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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE DESCRIPTION FILE**

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| **Academic Year & Semester** | **2019-20202, Semester VI** |
| **Course Code** | PE672EC |
| **Course Title** | DATA COMMUNICATION AND COMPUTER NETWORKING |
| **Curriculum Regulation** | **CBCS – OU (Affiliated Colleges)** |
| **Semester** | **VI** |
| **Course Instructor** | Mr. I.SRIKANTH, Associate Professor, ECE Department |

1. PREREQUISITE(S):

|  |  |  |  |
| --- | --- | --- | --- |
| **Level** | **Credits** | **Semester** | **Prerequisites** |
| UG | 3 | V | AC (PC502EC) |

1. SCHEME OF INSTRUCTIONS

|  |  |  |  |
| --- | --- | --- | --- |
| **Lectures** | **Tutorials** | **Practicals** | **Credits** |
| 3 | - | - | 3 |

1. SCHEME OF EVALUATION & GRADING

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No** | **Component** | **Duration** | **Maximum Marks** |
|  | **Continuous Internal Evaluation (CIE)** |  |  |
| 1. | Internal Examination – I | 60 minutes | 20 |
| 2. | Internal Examination - II | 60 minutes | 20 |
|  | Average of the two internal exams |  | **20** |
| 3. | Assignments | - | **5** |
| 4. | Quizzes | - | **5** |
|  | **CIE (Total)** |  | **30** |
| 5. | **Semester End Examination**  (University Examination) | 3 hours | **70** |
|  |  | **TOTAL** | **100** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks Range | 85-100 | 70 to < 85 | 60 to < 70 | 55 to < 60 | 50 to < 55 | 40 to < 50 | < 40 | Absent |
| Grade | S | A | B | C | D | E | F | Ab |
| Grade Point | 10 | 9 | 8 | 7 | 6 | 5 | 0 | - |

1. SYLLABUS

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| --- | --- | --- |
| **Unit** | **Syllabus Description** | **Target**  **Hours** |
| **I** | **Data communication:** A Communication Model, The Need for Protocol Architecture and Standardization, Network Types: LAN, WAN, MAN. Network Topologies: Bus, Star, Ring, Hybrid. Line configurations. Reference Models: OSI, TCP/IP.  **Circuit switching:** Circuit Switching Principles and concepts.  **Packet switching:** Virtual circuit and Datagram subnets, X.25. | 9 |
| **II** | **Data Link Layer:** Need for Data Link Control, Design issues, Framing, Error Detection and Correction, Flow control Protocols: Stop and Wait, Sliding Window, ARQ Protocols, HDLC.  **MAC Sub Layer:** Multiple Access Protocols: ALOHA, CSMA, Wireless LAN. IEEE 802.2, 802.3, 802.4, 802.11, 802.15, 802.16 standards. Bridges and Routers. | 8 |
| **III** | **Network Layer:** Network layer Services, Routing algorithms: Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, Distance Vector Routing, and Congestion Control Algorithms.  **Internet Working:** The Network Layer in Internet: IPV4, IPV6, Comparison of IPV4 and IPV6, IP Addressing, ATM Networks. | 8 |
| **IV** | **Transport Layer:** Transport Services, Elements of Transport Layer, Connection management, TCP and UDP protocols, ATM AAL Layer Protocol. | 8 |
| **V** | **Application Layer:** Domain Name System, SNMP, Electronic Mail, World Wide Web.  **Network Security:** Cryptography Symmetric Key and Public Key algorithms, Digital Signatures, Authentication Protocols. | 8 |
|  | **Total** | 41 |

**Suggested Reading:**

1. Andrew S Tanenbaum, “Computer Networks,” 5/e, Pearson Education, 2011.
2. Behrouz A. Forouzan, “Data Communication and Networking,”3/e, TMH, 2008.
3. William Stallings, “Data and Computer Communications,” 8/e, PHI, 2004.
4. Douglas EComer, “Computer Networks and Internet”, Pearson Education Asia, 2000.
5. PrakashC. Gupta, “Data Communications and Computer Networks”, PHI learning, 2013
6. E – RESOURCES
7. https://www.javatpoint.com/types-of-computer-network
8. https://nptel.ac.in/courses/106/105/106105183/
9. COURSE OBJECTIVES:

**Course Overview:**

The goal of this course is to introduce the basic computer networks. In this course the fundamental problems of computer networking, from sending bits over wires to running distributed applications will be introduced. Students will learn fundamental layered structure, understand common offered layered services, and examine protocols and algorithms used to operate the network. The course educates the student on the principles in circuit and packet switched networks, on the principles of transport, network and data link layer protocols, on the design issues in computer networking applications.

**The objectives of this course are to impart to the following to the students:**

* To provide a conceptual foundation for the study of data communications using the open Systems interconnect (OSI) model for layered architecture.
* To study the principles of network protocols and internetworking.
* To understand the Network security and Internet applications.
* To understand the concepts of switched communication networks.
* To understand the performance of data link layer protocols for error and flow control.
* To understand various routing protocols and network security.

1. COURSE OUTCOMES

**After completing this course the student will be able to:**

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| --- | --- | --- |
| **CO No.** | **Course Outcome** | **Taxonomy**  **Level** |
| 672.1 | **Understand** the basic network infrastructure to learn the overall function of networking systems. | **Understand** |
| 672.2 | **Identify** different tasks of computer communications networks and protocol architectures. **Analyze** and compare circuit switching and packet switching concepts. | **Analysis** |
| 672.3 | **Apply** knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission and explain the MAC Protocols and IEEE standards. | **Apply** |
| 672.4 | **Compare** various routing algorithm and select an appropriate one for a routing design and understand ATM network concepts. | **Analysis** |
| 672.5 | **Design** a network routing for IP networks and **Paraphrase** the services & protocols of Transport layer. | **Evaluate** |
| 672.6 | **Comprehend** the functionality of application layer and importance of network security | **Understand** |

1. MAPPING OF COs WITH POs & PSOs

Correlation Level: High – 3; Medium – 2; Low – 1

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| **PO / CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO 10** | **PO 11** | **PO 12** | **PS01** | **PSO2** | **PSO3** |
| **C672.1** | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| **C672.2** | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | - | 3 | - | - |
| **C672.3** | 1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | - | - |
| **C672.4** | 2 | 3 | 1 | 2 | - | - | - | - | - | - | - | - | 3 | - | - |
| **C672.5** | 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **C672.6** | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 2 | - | - |

1. LESSON PLAN:

The course plan is meant as a guideline. There may probably be changes.

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| --- | --- | --- | --- |
| S.No | Topic | No. of periods required | Teaching Methodology |
|  | **UNIT-1** |  |  |
| 1 | Data communication Introduction | 1 | PPT/ Discussion |
| 2 | The need for protocol Architecture and standardization. | 1 | PPT |
| 3 | Network Types, Network Topologies, Line configurations | 1 | PPT, STUDENT SEMINARS |
| 4 | Reference Models: OSI Model-Layered Architecture. | 1 | PPT/BOARD |
| 5 | TCP / IP protocol suite | 2 | PPT/BOARD |
| 6 | Circuit switching, Packet switching | 2 | PPT/BOARD |
|  | **UNIT-2** |  |  |
| 7 | Data link layer: need for data link control, design issues. | 1 | PPT/BOARD |
| 8 | Framing-fixed size framing, variable size framing, Flow control, Error detection and correction | 1 | PPT/BOARD |
| 9 | Flow control protocols: Protocols for Noiseless and Noisy Channels-go back n ARQ, selective repeat ARQ, stop and wait ARQ, sliding protocol. | 2 | PPT/BOARD |
| 10 | Bit oriented protocols-HDLC, Bit stuffing in HDLC | 1 | PPT/BOARD |
| 11 | MAC Sub Layer: Multiple Access Protocols: ALOHA, Slotted ALOHA, CSMA-CD, CSMA-CA, controlled access. | 2 | PPT |
| 12 | IEEE 802.2, 802.3, 802.4, 802.11. 802.15, 802.16 standards. Repeaters, bridges, Routers, gateways, switches | 2 | PPT/BOARD  PRESENTATIONS |
|  | UNIT-3 |  |  |
| 13 | Network Layer: Network layer Services | 1 | PPT/BOARD |
| 14 | Routing algorithms- shortest path routing, flooding, hierarchical routing, broadcast, multicast, Distance vector routing. | 2 | PPT/BOARD |
| 15 | Congestion control algorithms. | 1 | PPT/BOARD |
| 16 | Internetworking: the network layer in internet: IPV4, IPV6, Comparison of IPV4 and IPV6, IP Addressing. | 2 | PPT/BOARD |
| 17 | Architecture and Layers of ATM-switching, switching fabrics, service classes | 2 | PPT/ BOARD |
|  | **UNIT-4** |  |  |
| 18 | Transport Layer: transport services. | 1 | PPT/BOARD |
| 19 | Elements of transport layer | 1 | PPT/BOARD |
| 20 | Connection management | 2 | PPT/ BOARD |
| 21 | TCP and UDP protocols. | 2 | PPT/BOARD |
| 22 | ATM AAL Layer protocol | 2 | PPT/BOARD |
|  |  |  |  |
|  | **UNIT-5** |  |  |
| 23 | Application layer: Introduction, Domain Name Services DNS, SNMP | 1 | PPT/BOARD |
| 24 | E-mail-Message, World Wide Web (WWW) | 1 | STUDENT SEMINARS |
| 25 | Network Security: Cryptography-substitution ciphers, transposition ciphers. Symmetric key algorithms-DES, chaining DES, Breaking DES | 1 | STUDENT SEMINARS |
| 26 | Public key algorithms-RSA and other algorithms | 2 | PPT/BOARD |
| 27 | Digital signatures-secret key signatures, public key signatures, message digests, Birthday attacks, Management of public keys | 1 | PPT/BOARD |
| 28 | Authentication protocols-using key distribution center, authentication using Kerberos, using public key cryptography | 2 | PPT/BOARD |
|  | TOTAL CLASES | 41 |  |

**Prepared by:** Mr.I.SRIKANTH, Associate Professor, ECE

**Signature:**

**Date : 04-JAN-2020**

**HOD, EcE**