GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering
Level : PG
Subject Code : ME02000111
Subject Name : High Performance Networks

WEF Academic Year :	**2024-25**
Semester :	2
Category of the Course :	PEC-5

Prerequisite :	● Higher Engineering Mathematics, ● Fundamental knowledge of Data communication networks ● Digital Communication theory ● Wireless Networks ● Probability and random processes ● Programming skills in Simulation Exercises(MATLAB, Network Emulator Tool,NS2 or equivalent)
Rationale :	The purpose of this course is to provide an understanding of modern high performance communication networks. Topics include: overview of types of networks; design issues and tools, VOIP, Traffic Engineering, and Traffic modelling, Network Security and management.

Course Scheme :

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

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1.	Types of Networks, Network design issues, Data in support of network design. Network design tools, protocols and architecture. Streaming of stored Audio and Video, Best effort service, protocols for real time interactive applications, beyond best effort, scheduling and policing mechanism, integrated services, and RSVP-differentiated services.	9	20

2.	VoIP system architecture, protocol hierarchy, Structure of a voice endpoint, Protocols for the transport of voice media over IP networks. Providing IP quality of service for voice. Signaling protocols for VoIP, PSTN gateways, VoIP applications.	**9**	**20**
3.	VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS operation, Routing, Tunneling and use of FEC, Traffic Engineering, and MPLS based VPN, overlay networks-P2P connections.	**8**	**20**
4.	Traffic Modeling: Little's theorem, Need for modeling, Poisson modeling, Non-Poisson models, and Network performance evaluation.	**6**	**15**
5.	Network Security and Management: Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and fire walls, attacks and counter measures, security in many layers.	**5**	**15**
6.	Infrastructure for network management, the internet standard management framework – SMI, MIB, SNMP, Security and administration, ASN.1.	**5**	**10**
	Total	**42**	**100**

Reference Book :

1. J.F. Kurose & K.W. Ross,"Computer Networking- A top down approach featuring the internet", Pearson, 2nd edition, 2003.
2. Walrand .J. Varatya, High performance communication network, Morgan Kauffman – Harcourt Asia Pvt. Ltd. 2nd Edition, 2000.
3. LEOM-GarCIA, WIDJAJA, "Communication networks", TMH seventh reprint 2002.
4. Aunuragkumar, D. Manjunath, Joy kuri, "Communication Networking", Morgan Kaufmann Publishers, 1ed 2004.
5. HersentGurle& petit, "IP Telephony, packet Pored Multimedia communication Systems", Pearson education 2003.
6. Fred Halsall and Lingana Gouda Kulkarni," Computer Networking and the Internet" fifth edition, Pearson education
7. Nader F.Mir ,Computer and Communication Networks, first edition.
8. Larry l.Peterson & Bruce S.David, "Computer Networks: A System Approach"- 1996

Suggested Course Practical List :

1 To study Network Emulator Tool.
2 To study router configuration using Network Emulator Tool.
3 To configure VPN Remote access in Network Emulator.
4 To Configure VoIP in Network Emulator.
5 To implement SNMP protocol in Network Emulator.
6 To implement basic MPLS VPN in Network Emulator.
7 To implement Poisson distribution based traffic model in Matlab.
8 To implement encryption and decryption.
9 To implement VPN tunnelling over PPP in Network Emulator.

List of Laboratory/Learning Resources Required :

· NS-2, NS-3
· MATLAB
· Network Emulator Tool

Learning website:
· www.nptel.ac.in,www.cisco.com, www.gns3.com

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