



Course Syllabus  
Gyanmanjari College of Computer Application  
Semester-6 (BCA)

**Subject:** Internet of Things (IOT) – BCAXX16332

**Type of course:** Minor Stream

**Prerequisite:** Basic electronics, programming (C/C++ or Python), and microcontroller skills (Arduino, Raspberry Pi).

**Rationale:**

IoT has become a foundational technology across various industries, enabling smart, connected, and automated systems. This course provides students with a comprehensive introduction to IoT concepts, architectures, devices, and communication technologies. It equips them with the essential knowledge to understand, design, and implement IoT-based solutions, preparing them for roles in IoT development, system integration, and related fields.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	SEE		CEE			
				Theory	Practical	MSE	LWA	ALA	
3	0	2	4	75	25	30	20	50	200

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.*

3 Credits \* 25 Marks = 75 Marks (each credit carries 25 Marks) Theory

1 Credits \* 25 Marks = 25 Marks (each credit carries 25 Marks) Practical

SEE 100 Marks will be converted in to 50 Marks

CCE 100 Marks will be converted in to 50 Marks

It is compulsory to pass in each individual component.

**Course Content:**

Sr. No	Course content	Hrs	% Weightage
1	<b>Introduction to IOT</b> <ul style="list-style-type: none"> <li>Definition and Characteristics of IOT,</li> <li>Key Components of IoT System,</li> <li>Architecture of IOT</li> </ul>	10	20%

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	<ul style="list-style-type: none"> <li>○ Sensing Layer</li> <li>○ Network Layer</li> <li>○ Data Processing Layer</li> <li>○ Application Layer</li> <li>• Enabling technologies,</li> <li>• Internet of Things Challenges,</li> <li>• Internet of Things and cyber physical Systems,</li> <li>• WSN (wireless Sensor Network).</li> </ul>		
2	<b>IOT Sensors and Microcontrollers</b> <ul style="list-style-type: none"> <li>• What is Sensors – types of Sensors,</li> <li>• Internet of Things Sensor interfacing,</li> <li>• Advanced RISC Machine (ARM),</li> <li>• Basics of sensor network Topology.               <ul style="list-style-type: none"> <li>○ Star Topology</li> <li>○ Tree Topology</li> <li>○ Mesh Topology</li> <li>○ Cluster Topology</li> <li>○ Ring Topology</li> <li>○ Hybrid Topology</li> </ul> </li> <li>• Microcontroller.</li> </ul>	9	20%
3	<b>IOT Protocols and Cloud</b> <ul style="list-style-type: none"> <li>• Messaging Protocol (MQTP, HTTP/HTTPS, COAP, AMQP),</li> <li>• Transport Protocol (TCP, UDP, TLS),</li> <li>• IPV4- Internet Protocol Version 4,</li> <li>• IPV6 – Internet Protocol Version 6,</li> <li>• URI: Uniform Resource Identifier,</li> <li>• Internet of Things and Cloud</li> </ul>	9	20%
4	<b>Microcontroller</b> <ul style="list-style-type: none"> <li>• Arduino: Architecture,</li> <li>• Programming and Application</li> <li>• Raspberry Pi: Architecture,</li> <li>• Programming and Application.</li> </ul>	8	20%
5	<b>Applications of IOT</b> <ul style="list-style-type: none"> <li>• Recognize the need of IOT in real – World problems</li> <li>• Food Industry,</li> <li>• Healthcare,</li> <li>• Driver Assistant,</li> <li>• Smart Home.</li> <li>• Security in Cloud,</li> <li>• Types of Attack.</li> </ul>	9	20%



**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<b>IOT Scope:</b> List out the names of leading companies in the field of iot, discuss the future trends of iot, and highlight the top developers in the iot industry , make a presentation with relevant images and upload on GMIU web portal.	10
2	<b>Comparative Study of IoT Protocols</b> Students will find different IoT communication protocols (MQTT, CoAP, HTTP, Zigbee, LoRa) and prepare a comparative report on their efficiency, security, and use cases and prepare a document and upload on GMIU web portal.	10
3	<b>IoT Case Study Analysis</b> Students will analyze real-world IoT applications (like smart agriculture, healthcare IoT, or smart cities) and present the benefits, challenges, and future scope and prepare a document and upload on GMIU web portal..	10
4	<b>Exploration of IOT in Daily Life</b> Students have to identify IoT applications used in their homes or nearby surroundings and study their working process. They should find out which sensors are used and which communication protocol is implemented. Based on this information, students must prepare a brief report and upload it on the GMIU web portal.	10
5	<b>Small IOT Project</b> In this group activity, students will design and develop a small IoT-based hardware project that demonstrates proper sensor data flow and device interactions. Each group should create a working prototype using suitable sensors and components to collect and process data effectively. A short report describing the project objectives, working process, components used, and data flow must be prepared and uploaded on the GMIU web portal.	10
Total		50

**Suggested Specification table with Marks (Theory):75**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	25%	45%	15%	15%	0	0

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 above table.





**Course Outcome:**

After learning the course the students should be able to:	
CO1	Understand core concepts of IOT and its Architecture, Challenges in Detail.
CO2	Categorize the types of Sensors are used in IOT system and Microcontroller .
CO3	Understand Types of Internet Protocol in IOT with the importance of Security in Cloud Computing along with IOT.
CO4	Study the Architecture , Programming and Applications of Arduino and Raspberry Pi.
CO5	Recognize the need and Application of IOT in real – World problems.

**List of Practical**

Sr. No	Descriptions	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..	1	2
3	Implementation LED on Circuit board to turn ON LED every 2 sec.	1	2
4	Controlling LED with Push Button on Arduino Board.	1	2
5	Implementation of soil moisture sensor to measure or estimate the amount of water in the soil.	1	4
6	Implementation of buzzer sensor play the buzzer on circuit board	2	2
7	Implement Force Sensor on Microcontroller circuit Board.	2	4
8	Implementation of the gas sensor on circuit board.	4	2
9	Implementation of the LDR sensor on circuit board.	4	2
10	Connect three LEDs (Red, Yellow, Green) to simulate a traffic light system using delay functions.	5	4
11	Implementation of the Ultrasonic distance sensor on circuit board.	5	2
12	Use Obstacle avoidance sensor on Microcontroller circuit Board.	5	2
		Total	30

**Instructional Method:**

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

The internal evaluation will be done on the basis of Active Learning Assignment



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

### Reference Books

- [1] "IOT & its Applications"- fourth edition - Jan 2024:- Mr. Iresh. A. Dhotre (Technical Publication).
- [2] "Internet of Things a Hands on Approach" - 2015 – Arshdeep Bagha & Vijay Midisetti (Universities Press).
- [3] "INTERNET OF THINGS Architecture and Design Principles" – 2017 - Dr. Raj Kamal – (McGraw Hill Education (India) Private Limited).