Programme	**:**	**Diploma in Computer Engineering.**
Programme Code	**:**	**06**
Name of Course	**:**	**Advanced Computer Network**
Course Code	**:**	**CM484**
Pre-Requisite	**:**	**CM386 (Computer Network)**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	**20**	**80**	--	**25**	**25**

Course Rational:

This course is aimed at providing the students with conceptual understanding of issues of Computer Networks with respect to Network and above layers of TCP/IP model. It aims at providing in depth knowledge of Network Organization, addressing, Security and role of various protocols in Internetworking Environment.

Course Objectives:

After studying this course, the student will be able to

- Understand Setting up of a network.
- Understand the use of Internet Protocol.
- Configure Static as well as Dynamic IP Addresses .
- Understand how World Wide Web is organized.
- Explain and compare the different interconnecting systems throughout the world.
- Understand various security and protection issues in the Networking Environment.

Course Content:

Ch. No.		Name of Topic/Sub topic	Hrs	Weightage
1	**Network Layer I**			
	1.1	Logical Addressing :IPv4 Addresses- Address space, Notations, classful addressing, classless addressing, , Network address translation(NAT),IPv6 Addresses- Structure, Address space	10	12
	1.2	Internetworking- Need for Network Layer, Internet as a Datagram network, Internet as a Connectionless Network, IPv4- Datagram, Fragmentation, Checksum, Options IPv6- Advantages, Packet format, Extension headers, Transition from IPv4 to IPv6- Dual Stack, Dual Stack, Tunneling, Header translation		
	1.3	Address Mapping- Mapping Logical to Physical Addresses- ARP, Mapping Physical to Logical Addresses – RARP,BOOTP and DHCP		
2	**Network Layer II**			
	2.1	ICMP- Types of messages, Message format, Error reporting, Query	**10**	

	2.2	Delivery- Direct vs Indirect Delivery, Forwarding- forwarding Techniques, Forwarding Process, Routing Table, Unicast Routing Protocols- Optimization, Intra and Interdomain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing, Introduction to multicasting and broadcasting.		**12**
3	**Transport Layer**			
	3.1 3.2	Process to Process Delivery- Client/Server Paradigm, Multiplexing and Demultiplexing, Connectionless vs Connection-Oriented Service, Reliable vs Unreliable Three Protocols, User Datagram Protocol(UDP)- Well Known Ports for UDP, User Datagram, Checksum, UDP Operation, Use of UDP, TCP- TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control	**12**	**16**
	3.3	Data Traffic- Traffic Descriptor, Traffic profiles		
	3.4 3.5	Congestion- Network Performance, Congestion Control- Open Loop Congestion Control, Closed Loop Congestion Control, Examples- Congestion Control in TCP and Frame Relay Quality of Service- Flow Characteristics, Flow Classes, Techniques to Improve QoS- Scheduling, Tarffic shaping, Resource Reservation, Admission Control		
		SECTION – II		
4	**Application Layer I: DOMAIN NAME SYSTEM**			
	4.1	Name Space- Flat Name Space, Hierarchical Name Space, Domain Name Space- Label, Domain Name, Domain, Distribution Of Name Space- Hierarchy of Name Servers, Zone, Root Server, Primary and Secondary Servers	**10**	**14**
	4.2	DNS in the Internet- Generic Domains, Country Domains, Inverse Domain, Resolution- Resolver, Mapping names to Addresses, Mapping Addresses to Names, Recursive resolution, Iterative Resolution, Caching,		
	4.3	DNS Messages- Header, Types of Records- Question Record, Resource Record, Registrars, Dynamic, Domain Name Systems(DDNS), Encapsulation		
	4.4	REMOTE LOGGING :Remote logging, Telnet		
	4.5	ELECTRONIC MAIL AND FILE TRANSFER: , Electronic Mail- Architecture, User Agent, Message Transfer Agent: SMTP, Message Access Agent: POP and IMAP, Web-based Mail		
	4.6	File Transfer-File Transfer Protocol(FTP), Anonymous FTP		
5	**Application Layer II:WWW AND HTTP**			
	5.1	Architecture- Client(Browser), Server, Uniform Resource Locator, Cookies	**08**	**10**
	5.2	Web Documents- Static Documents, Active Documents, HTTP- HTTP Transaction, Persistent vs Nonpersistent Connection, Proxy Server		
	5.3	Network Management System- Configuration Management, Fault Management, Performance Management, Security and Accounting Management,		

6	**Cryptography and Security in the Internet**			
	6.1 6.2	Introduction to Cryptography- Definitions, Categories, Symmetric Key Cryptography- Traditional Ciphers, Simple Modern Ciphers, Asymmetric –Key Cryptography- RSA, Diffie-Hellman. Security Services- Message confidentiality, Message Integrity, Message Authentication, Message Nonrepudiation, Entity Authentication.	**12**	**16**
	6.3	IPSecurity(IPSec)- Two modes, Two Security protocols, Security Association		
	6.4	PGP- Security Parameters, Services, A Scenario, PGP Algorithms, Key Rings, PGP Certificates		
	6.5	Firewalls- Packet filter firewall, Proxy firewall		
		Total	**64**	**80**

List of Experiments/Assignments:

Sr. No.	**Name of Experiment/Assignment**	**Hrs**
1.	To Execute Network commands like ping, nmap, ipconfig, traceroute, netstat, finger, route.	04
2.	Designing Networks and Subnetworks.	04
3.	Configuring Static IP address. Configuring Dynamic IP address.(DHCP)	04
4.	Study of Router, Gateway, Switches Specifications.	02
5.	Simulation of RIP Protocol	02
6.	Monitoring Network through Network Monitoring Tools.	04
7.	Write programs for execution of asymmetric and symmetric cryptography algorithms.	04
8.	Study of available ISPs in India	02
9.	Configuring FTP Server.	02
10.	Configuring Telnet Server	02
	Total	**32**

Instructional Strategy:

Sr. No.	**Topic**	**Instructional Strategy**
1	Network Layer I :Host-to-Host Delivery, Internetworking, Addressing and Routing	Introduction and Explanation, Slide Presentation
2	Network Layer II :Host-to-Host Delivery, Internetworking, Addressing and Routing	Introduction and Explanation, Slide Presentation
3	Transport Layer : Process-to-process delivery: UDP, TCP	Explanation, Slide Presentation
4	Application Layer I: Client-Server Model	Explanation, Slide Presentation
5	Application Layer II: WWW AND HTTP	Explanation, Slide Presentation, Simulation of Algorithms
6	Cryptography and Security Protocols in Internet	Explanation, Presentation

Text Books:

Sr. No	**Author**	**Title**	**Publication**
1	Behrouz **A. Forouzan**	Data Communications and Networking	Tata McGraw Hill (Fourth Edition)

Reference Books:

Sr. No	Author	Title	Publication
1	**Andrew S.** Tanenbaum	Computer Networks	PHI Publications.

Learning Resources: Books, LCD, White board.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Network Layer: Host-to-Host Delivery, Internetworking, Addressing and Routing	08	02	02	12
2.	Transport Layer: Process-to-process delivery: UDP, TCP	10	02	04	16
3.	Application Layer: Client-Server Model	10	02	00	12
4.	Electronic Mail (SMTP) and File Transfer(FTP	10	02	02	14
5.	Security	10	02	02	14
6.	Security Protocols in Internet: IP level Security:IPSEC	10	02	--	12
	Total	**58**	**12**	**10**	**80**

(Prof. Smt. J.R.Hange ,Prof Smt B.K.Vyas)
Prepared By

(Prof S.V.Choudhari)
Secretary, PBOS

(Prof. U.V.Koakate)
Chairman, PBOS