CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2020-21

Programme: **Bachelor of Engineering (Information Technology)**

Semester: **IV**

Course Code: **102044501**

Course Title: **Computer Networks**

Course Group: **Professional Core Course**

Course Objectives: This course provides the fundamental knowledge of the various aspects of computer networking and enables students to understand the basic concepts data communication occurring using computer network. It is based on the OSI Reference Model, which deals with the major issues in the form of layered architecture with the use of related protocols. The course is driven from the engineering perspective.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	40 / 14	60 / 21	20/7	30/10	150 / 52

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction:** Understanding of Network and Internet, Network Topologies, The OSI Model, TCP/IP Protocol Suite, Guided and Unguided Transmission Media, Network Devices, Fundamental of Circuit-Switched and Packet-Switched Networks, Performance Metrics, Understanding of Delay, Loss and Throughput in the packet-switching network	05
2	**Data Link Layer - Logical Link Control Sublayer:** Introduction and Design Issues, Flow and Error Control, Techniques for Error Detection and Correction, Elementary Data Link Layer Protocols: Simplex, Stop and Wait, Sliding Window Protocol.	06

3	**Data Link Layer - Medium Access Control Sublayer:** Random Access Protocols (ALOHA, CSMA, CSMA/CD, CSMA/CA), Collision Free Protocols, Limited Contention Protocols, Wavelength Division Multiple Access Protocols,802.3 MAC sublayer Protocol, Wireless LAN protocols, Ethernet: Traditional Ethernet, Switched Ethernet, Fast Ethernet, Gigabit Ethernet. Data link layer switching: Bridges, local Internetworking, Spanning tree bridges, Virtual LAN	**07**
4	**Network layer:** Introduction and Design Issues, Implementation of Connection Oriented and Connection Less Service, Virtual Circuit and Datagram Subnets, IP protocol and addressing on the Internet, Routing Algorithms: Optimality principle, Shortest path routing, Flooding, Distance vector routing, Link state routing, Hierarchical routing, Broadcast routing, Multicast routing. Congestion Control Algorithms: Principles, Prevention policies, Congestion control in virtual circuit subnets, Congestion control in datagram subnets, Load shedding, Jitter control quality of service requirements, Techniques for achieving good quality of service Internetworking, Tunneling.	**10**
5	**Transport layer:** Introduction and transport layer services, Multiplexing and Demultiplexing, Connection Management, Principles of reliable data transfer, Connection less transport using UDP, Connection-oriented transport using TCP, Congestion Control.	**06**
6	**Application layer:** Principles of Computer Applications, File Transfer Protocol, Electronic Mail: Architecture and services, World Wide Web: Architectural Overview, HTTP. Domain Name System	**06**
	Total	**40**

List of Practicals / Tutorials:

1	Introduction to CISCO Packet Tracer software. 1. Use different types of devices like pc, switches, cables, pc with wireless card. 2. Create basic topologies and assign IP address, subnet mask, DNS, gateway IP address. 3. Test connectivity with ping command.
2	Write a program; 1. To identify the class of given IP address in dotted decimal notation. 2. To Find First address, Last address, and No. of address of given IP address in dotted decimal notation with network mask specified using CIDR notation.
3	Study of various networking commands in Windows.
4	Introduction to Default & Static Routing and Configuring the same in CISCO packet tracer.
5	Introduction to Dynamic Routing and configuring RIP and OSPF in CISCO packet tracer.
6	Configure DHCP and DNS Server in CISCO packet tracer.
7	Configure Web Server and FTP Server in CISCO packet tracer.
8	Examine Network Address Translation (NAT) in CISCO packet tracer.
9	Introduction to packet capturing using Wireshark.
10	Implement socket programming with UDP & TCP.

11	Case Study: Understanding of network design & components available at your institute. OR Mini Project: Implement Network Desktop Manager

Reference Books:

1	Andrew S Tanenbaum, "Computer Networks", 5thEdition, Pearson Education
2	Behrouz A Frozen, "Data Communication and Networking", 5th Edition, McGraw Hill
3	James Kurose and Keith Rose, "Computer Networking: A Top-Down Approach", 6thEdition, Pearson Education
4	William Stallings, "Data and Computer Communication", 10thEdition, Pearson Education

Supplementary learning Material:	
1	NPTEL - Swayam Courses
2	CISCO Packet Tracer
3	NS2 / NS3 Network Simulator
4	Wireshark Packet Capturing

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
15%	25%	25%	15%	20%	-	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand network fundamental, concepts of OSI reference model and real-world protocol suite such as TCP/IP.	**16**
CO-2	Learn different link layer terminologies like error detection-correction, multiple access protocol and link layer addressing used in network.	**26**
CO-3	Ability to design network architecture and to apply various routing algorithms for network-layer packet delivery.	**24**

CO-4	Learn essential principles of a connectionless and connection-oriented protocols used for reliable data transfer, flow control and congestion control.	**20**
CO-5	Understand basic protocols of application layer and how they can be used to assist in network design and implementation.	**14**

Curriculum Revision:	
Version:	1.0
Drafted on (Month-Year):	June-2020
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025