## COMPUTER NETWORKS
**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the academic year 2016 -2017)**
**SEMESTER – V**

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| Subject Code | 15CS52 | IA Marks | 20 |
| Number of Lecture Hours/Week | 4 | Exam Marks | 80 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |

**CREDITS – 04**

**Course objectives:** This course will enable students to

- Demonstration of application layer protocols
- Discuss transport layer services and understand UDP and TCP protocols
- Explain routers, IP and Routing Algorithms in network layer
- Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
- Illustrate concepts of Multimedia Networking, Security and Network Management

| Module – 1 | Teaching Hours |
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| **Application Layer:** Principles of Network Applications: Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols. The Web and HTTP: Overview of HTTP, Non-persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching, The Conditional GET, File Transfer: FTP Commands & Replies, Electronic Mail in the Internet: SMTP, Comparison with HTTP, Mail Message Format, Mail Access Protocols, DNS; The Internet's Directory Service: Services Provided by DNS, Overview of How DNS Works, DNS Records and Messages, Peer-to-Peer Applications: P2P File Distribution, Distributed Hash Tables, Socket Programming: creating Network Applications: Socket Programming with UDP, Socket Programming with TCP. **T1: Chap 2** | 10 Hours |
| **Module – 2** | |
| **Transport Layer :** Introduction and Transport-Layer Services: Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing: Connectionless Transport: UDP,UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N, Selective repeat, Connection-Oriented Transport TCP: The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control: The Causes and the Costs of Congestion, Approaches to Congestion Control, Network-assisted congestion-control example, ATM ABR Congestion control, TCP Congestion Control: Fairness. **T1: Chap 3** | 10 Hours |
| **Module – 3** | |
| **The Network layer:** What's Inside a Router?: Input Processing, Switching, Output Processing, Where Does Queuing Occur? Routing control plane, IPv6,A Brief foray into IP Security, Routing Algorithms: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, | 10 Hours |

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| Routing in the Internet, Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter/AS Routing: BGP, Broadcast and Multicast Routing: Broadcast Routing Algorithms and Multicast. <br> **T1: Chap 4:4.3-4.7** | |
| **Module – 4** | |
| **Wireless and Mobile Networks**: Cellular Internet Access: An Overview of Cellular Network Architecture, 3G Cellular Data Networks: Extending the Internet to Cellular subscribers, On to 4G:LTE,Mobility management: Principles, Addressing, Routing to a mobile node, Mobile IP, Managing mobility in cellular Networks, Routing calls to a Mobile user, Handoffs in GSM, Wireless and Mobility: Impact on Higher-layer protocols. <br> **T1: Chap: 6 : 6.4-6.8** | **10 Hours** |
| **Module – 5** | |
| **Multimedia Networking**: Properties of video, properties of Audio, Types of multimedia Network Applications, Streaming stored video: UDP Streaming, HTTP Streaming, Adaptive streaming and DASH, content distribution Networks, case studies: Netflix, You Tube and Kankan. <br> **Network Support for Multimedia**: Dimensioning Best-Effort Networks, Providing Multiple Classes of Service, Diffserv, Per-Connection Quality-of-Service (QoS) Guarantees: Resource Reservation and Call Admission <br> **T1: Chap: 7: 7.1,7.2,7.5** | **10 Hours** |
| **Course outcomes:** The students should be able to: <br> • Explain principles of application layer protocols <br> • Recognize transport layer services and infer UDP and TCP protocols <br> • Classify routers, IP and Routing Algorithms in network layer <br> • Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard <br> • Describe Multimedia Networking and Network Management | |
| **Question paper pattern:** <br> The question paper will have TEN questions. <br> There will be TWO questions from each module. <br> Each question will have questions covering all the topics under a module. <br> The students will have to answer FIVE full questions, selecting ONE full question from each module. | |
| **Text Books:** <br> 1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017 . | |
| **Reference Books:** <br> 1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition <br> 2. Larry L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER <br> 3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson <br> 4. Mayank Dave, Computer Networks, Second edition, Cengage Learning | |

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