GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Integrated MSc, 8th Semester
Branch: Information Technology
Subject Name: Advanced Computer Network System
Subject Code: 1380503

Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (I)	ESE(V)	
3	0	2	4	70	30	20	30	150

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1.	**Classful Internet Addresses, Mapping Internet Addresses to Physical Addresses (ARP), Internet Protocol: IPv4** Introduction, Universal identifiers, IP addresses and network connections, original classful addressing scheme, special purpose IP addresses like directed broadcast and network broadcast, Limited broadcast, Loopback address, Subnet and Classless extensions, Weaknesses in Internet addressing, Dotted decimal notation, Network byte order, Special address conventions. Concept of physical address, Address resolution problem, Relationship between network address and physical address, Two types of physical addresses, Resolution through direct mapping, Resolution through dynamic binding, ARP protocol format Purpose of Internet protocol, IPv4 datagram format , interpretation and significance of each header fields, IP options.	6	20
2.	**Error and Control Messages (ICMP), Classless And Subnet Address Extensions (CIDR), User Datagram Protocol (UDP)** Introduction of ICMP, Need for a controlling protocol, Error Reporting versus Error Correction, ICMP message delivery, ICMP message format, Introduction of CIDR, Minimizing Network Numbers, Proxy ARP, Subnet Addressing, Flexibility in subnetting, Variable length subnets, Subnet masks, Unified Forwarding Algorithm, Broadcasting to Subnets, Anonymous point to point networks, Classless Addressing and Supernetting, CIDR address blocks and Bit masks. Introduction of UDP, Need for UDP, UDP message format, UDP Pseudo header, UDP encapsulation and protocol layering, Layering and UDP Checksum computation, UDP multiplexing, demultiplexing, and role of ports in multiplexing and demultiplexing, UDP applications, port numbers of well known UDP based applications.	8	20

3.	**Reliable Stream Transport Service (TCP), Private Network Interconnection, Bootstrap and Auto configuration (DHCP)** Introduction, Need for stream delivery, Properties of reliable delivery service, Providing reliability, Concept of sliding windows, Ports, connections and endpoints, Active and Passive opens, Segments, Streams and sequence numbers, Variable window size and flow control, TCP segment format, Out of band data, TCP options, Acknowledgment, Retransmission and timeouts, Accurate measurement of RTT, Karn's algorithm and timer backoff, TCP connection establishment and termination Introduction to VPN, Private and hybrid networks, VPN addressing and routing, Extending VPN technology to individual hosts, VPN with private addresses, Introduction to NAT, NAT translation table creation, multi-address NAT, port mapped NAT, Interaction between NAT and ICMP, Introduction to DHCP, History of bootstrapping, Using IP to find IP Address, DHCP Retransmission Policy, DHCP Message format, Need for dynamic configuration, DHCP Lease concept, Multiple addresses and Relays, Lease renewal States, Address acquisition states, Early lease termination, DHCP options and message type, Options overload, DHCP and DNS.	8	20
4.	**The Domain Name System (DNS), File Transfer And Access (FTP, TFTP, NFS), Electronic Mail (SMTP, POP, IMAP, MIME)** Need for DNS, Flat versus hierarchical namespace, centralized versus distributed Names database, Delegation of authority for names, Subset authority, Internet domain Names, Top-level domains, Mapping domain names to addresses, Domain Name Resolution, Efficient translation, Caching, DNS message format, Compression, Inverse mappings, Pointer queries, DNS resource records, Dynamic DNS, DNSSec. Different ways of sharing a file, Features, Process model, TCP Port numbers, Data connection and control connection, User's view of FTP, Anonymous FTP, Secure FTP, TFTP, NFS, RPC, XDR. Introduction to E-mail protocols., Mailboxes, Names and Aliases, Alias expansion and mail forwarding, SMTP, POP, IMAP, MIME Extensions for non ASCII data, MIME Multipart messages.	8	20

5.	**World Wide Web (HTTP), Internet Security And Firewall Design (IPsec, SSL), A Next Generation IP (IPv6)** Importance of Web, Architectural components, URL, HTTP, HTTP methods, HTTP error messages, Connection types, Significance of different HTTP header fields, Negotiation, Conditional requests, Proxy servers, Caching, HTTP security and E- Commerce. Introduction to IPsec and SSL, Need for Security, IPSec, AH, SA, ESP, Authentication and mutable header fields, Tunneling, Required security algorithms, SSL and TLS, Firewalls, Firewall implementation issues, Packet filtering, Stateful firewalls, proxy servers, Monitoring and logging, Introduction to IPv6, Need for new IP protocol, IPv6 features, IPv6 base header format.	8	20

Reference Books:

1. Douglas E. Comer, “Internetworking with TCP/IP - (Vol. 1) Principles, Protocols, and Architecture”, 5th Edition, Prentice Hall of India (PHI) Publishers.
2. Behrouz A. Forouzan, “TCP/IP Protocol Suite”, 4th Edition, McGraw-Hill 2)
3. W. Richard Stevens, G. Gabrani, “TCP/IP- Illustrated, Vol. 1 (The Protocols)”, Pearson Publishers.

Course Outcome:

After learning the course, the students should be able to:

No.	CO statement
CO-1	To understand about Classful Internet Addresses, ARP, IPv4.
CO-2	Familiarize with ICMP, CIDR and UDP.
CO-3	Familiarize with Reliable Stream Transport Service (TCP), VPN, DHCP.
CO-4	To understand about DNS, File Transfer And Access (FTP, TFTP, NFS) and Electronic Mail Protocol.
CO-5	To understand about HTTP, Internet Security And Firewall Design and IPv6.