



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-5

Subject: Internet of Things - BETEC15310

Type of course: Professional Core and Professional Elective Courses

Prerequisite: Knowledge of the processor and programming

Rationale:

This course introduces the Internet of Things (IoT), focusing on smart device communication and interconnected systems. It covers data handling, communication protocols, security, and practical implementation. Students learn how IoT improves efficiency and enables automation across industries.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
2	0	2	3	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T- Tutorial; P - Practical; C - Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V - Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit. No	Course content	Hrs	% Weight age
1.	Introduction to IOT Definition of IoT, History of IOT, Components, Architecture, and working of IOT, Application, Advantages, and Disadvantages of IOT, Local Area Network, Wide area Network.	08	20%
2.	IoT Sensors & Actuators: Use of Sensors and Actuators in IOT, Gas Sensor, IR Sensor, Heartbeat Sensor: Ultrasonic Sensor, Gyro Sensor, LDR Sensor, Hydraulic, Pneumatic, Electrical, Thermal, and Mechanical Actuator	08	30%



3.	Protocols for IOT Explain the message passing protocols (MQTT, CoAP, XMPP), Transport protocols (BLE, Li-Fi, Wi-Fi), IPv4 and IPv6 Protocols, Security Architecture, and Security Challenges.	06	20%
4.	Arduino and Raspberry Pi Interface and IOT Applications Define and Explain Arduino Architecture, Arduino Sketch Structure, Arduino Program,, Raspberry Pi Interface.	05	20%
5.	IOT Applications IoT Applications in Food, Healthcare, Home Automation, Smart Agriculture Systems, Water Quality Monitoring using Arduino, and Driver Assistance.	03	10%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Smart Home Energy Management The student will analyze the home energy usage by imagining a network of smart sensors, identify key areas of energy waste, and upload a comprehensive findings report on the GMIU Web Portal	10
2.	Site Visit Students have to visit (in a group) and search for IoT devices on campus or in the community. Teams must document their findings and upload it on GMIU web Portal	10
3.	Risk Assessment Students will identify and mitigate potential threats of IOT Devices. Upload the report on the GMIU Web Portal.	10
Total		30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weight age	10%	20%	20%	10%	10%	30 %

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from the above table.



Course Outcome:

After learning the course, the students should be able to:	
CO1	Explain the fundamentals of IoT, including its architecture, components, working, and LAN/WAN concepts.
CO2	Describe the role and working of IoT sensors and actuators, including various sensor types and actuator technologies used in IoT applications.
CO3	Interpret IoT communication protocols, including message passing protocols, transport protocols, IP addressing, and security concepts used in IoT systems.
CO4	Illustrate Arduino and Raspberry Pi interfaces, including Arduino architecture, sketch structure and programming.
CO5	Discuss IoT applications in food systems, healthcare, home automation, smart agriculture, water quality monitoring, and driver assistance systems.

List of Practical:

Sr. No	Title	Unit No	Hrs
1	To understand IoT concepts by studying the architecture, components, and features of the ESP32.	1	2
2	To install and configure the ESP32 development environment with Wi-Fi setup using Arduino IDE / PlatformIO.	4	2
3	To control the LED using ESP32 through a Wi-Fi-based HTML web interface	4	2
4	To interface the LDR sensor with the ESP32 and display the light intensity on an HTML web page.	2	2
5	To interface an ultrasonic sensor with ESP32 and show distance data on the web UI.	2	2
6	To interface the IR sensor with ESP32 and monitor object detection via a web dashboard.	2	2
7	To control the Relay using ESP32 through an HTML-based web control panel.	2	2
8	To send and display real-time sensor data over Wi-Fi using the ESP32 web server (HTTP).	3	2
9	To design an ESP32 web server in Station Mode for multi-device control using HTML UI.	4	2



10	To develop a real-time IoT dashboard (multiple sensors) using ESP32 and HTML (auto-refresh/AJAX).	4	2
11	To implement the MQTT protocol with ESP32 and visualize/control data through a web dashboard.	3	2
12	To integrate ESP32 with a cloud/web platform and control devices via an HTML interface.	3	2
13	To set up the Raspberry Pi, install the OS, and perform basic GPIO interfacing using Python	4	2
14	To create a simple web server on Raspberry Pi to monitor/control the GPIO via a browser.	4	2
15	To design and implement a complete IoT system using ESP32 (Wi-Fi + HTML UI) and/or Raspberry Pi.	4	2
TOTAL			30

Instructional Method:

The course delivery method will depend on the requirements of the content and the needs of students. The teacher, in addition to conventional teaching methods by blackboard, may also use any tools such as demonstration, role play, quizzes, brainstorming, MOOCs, etc.

From the content, 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e- courses, and Virtual Laboratory

Practical/Viva examination will be conducted at the end of the semester for the evaluation of the performance of students in the laboratory.

Reference Books:

- [1] Raj Kamal, "Internet of Things: Architecture and Design Principles", McGraw Hill.
- [2] Adrian McEwen, "Designing the Internet of Things", Wiley.
- [3] Thompson Charter, "Internet of Things for Beginners", Lincoln Publication.
- [4] Anil Kumar and Jafer Hussain, "Connecting the Internet of Things", Apress Publication.
- [5] Packt Publications, "Internet of Things Programming Projects", Packt Publications.

