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| **Course Name:** | | | | | | | | | Computer Networks | | | | | | | | | | | | | | | | **Subject Code:** | | | | | | | | TMC 203 | | | |
|  | | | | | | | | |  | | | | | | | | | | | | | | | |  | | | | | | | |  | | | |
| **Program Name:** | | | | | | | | | Master of Computer Applications (MCA) | | | | | | | | | | | | | | | |  | | | | | | | |  | | | |
| **1** | **Contact Hours:** | | | | | | | | | 45 | | |  | | | | | | | | | | | | | **L** | | 3 | | | **T** | | | 0 | **P** | 0 |
|  |  | | | | | | | | |  | | |  | | | | | | | | | | | | |  | |  | | |  | |  | |  |  |
| **2** | **Examination Duration (Hrs):** | | | | | | | | | | | | | | |  | **Theory** | | | 0 | 3 |  | **Practical** | | | | 0 | | 0 | |  | | | | | |
|  |  | | | | | | | | | | | | | | |  |  | | |  |  |  |  | | | |  | |  | |  | | | | | |
| **3** | **Relative Weightage:** | | | | | | | | | |  | | | | **CWE:** | | | | 25 | **MTE:** | | | 25 | **ETE:** | | | | 50 | | | |  | | | | |
|  |  | | | | | | | | | |  | | | |  | | |  | |  | | |  |  | | | |  | | | |  | | | | |
| **4** | **Credits:** | | | | | | 0 | 3 | |  | | | | | | | |  | |  | | |  |  | | | |  | | | |  | | | | |
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| **5** | **Pre-Requisite:** | | | | | | | | | Basics of Information Technology. | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **6** | **Subject Area:** | | | | | | | | | Computer Science | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7** | **Objective:** | | | | | | | | To familiarize students with the layered design and protocols of computer networks, including the Internet | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | |
| **8** | **Course Outcome:** | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | |
|  | A student who successfully fulfills the course requirements will be able to: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **CO 1** | | | | | Apply and Characterize computer networks from the view point of components and from the view point of services. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **CO 2** | | | | | Display good understanding of the flow of a protocol in general and a network protocol. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **CO 3** | | | | | Evaluate and select the appropriate technology to meet Data Link Layer requirements. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **CO 4** | | | | | Evaluate and Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, BitTorrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **CO 5** | | | | | Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **CO 6** | | | | | Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **9** | | **Details of the Course:** | | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | |
| **Unit No.** | | | | **CONTENT** | | | | | | | | | | | | | | | | | | | | | | | | | | **CONTACT HOURS** | | | | | | |
| **1** | | | | **Introduction**: Data Communication Basics, History of Computer Networking and the Internet. Internet, Protocol, Services. Computer Network: Hardware, Media and topology. **Protocol layering:** The OSI Reference Model and the TCP/IP protocol stack. Internet Access Networks. Circuit and Packet Switching, Delays: Processing, Queuing, Transmission and Propagation delays. | | | | | | | | | | | | | | | | | | | | | | | | | | **7** | | | | | | |
| **2** | | | | **Application Layer**: Principles and Architectures of Network Applications. **Application Layer Protocols**- The Web and http: Persistent and Non-persistent connections, http message format, cookies, proxy server, conditional GET, File Transfer Protocol. **Email**: SMTP, mail message formats, mail access protocols: POP3, IMAP, MIME.  **DNS**: Services, how it works, Root, Top-Level and Authoritative DNS servers, Resource Records, DNS messages. A simple Introduction to p2p files distribution: Bit Torrent | | | | | | | | | | | | | | | | | | | | | | | | | | **10** | | | | | | |
| **3** | | | | **Transport Layer**: Introduction and Services, Transport layer in internet, Difference between Connection Oriented and Connectionless services. **UDP**: Segment structure, checksum in UDP.  **TCP**: the principles behind connection-oriented data transfer, stop-and-wait, Go Back N, Selective Repeat. Connection Establishment, TCP header, Round Trip Time, designing a reliable data transfer protocol. | | | | | | | | | | | | | | | | | | | | | | | | | | **9** | | | | | | |
| **4** | | | | **Network Layer:** Network Layer Design Issues, Packet Forwarding and Routing, Difference between Virtual Circuits and Datagram networks, The Internet Protocol (IP), Datagram format, IP fragmentation, IPv4 addressing, subnets, CIDR, classful addressing, DHCP, Network Address Translation (NAT). IPv6 Header, Moving from IPv4 to IPv6: tunneling, dual stack and header translation.  **Routing Algorithms:** Link state (LS), Distance Vector (DV).  **Routing in the Internet:** RIP, OSPF & BGP. | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | | | | | | |
| **5** | | | | **Link Layer and Local Area Network**: **Introduction and Services:** Service provided by the LL, Implemented. **Error-Detection and Correction Techniques:** Parity checks, Check-summing methods, Cyclic Redundancy Check (CRC). **Multiple Access protocols:** Channel partitioning, Random access.  **Ethernet:** Frame structure, CSMA/CD, Ethernet technologies.  **Signals-** analog and digital signals, periodic and a periodic signal, Digital Data Conversion: unipolar, polar, bipolar.  **Analog data conversion**: - PAM, PCM, sampling. **Modulation techniques**: - ASK, FSK, PSK, AM, FM, PM. | | | | | | | | | | | | | | | | | | | | | | | | | | 9 | | | | | | |
|  | | | | **TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | **45** | | | | | | |
|  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | |
| **11** | | **Suggested Books:** | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | |
| **Sl. NO.** | | | **NAME OF AUTHORS/BOOKS/PUBLISHERS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | **YEAR OF PUBLICATION** | | | | | |
| **1** | | | “Computer Networking – A Top Down Approach”, James F. Kurose and Keith W. Ross, Pearson Fifth Edition. | | | | | | | | | | | | | | | | | | | | | | | | | | | | **2014** | | | | | |
| **2** | | | “Computer Networks” 4th Edition, Andrew S. Tanenbaum, Pearson. | | | | | | | | | | | | | | | | | | | | | | | | | | | | **2006** | | | | | |
| **3** | | | “Computer Networking – A Top Down Approach” Behrouz A Forouzan and F Mosharraf, Fifth Edition, McGraw Hill. | | | | | | | | | | | | | | | | | | | | | | | | | | | | **2014** | | | | | |
| **4** | | | “Computer Networks & Internets”, Douglas E. Comer, MS Narayanan, 4th Edition. | | | | | | | | | | | | | | | | | | | | | | | | | | | | **2004** | | | | | |
| **5** | | | “TCP/IP Protocol Suite”, 4th Edition, Behrouz A Forouzan, TMH. | | | | | | | | | | | | | | | | | | | | | | | | | | | | **2010** | | | | | |