



**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY,
EAST DELHI CAMPUS,
SURAJMAL VIHAR-110092**

Semester: 5th												
Paper code: AIDS309/AIML309								L	T/P	Credits		
Subject: Introduction to Internet of Things								3	0	3		
Marking Scheme:												
1. Teachers Continuous Evaluation: As per university examination norms from time to time												
2. End Term Theory Examination: As per university examination norms from time to time												
INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: As per university norms												
1. There should be 9 questions in the end term examination question paper.												
2. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions.												
3. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit.												
4. The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks.												
5. The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required.												
Course Objectives:												
1.	To learn fundamentals of IoT and how to build IoT based systems											
2.	To emphasize on development of Industrial IoT applications											
3.	To recognize the factors that contributed to the emergence of IoT											
4.	To utilize and implement solid theoretical foundation of the IoT Platform and System Design.											
Course Outcomes:												
CO1	Ability to understand design flow of IoT based systems											
CO2	Analyse and understand different communication protocols for connecting IoT nodes to server											
CO3	Apply coding concepts to design real-time IoT solutions											
CO4	Develop the state-of-the-art IoT based systems, suitable for real life and Industry applications											
Course Outcomes (CO) to Programme Outcomes (PO) Mapping												
(Scale 1: Low, 2: Medium, 3: High)												
CO/ PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	-	-	2	2	2	-	1	1	-	-	1	1
CO2	-	-	2	2	2	-	1	-	-	-	1	1
CO3	-	-	2	2	2	-	1	-	-	-	1	1
CO4	1	1	3	2	2	1	1	1	1	1	1	1

Course Overview:

The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the middleware for Internet of Things. The course addresses various components of Internet of things such as Sensors, internetworking, protocols. In the end students will also be able to design and implement IoT circuits and solutions.



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UNIT I

[8]

The Internet of Things: An Overview of what is IoT? Why IoT? Explain the definition and usage of the term "Internet of Things (IOT)" in different contexts. Design Principles for Connected Devices, internet principles: internet communications-An overview, Physical Design of IoT, Logical Design of IoT, IoT standards, IoT generic architecture and IoT protocols. IoT future trends, Understand IoT Applications and Examples. Understand various IoT architectures based on applications. Understand different classes of sensors and actuators. Sensors: sensor terminology, sensor dynamics and specifications. Understand the basics of hardware design needed to build useful circuits using basic sensors and actuators.

UNIT II

[8]

Communication protocols and Arduino Programming: Understand various network protocols used in IoT, Understand various communication protocols (SPI, I2C, UART). Design and develop Arduino code needed to communicate the microcontroller with sensors and actuators, build circuits using IoT supported Hardware platforms such as Arduino, ESP8266 etc., Use of software libraries with an Arduino sketch that allows a programmer to use complicated hardware without dealing with complexity, Learning IoT application programming and build solutions for real life problems and test them in Arduino and Node MCU environments. Understand various wireless Technologies for IoT and its range, frequency and applications.

UNIT III

[8]

Fundamentals of IEEE 802.15.4, Zigbee and 6LOWPAN: Importance of IEEE 802.15.4 MAC and IEEE 802.15.4 PHY layer in constrained networks and their header format, Importance of Zigbee technology and its applications, use of IPv6 in IoT Environments, Understanding importance of IPv6 and how constrained nodes deal with bigger headers (IPv6). Understand IPv6 over Low-Power WPAN (6LoWPAN) and role of 6LoWPAN in wireless sensor network. Various routing techniques in constrained network. Understanding IoT Application Layer Protocols: HTTP, CoAP Message Queuing Telemetry Transport (MeTT).

UNIT IV

[8]

Application areas and Real-time Case Studies: Role of big data, cloud computing and data analytics in a typical IoT system. Analyze various case studies implementing IoT in real world environment and find out the solutions of various deployment issues. Smart parking system, Smart irrigation system-block diagram, sensors, modules on Arduino and Node MCU.

Text Books:

5. "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of things" by David Hanes, Cisco Press.
6. Internet of things with ESP 8266, Macro Schwartz, Pact publication.
7. Bahga, A., & Madiseti, V. (2014). Internet of Things: A hands-on approach. Vpt.
8. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013



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Reference Books:

5. Building the Internet of Things with IPv6 and MIPv6 The Evolving World of M2M Communications, Daniel Minoli, Wiley Publications.
6. Mastering internet of things by Peter Waher, Pact publication.
7. The Internet of Things: connecting objects to the web, Hakima chaouchi, Wiley Publications.
8. Course Era: "Interfacing with the Arduino" by Ian Harris, University of Irvine, California.