



# School of Computer Science & IT Devi Ahilya Vishwavidyalaya

## SYLLABUS

**BCA 3 years/ BCA (Hons./ Research) 4 years**

### Program Educational Objectives (PEOs)

- PEO 1:** Exhibit a strong inclination towards higher education and actively pursue in continuous development of their professional skills.
- PEO 2:** Develop communication and soft skills to inculcate professionalism for working in cross-cultural and global environment.
- PEO 3:** Build expertise on latest technological trends to bridge gap between industry and academia for better employability.
- PEO 4:** Evolve competency to design and develop computing applications that address the societal needs.

### Program Specific Outcomes (PSOs)

- PSO 1:** Apply knowledge of computing and inter-disciplinary techniques to design and develop quality software applications.
- PSO 2:** Ability to use modern tools and frameworks to create innovative solutions in emerging areas.

## VIII - SEMESTER

## CS-5613: COMPUTER NETWORKS

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### Course Outcomes (COs):

- CO1:** Learn the basic concepts of data communication, computer networks and Internet.
- CO2:** Develop the problem-solving skills required for communication between devices by understanding the design issues and services of various layers in a network architecture.
- CO3:** Apply the knowledge in developing robust and secure IT applications.
- CO4:** Understanding of specific implemented protocols covering the application layer, transport layer, network layer, and link layer of the Internet (TCP/IP) stack.
- CO5:** Understanding security issues.
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### Course Contents

#### UNIT-I

**No. of Hours: 8**

Introduction: Overview, Applications of Computer Networks; Network Hardware – LAN, MAN, WAN and topologies; LAN components – File server, Workstations, Network Adapter Cards; Network Software - Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less services, Service primitives, Relationship between Services and Protocols; Switching Techniques – Circuit Switching and Packet Switching; Reference models – OSI and TCP/IP, comparison and critique of OSI and TCP/IP reference models.

Physical Layer: data communication fundamentals – Signal, bandwidth, data rate, modulation; Guided Transmission media – Twisted pair, Coaxial Cable and Fibre Optics; Wireless transmission – EM spectrum, radio transmission, Microwave transmission, Infrared transmission.

#### UNIT-II

**No. of Hours: 8**

Data Link Layer: Design issues – Services, Framing, Error Control and Flow Control; Error Detection Techniques – Parity Check and Cyclic Redundancy Check (CRC); Error Correction Technique – Hamming code; Elementary Data Link Protocols – Unrestricted Simplex Protocol, Simplex Stop-and-Wait Protocol, Sliding Window protocols:- One-Bit Sliding Window Protocol, protocol using Go Back N and Selective Repeat; HDLC protocol; Data link layer in the Internet – PPP.

#### UNIT-III

**No. of Hours: 8**

Medium Access Sublayer: Channel Allocation problem; Multiple access protocols: Pure Aloha, Slotted Aloha, CSMA Protocols, CSMA/CD, Collision-Free Protocols, CSMA/CA; IEEE MAC Sublayer protocols - 802.2, 802.3; High speed LANs – Fast Ethernet, FDDI; Wireless LANs: IEEE 802.11, IEEE 802.16; Data Link Layer Switching – Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways.

#### UNIT-IV

**No. of Hours: 8**

Network Layer: Design issues; Routing algorithms - Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing; Internetworking; The Network Layer in the Internet - Internet Protocol, Internet addressing and Internet Control protocols.

#### **UNIT-V**

**No. of Hours: 8**

Transport Layer: Transport Service; Elements of transport protocols - Addressing, Connection establishment, Connection release, Flow control and Buffering, Multiplexing; The Internet Transport Protocols - UDP and TCP. Application layer: Client Server Architecture, DNS, WWW and HTTP, E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET.

Network Security: Cryptography, Symmetric Key Algorithms, Public key Algorithms and Digital Signatures.

#### **Text Books:**

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.

#### **Reference Books:**

1. Behrouz A. Forouzan , "Data Communications and Networking", Fourth Edition, McGraw-Hill Publication.

2. William Stallings, "Data and Computer Communications", Eighth Edition, Pearson Education.

3. James F. Kurose & Keith W. Rose "Computer Networking: A Top Down Approach", Fourth Edition, Pearson Education.

4. Douglas E. Comer, "Computer Networks and Internets", Fourth Edition, Pearson Education.

#### **Online Resources:**

## CS-5617: INTERNET AND WEB TECHNOLOGY

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### Course Outcomes (COs):

**CO1:** Use syntax and semantics of java programming language.

**CO2:** Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.

**CO3:** Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.

**CO4:** Developing application using advance java concepts.

**CO5:** Understanding the concepts of MVC architecture.

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### Course Contents

#### UNIT-I

**No. of Hours: 8**

Features of Java, Object-oriented programming overview, Introduction of Java Technologies, How to write simple Java programs, Data Types, Variables, Memory concepts, control statements, looping, Method CallStack and Activation Record, Argument Promotion and Casting, Scope of declaration and Method Overloading, StringHandling: The String constructors, String operators, Character Extraction, String comparison, String Buffer. Arrays: Declaring and Creating Arrays, Enhanced for Statement, Passing Arrays to Method, Multidimensional Arrays, Variable-Length Argument lists, Using Command-line Arguments

#### UNIT-II

**No. of Hours: 8**

Inheritance: Extending classes & related things, Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages Exception Handling: Introduction, overview of doing it and keywords used, when to use it, Multithreading: What are threads, The java Thread model, Thread priorities, Thread life cycle, Thread Synchronization, Applets: Applet basics, Applet Architecture, Applet life cycle methods, Database connectivity: JDBC, The design of JDBC, Typical uses of JDBC

#### UNIT-III

**No. of Hours: 8**

Introduction to HTTP, webServer and application Servers, Installation of Application servers, Config files, Web.xml. JavaServlet, Servlet Development Process, Deployment Descriptors, Generic Servlet, Lifecycle of Servlet, Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet, Various methods of Session Handling, various elements of deployment descriptors.

#### UNIT-IV

**No. of Hours: 8**

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL, java.sql Package, Querying database, adding records, deleting records, modifying records, types of Statement,

Separating Business Logic and Presentation Logic, Building and using JavaBean, Session handling in JSP, Types of errors and exceptions handling.

**UNIT-V**

**No. of Hours: 8**

MVC Architecture Introduction to Remote Method Invocation, Introduction to Enterprise Java Bean, Types of EJB, Creating and working with Session Bean

**Text Books:**

1. Java2:The Complete Reference by Herbert Schildt, Tata McGraw-Hill, 8th Edition, 2011.
2. K. Mukhar, "Beginning Java EE5: From Novice to Professional", Wrox Press.

**Reference Books:**

1. The Java Programming Language, Ken Arnold, James Gosling, David Holmes, 3rd Edition, Person Education, 2000
2. Head First Java, Kathy, Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005

**Online Resources:**

1. NPTEL Course Video Lectures on "Programming in java", By Prof. Debasis Samant, IIT Kharagpur
2. Swayam Course Video Lectures on "Web Technology", By Prof. Dr. Ashutosh Kumar Bhatt

## CS-5617: INTERNET AND WEB TECHNOLOGY-PRACTICAL

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### Course Outcomes (COs):

**CO1:** Able to write real world problem using core java concepts

**CO2:** Apply java concepts like inheritance, polymorphism, interfaces and packages in programming.

**CO3:** Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes

**CO4:** Developing web application using advance java concepts like jdbc, servlet and jsp.

**CO5:** Understanding the concepts of MVC architecture.

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### Course Contents

#### UNIT-I

**No. of Hours: 8**

1. Write a Java program to print 'Hello' on screen and your name on a separate line.
2. Write a Java program to print the sum of two numbers.
3. Write a Java program to divide two numbers and print them on the screen.
4. Write a Java program that takes two numbers as input and displays the product of two numbers.
5. Write a Java program to print the sum (addition), multiply, subtract, divide and remainder of two numbers.
6. Write a Java program to print the area and perimeter of a circle.
7. Write a Java program that takes three numbers as input to calculate and print the average of the numbers.
8. Write a Java program to swap two variables values.
9. Write a Java program to swap two variables values without using third variable.
10. Write a Java program to check whether Java is installed on your computer.
11. Write a Java program to get a number from the user and print whether it is positive or negative.
12. Write a Java program that takes three numbers from the user and prints the greatest number.
13. Write a Java program to find the number of days in a month.
14. Write a Java program that requires the user to enter a single character from the alphabet. Print Vowel or Consonant, depending on user input. If the user input is not a letter (between a and z or A and Z), or is a string of length > 1, print an error message.
15. Write a Java program that takes a year from the user and prints whether it is a leap year or not.
16. Write a program to check whether a number is divisible by 5 and 11 or not.
17. Write a program to check whether a number is even or odd.

18. Write a program to input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and grade.

19. Write a program to input basic salary of an employee and calculate its Gross salary according to following:

Basic Salary  $\leq$  10000 : HRA = 20%, DA = 80%

Basic Salary  $\leq$  20000 : HRA = 25%, DA = 90%

Basic Salary  $>$  20000 : HRA = 30%, DA = 95%

20. Write a program to input electricity unit charges and calculate total electricity bill according to the given condition:

For first 50 units Rs. 0.50/unit

For next 150 units Rs. 0.75/unit

For next 250 units Rs. 1.20/unit

For unit above 250 Rs. 1.50/unit

An additional surcharge of 20% is added to the bill

21. If his basic salary is less than Rs. 1500, then HRA = 10% of basic salary and DA = 90% of basic salary. If his salary is either equal to or above Rs. 1500, then HRA = Rs. 500 and DA = 98% of basic salary. If the employee's salary is input through the keyboard write a program to find his gross salary.

Write a program to calculate the salary as per the following table

Taken From Original file

## UNIT-II

**No. of Hours: 8**

1. Write a java program to create class called Employee with methods called work() and getSalary(). Create a subclass called HRManager that overrides the work() method and adds a new method called addEmployee().

2. Write a java program to create a class known as Person with methods called getFirstName() and getLastName(). Create a subclass called Employee that adds a new methods named getEmployeeID() and override the getLastName() methods to include the employee's job title.

3. Write a java program to create a class known as "BankAccount" with methods called deposit() and withdraw(). Create a subclass called SavingsAccount that overrides the withdraw() method to prevent withdraws if the account balance falls below one hundred.

4. Write a java program to create interface shape with getArea() method. Create three classes Rectangle, Circle and Triangle that implements the shape interface. Implement the getArea() method for each of the three classes.

5. Write a java program to create interface sortable with a method sort() that sorts an array of integers in ascending order. Create two classes Bubblesort and Selectionsort that implement the sortable interface and provide their own implementations of the sort() method.

6. Write a Java program to create an abstract class Animal with an abstract method called sound(). Create subclasses Lion and Tiger that extend the Animal class and implement the sound() method to make a specific sound for each animal.

7. Write a Java program to create an abstract class Employee with abstract methods calculateSalary() and displayInfo(). Create subclasses Manager and Programmer that extend the

Employee class and implement the respective methods to calculate salary and display information for each role

8. Write a Java program to create an abstract class Employee with abstract methods calculateSalary() and displayInfo(). Create subclasses Manager and Programmer that extend the Employee class and implement the respective methods to calculate salary and display information for each role

9. Write a Java program to create a class called "Cat" with instance variables name and age. Implement a default constructor that initializes the name to "Unknown" and the age to 0. Print the values of the variables.

10. Write a Java program to create a class called Student with instance variables studentId, studentName, and grade. Implement a default constructor and a parameterized constructor that takes all three instance variables. Use constructor chaining to initialize the variables. Print the values of the variables

11. Write a Java program to create a basic Java thread that prints "Hello, World!" when executed

12. Write a Java program that performs matrix multiplication using multiple threads.

13. Write a Java program that creates a bank account with concurrent deposits and withdrawals using threads.

14. Write a Java program to create a producer-consumer scenario using the wait() and notify() methods for thread synchronization.

15. Write a Java program to demonstrate Semaphore usage for thread synchronization.

16. Write a simple applet program to display "Hello Applet" Message.

17. Write a applet program to show its life cycle methods.

18. Write a applet program for revolving banner.

19. Connect database to Java program

20. Program to create database table using Java

21. Java Program to insert, update, delete & select records

22. Program to delete record from database

23. Program to execute batch of SQL statements

24. Program to insert date in oracle database

25. Program to insert & read image

26. Program to commit & rollback

27. Program to execute SQL select query

### **UNIT-III**

**No. of Hours: 8**

1. Write a program to create a servlet that displays the welcome message.

2. Create a simple interest calculator web page using a servlet.

3. Develop a dynamic web application using servlets to create and display cookies.

4. Create a registration form and display the values entered by the user in another page using servlets.

5. Write a program using servlets to display data from a database table.

6. Display a servlet that fetches init parameters from web.xml displaying user information.
7. Write a program using servlets to create and display context parameters.
8. Develop a dynamic web application using servlets to demonstrate doGet(), and doPost() methods.
9. Write an application using servlets to show how forward() method works.
10. Also, demonstrate the use of include() method in servlets.
11. Furthermore, show how sendRedirect() method works using servlets.
12. In order to demonstrate the working of servlet filters create a dynamic web application.

#### **UNIT-IV**

**No. of Hours: 8**

1. Write a program in JSP to display the given text in a paragraph in different font sizes using a loop.
2. Create a dynamic web application in JSP to find the grade according to the marks entered by the user using the switch statement.
3. Build an application in JSP to calculate factorial of a number using recursion.
4. Write a program to create a JSP method that accepts a number and returns its double.
5. Use Page directive in JSP to display the current date.
6. Create a summation method in JSP that accepts an array and display the sum of its element.
7. Write a program to create a JSP page called alert message JSP that displays alert messages if username & password fields are blank and displays welcome user otherwise.
8. Develop an application to demonstrate the include directive in JSP to display the current date from another JSP page.
9. Write a program in JSP to display the properties of an object using the useBean directive.
10. Build an application in JSP that redirects to another page.

#### **UNIT-V**

**No. of Hours: 8**

1. Write java program to demonstrate the functionality of RMI.
2. Write java program to show the use of EJB.
3. Write java program to demonstrate the functionality of MVC.
4. Write java program to show the use of session.

#### **Text Books:**

1. Java2:The Complete Reference by HerbertSchildt,TataMcGraw-Hill,8th Edition, 2011.
2. K.Mukhar,“BeginningJavaEE5:From Novice to Professional”, WroxPress.

#### **Reference Books:**

1. The Java Programming Language, Ken Arnold, James Gosling, David Holmes, 3rd Edition, Person Education, 2000
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