MAHARAJAH'S COLLEGE (AUTONOMOUS)::VIZIANAGARAM

I B.Sc. Computer Science Major

		SEMESTER II	L	T	P	C
R23	Major/ Minor	**C3-PROBLEM SOLVING USING C** (w.e.f.2023-24Admitted Batch)	5	3	2	4 (3+1)
		Total Hours -45				

Course Objectives:

1. To explore basic knowledge on computers
2. Learn how to solve common types of computing problems.
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

UNIT-I   9 hrs

Introduction to computer and programming:

Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware-andsoftware,Typesofsoftware,Compilerandinterpreter,ConceptsofMachinelevel,Assembly level and high-level programming, Flowcharts and Algorithms.

Fundamentals of C: History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input/output statements in C-Formatted and Unformatted I/O.

UNIT-II   9 hrs

Control statements:

Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue and go to.

UNIT-III   9 hrs

Derived data types in C:

Arrays: One Dimensional arrays-Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation.

Strings: Declaring& initializing string variables; String handling functions, Character handling functions

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UNIT-IV   9 hrs

Functions: Function Prototype, definition and calling, **return** statement, nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables.

Storage classes: automatic, external, static and register.

Pointers: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.

UNIT-V   9 hrs

Dynamic Memory Management: Introduction, Functions: malloc, calloc, realloc, free.

Structures: Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers.

Unions: Union definition; difference between Structures and Unions.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the working of a digital computer and Fundamental constructs of Programming
2. Analyze and develop a solution to a given problem with suitable control structures
3. Apply the derived data types in program solutions
4. Use the "C" language constructs in the right way
5. Apply the Dynamic Memory Management for effective memory utilization

Text Books:

1. E. Balagurusamy ―"Programming in ANSIC", Tata Mc Graw Hill, 6thEdn, ISBN-13:978- 1-25-90046-2
2. HerbertSchildt,―CompleteReferencewithC,TataMcGrawHill,4thEdn.,ISBN-13:9780070411838, 2000
3. ComputerfundamentalsandprogramminginC,REEMATHAREJA,OXFORDUNIVERSITYPRESS

Reference Books

1. E.Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING–TataMc-GrawHill, Second reprint 2008, ISBN 978-0-07-066909-3.

2. Ashok NK amthane, Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.

3. Henry Mullish & HuubertL.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub.House, 1996.

4. Y.kanithkar, letus C BPB,13th edition-2013,ISBN:978-8183331630,656pages.

Web links:

www.w3schools.com
www.greeksforgreeks.com
www.javatpoint.com
www.programmiz.com
https://onlinecourses.nptel.ac.in/noc24_cs42/preview

C3P-Problem solving using C Lab

(Hours/Week:02   **Total Hours: 30**   **Credits:01)**

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List of Experiments:

1. A. Write a program to calculate simple & compound interest.

    B. Write a C program to interchange two numbers.

2. Find the biggest of three numbers using C.

3. Write a C program to find the sum of individual digits of a positive integer.

4. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and
    1. Subsequent terms are found by adding the preceding two terms in these sequence.

5. Write a C program to check whether a number is Armstrong or not.

6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

7. Write a C program that implements searching of given item in given list.

8. Write a c program that uses functions to perform the following: Addition of two matrices. Multiplication of two matrices.

9. Write a program for length of a string with and without String Handling functions.

10. Write a program to demonstrate Call by Value and Call by Reference mechanism.

Lab Outcomes:
 • Apply and practice logical ability to solve the problems.

 • Understand C programming development environment, compiling, debugging, and linking and •
   executing a program using the development environment

 • Analyzing the complexity of problems, Modularize the problems into small modules and then • convert
   them into programs

 • Understand and apply the in-built functions and customized functions for solving the problems.

 • Understand and apply the pointers, memory allocation techniques and use of files for dealing with
   variety of problems.

 • Document and present the algorithms, flowcharts and programs in form of user-manuals

II B.Sc. Computer Science MINOR

R23		SEMESTER III	L	T	P	C
	Major /Minor	C5 – OBJECT ORIENTED PROGRAMMING USING JAVA (W.e.f.2023-24AdmittedBatch)	5	3	2	4 (3+1)
		Total Hours-45				

Course Objectives:

To introduce the fundamental concepts of Object-Oriented programming.

To design and implement object-oriented programming concepts in Java.

SYLLABUS

UNIT-I   9hrs

OOPs Concepts and Java Programming: Introduction to Object-Oriented concepts, procedural and object-oriented programming paradigm

Java programming: An Overview of Java, Java Environment, Data types, Variables, constants, scope and life time of variables, operators, type conversion and casting, Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(), Control Statements

UNIT-II   9hrs

Arrays, Command Line Arguments, Strings-String Class Methods

Classes & Objects: Creating Classes, declaring objects, Methods, parameter passing, static fields and methods, Constructors, and 'this' keyword, overloading methods and access

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, 'super' keyword, preventing inheritance: final classes and methods, the object class and its methods; **Polymorphism**: Dynamic binding, method overriding, abstract classes and methods;

UNIT-III   9hrs

Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface;

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions,

exception specification, built in exceptions, creating own exception sub classes.

UNIT-IV   9 hrs

Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.
Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, The Console class, Serialization

UNIT-V   9hrs

GUI Programming with Swing- Introduction, MVC architecture, components, containers. Understanding Layout Managers - Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

Course Outcomes:

 Upon successful completion of the course, a student will be able to:

1. Understand the basic concepts of Object-Oriented Programming and Java Program Constructs.

 2. Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch.

 3. Demonstrate various classes in different packages and can design own packages.

4. Manage Exceptions and Apply Threads.

 5. Create GUI screens along with event handling.

Text Books:

> 1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill.

> 2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books

> 1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.

> 2. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.

> 3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford Univ. Press.

Web links:
> www.w3schools.com
> www.greeksforgreeks.com
> www.javatpoint.com
> www.programmiz.com
> www.programmig.com.https://onlinecourses.nptel.ac.in/noc25_cs57/preview

C5P–OBJECT ORIENTED PROGRAMMING USING JAVA

(Hours/Week: 02   Total Hours: 30   Credits:01)

List of Experiments:

1. Write a Java program to print Fibonacci series using for loop.

2. WriteaJavaprogramtocalculatemultiplicationof2matrices.

3. Create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.

4. Write a Java program that implements method overloading and overriding.

5. Write a Java program to implement various types of inheritance.

      i. Single   ii. Multi-Level   iii. Hierarchical   iv. Hybrid

6. Write a Java program which accepts with draw amount from the user and throws an exception ―InSufficient Funds ‖ when withdraw amount more than available amount.

7. Write a Java program to create three threads and that displays―good morning ‖, for every one second,―hello‖ for every 2 seconds and―welcome‖ for every 3seconds by using extending Thread class.

8. Implement a Java program for handling mouse events when the mouse entered, exited, clicked, pressed, released, dragged and moved in the client area.

9. Implement a Java program for handling key events when the keyboard is pressed, released, typed.

10. Write a Java swing program that reads two numbers from two separate text fields and display sum of two numbers in third text field when button―add is pressed.

Lab Outcomes:

Upon successful completion of this course, the students will be able to:

- Able to analyze the necessity for Object Oriented Programming paradigm and• over structured programming and become familiar with the fundamental concepts in OOP.

- Demonstrate an ability to design and develop java programs, analyze, and• interpret object oriented data and report results.

- Demonstrate an ability to design an object oriented system, AWT components or multi-threaded process as per needs and specifications.

- Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs

		SEMESTER IV	L	T	P	C
R23	Major/ Minor	**C9–DATABASE MANAGEMENT SYSTEM** (W.e.f.2023-24AdmittedBatch)	5	3	2	**4 (3+1)**
		Total Hours -45				

Learning Objectives:

To familiarize with concepts of database design.

UNIT-I   9 hrs

Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base, costs and risks of database approach.

UNIT-II   9 hrs

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, **IS A** relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modeling.

UNIT-III   9 hrs

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra,

Limitations of relational algebra, relational calculus, tuple relational calculus, and domain relational Calculus (DRC), Functional dependencies and normal forms up to 3rdNormal form.

UNIT-IV   9 hrs

Structured Query Language: Introduction, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

UNIT-V   9 hrs

PL / SQL: Introduction, Short comings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data

Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL,Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

Learning Outcomes:

On successful completion of the course, students will be able to

1. Differentiate between database systems and file based systems.
2. Design a database using ER model.
3. Use relational model in database design.
4. Use SQL commands for creating and manipulating data stored in databases.
5. Write PL/SQL programs to work with databases.

Text Books:

1. Operating SystemPrinciplesbyAbrahamSilberschatz,PeterBaerGalvinandGregGagne

   (7th Edition)Wiley India Edition.

Reference Books:

1. Database Management Systems by Raghu rama krishnan, McGraw hill
2. Principles of Database Systems by J. D. Ullman
3. Fundamentals of Database Systems by R.ElmasriandS. Navathe
4. SQL: The Ultimate Beginners Guide by Steve Tale.

Web links:

www.w3schools.com
www.greeksforgreeks.com
www.javatpoint.com
www.programmiz.com

https://onlinecourses.nptel.ac.in/noc22_cs91/preview

C9P–DATA BASE MANAGEMENT SYSTEM LAB

(Hours/Week: 02 Total Hours:30 Credits:01)

List of Experiments:

1. Draw ER diagram for hospital administration.

2. Creation of college database and establish relationships between tables.

Questions to be performed on DDL and DML

1. Create employeetablewithPrimaryKeyotherconstraints.AndPopulatethetables with data.
2. Display all the details of all employees working in the company.
3. Display ssn, lname, fname, address of employees who work in department no7.
4. Retrieve the Birth date and Address of the employee whose name is 'Franklin T.Wong.'
5. Retrieve the name and salary of every employee.
6. Retrieve all distinct salary values.
7. Retrieve all employee names whose address is in_Bellaire'
8. Retrieveallemployeesindepartment5whosesalaryisbetween50,000and 60,000 (inclusive).
9. Retrieve the name and address of all employees who work for the 'Research' department.
10. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
11. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
12. Select the names of employees whose salary does not match with salary of any employee in department 10.
13. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
14. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
15. Select the names of employees whose salary is greater than the average salary of all employees in department 10.

Questions to be performed on DDL and DML

1. Write a PL/SQL program to check the given number is palindrome or not.
2. Write a PL/SQL program to display the table of the given number.
3. Write a PL/SQL program to display the employee table using cursor.

Lab Outcomes:

- Students get practical knowledge on designing and creating relational database systems.
- Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger views and embedded SQL.
- Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
- Students will be able to design and implement database applications on their own

MAHARAJAH'S COLLEGE (AUTONOMOUS)::VIZIANAGARAM

II B.Sc. Computer Science Major

		SEMESTERIV	L	T	P	C
R23	Major/ Minor	**C10–OBJECT ORIENTED SOFTWARE ENGI-NEERING** (W.e.f.2023-24AdmittedBatch)	5	3	2	4 (3+1)
		Total Hours -45				

Course Objectives:

To introduce Object Oriented Software Engineering (OOSE) – which is a popular technical approach to analyzing, designing an application, system, or business by applying the object- oriented paradigm and visual modeling.

SYLLABUS

UNIT-I   (9hrs)

Introduction to Object-Oriented Programming: Overview of software engineering, Introductionto Object-Oriented Programming (OOP) concepts (classes, objects, inheritance, polymorphism), Unified Modeling Language (UML) basics, Introduction to software development process and software development lifecycle (SDLC).

UNIT-II   (9hrs)

Requirements Analysis and Design: Requirements analysis and specification, Use cases and scenarios, Object-oriented analysis and design (OOAD), Design patterns, UML modeling techniques (class diagrams, sequence diagrams, state machine diagrams, activity diagrams).

UNIT-III   (9hrs)

Software Construction and Testing: Software construction basics, Object-oriented design principles, Object-oriented programming languages (Java, C++,Python),Software testing basics

(unit testing, integration testing, system testing),Test-driven development (TDD).

UNIT-IV   (9hrs)

Software Maintenance and Evolution: Software maintenance basics, refactoring techniques Software version control, Code review and inspection, Software evolution and reengineering.

UNIT-V   (9hrs)

Advanced Topics in Object-Oriented Software Engineering: Model-driven engineering (MDE), Aspect-oriented programming (AOP), Component-based software engineering (CBSE), Service- oriented archi-

tecture (SOA), Agile software development and Scrum methodologies.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand and apply the fundamental principles of Object-Oriented Programming (OOP) concepts and Unified Modeling Language (UML) basics, in the development of software solutions.
2. Analyze and specify software requirements, develop use cases and scenarios, apply object- oriented analysis and design (OOAD) principles.
3. Familiar with the concept of test-driven development (TDD) and its practical implementation.
4. Analyze and Evaluate Software Maintenance and Evolution Strategies.
5. Apply Advanced Object-Oriented Software Engineering Concepts.

Text Book(s)

1. AnIntroductiontoObject-OrientedAnalysisandDesignandtheUnifiedProcess, 3rdEdition,

   Craig Larman, Prentice-Hall.

2. Programming in Java by Sachin Malhotra, Oxford University Press

Reference Books

1. Requirements engineering: processes and techniques, G.Kotonya and ,I. Sommerville, 1998, Wiley

2. Design Patterns, E.Gamma, R.Helm,R. Johnson,andJ. Vlissides.

3. The Unified Modeling Language Reference Manual, J.Rumbaugh, I.Jacobson and G.Booch,

   Addison Wesley

Web links:

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www.greeksforgreeks.com
www.javatpoint.com
www.programmiz.com
https://onlinecourses.nptel.ac.in/noc25_cs34/preview

C10P–OBJECT ORIENTED SOFTWARE ENGINEERING LAB

(Hours/Week: 02   TotalHours:30   Credits:01)

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List of Experiments:

Suggested Software Tools: StarUML/ UMLGraph / Topcased / Umberollo / Argo UML/ EclipseIDE,Visual Paradigm for UML/Rational Software Architect/Any other Open Source Tool.

List of Experiments:

Select domain of interest (e.g. College Management System) and identify multi-tier software application to work on (e.g. Online Fee Collection). Analyze, design and develop this application using OOSE approach:

1. DevelopanIEEEstandardSRSdocument.Alsodevelopriskmanagementandproject plan (Gantt chart).

2. Understanding of System modeling: Data model i.e.ER–Diagram and draw the ER diagram with generalization, specialization and aggregation of specified problem statement.

3. Understanding of System modeling: Functional modeling: DFD level 0 i.e. Context Diagram and draw it.

4. Understanding of System modeling: Functional modeling: DFD level1 and DFD   level2 and draw it.

5. Identify use cases and develop the use case model.

6. Identify the business activities and develop an UML Activity diagram.

7. Identity the conceptual classes and develop a domain model with UML Class diagram.

8. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.

9. Draw the state chart diagram.

10. Identify the user interface, domain objects, and technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.

11. Implement the technical services layer.

12. Implement the domain objects layer.

13. Implement the user interface layer.

14. Draw component and deployment diagrams.

	SEMESTER-V	L	T	P	C
R23	**Course 13: Web Applications Development using PHP & MYSQL** **(w.e.f. 2023-24 Admitted Batch)**	5	3	2	**4** **(3+1)**
	Total Hours - 45				

Learning Objectives:

To enable students to understand open-source tools to create dynamic web pages, implement user interactivity, and gain proficiency in developing web sites

UNIT-I   (9 hrs)
The building blocks of PHP: Variables, Data Types, Operators and Expressions, Constant.**Flow Control Functions in PHP**: Switching Flow, Loops, Code Blocks and Browser Output.**Working with Functions:** Creating functions, Calling functions, Returning the values from User- Defined Functions, Variable Scope, Saving state between Function calls with the static statement,arguments offunctions

UNIT-II   (9 hrs)
Working with Arrays: Creating Arrays, Some Array-Related Functions.
Working with Objects: Creating Objects, Accessing Object Instances, **Working with Strings**,**Dates and Time:** Formatting strings with PHP, Manipulating Strings with PHP, Using Date andTime Functions in PHP.

UNIT-III   (9 hrs)
Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and **Working with File Uploads**, Managing files on server,**Exception handling.**

UNIT-IV   (9 hrs)
Working with Cookies and User Sessions: Introducing Cookies, setting a Cookie with PHP, Session Function Overview, starting a Session, working with session variables, passing session IDs inthe Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

UNIT-V   (9 hrs)
Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, connecting to MySQL with PHP, Working with MySQL Data. Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism.

Learning Outcomes: On successful completion of the course, students will be able to

1. Write simple programs in PHP.

2. Understand how to use regular expressions, handle exceptions, and validate data usingPHP.

3. Apply In-Built functions and Create User defined functions in PHP programming.

4. Write PHP scripts to handle HTML forms.

5. Know how to use PHP with a MySQL database and can write database driven web pages.

Text Book(s)
1. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, Pearson Education (2007).
2. Steven Holzner , PHP: The Complete Reference, McGraw-Hill

Reference Books
1. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition O'reilly,2014
2. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson (2006).

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> www.programmiz.com
> https://onlinecourses.swayam2.ac.in/aic20_sp32/preview

V Semester
Course 13: Web Applications Development using PHP & MYSQL
LIST OF PRACTICAL EXPERIMENTS

1. Write a PHP program to Display "Hello"

2. Write a PHP Program to display the today's date.

3. Write a PHP program to display Fibonacci series.

4. Write a PHP Program to read the employee details.

5. Write a PHP program to prepare the student marks list.

6. Create student registration form using text box, check box, radio button, select, submit button.Anddisplay user inserted value in new PHP page.

7. Create Website Registration Form using text box, check box, radio button, select, submitbutton.And display user inserted value in new PHP page.

8. Write PHP script to demonstrate passing variables with cookies.

9. Write a PHP script to connect My SQL server from your website.

10. Write a program to keep track of how many times a visitor has loaded the page.

11. Write a PHP application to perform CRUD (Create, Read, Update and Delete) operations on a database table.

12. Create a web site using any open-source framework built on PHP and MySQL – It is a team activity wherein students are divided into multiple groups and each group comes up with theirown website with basic features.

Lab Outcomes:

- Develop program using control statement
- Perform operation based on arrays and graphics
- Develop programs by applying various object oriented concepts.
- Use form controls with validation to collect user's input.
- Perform database operations in PHP.

	SEMESTER-V	L	T	P	C
R23	**Minor**	**Course 6: Internet of Things** **(w.e.f. 2023-24 Admitted Batch)**	5	3	2	**4** **(3+1)**
		Total Hours - 45				

Learning Objectives:

To enable students to understand basic IoT constructs, create IoT solutions to real world problems using IoT

UNIT – I   9hrs

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

UNIT – II   9hrs

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

Unit – III   9hrs

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet and Modbus.

IP Based Protocols for IoT: IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols.

Unit – IV   9hrs

Arduino Simulation Environment: Arduino Uno Architecture, Setting up the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.

Sensor & Actuators with Arduino: Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensors with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino.

Unit – V   9hrs

Developing IOT's: Implementation of IoT with Arduino, Connecting and using various IoT Cloud Based Platforms such as Blynk, Thingspeak, AWS IoT, Google Cloud IoT Core etc. Cloud Computing, Fog Computing, Privacy and Security Issues in IoT.

Learning Outcomes: On successful completion of the course, students will be able to

1. Understand various concepts, terminologies and applications of IoT
2. Learn how to build IoT devices with development boards
3. Understand various Wireless protocols for IoT
4. Learn how to use various sensors and actuators & develop IoT solutions using Arduino
5. Develop and Connect IoT with Cloud Platforms.

Text Book(s)

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti,Universities Press, 2015, ISBN: 9788173719547
2. Sudip Mishra, Anandarup Mukherjee, Arijit Roy: Introduction to IOT, CambridgeUniversity Press.
3. Internet of Things- Dr Surya Durbha & Dr Jyoti Joglekar, Oxford University Press

Reference Books

1. Daniel Minoli, ─ "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications

2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies,Platforms, and Use Cases", CRC Press

Web links:

www.w3schools.com

www.greeksforgreeks.com

www.javatpoint.com

www.programmiz.com

Course 6: Internet of Things
LIST OF PRACTICAL EXPERIMENTS

1. Understanding Arduino UNO Board and Components

2. Installing and work with Arduino IDE

3. Blinking LED sketch with Arduino

4. Simulation of 4-Way Traffic Light with Arduino

5. Using Pulse Width Modulation

6. LED Fade Sketch and Button Sketch

7. Analog Input Sketch (Bar Graph with LEDs and Potentiometre)

8. Digital Read Serial Sketch (Working with DHT/IR/Gas or Any other Sensor)

9. Working with Adafruit Libraries in Arduino

10. Spinning a DC Motor and Motor Speed Control Sketch

11. Working with Shields

12. Design APP using Blink App or Things peak API and connect it LED bulb.
13. Design APP Using Blynk App and Connect to Temperature, magnetic Sensors