Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-5 (Diploma)

Subject: Internet of Things: Concepts and Application - DETEC15213

Type of course: Minor Stream

Prerequisite: Basic Electronics, Fundamentals of Programming

Rationale:

The Internet of Things (IoT) is transforming industries and everyday life through smart connectivity and automation. This course equips students with foundational knowledge of IoT architecture, devices, communication protocols, and real-world applications. It emphasizes hands-on learning and problem-solving skills, enabling students to design and implement basic IoT systems aligned with modern technological needs.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	00	50	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	% Weightage
1.	**Introduction to IoT** Definition and Characteristics of IoT, Explain the IoT Architecture and the LoT Application, explain the challenges involved in developing an IoT system.	6	15%

2.	**Sensors & Actuators** Distinguish the sensors like PIR Motion Sensor, Sharp IR Distance Sensor, LDR Sensor, Gyro Sensor, Ultrasonic Distance Sensor, DHT Sensor, and their working. Distinguish the Actuators like Servo Motor, Solenoid, Stepper Motor, and their working, and the need for a Relay module.	10	20%
3.	**Programming with Arduino Uno** Illustrate the Arduino Uno board, apply basic programming skills to develop the code for the Arduino Uno board, practice the built-in, library, and user-defined functions in the program, LED Blinking Program, and interface different sensors and actuators with the Arduino board.	12	30%
4.	**IoT Communication Protocols** Explain the message passing protocols (MQTT, COAP, XMPP), Paraphrase transport protocols (BLE, Li-Fi, Wi-Fi), and differentiate different sensor network topologies.	8	15%
5.	**Applications of IoT** Recognize the need for IoT in real- world problems, and apply various components of IoT to solve a real-world problem.	9	20%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	**IoT Case Study Analysis:** Students will analyze a real-world IoT system, such as a smart home, smart agriculture, or healthcare monitoring system. They will identify components like sensors, actuators, controllers, and communication protocols, and explain system's working using block diagrams. A report should be submitted on the GMIU web portal.	10
2.	**Arduino Programming & Debugging Task:** Students will develop a basic IoT application (e.g., LED control, temperature monitoring). They will debug given faulty code or improve existing logic and justify changes based on programming concepts. Submit code, output screenshots, and an explanation on the GMIU web portal.	10
3.	**Site Visit** Students have to visit the campus or nearby community and identify existing IoT devices, analyzing their functionality and applications. Each team must document observations with brief analysis and submit a structured report on the GMIU Web Portal.(group per students - 02)	20
4.	**Mini IoT Innovation Project:** Students will design a small IoT-based solution (e.g., smart energy meter, smart irrigation system). They must define the problem, design a circuit/block diagram, and demonstrate working (hardware/simulation). Submit project report, images/videos, and explanation on the GMIU web portal.	10

	Total	50

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)
Weightage	20%	30%	15%	10%	20%	05%

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 fundamental concepts, architecture, and applications of the Internet of Things (IoT).
CO2	Identify and analyze the working of various sensors and actuators used in IoT systems.
CO3	Develop basic IoT applications using Arduino by interfacing sensors and actuators.
CO4	Analyze different IoT communication protocols and networking technologies.
CO5	Design and implement a simple IoT-based solution for real-world problems.

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

The internal evaluation will be done based on the Active Learning Assignment

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] L. Atzori, A. Iera, and G. Morabito, "The Internet of Things: A Survey," IEEE Communications Magazine, vol. 54, no. 12, pp. 278–284, Dec. 2010.

[2] R. Buyya and A. V. Dastjerdi, Internet of Things: Principles and Paradigms. Burlington, MA, USA: Morgan Kaufmann, 2016.

[3] D. Hanes, G. Salgueiro, P. Grossetete, R. Barton, and J. Henry, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things. Indianapolis, IN, USA: Cisco Press, 2017.

[4] S. Madakam, R. Ramaswamy, and S. Tripathi, "Internet of Things (IoT): A Literature Review," Journal of Computer and Communications, vol. 3, no. 5, pp. 164–173, 2015.

[5] A. Bahga and V. Madisetti, Internet of Things: A Hands-On Approach. Atlanta, GA, USA: VPT, 2014.