

<b>COMPUTER NETWORKS AND SECURITY</b> <b>(Effective from the academic year 2018 -2019)</b> <b>SEMESTER – V</b>			
<b>Course Code</b>	<b>18CS52</b>	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	03
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS52) will enable students to: <ul style="list-style-type: none"> <li>• Demonstration of application layer protocols</li> <li>• Discuss transport layer services and understand UDP and TCP protocols</li> <li>• Explain routers, IP and Routing Algorithms in network layer</li> <li>• Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard</li> <li>• Illustrate concepts of Multimedia Networking, Security and Network Management</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Application Layer:</b> 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. <b>T1: Chap 2</b> <b>RBT: L1, L2, L3</b>			10
<b>Module 2</b>			
<b>Transport Layer :</b> 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. <b>T1: Chap 3</b> <b>RBT: L1, L2, L3</b>			10
<b>Module 3</b>			
<b>The Network layer:</b> 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, Routing in the Internet, Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter/AS Routing: BGP, Broadcast Routing Algorithms and Multicast. <b>T1: Chap 4: 4.3-4.7</b> <b>RBT: L1, L2, L3</b>			10

<b>Module 4</b>	
<p>Network Security: Overview of Network Security: Elements of Network Security , Classification of Network Attacks , Security Methods , Symmetric-Key Cryptography : Data Encryption Standard (DES), Advanced Encryption Standard (AES) , Public-Key Cryptography : RSA Algorithm , Diffie-Hellman Key-Exchange Protocol , Authentication : Hash Function , Secure Hash Algorithm (SHA) , Digital Signatures , Firewalls and Packet Filtering , Packet Filtering , Proxy Server .</p> <p><b>Textbook2: Chapter 10</b>  <b>RBT: L1, L2, L3</b></p>	10
<b>Module 5</b>	
<p>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</p> <p>Voice-over-IP : Limitations of the Best-Effort IP Service , Removing Jitter at the Receiver for Audio , Recovering from Packet Loss Protocols for Real-Time Conversational Applications , RTP , SIP</p> <p><b>Textbook11: Chap 7</b>  <b>RBT: L1, L2, L3</b></p>	10
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Explain principles of application layer protocols</li> <li>• Recognize transport layer services and infer UDP and TCP protocols</li> <li>• Classify routers, IP and Routing Algorithms in network layer</li> <li>• Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard</li> <li>• Describe Multimedia Networking and Network Management</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson, 2017 .</li> <li>2. Nader F Mir, Computer and Communication Networks, 2<sup>nd</sup> Edition, Pearson, 2014.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition</li> <li>2. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER</li> <li>3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson</li> <li>4. Mayank Dave, Computer Networks, Second edition, Cengage Learning</li> </ol>	