Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute Of Technology
Semester-5 (Diploma)

Subject: Fundamentals of IOT–DETCE15216

Type of course: Professional Core

Prerequisite: Basic Knowledge of Internet of Things.

Rationale:

IoT (Internet of Things) is rooted in the transformative impact that IoT technologies are having on various industries and daily life. The course aims to provide students with a solid foundation in the principles, technologies, and applications of IoT, recognizing its significance as a key driver of technological innovation and societal advancement.

Teaching and Examination Scheme:

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

Legends: CI-Class Room 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:

Sr. No	Course Content	Hrs.	% Weightage
1	**Introduction to IoT** Definition and Characteristics of IoT, Explain the IoT Architecture and IoT Application, Explain the challenges involved in developing an IoT system.	4	15%
2	**IoT 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, Need of Relay module.	8	25%
3	**IoT Development with Arduino** 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, Interface different sensors and actuators with Arduino board.	8	25%
4	**IoT Communication Protocols** Explain the message passing protocols (MQTT, COAP, XMPP), Paraphrase transport protocols (BLE, Li-Fi, Wi-Fi), Differentiate different sensor network topologies.	6	20%
5	**Applications of IoT** Recognize the need of IoT in real- world problems, Apply various components of IoT to solve a real world problem.	4	15%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Sensor to Server** Students will study the fundamentals of IoT architecture, including sensors, actuators, communication protocols, and data processing. They will then select an IoT-based application and create detailed documentation covering its complete specifications, including the sensors, circuits, and components used. Additionally, they will explain the functionality, advantages, and disadvantages of the chosen IoT application, providing a comprehensive understanding of its real-world implementation. Finally, they must upload a PDF of their handwritten content to the GMIU web portal.**(Group of 4 students)**	10
2	**Senses of Smart Devices** Students should select an IoT application from ALA-1 and design its user interface, ensuring device compatibility, sensor data visualization, connectivity, and responsiveness. Additionally, they must create a flowchart to represent the application's workflow and develop its architecture, illustrating the integration of sensors, communication protocols, and data processing components. Finally, they must upload a PDF of their handwritten content to the GMIU web portal.**(Group of 4 students)**	10
3	**Arduino Arena** Design an IoT Application or Device from ALA-1 using Arduino Uno &Develop an IoT application or device using Arduino Uno with multiple sensors, ensuring each sensor performs a unique function. Create a screenshot of the application's design, including its code and a working circuit diagram. Ensure proper integration of sensors, connectivity, and functionality for an efficient IoT system. **(Group of 4 students)**	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 %	15%	20%	25%	20%	10%	10%

Course Outcome:

	After learning the course, the students should be able to:
CO1	Explain the basic concept of IoT
CO2	Explore IOT uses and all the sensors and their information.
CO3	Write code in Arduino, its Datatype, Operators, Libraries, Control system, Loops, Functions and LED blinking program.
CO4	Develop Arduino applications using protocols like Message protocols, Transport protocols and topologies.
CO5	Understand how an IOT application works in our real-world.

List of Practical:

Sr. No.	Description	Unit No.	HRS
1	Study of Arduino Uno board technical specifications and pins.	1	2
2	Study of various Sensors and actuators for IoT applications.	2	2
3	Develop an IoT based application using Arduino board to blink the on-board LED at one second interval.	2	2
4	Develop IoT based application using Arduino board to turn ON and OFF the 3 LEDs (Red, Green, Blue) based on the 3 Pushbutton switches.	2	4
5	Develop an IoT based application using Arduino board to implement automated traffic signal systems using different color LEDs.	2	4
6	Develop IoT based application using Arduino board to read analog input from a potentiometer and control the brightness of an LED.	2	2
7	Develop IoT based application using Arduino board from DHT sensor to measure temperature and humidity.	2	2
8	Develop IoT based application using Arduino board and ultrasonic sensor to measure distance and display it on the Serial Monitor.	2	2

9	Develop an IoT based application using Arduino board and PIR sensor to detect presence/movement and turn on an LED automatically.	3	2
10	Develop an IoT based application using Arduino board to control servo motors back and forth across 180 degrees.	3	2
11	Develop an IoT based application using an Arduino board to print "Hello IoT" and "Welcome" on a 16x2 LCD display.	3	2
12	Write a program on Arduino IDE to publish temperature data to MQTT broker.	4	2
13	Develop IoT based application using Arduino board and relay to implement smart appliance control.	5	2
	Total		30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

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

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

Reference Books:

[1] Fundamentals of IOT by J.B.Patel, D.K.Thankar, H.K. Patel.

[2] IoT Fundamentals Networking Technologies, Protocols and Use Cases for Internet of Things by David Hanes, Gonzalo, salgueiro.

[3] Designing the Internet of Things by Adrian McEwen, Hakim Cassimally.

[4] IoT Fundamentals, David Hence at el, Cisco Press.

[5] IoT Based Projects, Rajesh Singh at el, BPB.