



St. Mira's College for Girls, Pune  
(S.Y.B.Sc.(C.S.) 2021-2024)

**Computer Science Paper-II**  
**Computer Networks-I**  
**[CORE COURSE]**

<b>Semester IV</b>	<b>Credits: 2</b>	<b>Subject Code: BS42102</b>	<b>Lectures: 36</b>
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**Course Outcomes:**

**At the end of this course, the learner will be able to:**

- Describe how computer networks are organized with the concept of layered approach.
- Explain the OSI and TCP/IP Reference Models
- Categorize the working of various protocols.
- Analyze, evaluate and design networks, services and technologies for an organization's LAN and WANs.

**Unit 1: Introduction to Networks and Network Models**

**4**

- Data communication, components, data representation
- Networks, network criteria, network types - LAN, MAN, WAN, Switching, The Internet, Accessing the Internet
- Network Software- Protocol hierarchies, Design issues of the layer, Connection Oriented and Connectionless Services
- Reference models - OSI Reference Models, TCP/IP Reference model, Connection devices in different layers, Comparison of OSI and TCP/IP Reference Models

**Unit 2: Lower Layers**

**10**

- Communication at the physical layer, Performance - bandwidth, throughput, latency, bandwidth-delay product, jitter
- Line-Coding Techniques
- Design issues of Data Link Layer, Services - Framing, flow control, error control, congestion control, Link layer addressing
- Framing Methods - Character Count, Flag bytes with Byte Stuffing, Flag's bits with Bit Stuffing, Physical Layer Coding Violations
- The Channel allocation problem, Static and dynamic allocation, Media Access Methods - Taxonomy of multiple-access protocols
- Switching and TCP/IP layers, Types - circuit switching, packet switching and message switching
- Wired LANs and Wireless LANs

**Unit 3: Network Layer**

**12**

- Network layer services - Packetizing, Routing and forwarding, other services
- Open and closed loop congestion control
- IPv4 addressing- Address space, classful addressing, Subnetting, Super netting, classless addressing, Network address resolution

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<ul style="list-style-type: none"> <li>• Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options</li> <li>• Mobile IP-addressing, agents, Three phases</li> <li>• Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between IPv4 and IPv6</li> <li>• Routing - General idea, Algorithms - Distance vector routing, link state routing, path- vector routing</li> </ul>	
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<b>Unit 4: Transport Layer</b>	<b>10</b>
<ul style="list-style-type: none"> <li>• Transport layer Services- Process-to-process communication, Addressing, Encapsulation and decapsulation, Multiplexing and demultiplexing, Flow control, Pushing or pulling, Flow control, Buffers, Sequence numbers, acknowledgements, sliding window, congestion control.</li> <li>• Connectionless and Connection-oriented service, Port numbers</li> <li>• Transport layer protocols- User datagram protocol, user datagram, UDP services</li> <li>• Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP</li> </ul>	

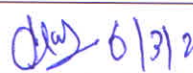
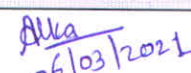
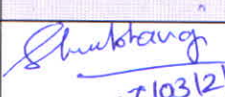
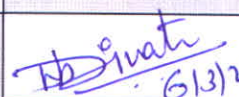

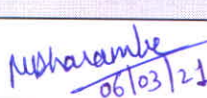
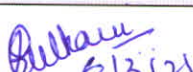
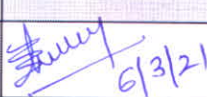
\*Contact hours=12

<b>Recommended Books:</b>
<ul style="list-style-type: none"> <li>• Forouzan, B. A., Coombs, C. A., &amp; Fegan, S. C. (2001). <i>Data communications and networking</i>. Boston: McGraw-Hill.</li> <li>• Tanenbaum, A. S. (1996). <i>Computer networks</i> (6<sup>th</sup> ed.). Upper Saddle River, N.J: Prentice Hall PTR.</li> </ul>

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