procedure for an application using exception handling
10	Write a PL/SQL procedure for an application using functions
11	Write a PL/SQL procedure for an application using package.

Course Title: ETL Tool	Course Code: 24MJCS4S
Total Contact Hours: 26	No. of Credits: : 02
L:T:P: 1-0-2	Duration of SEE: 01
Internal Assessment Marks: 10	
Semester End Exam Marks: 40	

Course Outcomes (COs):
• Data Integration Skills: Students will be able to integrate data from multiple sources, such as databases, files, and applications.
• Data Transformation Skills: Students will be able to transform data into a standardized format, including data cleaning, data aggregation, and data formatting.
• Data Loading Skills: Students will be able to load data into a target system, such as a data warehouse or a database.
• Data Warehousing Skills: Students will be able to design and implement data warehouses using ETL tools.

Unit	Description	Hours
1	**Introduction:** Overview of Data Warehousing, Introduction to ETL (Extract, Transform, Load),Importance of ETL in Data Warehousing, Types of ETL Tools (On-Premise & Cloud-Based),ETL vs ELT, Architecture of ETL Process	**7**
2	Understanding Data Sources (Databases, Files, APIs, etc.),Types of Data Extraction, Connecting to Different Data Sources, Change Data Capture (CDC),Real-time vs Batch Extraction	**6**
	1. Develop an ETL program to extract data from various sources, transform it into a standardized format, and load it into a data warehouse. 2. Create an ETL program to migrate data from an old system to a new system, transforming the data as needed to match the new system's requirements. 3. Develop an ETL program to synchronize data between two or more systems, ensuring that data is consistent and up-to-date across all systems. 4. Create an ETL program to cleanse data by removing duplicates, handling missing values, and correcting errors. 5. Develop an ETL program to aggregate data from multiple sources, summarizing data by grouping, filtering, and sorting. 6. Create an ETL program to validate data against a set of rules, ensuring that data meets specific criteria before loading it into a target system. 7. Develop an ETL program to load data into a database, handling issues such as data type conversions, indexing, and constraint checking. 8. Create an ETL program to load data into a data warehouse, handling issues such as data partitioning, indexing, and aggregation. 9. Develop an ETL program to load data into a big data system, handling issues such as data ingestion, processing, and storage. 10. Develop ETL programs using Informatica PowerCenter to extract, transform, and load data into various target systems.	**13**

References:

1. Ralph Kimball, Margy Ross – *The Data Warehouse Toolkit*

2. Mark Adelhart – *ETL Architecture for Data Integration*

Jiawei Han, MichelineKamber – *Data Mining: Concepts and Technique*

BCA/B.Sc Degree

Examination, SEP – QP –

Pattern

Time: 3 Hours **Max. Marks: 80**

Section – A

Note: Answer all sub questions

Each question carries TWO mark. **(10 x 2 = 20)**

1.

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)

Section – B

Note : Answer any Four questions

Each question carries FIVE marks. **(4 x 5 =20)**

2.
3.
4.
5.
6.
7.

Note : Answer any Four questions

Section – C

Each question carries TEN marks. **(4 x 10 =40)**

8.
9.
10.
11.
12.
13.

Note : 1. For Section –A , Two questions from each Unit.

2. For Section – B , One question from each Unit, and Q-7 must be from Unit 2 to 5.
3. For Section – C , One question from each Unit, and Q-13 must be from Unit 2 to 5.

BCA/B. Sc Degree

Examination, SEP – Scheme for

Practical Examination

1. Writing Two Programs : 14 Marks (for each 7 marks)
2. Execution of Two programs : 16 Marks (for each 8 marks)
3. Practical record : 05 Marks
4. Viva Voce :

05 Marks Total:

40 Marks