

THEORY-2

INTERNET OF THINGS

(Common to CSE/IT)

A. RATIONALE

IoT is a new Technology which shall make revolutionary changes in all fields of Life including Industries. Smart cities are the best place where applications of IoT can be predominantly seen. IoT involves extensive use of sensors, network, actuators, micro controllers ,software. Using such components in network shall bring versatile usage of IoT through Cloud service.

B. OBJECTIVE:

After completion of this course the student will be able to:

- Know what IoT is
- Know Physical and Logical design of IoT
- Understand the other Technology associated with IoT
- Know the areas of applications of IoT
- Understand the concept of IIoT
- Know the working with Arduino and Raspberry Pi

C. DETAIL CONTENTS:

| Sl. No. | Chapters | Periods |
|---------|--|---------|
| 1 | 1. Introduction to Internet of Things 1.1 Introduction 1.2 Characteristics of IoT 1.3 Applications of IoT 1.4 IoT Categories 1.5 IoT Enablers and connectivity layers 1.6 Baseline Technologies 1.7 Sensor 1.8 Actuator 1.9 IoT components and implementation 1.10 Challenges for IoT | 6 |
| 2 | 2. IOT Networking 2.1 Terminologies 2.2 Gateway Prefix allotment 2.3 Impact of mobility on Addressing 2.4 Multihoming 2.5 Deviation from regular Web 2.6 IoT identification and Data protocols | 6 |
| 3 | 3. Connectivity Technologies 3.1 Introduction 3.2 IEEE 802.15.4 3.3 ZigBee, 6LoWPAN 3.4 RFID, HART and wireless HART 3.5 NFC, Bluetooth, Z wave, ISA100.11.A | 6 |
| 4 | 4. Wireless Sensor Networks 4.1 Introduction 4.2 Components of a sensor node 4.3 Modes of Detection 4.4 Challenges in WSN 4.5 Sensor Web 4.6 Cooperation and Behaviour of Nodes in WSN | 6 |

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| | 4.7 Self-Management of WSN 4.8 Social sensing WSN 4.9 Application of WSN 4.10 Wireless Multimedia sensor network 4.11 Wireless Nano-sensor Networks 4.12 Underwater acoustic sensor networks 4.13 WSN Coverage Stationary WSN, Mobile WSN | |
| 5 | 5. M2M Communication 5.1 M2M communication 5.2 M2M Ecosystem 5.3 M2M service Platform 5.4 Interoperability | 6 |
| 6 | 6. Programming with Arduino 6.1 Features of Arduino 6.2 Components of Arduino Board 6.3 Arduino IDE 6.4 Case Studies | 5 |
| 7 | 7. Programming with Raspberry Pi 7.1 Architecture and Pin Configuration 7.2 Case studies 7.3 Implementation of IoT with Raspberry Pi | 5 |
| 8 | 8. Software defined Networking 8.1 Limitation of current network 8.2 Origin of SDN 8.3 SDN Architecture 8.4 Rule Placement, Open flow Protocol 8.5 Controller placement 8.6 Security in SDN 8.7 Integrating SDN in IoT | 6 |
| 9 | 9. Smart Homes 9.1 Origin and example of Smart Home Technologies 9.2 Smart Home Implementation 9.3 Home Area Networks(HAN) 9.4 Smart Home benefits and issues | 5 |
| 10 | 10. Smart Cities 10.1 Characteristics of Smart Cities 10.2 Smart city Frameworks 10.3 Challenges in Smart cities 10.4 Data Fusion 10.5 Smart Parking 10.6 Energy Management in Smart cities | 5 |
| 11 | 11. Industrial IoT 11.1 IIoT requirements 11.2 Design considerations 11.3 Applications of IIoT 11.4 Benefits of IIoT 11.5 Challenges of IIoT | 4 |

Coverage of Syllabus upto Internal Exams (I.A.) Chapter 1,2,3,4

Books Recommended :-

| Sl. No. | Name of Authors | Title of the Book | Name of the publisher |
|---------|-----------------|--------------------|-----------------------|
| 01 | Jeeva Jose | Internet of Things | Khanna Books |

| | | | |
|----|-------------------------------|---|------------------|
| 02 | Arsheep Bhaga, Vijay Madiseti | Internet of Things A Hands-on approach | University press |
|----|-------------------------------|---|------------------|

Reference Books :-

| Sl. No. | Name of Authors | Title of the Book | Name of the publisher |
|---------|--|---|-------------------------------------|
| 01 | RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan | Internet of Things | Wiley |
| 02 | Srinivasa K. G., Siddesh G. M., Hanumantha Raju R. | Internet of Things | Cengage Learning India Pvt. Ltd. |
| 03 | Raj Kamal | Internet of Things : Architecture and Design Principles | McGraw Hill Education |

Website References :-

| Sl. No. | Links |
|---------|---|
| 01 | https://nptel.ac.in/courses/106/105/106105166/ |
| 02 | www.electronicshub.org |
| 03 | https://www.youtube.com/watch?v=WUYAjsxnwjU4&list=PLJ5C_6qdAvBG7SHg5mLOQq6bzF-sOPu3k |
| 04 | https://www.informit.com/articles |
| 05 | https://www.google.co.in/books/edition/Internet_of_Things/L6YEEAAAQBAJ |
| 06 | https://www.researchgate.net/ |

D. LESSON PLAN

| Sl. No. | Topic | Expected Date of Completion | Actual Date of Completion | Teaching Learning Process | Shortfall if any(Y/N) Remarks |
|--|---|-----------------------------|---------------------------|---------------------------|-------------------------------|
| 1. Introduction to Internet of Things | | | | | |
| 1. | 1.1 Introduction 1.2 Characteristics of IoT 1.3 Applications of IoT | 19/04/21 | 19/04/21 | Video Lecture & PPT | No |
| 2. | 1.4 IoT Categories | 22/04/21 | 22/04/21 | Video Lecture & PPT | No |
| 3. | 1.5 IoT Enablers and connectivity layers | 23/04/21 | 23/04/21 | Video Lecture & PPT | No |
| 4. | 1.6 Baseline Technologies | 26/04/21 | 26/04/21 | Video Lecture & PPT | No |
| 5. | 1.7 Sensor 1.8 Actuator | 28/04/21 | 28/04/21 | Video Lecture & PPT | No |
| 6. | 1.9 IoT components and implementation 1.10 Challenges for IoT | 29/04/21 | 29/04/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-1 | | | LectureNotes | |
| 2. IOT Networking | | | | | |

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|-------------------------------------|---|----------|----------|---------------------|----|
| 7. | 2.1 Terminologies 2.2 Gateway Prefix allotment | 03/05/21 | 03/05/21 | Video Lecture & PPT | No |
| 8. | 2.3 Impact of mobility on Addressing | 05/05/21 | 05/05/21 | Video Lecture & PPT | No |
| 9. | 2.4 Multihoming | 06/05/21 | 06/05/21 | Video Lecture & PPT | No |
| 10. | 2.5 Deviation from regular Web | 07/05/21 | 07/05/21 | Video Lecture & PPT | No |
| 11. | 2.6 IoT identification and Data protocols | 10/05/21 | 10/05/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-2 | | | LectureNotes | |
| 3. Connectivity Technologies | | | | | |
| 12. | 3.1 Introduction 3.2 IEEE 802.15.4 | 12/05/21 | 12/05/21 | Video Lecture & PPT | No |
| 13. | 3.3 ZigBee, 6LoWPAN | 13/05/21 | 13/05/21 | Video Lecture & PPT | No |
| 14. | 3.4 RFID, Bluetooth | 17/05/21 | 17/05/21 | Video Lecture & PPT | No |
| 15. | 3.4 HART and wireless HART | 19/05/21 | 19/05/21 | Video Lecture & PPT | No |
| 16. | 3.5 NFC, Z wave | 20/05/21 | 20/05/21 | Video Lecture & PPT | No |
| 17. | 3.5 ISA100.11.A | 24/05/21 | 24/05/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-3 | | | LectureNotes | |
| 4. Wireless Sensor Networks | | | | | |
| 18. | 4.1 Introduction 4.2 Components of a sensor node | 28/05/21 | 28/05/21 | Video Lecture & PPT | No |
| 19. | 4.3 Modes of Detection 4.4 Challenges in WSN | 31/05/21 | 31/05/21 | Video Lecture & PPT | No |
| 20. | 4.5 Sensor Web 4.6 Cooperation and Behaviour of Nodes in WSN 4.7 Self-Management of WSN | 02/06/21 | 02/06/21 | Video Lecture & PPT | No |
| 21. | 4.8 Social sensing WSN 4.9 Application of WSN | 03/06/21 | 03/06/21 | Video Lecture & PPT | No |
| 22. | 4.10 Wireless Multimedia sensor network 4.11 Wireless Nano-sensor Networks | 04/06/21 | 04/06/21 | Video Lecture & PPT | No |
| 23. | 4.12 Underwater acoustic sensor networks 4.13 WSN Coverage Stationary WSN, Mobile WSN | 05/06/21 | 05/06/21 | Video Lecture & PPT | No |

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|---|--|----------|----------|---------------------|----|
| LMS | ASSIGNEMENT-4 | | | LectureNotes | |
| 5. M2M Communication | | | | | |
| 24. | 5.1 M2M communication | 07/06/21 | 07/06/21 | Video Lecture & PPT | No |
| 25. | 5.2 M2M Ecosystem | 09/06/21 | 09/06/21 | Video Lecture & PPT | No |
| 26. | 5.3 M2M service Platform | 10/06/21 | 10/06/21 | Video Lecture & PPT | No |
| 27. | 5.4 Interoperability | 11/06/21 | 11/06/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-5 | | | LectureNotes | |
| 6. Programming with Arduino | | | | | |
| 28. | 6.1 Features of Arduino | 14/06/21 | 14/06/21 | Video Lecture & PPT | No |
| 29. | 6.2 Components of Arduino Board | 16/06/21 | 16/06/21 | Video Lecture & PPT | No |
| 30. | 6.3 Arduino IDE | 17/06/21 | 17/06/21 | Video Lecture & PPT | No |
| 31. | 6.4 Case Studies | 18/06/21 | 18/06/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-6 | | | LectureNotes | |
| 7. Programming with Raspberry Pi | | | | | |
| 32. | 7.1 Architecture and Pin Configuration | 21/06/21 | 21/06/21 | Video Lecture & PPT | No |
| 33. | 7.2 Case studies | 23/06/21 | 23/06/21 | Video Lecture & PPT | No |
| 34. | 7.3 Implementation of IoT with Raspberry Pi | 24/06/21 | 24/06/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-7 | | | LectureNotes | |
| 8. Software defined Networking | | | | | |
| 35. | 8.1 Limitation of current network 8.2 Origin of SDN | 25/06/21 | 25/06/21 | Video Lecture & PPT | No |
| 36. | 8.3 SDN Architecture 8.4 Rule Placement, Open flow Protocol | 28/06/21 | 28/06/21 | Video Lecture & PPT | No |
| 37. | 8.5 Controller placement | 30/06/21 | 30/06/21 | Video Lecture & PPT | No |
| 38. | 8.6 Security in SDN | 01/07/21 | 01/07/21 | Video Lecture & PPT | No |
| 39. | 8.7 Integrating SDN in IoT | 02/07/21 | 02/07/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-8 | | | LectureNotes | |
| 9. Smart Homes | | | | | |
| 40. | 9.1 Origin and example of Smart Home Technologies | 05/07/21 | 05/07/21 | Video Lecture & PPT | No |
| 41. | 9.2 Smart Home Implementation | 07/07/21 | 07/07/21 | Video Lecture & PPT | No |

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|---------------------------|--|----------|----------|---------------------|----|
| 42. | 9.3 Home Area Networks(HAN) | 08/07/21 | 08/07/21 | Video Lecture & PPT | No |
| 43. | 9.4 Smart Home benefits and issues | 09/07/21 | 09/07/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-9 | | | LectureNotes | |
| 10. Smart Cities | | | | | |
| 44. | 10.1 Characteristics of Smart Cities 10.2 Smart city Frameworks | 10/07/21 | 10/07/21 | Video Lecture & PPT | No |
| 45. | 10.3 Challenges in Smart cities 10.4 Data Fusion | 14/07/21 | 14/07/21 | Video Lecture & PPT | No |
| 46. | 10.5 Smart Parking | 15/07/21 | 15/07/21 | Video Lecture & PPT | No |
| 47. | 10.6 Energy Management in Smart cities | 16/07/21 | 16/07/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-10 | | | LectureNotes | |
| 11. Industrial IoT | | | | | |
| 48. | 11.1 IIoT requirements 11.2 Design considerations | 19/07/21 | 19/07/21 | Video Lecture & PPT | No |
| 49. | 11.3 Applications of IIoT | 22/07/21 | 22/07/21 | Video Lecture & PPT | No |
| 50. | 11.4 Benefits of IIoT 11.5 Challenges of IIoT | 23/07/21 | 23/07/21 | Video Lecture & PPT | No |
| LMS | ASSIGNEMENT-11 | | | LectureNotes | |