

The background is a dark blue gradient with a subtle pattern of small white dots. Overlaid on the left side is a large, semi-circular degree scale ranging from 140 to 260. Several concentric circles and dashed lines with arrows are scattered across the image, suggesting a technical or scientific theme.

# 15CSE480

# INTERNET OF THINGS

Lab Based Course

# COURSE DETAILS

Credits	3 - 0 - 0 - 3
Offered to	VII Sem B.Tech CSE (2018-22 Batch)
Class Strength and No of Sections	Total: 231 students in 3 Groups
Faculty Members	Dr R Gowtham (Group1) Mr A Baskar (Mentor) (Group2) Mr AK Sumesh (Group3)
Department	CSE

# OBJECTIVE OF THE COURSE

- •To introduce various concepts in IoT based applications and the associated HW and SW design
- •To understand and apply different enabling technologies for IoT like application level protocols, identification, device management, service discovery in various use cases.
- •To explore the integration of IoT with Cloud and the usage of Edge / Fog Computing along with Data Analytics to build Autonomous Systems.

# COURSE OUTCOMES

	Course Outcome	BTL
CO 1	Understand the key techniques and theory behind Internet of Things	L2
CO 2	Apply effectively the various enabling technologies (both hardware and software ) for IoT	L3
CO 3	Understand the integration of Cloud and IoT , Edge and Fog Computing	L2
CO 4	Apply various techniques for Data Accumulation, Storage and Analytics	L3
CO 5	Design and build IoT system for any one interesting Use case	L4,L5

# SYLLABUS

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## Unit - I

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Introduction to IoT - IoT definition - Characteristics - Things in IoT - IoT Complete Architectural Stack - IoT enabling Technologies - IoT Challenges - IoT Levels - A Case Study to realise the stack.

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Sensors and Hardware for IoT - Accelerometer, Proximity Sensor, IR sensor, Gas Sensor, Temperature Sensor, Chemical Sensor, Motion Detection Sensor. Hardware Kits - Arduino, Raspberry Pi, nodeMCU. A Case study with any one of the boards and data acquisition from sensors (Lab Component)

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## Unit – II

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Protocols for IoT – Infra structure protocol (IPV4/V6 | RPL), Identification (URLs), Transport (Wi-Fi, Li-Fi, BLE), Discovery, Data Protocols, Device Management Protocols. - A Case Study with MQTT/CoAP usage. (Lab Component).

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Cloud and Data analytics- Types of Cloud - IoT with cloud challenges - Selection of cloud for IoT applications. Fog computing for IoT- Edge computing for IoT- Cloud security aspects for IoT applications. RFM for Data Analytics. Case study with AWS / AZURE / Adafruit / IBM Bluemix (Lab Component).

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## Unit – III

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Casestudies with architectural analysis:

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IoT applications - Smart City - Smart Water - Smart Agriculture - Smart Energy - Smart Healthcare - Smart Transportation - Smart Retail - Smart waste management . (Lab Component - As a project)

## TEXT BOOKS / REFERENCE BOOKS

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### Text Books:

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1. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
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### References:

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1. Infosys Training E Materials. Infosys Knowledge Institute (IKI)
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2. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by pethuru Raj and Anupama C. Raman (CRC press)
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3. Adrian McEwen, Designing the Internet of Things, Wiley (B November 20t3), ISBN-13:978-11-L1,8430620,
- 
4. NPTEL Reference : <https://nptel.ac.in/courses/106/105/106105166/>
- 
5. NPTEL IIoT (Prof Sudip Misra IIT Kharagpur)  
[https://onlinecourses.nptel.ac.in/noc20\\_cs24/unit?unit=14&lesson=125](https://onlinecourses.nptel.ac.in/noc20_cs24/unit?unit=14&lesson=125)
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6. Swayam portal: [https://swayam.gov.in/nd1\\_noc20\\_cs69/preview](https://swayam.gov.in/nd1_noc20_cs69/preview)
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7. RBCCPS IISc: <https://cps.iisc.ac.in/> IUDX
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# 15CSE480 COURSE REPOSITORY

• <https://sites.google.com/view/aseiot>

FYI: End Exam Reference Materials are Listed in <https://sites.google.com/view/aseiot/endexam>

Last Date to complete your Final review for IoT Project 10th October 2019 - Refer [Instructions regarding 15CSE480 IoT Course Project](#) available in Lab manuals section.

Additional Materials for Edge, Fog and Cloud Computing as well as Data Analytics were added in the

# EVALUATION PATTERN

S. No	Components	Weightage in %
<u>Internal (70 Marks)</u>		
1	Mid Term Exam (Online exam)	10
2	Mid Term Exam (Online Viva)	10
3	Continuous Assessment –Theory	10
	3.a No of online Quiz (3)	Quiz1: 3
	3.b Missed online Quiz (1)	Quiz2: 3
		Quiz3: 4
4	Continuous Assessment-Lab	40
	4.a Use case –Design-Sprint #1 (No of Review:2)	Review1:5
		Review2:15
	4.b Use case-Implementation- Sprint #2 (No of Review:1)	Review3 :20
<u>External (30 Marks)</u>		
5	End semester Exam (Online Exam)	10
6	End Semester Exam (Online Viva)	20



# HARDWARE AND SOFTWARE DETAILS

## Hardware:

- Node MCU ESP8266 /ESP32
- Raspberry pi / Intel IoT

## Software

- Arduino IDE
- MicroPython

## Cloud Platform

- Adafruit
- Thingspeak
- AWS
- Google Cloud Platform