2. BCA Semester - V Syllabus

BCA Semester - V (Third Year)

Subject Title : Object Oriented Programming using Java
Subject Code : CAM301-3C
Subject Type : Major

Rationale:

The objective of the Object Oriented Programming through Java is to equip students with a comprehensive understanding of the Java programming language and its applications. Students will learn to design, implement, and debug Java programs while grasping core concepts of Object Oriented programming, Exception handling, and file I/O operations. The course aims to develop proficiency in using Java Collections Framework and creating multithreaded applications. Additionally, students will gain experience in building Graphical User Interfaces (GUIs). Ultimately, the objective is to prepare students for real-world software development challenges and enhance their problem-solving skills through practical projects.

Learning Outcomes:

The Students will be able to:

- Write, compile, run, and test simple Object Oriented Java programs.
- Implement Object Oriented designs with Java.
- Design and program stand-alone Java applications.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Implement Java classes with inheritance.
- Create multi-threading applications.
- Impart hands on experience with Java applet.

Teaching and Evaluation Scheme:

Credit	Duration in Hours		Maximum Marks		
	Theory	Practical	CCE (Formative)	SEE (Summative)	Total
4	30	60	50	50	100

Course Content:

Unit I   [Weightage=25% approx., Lectures=7, Practicals=14]

Introduction to Java: Overview of Java programming language, Features of Java: Platform independence, Object Oriented, etc., Java Development Kit (JDK), Java Runtime Environment (JRE), and Java Virtual Machine (JVM).

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Basics of Java: Java syntax and structure, Data types and variables, Operators: arithmetic, relational, logical, bitwise, Control statements: Conditional statements (if, switch) and loops (for, while, do-while).

Unit II   [Weightage=25% approx., Lectures=8, Practicals=16]
Object Oriented Programming (OOP) Concepts: Classes and Objects, Constructors and Destructors.
Inheritance: Single, Multilevel, Hierarchical.
Polymorphism: Method Overloading and Method Overriding.
Abstraction: Abstract classes and Interfaces.
Encapsulation: Access modifiers.

Unit III   [Weightage=25% approx., Lectures=7, Practicals=14]
Exception Handling: Introduction to exceptions, Types of exceptions: Checked vs. Unchecked, Exception handling using try, catch, finally, throw, and throws, Custom exceptions.
Java Collections Framework: Introduction to Collections, List, Set, Map interfaces, ArrayList, LinkedList, HashSet, TreeSet, HashMap, TreeMap, Iterators and Enumeration, Generics in Collections.

Unit-IV   [Weightage=25% approx., Lectures=8, Practicals=16]
Multithreading: Introduction to threads and concurrency, Creating threads: Extending Thread class and implementing Runnable interface, Thread lifecycle and states, Synchronization: synchronized methods and blocks, Inter-thread communication.
File Handling in Java: Introduction to Input /Output (I/O) in Java, File handling using java.io package, Reading and writing files.
GUI Programming with AWT: Introduction to GUI programming, AWT components: Frames, Panels, Buttons, TextFields.
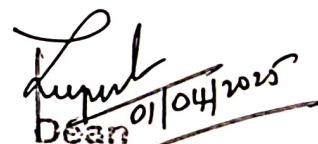
Text Book:
    Programming with Java E Balaguruswamy.

Reference Books:
- Ivor Horton's Beginning Java - Ivor Horton, Wiley Computer Publishing.
- Java: The Complete Reference by Herbert Schildt.
- Head First Java by Kathy Sierra and Bert Bates.
- Effective Java by Joshua Bloch.

Reference Links:
- https://www.javatpoint.com/java-tutorial
- https://www.javatpoint.com/java-ee
- https://www.w3schools.com/java
- https://www.tutorialspoint.com/java

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Practical List:

Introduction to Java
- Set up the Java development environment (JDK, IDE).
- Write a "Hello, World!" program.

Basics of Java
- Create a program to demonstrate data types and variable declarations.
- Implement arithmetic operations and use control statements to perform basic calculations based on user input.

Object Oriented Programming (OOP) Concepts
- Create a class representing a Student with attributes and methods.
- Demonstrate inheritance by creating a Graduate class that extends the Student class.
- Implement method overloading and method overriding in a program.

Exception Handling
- Write a program to handle exceptions using try-catch blocks (e.g., dividing by zero).
- Create a custom exception and use it in a program to validate user input.

Java Collections Framework
- Implement a program that uses an ArrayList to store and manipulate a list of student names.
- Use a HashMap to store and retrieve students' id and name.
- Create a program to demonstrate the use of Set with unique values.
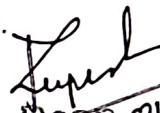
Multithreading
- Create a program that demonstrates creating threads using the Thread class and Runnable interface.
- Implement synchronization in a multi-threaded application (e.g., incrementing a shared counter).

GUI Programming with AWT and Swing
- Create a simple AWT application with buttons and text fields.

File Handling in Java
- Write a program to read data from a text file and display it on the console.
- Create a program to write user input to a text file.

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BCA Semester – V (Third Year)

Subject Title : **Next Generation Database**
Subject Code : **CAM302-3C**
Subject Type : **Major**

Rationale:

NoSQL and MongoDB - the Next Generation Database solutions offer superior scalability and flexibility compared to traditional relational databases, making them ideal for handling large volumes of unstructured data and real-time applications. They support various data models and are optimized for high performance and fault tolerance, which is advantageous for dynamic, evolving applications.

Learning Outcomes:

The Students will be able to:
- Understand NoSQL data models.
- Understand Scalability techniques.
- Understand Schema flexibility.
- Understand Consistency trade-offs, and practical implementation for diverse applications.

Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	30	60	50	50	100

Course Content:

Unit I   **[Weightage=25% approx., Lectures=7, Practicals=14]**

Introduction to NoSQL and MongoDB

Introduction to MongoDB, Overview of Database Types (Relational vs. NoSQL), Use Cases and Advantages of MongoDB.
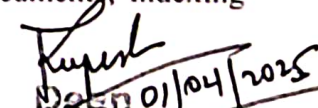
MongoDB Installation and Setup: Installing MongoDB on Various Platforms (Windows, macOS, Linux), Basic Configuration and Startup, MongoDB Shell (mongosh), Overview MongoDB Compass.

Unit II   **[Weightage=25% approx., Lectures=7, Practicals=14]**

MongoDB Architecture: MongoDB Data Model (Documents, Collections), Database Architecture (Replica Sets, Sharding), Storage Engine and Performance.

CRUD Operations: Create, Read, Update, Delete Operations, Querying Documents, Indexing and Performance Tuning.

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Unit III: [Weightage=25% approx., Lectures=8, Practicals=16]

Data Modeling: Schema Design and Best Practices, Embedding vs. Referencing, Normalization and Denormalization.

Designing Schemas: Designing Schemas for Various Use Cases, Implementing Embedded and Referenced Documents, Schema Validation Implementation.

Unit IV: [Weightage=25% approx., Lectures=8, Practicals=16]

Aggregation Framework: Introduction to Aggregation, Pipeline Stages (Match, Group, Project, Sort, etc.), Advanced Aggregation Topics, Building Aggregation Pipelines, Complex Aggregation Scenarios, Performance Tuning for Aggregations.

Text Book:

MongoDB: The Definitive Guide - Kristina Chodorow.
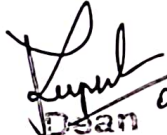
Reference Book:

MongoDB in Action - Kyle Banker.

Reference Link:

MongoDB Official Documentation.

Practical List:

- Installation and Initial Configuration.
- Configuring Replica Sets and Sharding.
- Basic Database Operation.
- CRUD Operations: Creating and Reading Documents.
- Updating and Deleting Documents Practical Querying Exercises.
- Index Creation and Optimization.
- Designing Schemas for various Use Cases.
- Implementing Embedded and Referenced Documents.
- Schema Validation Implementation.
- Building Aggregation Pipelines.
- Complex Aggregation Scenarios.
- Performance Tuning for Aggregations.

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BCA Semester – V (Third Year)

Subject Title : **Software Testing**
Subject Code : **CAM303-3C**
Subject Type : **Major**

Rationale:

The Software Testing is a critical discipline within software engineering, ensuring that software products meet specified requirements the primary goal of this subject is to equip students with the knowledge and practical skills required to effectively test software in diverse environments. It covers both manual and automated testing techniques, providing a strong foundation in understanding the software development lifecycle and its integral connection with testing.

Learning Outcomes:

The Students will be able to:

- Understand the foundational principles of software testing and identify various testing types and their importance throughout the Software Development Life Cycle.
- Design effective test cases using various testing techniques and manage the entire testing process, including planning, execution, and defect management.
- Apply advanced testing techniques and develop automation scripts to ensure the efficiency and scalability of the testing process.
- Evaluate software quality using metrics and adopt emerging testing trends and tools, ensuring compliance with industry standards and legal requirements.

Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	60	-	50	50	100

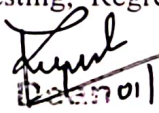## Course Content:

Unit I [Weightage=25% approx., Lectures=15]
Introduction to Software Testing
Basics of Software Testing: Definition and Importance of Testing, Software Development Life Cycle (SDLC) and Software Testing Lifecycle (STLC), Testing Principles, Testing Objectives.
Types of Software Testing: Manual Testing vs. Automation Testing, Static vs. Dynamic Testing, White Box, Black Box, and Grey Box Testing.
Levels of Testing: Unit Testing, Integration Testing, System Testing, Acceptance Testing.
Software Testing Techniques: Verification and Validation, Exploratory Testing, Regression Testing, Smoke and Sanity Testing.

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Unit II [Weightage=25% approx., Lectures=15]

Test Case Design Techniques and Test Management

Test Design Techniques: Equivalence Partitioning, Boundary Value Analysis, Decision Table Testing, State Transition Testing, Use Case Testing.

Test Case and Test Data: Test Case Format and Structure, Writing Effective Test Cases, Test Data Preparation and Management.

Unit III [Weightage=25% approx., Lectures=15]

Advanced Testing Techniques and Software Quality Assurance

Advanced Testing Techniques: Performance Testing (Load, Stress, Volume, Scalability Testing), Security Testing (Penetration Testing, Vulnerability Scanning), Usability Testing, Compatibility Testing (Cross-Browser, Cross-Device).

Software Quality Assurance (SQA): Role of SQA in the Software Development Process, SQA vs. Testing, Quality Control, Quality Assurance, and Process Improvement.

Unit IV [Weightage=25% approx., Lectures=15]

Defect Tracking and Test Planning

Defect Tracking: Bug, Bug Status, Bug Life Cycle Stages, Bug Priority and Severity.

Test Planning: Test Organization, Structure of Testing Group, Test Planning, Detailed Test Design and Test Specifications.

Case Study on Desktop Applications / Web based Application/ Website - Verification, to apply any one Testing Methods on Modulus/Units of Application.

Text Book:

> "Software Testing: Principles and Practices", 2nd Edition, Srinivasan Desikan, Gopalaswamy Ramesh, Pearson Education.

Reference Books:

- Foundation of Software Testing, Aditya P. Mathur, Fifth Edition 2011, Pearson Edition.
- Software Testing Principles and Practices Naresh Chauhan Oxford University Press Publication.
- Software Testing, Yogesh Singh , Cambridge University Press.

Reference Links:

- https://www.javatpoint.com/software-testing-tutorial
- https://www.geeksforgeeks.org/software-testing-tutorial
- https://www.tutorialspoint.com/software_testing/index.htm
- https://artoftesting.com/software-testing-tutorial

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BCA Semester – V (Third Year)

Subject Title : **Enterprise Resource Planning**
Subject Code : **CAE301-3C**
Subject Type : **Minor**

Rationale:

The rationale behind learning about Enterprise Resource Planning (ERP) systems is rooted in the need for organizations to efficiently manage and integrate their business processes, improve decision-making, and maintain a competitive edge in the market.

Learning Outcomes:

The Students will be able to:
- Gain an understanding of ERP systems, including their components and functionalities.
- Learn about different ERP modules (e.g., Finance, Human Resources, Supply Chain Management) and how they integrate to streamline business processes.
- Develop skills in managing change within organizations as they adopt and adapt to ERP systems.
- Learn to troubleshoot and resolve issues related to ERP system performance and functionality.

Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	60	-	50	50	100

Course Content:

Unit - I   [Weightage=25% approx., Lectures=15]

Introduction to ERP: ERP Concept, Reasons for the growth of the ERP Market.
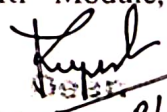**Evolution of ERP**: Conceptual Model of ERP, Evolution of ERP, Structure of ERP: Two-tier Architecture, Three-tier Architecture, Architecture Overview of SAP, R/3 ERP, Architecture Overview of Baan's ERP.
Best Practices in ERP: Concept of Best Practice, Style of Manufacturing: Manufacturing Industries, Project Industries, Service Industries, Demand Management: Introduction to S&OP.

Unit - II   [Weightage=25% approx., Lectures=15]
Basic Functional Modules in ERP: Manufacturing, Distribution, Financial, BoM Module, Financial Accounting Module, Master Production Scheduling Module, MRP Module, CRP Module, Purchase Control Module.

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Unit – III   [Weightage=25% approx., Lectures=15]

ERP Implementation: Implementation Approach, Elements of Implementation Methodology.
ERP Implementation Life Cycle: Objectives of ERP Implementation, Different Phases of ERP Implementation, Reasons for ERP Implementations failure.
ERP Package Evaluation and Selection.

Unit - IV   [Weightage=25% approx., Lectures=15]

ERP Vendor Analysis: Introduction to Major ERP Vendors and their flagship product, SAP, Oracle, PeopleSoft, Baan, J.D. Edwards, Ramco, QAD.
Case Study: Nestle GLOBE Project – A successful implementation of ITC, Oracle ERP implementation at Maruti Suzuki, SIEBEL CRM implementation at Bharti Airtel, i2 Supply Chain solution implementation at Asian Paints.

Text Books:

- Enterprise wide Resource Planning – Theory and Practice by Rahul V Altekar, PHI.
- Enterprise Resource Planning, second edition by Alexis Leon, Tata McGraw Hill.

Reference Books:

- Enterprise Resource Planning (ERP) Text and Case Studies, Mr. C.S.V. Murthy, Himalaya Publication.
- ERP - A Managerial Perspective, S. Sadagopan, McGraw-Hill.

Reference Links:

- https://www.geeksforgeeks.org/introduction-to-erp/
- https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm

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BCA Semester – V (Third Year)

Subject Title   :   **Cyber Security**
Subject Code   :   **CAE302-3C**
Subject Type   :   **Minor**

Rationale:

This syllabus equips students with essential knowledge of cyberspace, cyber security, and e-commerce, addressing foundational concepts, technological infrastructure, and practical security measures. It covers the history and impact of the internet, challenges in cyber security, and best practices for safe digital interactions. Understanding social media dynamics and digital payment systems further prepares students for real-world applications and regulatory compliance.

Learning Outcomes:

The Students will be able to:

- Understand the cyber security threat landscape.
- Analyze and evaluate the importance of personal data its privacy and security.
- Analyze and evaluate the cyber security risks.
- Increase awareness about cyber attack vectors and safety against cyber fraud.
- Take measures for self cyber protection as well as societal cyber protection.

Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	60	-	50	50	100

Course Content:

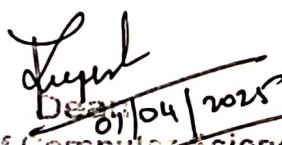**Unit I**   **[Weightage=25% approx., Lectures=15]**

Defining Cyberspace and overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World Wide Web, Advent of internet, Regulation of cyberspace, concept of cyber security, Issues and challenges of cyber security.

Unit II   **[Weightage=25% approx., Lectures=15]**

Classification of cybercrimes, Common cybercrimes: Cybercrime targeting computers and mobiles, Cybercrime against women and children, Financial frauds, Social engineering attacks, Malware and Ransomware attacks, Zero day attacks, Cybercriminals modus operandi, Reporting of cybercrimes, Remedial and mitigation measures.

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Unit III [Weightage=25% approx., Lectures=15]

Introduction to Social networks, Types of Social media, Viral content, Social media privacy, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media.

Unit IV [Weightage=25% approx., Lectures=15]

E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorized banking transactions. Relevant provisions of Payment Settlement Act, 2007 Legal perspective of cybercrime, IT Act 2000 and its amendments.
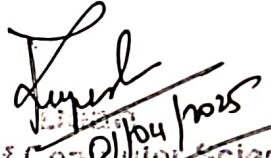
Text Book:

Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole (Wiley India Pvt. Ltd., First Edition, 2011).

Reference Books:

- Cyber Crime Impact in the New Millennium by R. C Mishra (Author Press, Edition 2010).
- Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver (Create Space Independent Publishing Platform, Pearson, 13th November, 2001).
- Electronic Commerce by Elias M. Awad (Prentice Hall of India Pvt. Ltd.).

Reference Links:

- https://www.geeksforgeeks.org/cyber-security-tutorial/
- https://www.javatpoint.com/cyber-security-tutorial

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BCA Semester - V (Third Year)

Subject Title : **Project Work-V**
Subject Code : **SEC301-3C**
Subject Type : **SEC**

Rationale:

Project development as a subject helps them understand and apply the concepts they are learning in different subjects throughout the semester. By studying various theoretical and fundamental concepts, students will be able to reinforce their learning by developing real time or scenario based applications.

Learning Outcomes:

Using PHP, students can initiate web applications or projects, such as building a complete website with PHP and MySQL as the front end and backend. This involves understanding the concepts behind object oriented PHP, including abstraction and inheritance, and learning how to manage RDBMS within an OOP framework. Basic knowledge of PHP, JavaScript, and HTML is required. Projects can be executed in either Core PHP or OOP PHP. These projects help you learn database applications by utilizing concepts like command-line clients, relational database principles, data types, and executing basic DDL and DML queries using SQL, as well as joining tables

Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
2	-	60	25	25	50

Course Content:

Project Work – V   [Weightage=100% approx., Practicals=60]

    I. Title

  II. Scope or Objective

 III. Functional Requirement

      Note: (In-depth Application Specific, also include reference taken from any website or

      some Existing System of any Company).

 IV. Tools & Technology

      Note: (Hardware & Software Requirement).

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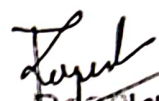Kadi Sarva Vishwavidyalaya
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V. System Design

- Entity Relationship Diagram.
- Data Dictionary.

Note:(Master Table Followed by Transaction Tables, where Sample Data needs to be included, which will show 10 records for each table .Constraints, data types with size and descriptions should be mentioned clearly)

VI. Screen Layouts & coding

Note: (Screen Layouts include Data, Description and if applicable then validation).

Please Note: The Project Work shall be submitted as a Project Work – V Presentation / Report / Project Demonstration.

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