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# Department of Computer Science and Engineering

**TEACHING PLAN**

Class : B. Tech. - Computer Science and Engineering - Semester V

Subject : 18CS2002 - Computer Networks

Faculty Incharge(s) : Dr. J. Immanuel Johnraja

Academic year : ODD Semester 2021-22

Class : Batch 1

**Course Objectives:**

* understand the protocol layers and their service models.
* compare and analyze connectionless and connection oriented transport protocols.
* manage the network infrastructure.

**Course Outcomes:**

* describe the protocol layers, Internet protocol and their service models.
* identify the factors influencing computer network infrastructure and development.
* apply the network protocols in building the computer networks.
* analyze the routing algorithms and their behaviours.
* design computer networks with optimized address assignment.
* evaluate the performance and characteristics of network protocols.

**Module 1: Overview**

Protocol, Physical media, Packet switching, Circuit switching, Delay, loss and throughput, Network topology, Protocols and standards, OSI model, Connecting LAN and virtual LAN

**Module 2: Application layer**

Principles of network applications, Web and HTTP, File transfer protocol, Electronic mail, Domain name system, DDNS, SSH, SNMP

**Module 3: Transport layer**

Transport layer services, Multiplexing and demultiplexing, User datagram protocol, Transmission control protocol: connection, features, segment, Round-Trip Time estimation and timeout, Flow control, Congestion control, SCTP

**Module 4: Network layer**

Router architecture, IPv4 addressing, IPv6 addressing, IPv4, Transition from IPv4 to IPv6, ICMP, Unicast routing protocols.

**Module 5: Data link layer**

Introduction, Error detection and correction, Multiple access links and protocols, Ethernet, ARP, DHCP, VLAN, MPLS

**Module 6: Advanced Networking**

Introduction to Software defined networking, Working of SDN, SDN in data centre, SDN applications, Data centre networking

**Text books:**

1. James F. Kurose and Keith W. Ross, “Computer Networking A Top-Down Approach”, 6th edition, Pearson, 2013, ISBN: 978-0-13-285620-1

2. Paul Göransson, Chuck Black and Timothy Culver, “Software Defined Networks A Comprehensive Approach”, 2nd edition, Elsevier, 2017, ISBN: 978-0-12-804555-8

**Reference books:**

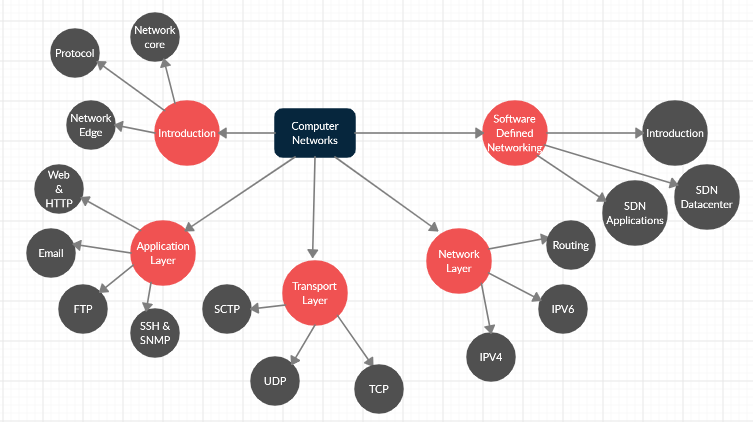
1. Behrouz A. Forouzan, “Data Communications and Networking”, 4th edition, McGrawHill Higher education, 2007, ISBN: 978-0-07-296775-3

2. William Stallings, “Data and Computer Communications”, 8th edition, Pearson, 2006, ISBN: 0-13-243310-9

3. Thomas D. Nadeau and Ken Gray, “Software Defined Networks”, Oreilly, ISBN: 978-1-449-34230-2

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| **Unit No** | **Lecture No** | Topic | **Book/Author & Page Nos. Used for teaching** | **Teaching Method** |
| Unit - 1 | 1 | Computer Networks and the Internet | Computer Networking A Top-Down Approach”, 6th edition Topic 1.1 | PPT |
| 2,3 | The Network Edge | Computer Networking A Top-Down Approach”, 6th edition Topic 1.2 | PPT |
| 4,5 | The Network Core | Computer Networking A Top-Down Approach”, 6th edition Topic 1.3 | PPT |
| 6,7 | Delay and loss in packet switched networks | Computer Networking A Top-Down Approach”, 6th edition Topic 1.4 | PPT |
| 8 | Protocol layers and their service models, Connecting LAN and virtual LAN | Computer Networking A Top-Down Approach”, 6th edition Topic 1.5 | Wireshark & PT |
| IPD Seminar Video | | | | |
| Unit - II | 9 | Principles of network applications | Computer Networking A Top-Down Approach”, 6th edition Topic 2.1 | PPT |
| 10 | The web and the HTTP | Computer Networking A Top-Down Approach”, 6th edition Topic 2.2 | Wireshark |
| 11 | File transfer: FTP | Computer Networking A Top-Down Approach”, 6th edition Topic 2.3 | PT |
| 12 | Electronic mail in the internet | Computer Networking A Top-Down Approach”, 6th edition Topic 2.4 | PT |
| 13 | DNS- The Internet’s Directory Service | Computer Networking A Top-Down Approach”, 6th edition Topic 2.5 | PT |
| 14 | SSH, SNMP | Computer Networking A Top-Down Approach”, 6th edition Topic 9.1 & 9.2 | PT |
|  |  | Panel Discussion with Industry Expert |  |  |
| Unit - III | 15 | Introduction to transport layer services, Multiplexing and Demultiplexing | Computer Networking A Top-Down Approach”, 6th edition Topic 3.1 & 3.2 | PPT |
| 16 | Connectionless transport: UDP | Computer Networking A Top-Down Approach”, 6th edition Topic 3.3 | PPT |
| 17 | Connection-oriented transport: TCP connection, TCP Segment Structure | Computer Networking A Top-Down Approach”, 6th edition Topic 3.5.1 & 3.5.2 | Wireshark |
| 18 | Round-Trip Time estimation and timeout | Computer Networking A Top-Down Approach”, 6th edition Topic 3.5.3 | PPT |
| 19 | Reliable Data Transfer | Computer Networking A Top-Down Approach”, 6th edition Topic 3.5.4 | PPT |
| 20 | Flow Control | Computer Networking A Top-Down Approach”, 6th edition Topic 3.5.5 | PPT |
| 21 | TCP Congestion Control | Computer Networking A Top-Down Approach”, 6th edition Topic 3.5.6 | PPT |
| 22 | SCTP | Data Communications and Networking”, 4th edition Topic 23.4 | PPT |
| Certificate Course Completion | | | | |
| Unit- IV | 23 | Introduction to Network layer, What’s inside a router? | Computer Networking A Top-Down Approach”, 6th edition Topic 4.1 & 4.3 | PPT |
| 24 - 27 | The Internet protocol (IP): Forwarding and addressing in the internet  IPV4 Addressing, Subnetting and VLSM | Computer Networking A Top-Down Approach”, 6th edition Topic 4.4.1 & 4.4.2 | Activities |
| 28 | IPv6 Packet Format  IPV6 Addressing | Computer Networking A Top-Down Approach”, 6th edition Topic 4.4.4 | Activities |
| 29 | Transition from IPV4 to IPV6, ICMPV6 | Computer Networking A Top-Down Approach”, 6th edition Topic 4.4.4 | PPT |
| 30 - 35 | Unicast Routing Protocols | Computer Networking A Top-Down Approach”, 6th edition Topic 4.5 | PT |
| 36 | Routing in the Internet | Computer Networking A Top-Down Approach”, 6th edition Topic 4.6 | PT |
| IPD Seminar | | | | |
| Unit - V | 37 | Introduction to link layer and services | Computer Networking A Top-Down Approach”, 6th edition Topic 5.1 | PPT |
| 38,39 | Error detection and correction techniques | Computer Networking A Top-Down Approach”, 6th edition Topic 5.2 | PPT |
| 40 | Multiple access protocols | Computer Networking A Top-Down Approach”, 6th edition Topic 5.3 | PPT |
| 41 | Link layer addressing | Computer Networking A Top-Down Approach”, 6th edition Topic 5.4.1 | PPT |
| 42 | Ethernet, ARP, DHCP, VLAN & MPLS | Computer Networking A Top-Down Approach”, 6th edition Topic 5.4 & 5.5 | PT |
| Unit - VI | 43 | Introduction to SDN | Software Defined Networks A Comprehensive Approach”, 2nd edition Chapter 4, Topic 4.1 | PPT |
| 44 | Working of SDN | Software Defined Networks A Comprehensive Approach”, 2nd edition Chapter 4, Topic 4.2 | PPT |
| 45 | SDN in data center | Software Defined Networks A Comprehensive Approach”, 2nd edition Chapter 7 | PPT |
| 46 | SDN Applications | Software Defined Networks A Comprehensive Approach”, 2nd edition Chapter 10 | PPT |
| 47 | Data center Networking | Computer Networking A Top-Down Approach”, 6th edition Topic 5.6 | PPT |
| Seminar by Industry Expert | | | | |

**Concept Map of the entire subject:**



**Course Articulation Matrix:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 2 | - |
| CO2 | 1 | 3 | - | 2 | - | - | - | - | - | - | - | 2 | 3 | - |
| CO3 | - | - | 3 | 1 | - | 1 | - | - | - | - | - | - | 2 | - |
| CO4 | - | 3 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO5 | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 | - |
| CO6 | 1 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| Average | 1 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | - |

**Assessment Pattern:**

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| **Bloom’s Category** | **Continuous Assessment Tests** | | | **Qualitative Assessment (QA)** | | | **End Semester Examination** |
|  | 1 | 2 | 3 | 1 | 2 | 3 |  |
| Remember | 10 | 10 | 10 |  |  |  | 30 |
| Understand | 20 | 20 | 20 | 10 |  |  | 50 |
| Apply | 10 | 10 | 10 |  | 10 | 10 | 20 |
| Analyze | - | - | - |  |  |  |  |
| Evaluate | - | - | - |  |  |  |  |
| Create | - | - | - |  |  |  | - |