GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Electronics & Communication

(Wireless Communication Systems And Networks)

Course / Subject Code :

Course / Subject Name : Advanced Communication Networks

w. e. f. Academic Year:	2024-25
Semester:	1st Semester
Category of the Course:	PCC

Prerequisite:	Computer Networks, Digital Communications
Rationale:	Students of EC Engineering need to possess good understanding of the advancements in networking and various networking standards and protocols. This course imparts a unified systems view of the broad field of advanced computer communications. The fundamental principles of advanced communications networks and protocols are thoroughly presented and applied in data communication networking.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Describe the basic building blocks of a computer network and understand the architecture of the global Internet	U
02	Describe, analyze and compare a number of datalink, network, and transport layer protocols.	N
03	Develop a strong theoretical foundation on performance analysis of various queueing models with applications to Internet.	N
04	Develop the ability to explore the design and development of more resource efficient and state of the art networking technologies.	C
05	Gain experience with using software tools for network simulation, testing, troubleshooting	A

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme:

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

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Advance Topics in Networking :** Packet Switching, Circuit Switching, A Network of Networks, Delay Loss and Throughput in Packet-Switched Networks, Principles of Congestion Control, Approaches to Congestion Control, TCP Congestion Control, Fairness, Explicit Congestion Notification (ECN), Fairness, IPv4 and IPv6, Generalized forwarding and SDN, OSPF, BGP, SDN, ICMP, SNMP, VLANs, MPLS, Process of a Web Page Request.	12	25
2.	**Network at Application:** Web and HTTP, Cookies & Web Caching, Electronic Mail, DNS, P2P, Video Streaming and Distribution, UDP and TCP Socket Programming.	6	15
3.	**Mobile and Multimedia Networking**: WiFi, 802.11 Wireless LANs, Cellular Internet Access, 4G LTE, Mobility Management, Mobile IP, Cellular Mobility Management, Multimedia Networking, Streaming Video, Voice Over IP, RTP, SIP, Multimedia QoS.	6	15
4.	**BroadBand Distribution & Access Network** : A History of Broadband Networks, Legacy Access Networks, Copper DSL Evolves, Challenges to DSL Access Networks, DSLAM Evolution, ATM DSLAMs, Ethernet DSLAMs, Triple-Play Services, MPLS Backbone Networks, Ethernet DSLAMs, HighAvailability Broadband Access, PPP, PPPoA, PPPoE, ADSL Access, G.DMT, G.Lite, ADSL2, ADSL2+, VDSL and VDSL2, SHDSL	12	25

5.	**Security in Networking** : Network Security and Cryptography, Message Integrity and Digital Signatures, EndPoint Authentication, E-mail Security, TCP and SSL, IPSec and VPN, Wireless Security, Firewall and IDS.	9	20
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**20**	**30**	**10**	**10**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Kuros and Ross, Computer Networking A Top Down Approach 7th Ed, Pearson Publication
2. Chris Hellberg, Dylan Greene, Truman Boyes - Broadband Network Architectures_ Designing and Deploying Triple Play Services-Prentice Hall (2007)
3. Andrew Tanenbaum, Computer Networks, 5th Edition, Pearson Education
4. Behrouz Forouzan, Data Communication And Networking, 5th Edition, TMH
5. Patrick J. Conlan - Cisco network professional's advanced internetworking guide-Wiley Technical Pub (2009)
6. James Roberts, Ugo Mocci, Jorma Virtamo (eds.) - Broadband Network Traffic_ Performance Evaluation and Design of Broadband Multiservice Networks-Springer

(b) Open source software and website:

1. Network Simulator /Matlab/Scilab
2. https://nptel.ac.in (Computer Networks and Internet Protocol by Prof. Soumya Kanti Ghosh)

Suggested Course Practical List:

Experiments can be based on following listed any or multiple techniques but not limited to that tutor can have his own selection suitable with the subject matter.

1. Wireshark Lab
2. Socket Programming Assignments
3. Network Simulator 2
4. Network Simulator 3
5. GNS3

6. Cisco Packet Tracer
7. OPNet
8. Python Programs
9. Matlab or Scilab based Simulations
10. Various Server Implementation
11. Configuration of Physical Devices
12. Creating Enterprise Network Design

List of Laboratory/Learning Resources Required: Computers, Networking equipment

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