



SARVAJANIK UNIVERSITY
Sarvajani College of Engineering and Technology
 Bachelor of Technology



B. Tech. Semester V

Subject Name: Internet Of Things

Subject Code: BTEC15501

Type of course: OE

Prerequisite: Digital Logic

Rationale: The course enables students to understand the basics of the Internet of things architecture. Also it enables devices that self-report in real-time, improving efficiency and bringing important information to the surface more quickly than a system depending on human intervention.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	2	4	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. no.	Topics	Teaching Hrs.	Module % Weightage
1	Introduction to Internet of Things: IoT Definition, IoT characteristics, M2M and IoT, End to End IoT Architecture, Physical design of IoT, Logical Design of IoT, Overview of IoT protocols, IoT levels and deployment templates, Challenges for IoT, Interdependencies of IoT and cloud computing, Web of things.	8	18
2	IoT Components: Sensors and actuators, IoT components and implementation, Programming of NodeMCU, Implementation of IoT with Edge devices, Peripheral interfacing and real world implementation, Controlling devices using mobile application and web application, Types and configurations of gateways, Specifications of IoT gateways.	12	25
3	IoT Protocols: Link layer protocols, Network/internet layer protocols, Transport layer protocols, Application layer protocols: Hypertext transfer protocol (HTTP), Systematic HTTP access methodology, Web Socket, Constrained application protocol CoAP), Message Queue Telemetry Transport Protocol (MQTT), XMPP, DDS, AMQP.	10	25



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4	Data Collection and Computing: Introduction, Cloud Computing Paradigm for Data Collection, Storage and Computing, Cloud Service Models, IoT Cloud-based services using different platforms.	8	18
5	IoT Applications and case study: Broad categories of IoT applications, Consumer IoT, Commercial IoT, Industrial IoT, Infrastructure IoT, Military Things (IoMT), IoT Case studies: Home automation with IoT, River water pollution monitoring, Smart city street light control and monitoring, Health care monitoring, Voice Apps on IoT device, Industry 4.0 standards.	7	14

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	25	15	10	5

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels (**Revised Bloom’s Taxonomy**)

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.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	AVR Microcontroller and Embedded Systems: Using Assembly and C	By Mazidi, Sarmad Naimi, Sepehr Naimi	Pearson 0138003319 9780138003319	2011	1 st
2.	Internet of Things with Arduino Blueprints	Pradeeka Seneviratne	Packt Publishing	2015	Latest
3.	An Introduction: Internet of Things, Connecting Devices, Edge Gateway, and Cloud with Applications	Rahul Dubey	CENGAGE India Publication 9353500931 9789353500931	2019	Latest
4.	Internet of Things: Architecture and Design Principles	Raj Kamal	Mc Graw Hill 9352605225 9789352605224	2017	2 nd
5.	Internet of Things (A Hands-on-Approach)	Vijay Madiseti Arshdeep Bahga	University Press 9788173719547	2015	1 st



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Course Outcome:

Sr. No.	CO Statement After learning this subject students will be able to	Marks % weightage
CO-1	Explain terminologies and architectures of IoT systems.	20
CO-2	Use programming languages and environments for available wifi modules in hardware.	20
CO-3	Describe the principles and working of sensors used for IoT designs.	20
CO-4	Analyze the architecture of protocols used in IoT systems.	20
CO-5	Identify techniques of data storage in the cloud and analytics in IoT.	10
CO-6	Analyse case study based on IoT related technologies.	10

Mapping with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	-	-	-	-	-	-	-	-	-	-	1
CO-2	3	2	-	2	3	-	-	-	-	3	2	1
CO-3	3	-	-	-	-	-	-	-	-	-	-	-
CO-4	3	-	-	-	-	-	-	-	-	-	-	2
CO-5	3	2	-	-	2	-	-	-	3	-	-	3

List of Practical:

- 1 Detailed comparative analysis of various intelligent boards like Arduino, NodeMCU-ESP8266, ESP32, STM 32, Raspberry Pi, IoT Gateway board (from EDGate Technologies).
- 2 Perform GPIO Interfacing and programming with boards like Arduino, ESP8266 and ESP32 and do Tinkercad simulations too.
 - A. Interfacing an LED for switching ON and OFF.
 - B. Fade in and fade out of LED.
 - C. Blinking RGB LED with some delay.
- 3 Digital On/Off using IR sensor and LDR Sensor & Understand and implement Interfacing with hardware and programming.
- 4 Monitoring Temperature and Humidity with DHT11 and ESP 8266, transferring data over the internet and monitoring on Blynk website and application.
- 5 Light Intensity Level Measure with LDR and Blynk app and NodeMCU.
- 6 LED Control with Blynk and NodeMCU, ESP8266- Web dashboard and Mobile App.
- 7 Controlling LED through Adafruit IO and MQTT protocol.
- 8 Interface Gyroscope with NodeMCU and observe the reading through Blynk or think Speak server.
- 9 Interface Soil Moisture sensor with NodeMCU and observe changes in moisture level on



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serial monitor.

- 10 Interface Smoke detector with ESP8266 to find the existence of fire on serial monitor and to take necessary actions.

Major Equipment:

- Arduino, ESP8266 (NodeMCU)

List of Open Source/learning website:

- <https://nptel.ac.in/courses/108/105/108105102/>- Microprocessors And Microcontrollers
- <https://www.udemy.com/course/pi-bootcamp>
- https://onlinecourses.nptel.ac.in/noc21_cs17/preview- Introduction to internet of things
- https://onlinecourses.nptel.ac.in/noc21_ee85/preview- Design for internet of things
- https://onlinecourses.nptel.ac.in/noc21_cs66/preview- Introduction to Industry 4.0 and Industrial Internet of Things
- <https://nptel.ac.in/courses/108/108/108108098/>- Design for internet of things

List of Open Source Software:

- Arduino 1.8.12, Tinkercad