Government Polytechnic, Balangir

Department of Computer Science Engineering

LESSON PLAN 2026-27(WINTER)

NAME OF THE TEACHER : ANJALI MUNDA, GUEST FACULTY

Subject: **Internet of Things (IoT)(Course Code: CSEPC 301/TH1)**
Program: Diploma in Computer Science and Engineering
Semester: 5th
Total Contact Hours: 45
Total Marks: 100
Assessment: Internal Assessment – 30, End Term – 70

After completion of the course, the students will be able to:
CO1- Explain Core IoT Concepts, including architecture, components, and communication models.
CO2- Identify IoT Ecosystem Elements, such as sensors, actuators, microcontrollers, communication protocols, and cloud platforms.
CO3- Integrate Hardware Components like Arduino, Raspberry Pi, sensors, and actuatorsfor IoT projects.
CO4- Analyze Sensor Data from IoT devices.
CO5- IdentifyCommon SecurityThreats in IoT ecosystems, including data breaches, device hijacking, and network vulnerabilities.

Lesson	Unit	Topic	Learning Objective	Activity	Course Outcome	Learning Methodology	Homework
1	Unit I	Overview and Definition of IoT	Understand the basic concept and significance of IoT.	Group discussion on real-world IoT examples.	CO1: Core Concepts	Lecture & Interactive Discussion	Identify 3 IoT devices used at home.
2	Unit I	Historical Evolution and Future Prospects	Trace the history of IoT and predict future trends.	Timeline creation exercise.	CO1: Core Concepts	Lecture	Read a brief article on the future of IoT.
3	Unit I	Applications Across Various Industries	Explore IoT applications in healthcare, agriculture, manufacturing, etc..	Case study analysis of a smart hospital.	CO2: Ecosystem Elements	Case-Based Learning	Research a smart agriculture use case.
4	Unit I	IoT Architecture and Components	Explain the basic architecture of an IoT system.	Diagramming the IoT architecture layers.	CO1: Core Concepts	Visual Presentation	Draw the 4-layer IoT architecture.
5	Unit I	Basic Architecture: Sensors, Actuators, Connectivity	Differentiate between sensors, actuators, and connectivity layers.	Match the component to its layer game.	CO2: Ecosystem Elements	Gamified Learning	Define the role of data processing in IoT.
6	Unit I	Hardware Components: Microcontrollers	Understand the function of microcontrollers like Arduino.	Hands-on viewing of Arduino boards.	CO3: Integrate Hardware	Demonstration	Compare basic specs of an Arduino Uno.
7	Unit I	Hardware Components: Microprocessors	Understand the function of microprocessors like Raspberry Pi.	Hands-on viewing of Raspberry Pi.	CO3: Integrate Hardware	Demonstration	Contrast Raspberry Pi with Arduino.
8	Unit I	Software Components	Define the role of OS and middleware in IoT.	System diagram breakdown.	CO1: Core Concepts	Lecture	List popular IoT operating systems.

9	Unit II	Intro to Sensors and Actuators	Define sensors and actuators in physical spaces.	Component identification drill.	CO2: Ecosystem Elements	Active Recall	Find an everyday object that uses a sensor.
10	Unit II	Types of Sensors: Temperature & Humidity	Explain how temperature and humidity sensors work.	Live demo of a DHT11 sensor data feed.	CO4: Analyze Data	Live Demonstration	Write a short summary of how a thermistor works.
11	Unit II	Types of Sensors: Motion and Others	Explain motion detection and other common sensors.	PIR sensor trigger activity.	CO2: Ecosystem Elements	Hands-on Activity	Research how ultrasonic sensors calculate distance.
12	Unit II	Actuators: Motors and Relays	Describe the function of motors and relays in IoT.	Activating a relay via a basic script.	CO3: Integrate Hardware	Practical Demo	Describe the difference between a servo and a DC motor.
13	Unit II	Control Mechanisms	Understand basic control loops for actuators.	Flowchart creation for automated lighting.	CO3: Integrate Hardware	Problem Solving	Create a flowchart for a smart thermostat.
14	Unit II	Interfacing Sensors with Microcontrollers	Learn wiring and coding logic for sensor interfacing.	Breadboarding a basic sensor circuit.	CO3: Integrate Hardware	Workshop	Review basic C++ syntax for Arduino reading.
15	Unit II	Interfacing Actuators with Microcontrollers	Learn wiring and coding logic for actuator control.	Breadboarding an LED/motor circuit.	CO3: Integrate Hardware	Workshop	Write a pseudocode to turn on a motor.
16	Unit II	Analog and Digital Data Acquisition	Differentiate between analog and digital data methods.	Reading ADC values on a screen.	CO4: Analyze Data	Analytical Exercise	Explain ADC resolution.
17	Unit II	Signal Conditioning and Filtering	Understand techniques to clean raw sensor data.	Apply a simple moving average filter to raw data.	CO4: Analyze Data	Guided Practice	Research hardware vs software debouncing.
18	Unit II	Data Processing and Storage Basics	Introduce local processing and storage methods.	Log sensor data to an SD card.	CO4: Analyze Data	Practical Demo	Explain the difference between EEPROM and flash memory.
19	Unit III	IoT Communication Protocols Overview	Understand why specialized protocols are needed for IoT.	Compare OSI model with IoT protocol stack.	CO2: Ecosystem Elements	Lecture	Review the TCP/IP model.
20	Unit III	MQTT Protocol	Explain the publish/subscribe model of MQTT.	Setup a local MQTT broker test.	CO1: Core Concepts	Simulation	Define "Broker," "Publisher," and "Subscriber".
21	Unit III	CoAP and HTTP	Differentiate between CoAP and standard HTTP.	REST API mock request exercise.	CO1: Core Concepts	Interactive Lecture	Compare overheads of HTTP vs CoAP.
22	Unit III	Wireless Comms: Wi-Fi & Bluetooth	Evaluate Wi-Fi and Bluetooth for IoT use cases.	Pair a Bluetooth module with a phone.	CO3: Integrate Hardware	Lab Activity	List range and power limitations of Bluetooth.

23	Unit III	Wireless Comms: Zigbee & LoRaWAN	Evaluate low-power, long-range alternatives.	Range calculation scenarios.	CO2: Ecosystem Elements	Case Study	Compare Zigbee mesh networking to LoRaWAN.
24	Unit III	Wired Comms: Ethernet & Serial	Understand reliable wired communication.	Serial monitor communication test.	CO2: Ecosystem Elements	Practical Demo	Explain UART, SPI, and I2C basics.
25	Unit III	Networking Fundamentals: IP Addressing	Review IP addressing structures.	IP class identification quiz.	CO1: Core Concepts	Quiz & Review	Convert 3 IP addresses to binary.
26	Unit III	Subnetting Relevance to IoT	Apply subnetting to segregate IoT networks.	Subnet calculation worksheet.	CO1: Core Concepts	Problem Solving	Calculate usable hosts for a given /26 subnet.
27	Unit III	Network Topologies and Architectures	Identify star, mesh, and tree topologies.	Draw topology maps for a smart home.	CO1: Core Concepts	Diagramming	Sketch a mesh network topology.
28	Unit III	Introduction to IPv6	Understand why IPv6 is critical for IoT scaling.	Compare IPv4 vs IPv6 headers.	CO1: Core Concepts	Lecture	Write down the length and format of an IPv6 address.
29	Unit IV	Overview of IoT Platforms	Define the role of an IoT platform.	Explore a platform dashboard online.	CO2: Ecosystem Elements	Web Exploration	Differentiate between device management and data management.
30	Unit IV	Popular Platforms: AWS IoT	Explore AWS IoT core features.	Navigate AWS IoT console tutorial.	CO2: Ecosystem Elements	Guided Walkthrough	Summarize the concept of a "Device Shadow" in AWS.
31	Unit IV	Popular Platforms: Google Cloud IoT	Explore Google Cloud IoT features.	Compare AWS vs Google Cloud offerings.	CO2: Ecosystem Elements	Peer Discussion	Read about GCP IoT Core registry.
32	Unit IV	Data Analytics Tools	Understand how analytics extracts value from IoT data.	Review a simulated dataset for trends.	CO4: Analyze Data	Data Analysis	Define predictive vs descriptive analytics.
33	Unit IV	Data Visualization Tools	Learn to present data effectively.	Create a simple chart from sensor CSV data.	CO4: Analyze Data	Software Lab	Sketch a dashboard for a smart thermostat.
34	Unit IV	Edge Computing Concepts	Explain processing data at the edge vs the cloud.	Debate: Edge vs Cloud latency.	CO1: Core Concepts	Debate / Discussion	List 3 benefits of edge computing.
35	Unit IV	Cloud Computing: IaaS, PaaS, SaaS	Differentiate cloud service models.	Classify 10 different software services.	CO2: Ecosystem Elements	Classification Game	Give one example each of IaaS, PaaS, and SaaS.
36	Unit IV	Integration of IoT Devices with Cloud	Understand APIs and bridging devices to cloud.	Send a test payload to a cloud webhook.	CO3: Integrate Hardware	Practical Demo	Review API key security basics.
37	Unit IV	Data Storage in the Cloud	Explore databases suitable for time-series IoT data.	Compare SQL vs NoSQL for IoT.	CO4: Analyze Data	Lecture	Research time-series databases.

38	Unit IV	Processing and Management in Cloud	Learn how cloud rules engines process data.	Setup a simple IF-THEN rule on a platform.	CO4: Analyze Data	Workshop	Write a rule to trigger an alert if temperature > 30°C.
39	Unit V	Security Challenges in IoT	Identify why IoT devices are inherently vulnerable.	Threat modeling a smart camera.	CO5: Security & Privacy	Threat Modeling	Read a case study on the Mirai botnet.
40	Unit V	Common Vulnerabilities and Threats	Understand device hijacking and network flaws.	Analyze common default password exploits.	CO5: Security & Privacy	Case Study	List top 3 OWASP IoT vulnerabilities.
41	Unit V	Authentication & Authorization	Differentiate identifying vs granting permissions.	Implement a simple token check logic.	CO5: Security & Privacy	Logic Exercise	Explain Multi-Factor Authentication (MFA).
42	Unit V	Data Encryption & Secure Comms	Understand basic cryptography (TLS/SSL) for IoT.	Visualize asymmetric encryption.	CO5: Security & Privacy	Visual Lecture	Define Public vs Private keys.
43	Unit V	Privacy: Laws and Regulations	Review regulations like GDPR.	Review a privacy policy snippet.	CO5: Security & Privacy	Reading & Analysis	Research one principle of GDPR.
44	Unit V	User Consent and Data Ownership	Understand the ethics of user data collection.	Roleplay: Consumer vs Data Broker.	CO5: Security & Privacy	Roleplay	Write a short consent prompt for an app.
45	Unit V	Best Practices for IoT Privacy	Compile strategies for secure IoT development.	Create a security checklist for a project.	CO5: Security & Privacy	Collaborative Review	Final review of the security checklist.

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