

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Sc., Computer Science Honours MAJOR w.e.f AY 2025-26 onwards V Semester Course Structure

Year	Semester	Paper	Title of the Course	No. of Hrs./ Week	No. of Credits
3	V	12	Web Interface Designing Technologies (T)	3	3
			Web Interface Designing Technologies (P)	2	1
		13	Web Applications Development using PHP & MYSQL (T)	3	3
			Web Applications Development using PHP & MYSQL (P)	2	1
		14A	Internet of Things (T)	3	3
			Internet of Things (P)	2	1
			OR		
		14B	Foundations of Data Science (T)	3	3
			Foundations of Data Science -(P)	2	1
		15A	IoT Applications Development and Programming -(T)	3	3
			IoT Applications Development and Programming -(P)	2	1
			OR		
		15B	Foundations of Artificial Intelligence -(T)	3	3
			Foundations of Artificial Intelligence-(P)	2	1

Note:

choose either Set-A (14 A and 15 A) (or) Set-B (14 B and 15 B)

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 12: Web Interface Designing Technologies
(w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

Learning Objectives:

To enable students to understand web architecture, develop aesthetic websites, create static and dynamic web pages, implement user interactivity, and gain proficiency in installing and utilizing WordPress and plugins.

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

1. Understand and appreciate the web architecture and services along with its basic building blocks
2. Gain knowledge about various components of a website related to aesthetics
3. Demonstrate skills regarding creation of a static website and addition of dynamic behavior to a website
4. Get experience on making user-interactive web pages.
5. Learn how to install word press and gain the knowledge of installing various plugins to use in their websites.

UNIT - I

HTML: Introduction to web designing, difference between web applications and desktop applications, introduction to HTML, HTML structure, elements, attributes, headings, paragraphs, images, tables, lists, blocks, symbols, embedding multi-media components in HTML, HTML forms.

UNIT – II

CSS: CSS home, introduction, syntax, CSS combinators, colors, background, borders, margins, padding, height/width, text, fonts, tables, lists, position, overflow, float, pseudo class, pseudo elements, opacity, tool tips, image gallery, CSS forms, CSS counters.

UNIT – III

Java Script: JavaScript introduction, variables, operators, Conditional and looping statements, string manipulations, mathematical functions, arrays, functions, Regular expression objects.

UNIT-IV

Client-Side Scripting: Accessing HTML form elements using Java Script object model, basic data validations, data format validations, opening windows using java script, different kinds of dialog boxes.

UNIT – V

Word press: Introduction to word press, features, and advantages, working with posts, managing pages, working with media - Adding, editing, deleting media elements, working with widgets, using menus, working with themes, defining users, roles and profiles, adding external links.

Text Book(s)

1. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley (2007)
2. Paul S.WangSanda S. Katila, an Introduction to Web Design plus Programming, Thomson (2007).

Reference Books

1. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media Inc.
2. An Introduction to HTML and JavaScript: for Scientists and Engineers, David R. Brooks. Springer, 2007
3. Schaum's Easy Outline HTML, David Mercer, McGraw Hill Professional.
4. Word press for Beginners, Dr.Andy Williams.
5. Professional word press, Brad Williams, David damstra, Hanstern.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Infographic explaining the necessity to have a web site for each of the agencies such as hotels, hospitals, supermarkets, and educational institutions.

Evaluation Method: Assess the accuracy, visual design, clarity, creativity, use of visual elements, presentation of the infographic explaining the necessity of a website for different agencies.

Unit 2: Activity: Seminar though PPT on various Look and Feel components that websites related to different agencies

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 3: Activity: Code snippets Challenge.

Evaluation Method: Accuracy, functionality, efficiency, code readability, and problem-solving approach of the JavaScript code snippets

Unit 4: Activity: Group discussion on different kinds of web forms that take and validate user input using java script validations

Evaluation Method: Active participation, knowledge sharing, critical thinking, and demonstration of different web forms and JavaScript validations

Unit 5: Activity: Creation of Personal website using wordpress

Evaluation Method: Design aesthetics, functionality, user interactivity, content organization, and utilization of plugins

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 12: Web Interface Designing Technologies
(w.e.f. 2025-26)

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. Create an HTML document with the following formatting options: (a) Bold, (b) Italics, (c) Underline, (d) Headings (Using H1 to H6 heading styles), (e) Font (Type, Size and Color), (f) Background (Colored background/Image in background), (g) Paragraph, (h) Line Break, (i) Horizontal Rule, (j) Pre tag
2. Create an HTML document which consists of: (a) Ordered List (b) Unordered List (c) Nested List (d) Image
3. Create a Table with four rows and five columns. Place an image in one column.
4. Using "table" tag, align the images as follows:



5. Create a menu form using html.
6. Style the menu buttons using CSS.
7. Create a form using HTML which has the following types of controls:
(a) Text Box (b) Option/radio buttons (c) Check boxes (d) Reset and Submit buttons
8. Embed a calendar object in your web page.
9. Create a form that accepts the information from the subscriber of a mailing system.

Word press:

10. Access admin panel and manage posts
11. Access admin panel and manage pages
12. Add widgets and menus
13. Create users and assign roles
14. Create a site and add a theme to it

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 12: Web Interface Designing Technologies
(w.e.f. 2025-26)

MODEL QUESTION PAPER

Time: **3 Hours**

Max. Marks: **75**

PART-A

Answer any **FIVE** of the following. Each Question Carries 5 marks.

(5X5=25)

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

PART-B

Answer any **FIVE** of the following. Each Question Carries 10 marks.

(5X10=50)

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 13: Web Applications Development using PHP & MYSQL
(w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

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

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 using PHP.
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.

UNIT-I

The building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. **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 of functions

UNIT-II

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 and Time Functions in PHP.

UNIT-III

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

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 in the Query String, Destroying Sessions and Unsetting Variables.

UNIT-V

Interacting with MySQL using PHP: Learning Basic SQL Commands, Using Transactions and Stored Procedures in MySQL, MySQL or MySQLi Functions, Interacting with MySQL Using PHP, Working with MySQL Data

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).

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Infographic explanation of client-server architecture and different server-side scripting languages.

Evaluation Method: Assess the accuracy, visual design, clarity, creativity, use of visual elements, presentation of the infographic explaining the benefits of server-side scripting languages.

Unit 2: Activity: Presentation on various open-source frameworks available in LAMP model

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 3: Activity: Code snippets Challenge.

Evaluation Method: Accuracy, functionality, efficiency, code readability, and problem- solving approach of the PHP code snippets

Unit 4: Activity: Group discussion on Session Management in PHP

Evaluation Method: Active participation, knowledge sharing, critical thinking, and demonstration of Session Management

Unit 5: Activity: Hands-on Lab Session on MYSQL Queries

Evaluation Method: Lab Performance and Correctness of solution Implementation

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 13: Web Applications Development using PHP & MYSQL
(w.e.f. 2025-26)

Practical

Credits: 1

2 hrs/week

List of 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.
And display user inserted value in new PHP page.
7. Create Website Registration Form using text box, check box, radio button, select, submit button. 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 MySQL 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 their own website with basic features

SRI VENKATESWARA UNIVERSITY: : TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 13: Web Applications Development using PHP & MYSQL

(w.e.f. 2025-26)
MODEL QUESTION PAPER

Time: **3 Hours**

Max. Marks: **75**

PART-A

Answer any **FIVE** of the following. Each Question Carries 5 marks.

(5X5=25)

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

PART-B

Answer any **FIVE** of the following. Each Question Carries 10 marks.

(5X10=50)

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 14 A: Internet of Things
(w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

Learning Objectives:

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

UNIT - I

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, IOT Enabling Technologies, IoT frameworks, IoT and M2M.

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

UNIT - II

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

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, **IP Based Protocols for IoT:** IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT.

Unit - IV

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.

Unit - V

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.

Text Book(s)

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Sudip Mishra, Anandarup Mukherjee, Arijit Roy: Introduction to IOT, Cambridge University 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

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Seminar on various applications of IoT through PPT

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 2: Activity: Hands-on Lab activity on Arduino Development

Evaluation Method: Lab Performance and Correctness of Circuit Implementation

Unit 3: Activity: Group discussion on Future Wireless Technologies.

Evaluation Method: Active participation, knowledge sharing, critical thinking, and demonstration of different wireless technologies for IoT

Unit 4: Activity: Peer activity on different types of Sensors

Evaluation Method: Peer evaluation of working principle of Sensor, use-cases of sensors.

Unit 5: Activity: Guest Lecture or Expert talk on Cloud based IoT platforms

Evaluation Method: Active Participation, Post Talk report presentation

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B.Sc. Computer Science Honours
III year V Semester
Course 14 A: Internet of Things
(w.e.f. 2025-26)

Practical

Credits: 1

2 hrs/week

List of 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

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B.Sc. Computer Science Honours
III year V Semester
Course 14 A: Internet of Things
(w.e.f. 2025-26)
MODEL QUESTION PAPER

Time: **3 Hours**

Max. Marks: **75**

PART-A

Answer any **FIVE** of the following. Each Question Carries 5 marks.

(5X5=25)

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

PART-B

Answer any **FIVE** of the following. Each Question Carries 10 marks.

(5X10=50)

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 14 B: Foundations of Data Science
(w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

Learning Objectives:

To enable students to develop solutions for real-world problems

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

1. Identify the need for data science and understand various data collection strategies
2. Understand about NoSQL and Descriptive Statistics
3. Apply Numpy methods to process the data in an array.
4. Summarize and Compute Descriptive Statistics using Pandas.
5. Apply powerful data manipulations visualization using Pandas

UNIT-I

Introduction to Data Science: Need for Data Science – What is Data Science - Evolution of Data Science, Data Science Process – Business Intelligence and Data Science – Prerequisites for a Data Scientist – Tools and Skills required. Applications of Data Science in various fields – Data Security Issues. **Data Collection Strategies:** Data Pre-Processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization.

UNIT-II

Getting Started with Python: Introduction to Python, Python Keywords, Identifiers Variables, Comments, Data Types, Operators, Input and Output, Type Conversion, Debugging. Flow of Control, Selection, Indentation, Repetition, Break and Continue Statement, Nested Loops. **Strings-** String Operations, Traversing a String, String handling Functions.

UNIT-III

Functions: Functions, Built-in Functions, User Defined Functions, recursive functions, Scope of a Variable. **Python and OOP:** Defining Classes, Defining and calling functions passing arguments, Inheritance, polymorphism, Modules – date time, math, Packages. **Exception Handling-** Exception in python, Types of Exception, User-defined Exceptions

UNIT-IV

List: Introduction to List, List Operations, Traversing a List, List Methods and Built-in Functions. **Tuples and Dictionaries:** Introduction to Tuples, Tuple Operations, Tuple Methods and Built-in Functions, Nested Tuples. Introduction to Dictionaries, Dictionaries are Mutable, Dictionary Operations, Traversing a Dictionary, Dictionary Methods and Built-in functions.

UNIT-V

Introduction to NumPy: Array, NumPy Array, Indexing and Slicing, Operations on Arrays, Concatenating Arrays, Reshaping Arrays, Splitting Arrays, Statistical Operations on Arrays. **Data Handling using Pandas:** Introduction to Python Libraries, Series, DataFrame, Importing and Exporting Data between CSV Files and DataFrames. **Plotting Data using Matplotlib:** Introduction, Plotting using Matplotlib –Line chart, Bar chart, Histogram, Scatter Chart, Pie Chart.

Text Book(s)

1. Mark Lutz, Learning Python, 5th Ed. O'REILLY
2. Core Python Programming by Dr. R. Nageswara Rao
3. Problem Solving and Python Programming by E. BalaguruSwamy
4. Python programming: using problem solving approach by Reema Thareja.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Seminar on Role of Data Science in Politics

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 2: Activity: Exercises on Descriptive Statistics

Evaluation Method: Problem Solving, Accuracy

Unit 3: Activity: Hands-on Lab using Numpy

Evaluation Method: Lab Performance and Correctness of solution Implementation

Unit 4: Activity: Hands-on Lab Activity on Pandas

Evaluation Method: Lab Performance and Correctness of solution Implementation.

Unit 5: Activity: Group Activity to visualize college performance records using various plots

Evaluation Method: Active Participation, Post Talk report presentation

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 14 B: Foundations of Data Science
(w.e.f. 2025-26)

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. Write a Program to check whether given number is Armstrong or not.
2. Write a Program to check whether given number is perfect or not.
3. Write a program to find factorial of given number using recursive function
4. Write a program to implement inheritance and polymorphism
5. Demonstrate a python code to print try, except and finally block statements
6. Write a program to demonstrate String handling functions
7. Write a program to input n numbers from the user. Store these numbers in a tuple. Print the maximum and minimum number from this tuple.
8. Write a program to enter names of employees and their salaries as input and store them in a dictionary
9. Write a program to implement statistical operations on arrays using numPy
10. Write a program to import and export CSV file to DataFrame.
11. Create the DataFrame Sales containing yearwise sales and perform basic operation on it.
12. Visualize the plots using matplotlib.

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III year V Semester
Course 14 B: Foundations of Data Science
(w.e.f. 2025-26)
MODEL QUESTION PAPER

Time: **3 Hours**

Max. Marks: **75**

PART-A

Answer any **FIVE** of the following. Each Question Carries 5 marks.

(5X5=25)

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

PART-B

Answer any **FIVE** of the following. Each Question Carries 10 marks.

(5X10=50)

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 15A: IoT Applications Development and Programming
(w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

Learning Objectives:

To enable students to develop IoT solutions for real-world problems

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

1. Understand the Basic Concepts of Internet of Things
2. Learn various Sensors and their associative protocols
3. Learn the Single Board Computers for development of IoT
4. Build the IoT devices with the Node-RED without Complex coding
5. Develop various IoT real-time applications

UNIT-I

Overview of the Internet of Things (IoT) and Sensors: Sensors - Energy-based, Signal Output, Mode of Operation, Electronic Sensors. Connectivity - Bluetooth, Zigbee, Wi-Fi, LoRa, Wired Communication. Machine Intelligence, Active Management, Sensor Fusion, Smart Devices- Human-Computer Interaction, Context Awareness, Actuators, IoT and Smart City Applications- Automobile Sensors, Smart Home Sensors, Smart Transportation Sensors.

UNIT-II

IoT Sensors and Their Interfacing Protocols: Vision and Imaging Sensors- Line Scan Cameras, 3D Depth Cameras, **Sensors That Measure Temperature**-Thermocouples, Resistance Temperature Detector (RTD), Temperature Thermistor Sensors, Semiconductor Temperature Sensors, Radiation Sensors; Proximity Sensors, Pressure Sensors, Position Sensors, Photoelectric Sensors, Particle Sensors, Types of Particle Sensors-Metal Detectors, Level Sensors, Leak Detectors, Humidity Sensors, Gas and Chemical Sensors, Gas Detectors, Carbon Monoxide (MQ7) Detectors, Flame Detectors, Sensor Communication Protocols

UNIT-III

Programming Single Board Computers: Arduino Programming, Raspberry Pi-Basic functionality of Raspberry Pi B+ board, setting up the board, configuration and use, Basics of Linux and its use, Introduction to Raspberry Pi GPIO Access, Interfacing DHT, Interfacing Picam to Raspberry Pi zero w, Pi Camera Specifications, Pi Camera Access, Interfacing PIR Sensor **Python:** File Concepts, Spreadsheet Concepts, Communication Concepts, Wired and Wireless Programming Concepts

UNIT-IV

Node-RED: Node-RED Features, Installation of Node-RED, Node-RED Architecture, Node-RED Flow Editor, Basic Function Nodes, Node-RED Library, Node-RED Applications; MQTT Protocols, Google Sheets Programming (gsread), Firebase Programming, Matplotlib- Getting Started, Bar Graphs, Scatter Plot, Spectrum Representation, Coherence of Two Signals, Cross- Correlation Graph, Autocorrelation

Graph, Changing Figure Size in Different Units, Scale Pie Charts, Style Sheets- FiveThirtyEight Style Sheet, Solarized Light Style Sheet.

UNIT-V

Wireless Connectivity in IoT: Introduction, Low-Power Wide-Area Networks (LPWANs),RFID Protocol, XBEE Radios with Arduino, Bluetooth with Arduino, Arduino with a GSMModem, Arduino with Firebase Cloud Connectivity

The Internet of Things through the Raspberry Pi: Introduction, Cluster Computing with Raspberry Pi Zero W-Message Passing Interface (MPI), Networking with RP is for Simple MPI Scripts, Simple MPI Programming

Text Book(s)

1. Internet of Things Using Single Board Computers, G. R. Kanagachidambaresan, Apress, 2022.
2. Practical Node-RED Programming, Taiji Hagino, Packt Publishing, 2021

Reference Books

1. Internet of Things Programming Projects: Build modern IoT solutions with the Raspberry Pi 3 and Python, Colin Dow, Packt Publishing, 2021
2. Programming the Internet of Things: An Introduction to Building Integrated, Device-to-Cloud IoT Solutions, Andy King, O'Reilly Media, 2021

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Case Study Presentation on Smart City IoT realization

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids, audience engagement

Unit 2: Activity: Poster Presentation for various kinds of Sensors

Evaluation Method: Creative & informative posters or infographics on Sensors

Unit 3: Activity: Hands-on Lab using RPi.

Evaluation Method: Lab Performance and Correctness of solution Implementation

Unit 4: Activity: Hands-on Lab Activity on Node-RED

Evaluation Method: Lab Performance and Correctness of solution Implementation.

Unit 5: Activity: Guest Lecture or Expert talk on Cloud based IoT platforms

Evaluation Method: Active Participation, Post Talk report presentation

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 15A: IoT Applications Development and Programming
(w.e.f. 2025-26)

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. Write a program to switch light on when the input is 1 and switch the light off when the input is 0 using Raspberry pi
2. Install Node-RED and Flow-based Programming Development Environment
3. Create Basic Flows with Major Nodes
4. Develop a Node-Red Flow for various Case Studies
5. Implement Node-RED in the Cloud Calling a Web API from Node-RED
6. Create a To Do Application with Node-RED Handling Sensor Data on the Raspberry Pi
7. Develop a Dashboard with various 2D Graphs with Matplotlib
8. Install MySQL database in Raspberry pi.
9. Write a program to work with basic MySQL queries by fetching data from database in Raspberry pi.
10. Arduino with Firebase Cloud Connectivity
11. Visualize Data by Creating a Server-side Application in the Firebase

SRI VENKATESWARA UNIVERSITY: : TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 15A: IoT Applications Development and Programming
(w.e.f. 2025-26)
MODEL QUESTION PAPER

Time: **3 Hours**

Max. Marks: **75**

PART-A

Answer any **FIVE** of the following. Each Question Carries 5 marks.

(5X5=25)

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

PART-B

Answer any **FIVE** of the following. Each Question Carries 10 marks.

(5X10=50)

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 15 B : Foundations of Artificial Intelligence
(w.e.f. 2025-26)

Theory	Credits: 3	3 hrs/week
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Learning Outcomes: On successful completion of the course, students will be able to

1. List the objectives and functions of modern AI.
2. Categorize an AI problem based on its characteristics and its constraints.
3. Understand and implement search algorithms.
4. Learn how to analyze the complexity of a given problem and come with suitable optimizations.
5. Demonstrate practical experience by implementing and experimenting with the learnt algorithms.

UNIT-I

Introduction to Artificial Intelligence: Introduction, Brief History- Intelligent Systems- Categorization of Intelligent Systems- Components of AI Program- Foundations of AI- Sub-areas of AI- Applications- Development of AI Languages- Current Trends in AI- Future of AI

UNIT-II

Intelligent Agents, Structure of Intelligent Agents- Types of Agents: Simple Reflex Agents- Goal Based Agents- Utility Based Agents. Properties of Environments (Type of Environments) in AI: Fully Observable vs Partially Observable, Deterministic vs Stochastic, Competitive vs Collaborative, Single-agent vs Multi-agent, Static vs Dynamic, Discrete vs Continuous.

UNIT-III

Search Strategies: Uninformed Search Strategies, Breadth-First Search, Uniform Cost Search, Depth-First Search, Analysis of Search Methods.

Heuristic search techniques: Generate and Test, Hill climbing, Best-First Search.

UNIT-IV

AI – Knowledge Representation - Procedural versus Declarative Knowledge – Logic Programming – Forward Versus Backward Reasoning – Matching – Control Knowledge.

Using Predicate Logic: Representing simple facts in logic, Representing Is-a Relationships

UNIT-V

Applications of AI- Language Models – Information Retrieval- Information Extraction – Natural Language Processing

Statistical Reasoning: Probability and Bayes Theorem, Certainty factors and Rule-based systems, Dempster-Shafer Theory.

Text Book(s)

1. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw Hill Edition.
2. Russell, S., & Norvig, P. Artificial Intelligence: A Modern approach, Third Edition, Pearson New International Edition, 2014.

Online Resources:

<https://www.tutorialspoint.com/>

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Hands-on Lab exercise on Python Control Statements

Evaluation Method: Lab Performance and Correctness of solution Implementation

Unit 2: Activity: Assignment of Files in Python

Evaluation Method: Problem Solving, Accuracy

Unit 3: Activity: Exercises on Regular expressions

Evaluation Method: Solutions, Accuracy of Validation

Unit 4: Activity: Poster Presentation on various GUI components in Python

Evaluation Method: Content knowledge, organization, clarity, presentation skills, visual aids.

Unit 5: Activity: Group Project

Evaluation Method: Project effectiveness, User interface, Solution to the Problem

SRI VENKATESWARA UNIVERSITY::TIRUPATI
B.Sc. Computer Science Honours
III year V Semester
Course 15 B : Foundations of Artificial Intelligence
(w.e.f. 2025-26)

Practical	Credits: 1	2 hrs/week
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List of Experiments:

The programs may be implemented using c/java/python

1. Write a program to implement Breadth First Search.
2. Write a program to implement Depth First Search.
3. Write a program to implement Tic-Tac-Toe game.
4. Write a program to implement 8-Puzzle problem.
5. Write a program to implement Water-Jug Problem.
6. Write a program to implement Travelling SalesMan problem.
7. Write a program to implement Towers of Hanoi problem.
8. Write a program to implement 8-Queens problem.

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MODEL QUESTION PAPER

Time: **3 Hours**

Max. Marks: **75**

PART-A

Answer any **FIVE** of the following. Each Question Carries 5 marks.

(5X5=25)

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

PART-B

Answer any **FIVE** of the following. Each Question Carries 10 marks.

(5X10=50)

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V