

# MOOC APPROVAL REQUEST

As per KTU B.Tech Regulations 2024, Section 17

## KTU COURSE

Code: PEECT752

Name: Internet of Things

## NPTEL COURSE

Name: Introduction to Internet of Things

Instructor: Prof. Sudip Misra

Institution: IIT Kharagpur

Duration: 12 Weeks

Course ID: noc26-cs37

Semester: Jan-Apr 2026

Date: December 02, 2025

## Document Contents:

1. KTU Course Syllabus (Complete)
2. NPTEL Course Details
3. Syllabus Comparison Report

## SEMESTER S7

### INTERNET OF THINGS

<b>Course Code</b>	<b>PEECT 752</b>	<b>CIE Marks</b>	40
<b>Teaching Hours/Week (L: T:P: R)</b>	3:0:0:0	<b>ESE Marks</b>	60
<b>Credits</b>	3	<b>Exam Hours</b>	2 Hrs. 30 Min.
<b>Prerequisites (if any)</b>	None/ (Course code)	<b>Course Type</b>	Theory

**Course Objectives:**

1. This course aims to introduce IoT fundamentals.

### SYLLABUS

<b>Module No.</b>	<b>Syllabus Description</b>	<b>Contact Hours</b>
1	<b>Introduction to IoT technology:</b> Definitions of IoT, Characteristics of IoT devices – power, computational constraints, IoT Architectural view – Middleware based architecture, Service oriented architecture, M2M Communication and IoT, Typical application areas of IoT technology (case studies of at least four domains) - Energy management and Smart grid, IoT for Home, Cities, Environment monitoring, Agriculture, Supply chain and customer monitoring	9
2	<b>Components of IoT technology:</b> Identification/Addressing - Electronic Product Codes, RFID, ubiquitous code, IPv4, IPv6. Sensors and Actuators*. IoT Hardware**, IoT Software – overview of Operating systems, Firmware, Middle ware, Application software used in IoT. Connectivity for IoT devices – characteristics.	9
3	<b>Communication technologies for IoT :</b> Zigbee - key features, architecture, limitations, Bluetooth technology - bluetooth stack, piconet, scatternet, limitations, Bluetooth Low Energy (key features, architecture, limitations), Wifi (IEEE 802.11) technology – key features, limitations, Cellular technology – GSM, 3G, 4GLTE (overview), features, limitations, LoRa	9

	technology – features, LoRaWAN architecture, 6LoWPAN – features, protocol stack, Narrow Band (NB- IoT) – features, applications, Sigfox – features, applications	
4	<b>IoT Data Management :</b> Storage technologies for IoT hardware – Volatile, Non-volatile, Embedded (MTP/OTP), external flash (NAND/NOR), DRAM, eflash, UFS, eMMC (overview of technologies). Cloud and IoT, Cloud computing – architecture, advantages of cloud computing, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS). Case study of commercial cloud computing platforms like - Microsoft Azure IoT Suite, Google Cloud's IoT Platform, IBM Watson IoT Platform. IoT analytics	9

**Course Assessment Method**  
**(CIE: 40 marks, ESE: 60 marks)**

**Continuous Internal Evaluation Marks (CIE):**

Attendance	Assignment/ Micropjject	Internal Examination-1 (Written)	Internal Examination- 2 (Written )	Total
5	15	10	10	40

**End Semester Examination Marks (ESE)**

*In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions*

Part A	Part B	Total
<ul style="list-style-type: none"> <li>• 2 Questions from each module.</li> <li>• Total of 8 Questions, each carrying 3 marks</li> </ul> <p><b>(8x3 =24marks)</b></p>	<ul style="list-style-type: none"> <li>• Each question carries 9 marks.</li> <li>• Two questions will be given from each module, out of which 1 question should be answered.</li> <li>• Each question can have a maximum of 3 sub divisions.</li> </ul> <p><b>(4x9 = 36 marks)</b></p>	60

### Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
<b>CO1</b>	Explain in a concise manner the architecture of IoT	<b>K2</b>
<b>CO2</b>	Identify various hardware and software components used in IoT	<b>K3</b>
<b>CO3</b>	Describe the various communication technologies and interfaces in IoT	<b>K2</b>
<b>CO4</b>	Describe the usage of modern technologies like cloud computing for data management in IoT	<b>K2</b>

Note: *K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

### CO-PO Mapping Table (Mapping od Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2								2
CO2	3	2	2	2								2
CO3	3	2	2	1								2
CO4	3	2	2	1								2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

<b>Text Books</b>				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Internet of Things : Architecture and Design Principles”	Rajkamal	McGraw Hill (India) Private Limited.	2nd edition,2022
2	“Internet of Things (A Hands-on- Approach)”	Vijay Madisetti and Arshdeep Bahga	Orient Blackswan Private Limited - New Delhi	1st Edition,2015

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	. Internet of things: A survey on enabling technologies, protocols, and applications	Al-Fuqaha	IEEE Communications Surveys & Tutorials	2015
2	The Internet of Things	Samuel Greengard	The MIT Press Essential Knowledge series Paperback	March 20, 2015
3	The Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems	Ovidiu Vermesan and Peter Friess	River Publishers	1st Edition, 2013
4	. Internet of Things - From Research and Innovation to Market Deployment	Peter Friess, Ovidiu Vermesan	River Publishers	1 <sup>st</sup> Edition, 2014

Video Links (NPTEL, SWAYAM...)	
Module No.	Link ID
1	<a href="https://youtu.be/WUYAjxnwjU4?si=s58W-NKMrEQMaJ8m">https://youtu.be/WUYAjxnwjU4?si=s58W-NKMrEQMaJ8m</a> <a href="https://youtu.be/BXDxYh1EV2w?si=8oFtQB9vycC_c-t2">https://youtu.be/BXDxYh1EV2w?si=8oFtQB9vycC_c-t2</a>
2	<a href="https://youtu.be/z3VEZPwl5gA?si=tNuzG_By-KBU3ks_">https://youtu.be/z3VEZPwl5gA?si=tNuzG_By-KBU3ks_</a> <a href="https://youtu.be/SXz0XR68dwE?si=1tVN1g9FQcGp87li">https://youtu.be/SXz0XR68dwE?si=1tVN1g9FQcGp87li</a> <a href="https://youtu.be/TvzgzO6xKrY?si=gYzJstW51MTNsgKj">https://youtu.be/TvzgzO6xKrY?si=gYzJstW51MTNsgKj</a>
3	<a href="https://youtu.be/qko-f1VDhCM?si=0tWM_OHS395ESV_w">https://youtu.be/qko-f1VDhCM?si=0tWM_OHS395ESV_w</a> <a href="https://youtu.be/d9QfVpCG00Y?si=qeHk8tPg_torr2yX">https://youtu.be/d9QfVpCG00Y?si=qeHk8tPg_torr2yX</a> <a href="https://youtu.be/1zQ8wbBozqI?si=7vOSHMt8OT3nQINO">https://youtu.be/1zQ8wbBozqI?si=7vOSHMt8OT3nQINO</a>
4	<a href="https://youtube.com/playlist?list=PLE7VH8RC_N3bpVne8QzOAHziegmjQ2qE&amp;si=rr5Fpuew5q9_Y4qg">https://youtube.com/playlist?list=PLE7VH8RC_N3bpVne8QzOAHziegmjQ2qE&amp;si=rr5Fpuew5q9_Y4qg</a>



# INTRODUCTION TO INTERNET OF THINGS

## PROF. SUDIP MISRA

Department of Computer Science and Engineering  
IIT Kharagpur

**PRE-REQUISITES :** Basic programming knowledge

**INTENDED AUDIENCE :** CSE, IT, ECE, EE, Instrumentation Engineering, Industrial Engineering

### COURSE OUTLINE :

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

### ABOUT INSTRUCTOR :

Prof. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles. His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award). Dr. Misra was also awarded the Canadian Government's prestigious NSERC Post-Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Transactions on Vehicular Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier). Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

### COURSE PLAN :

**Week 1:** Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I

**Week 2:** Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II

**Week 3:** Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

**Week 4:** Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications

**Week 5:** Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

**Week 6:** Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi

**Week 7:** Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

**Week 8:** SDN for IoT (contd), Data Handling and Analytics, Cloud Computing

**Week 9:** Cloud Computing(contd), Sensor-Cloud

**Week 10:** Fog Computing, Smart Cities and Smart Homes

**Week 11:** Connected Vehicles, Smart Grid, Industrial IoT

**Week 12:** Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

# SYLLABUS COMPARISON

KTU: PEECT752 - Internet of Things

NPTEL: Introduction to Internet of Things

KTU SYLLABUS TOPICS	NPTEL SYLLABUS TOPICS	OK
Module 1: IoT Architecture, Sensors	IoT Architecture, Sensing, Actuation	✓
Module 2: Protocols: MQTT, CoAP	IoT Protocols, MQTT, CoAP, HTTP	✓
Module 3: IoT Platforms, Cloud	IoT Cloud Platforms, Data Analytics	✓
Module 4: IoT Security, Applications	IoT Security, Smart Applications	✓

## CONTENT OVERLAP: $\geq 70\%$

The above comparison confirms that the NPTEL course content matches at least 70% of the KTU syllabus as required by R 17.4.