



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

Semester IV	Credits: 2	Subject Code: BS42102	Lectures: 36
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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

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- 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

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- 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

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- 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"> • Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options • Mobile IP-addressing, agents, Three phases • Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between IPv4 and IPv6 • Routing - General idea, Algorithms - Distance vector routing, link state routing, path- vector routing 	
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Unit 4: Transport Layer	10
<ul style="list-style-type: none"> • 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. • Connectionless and Connection-oriented service, Port numbers • Transport layer protocols- User datagram protocol, user datagram, UDP services • Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP 	

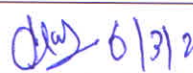
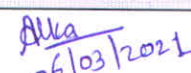
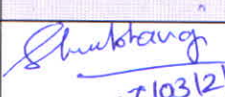
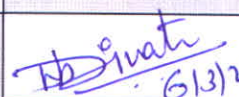

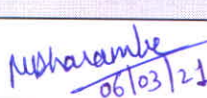
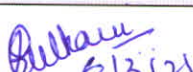
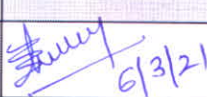
*Contact hours=12

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

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