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| --- | --- | --- | --- | --- | --- |
|  | Internet of Things(Elective-VII) | **L** | **T** | **P** | **C** |
| **Version 1.0** | **Contact hour-45** | **3** | **0** | **0** | **3** |
| **Pre-requisites/Exposure** | **Basics of Microprocessor/Microcontroller** | | | | |
| **Co-requisites** | **--** | | | | |

**Course Objectives:**

* To give a brief overview of IoT.
* To enable Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G precision at workplace.
* To give the students a perspective to smart objects, Network Convergence, IoT-Standard and Characteristic.
* To enable students, study the structure of Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP for their profession.

**Course Outcomes:**

On completion of this course, the students will be able to

CO1. **Understand t**he Architecture of IoT, Security issues, Opportunities for IoT

CO2. **Effectively** analyse Concept of wireless sensor network

CO3. **Explore** Network Convergence, IoT-Standard and Characteristic.

CO4. **Precise** analysis of Sensor network architecture,

CO5. **Apply** IoT Taxonomy, System Model.

**Catalog Description:**

The [Internet of Things](https://www.sciencedirect.com/topics/social-sciences/internet-of-things) (IoT), as a new growth engine of the [information and communications technology](https://www.sciencedirect.com/topics/computer-science/information-and-communication-technologies) industry, has sparked global enthusiasm. However, academic deliberation has concentrated on technological aspects, discounting the multifaceted nature of IoT. Therefore, we reviewed non-technical and technical domain to examine the current status of IoT discourse and applied analytic hierarchy process models to assess the priorities for future IoT research.

**Course Content:**

**Unit I: 2 lecture hours**

Introduction: What is IoT and the connected world?

Architecture of IoT, Security issues, Opportunities for IoT

**Unit II: 4 lecture hours**

**Wireless Communication**

Wireless Communication –Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G

**Unit III: 2 lecture hours**

**Wireless Sensor Networks**

Concept of wireless sensor network, Chronology of sensor node, Senor network architecture,

Taxonomy, System Model.

**Unit IV: 6 lecture hours**

**Architecture**

IoT built from smart objects, Network Convergence, IoT-Standard and Characteristic,

Outline of Architecture, Opportunities in IoT, Architectural Components and its mapping into protocols.

**Unit V: 8 lecture hours**

**Wireless Standards**

What are Wireless Standards? Network and Device Layer Protocol, Routing Protocol for Low Power and Lossy Networks (RPL), 6LowPAN, IEEE 802.15.4, Bluetooth Low Energy (BLE), LTE.

**Unit VI: 10 lecture hours**

**Middleware layer Protocol**

multicast DNS (mDNS), DNS Service Discovery (DNS-SD)

**Application Layer Protocol**

Constrained Application Protocol (CoAP), Message Queuing Telemetry Transport (MQTT),

Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP).

**Unit VII: 13 lecture hours**

**Localization, Data Storage (Big Data), Web of Things (WoT) and Security**

Localization:

Localization algorithms, Indoor localization, Localization for mobile systems, Applications,

Data Storage (Big Data): Managing high rate sensor data, Processing data streams, Data consistency in an intermittently connected or disconnected environment, Identifying outliers and anomalies.

Security: Why is security for IoT so hard? Threat models; Defensive strategies and examples

**Applications**

Smart health; Home automation; Location tracking

**Text Books:**

1. Internet of Things (IoT): Technologies, Applications, Challenges and Solutions-

BK Tripathi (Editor), J Anuradha (Editor), CRC press, 2018

2. The Internet of Things, S. Greengard, MIT Press, 2015, 1st Edition

**Reference Books:**

1. Ala Al-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications", IEEE Communication Surveys & Tutorials, Vol. 17, No. 4, Fourth Quarter 2015, pp 2347-76

2. S. M. RIAZUL ISLAM et al., "The Internet of Things for Health Care: A Comprehensive Survey", IEEE Access, Jun 2015, pp678-08

**Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination**

**Examination Scheme:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Components** | **Attendance** | **Internal Assessment** | **MTE** | **ETE** |
| **Weightage (%)** | **10** | **30** | **20** | **40** |

**Relationship between the Course Outcomes (COs) and Program Outcomes (POs)**

|  |  |  |
| --- | --- | --- |
| **Mapping between COs and POs** | | |
|  | **Course Outcomes (COs)** | **Mapped Program Outcomes** |
| **CO1** | **Understand** the Architecture of IoT, Security issues, Opportunities for IoT. | **PO1, PO11, PO10** |
| **CO2** | **Effectivelyanalyse**Concept of wireless sensor network. | **PO1, PO2, PO3, ,PO10** |
| **CO3** | **Explore** Network Convergence, IoT-Standard and Characteristic. | **PO1, PO2, PO3, PO4, PO5, PO7, PO10,PO11,PO12** |
| **CO4** | **Precise** analysis of Sensor network architecture. | **PO1, PO6, PO8, PO9, PO12** |
| **CO5** | **Expound** IoT Taxonomy, System Model for smart infrastructure. | **PO1, PO6, PO8, PO9, PO12,** |

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|  |  | Engineering Knowledge | Problem analysis | Design/development of solutions | Conduct investigations of complex problems | Modern tool usage | The engineer and society | Environment and sustainability | Ethics | Individual or team work | Communication | Project management and finance | Life-long Learning |
| Course Code | Course Title | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| ECS  61128 | Internet of Things(Elective -VII) | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 2 | 3 |

1=weakly mapped

2= moderately mapped

3=strongly mapped

**Model Question Paper**

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**ADAMAS UNIVERSITY**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**END-SEMESTER EXAMINATION: JULY 2020**

Name of the Program: M. Tech Semester: II Stream: CSE

PAPER TITLE: Internet of Things(Elective-VII) PAPER CODE: ECS61128

Maximum Marks: 40 Time duration: 3 hours

Total No of questions: 12 Total No of Pages: 01

**Instruction for the Candidate:**

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

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| --- | --- | --- | --- |
| **Section A (Answer All the Questions) (5 x 1 = 5)** | | | |
| 1. | **List** the steps involved in Architecture of IoT | **U** | **CO1** |
| 2. | **Enumerate** the basic elements of wireless sensor network | **U** | **CO2** |
| ­­­ 3. | **Define** Extensible Messaging and Presence Protocol (XMPP), | **R** | **CO3** |
| 4. | **What** is multicast DNS (mDNS),? | **R** | **CO4** |
| 5. | **Give** the principles of Localization for mobile systems. | **U** | **CO3** |
|  | **SECTION B (**Attempt any **Three Questions) (3 x 5 = 15)** |  | |
| 6. | **Describe** the characteristics of Constrained Application Protocol (CoAP), Message Queuing Telemetry Transport (MQTT),  . | **U** | **CO1** |
| 7. | **Examine** Why is security for IoT so hard? And **its Inference** with your own example. | **U,Ap** | **CO1,CO2** |
| 8. | **Elucidate** the factors influencing IoT security. | **Ap** | **CO3** |
| 9. | **Explain** with Example: i) Smart healthcare ii) Reliability Coefficient of smart city. | **Evaluate** | **CO4 /CO5** |
|  | **SECTION (Answer Any Two Questions) (2 x 10 = 20)** |  | |
| 10. | **Explain** in detail about Home automation. | **U** | **CO4** |
| 11. | **Write** a Quality Control **Plan** for the Managing high rate sensor data, Processing data streams. | **Create** | **CO4** |
| 12. | **Distinguish** Data consistency in an intermittently connected or disconnected environment. | **An** | **CO5** |

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| **MBA61142** | E-Commerce (Elective -VII) | **L** | **T** | **P** | **C** |
| **ion 1.0** | **Contact Hours -45** | **3** | **0** | **0** | **3** |
| **Pre-requisites/Exposure** | **Basic marketing knowledge.** | | | | |
| **Co-requisites** | **--** | | | | |