GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering
Level: Diploma
Branch: Information Technology
Subject Code : DI04016011
Subject Name : Mobile Computing and Networks

w. e. f. Academic Year:	2025-26
Semester:	4th
Category of the Course:	PCC

Prerequisite:	Students taking this course are expected to have a basic understanding of computer fundamentals and operating systems. Familiarity with concepts of computer networks such as OSI and TCP/IP models, data communication basics, and Internet protocols will be helpful. A general awareness of wireless communication technologies and mobile devices will also provide a strong foundation. These prerequisites will enable learners to grasp advanced topics in mobile computing and networking more effectively.
Rationale:	This course introduces students to different types of networks, key protocols, and fundamental addressing systems such as subnetting and supernetting. It emphasizes the core principles and techniques currently applied in the IT industry. The curriculum also explores mobile computing and networking, covering the essentials of mobile devices and wireless communication technologies. In today's digital era, mobile computing plays a vital role in everyday life, enabling people to access information, communicate, and carry out business activities seamlessly. By the end of the course, students will gain the skills and knowledge needed to manage mobile computing systems and networks effectively. In addition, the course provides insights into the latest advancements in the field, including emerging technologies like 5G and 6G, giving students a strong foundation in modern mobile computing trends.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Differentiate OSI and TCP/IP models.	Understand
02	Compare IPv4 and IPv6 addressing schemes.	Analyze
03	Understand the concepts of Mobile Computing.	Understand
04	Explain end to end packet delivery using TCP for mobile network.	Understand
05	Understand the emerging trends in mobile communication.	Understand

**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(M)	PA(I)	ESE (V)	
3	1	0	4	70	30	00	00	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Networking Essential** 1.1 Models of Network Computing - Centralized Computing - Distributed Computing - Collaborative Computing 1.2 Client Server Network and Peer to Peer Network 1.3 Need of layered mechanism 1.4 OSI Model - Responsibilities of each layer 1.5 TCP/IP Protocol Suite - Comparison of TCP/IP with OSI model - A brief description of Protocols at each layer of TCP/IP 1.6 Data Traffic - Traffic descriptor - Traffic profiles 1.7 Congestion - Network Performance 1.8 Congestion Control - Open-Loop Congestion Control - Closed-Loop Congestion Control	09	20
2.	**Protocol and Addressing Scheme** 2.1 ARP,RARP (Introduction) 2.2 Routing - Types of routing - Routing table 2.3 SMTP, POP, IMAP (Introduction) 2.4 Introduction to WWW and HTTP/S 2.5 Data link layer protocols - Simplest, stop and wait, stop and wait ARQ 2.6 IPv4 addressing scheme	10	22

	- Classful and classless notations - Ipv4 datagram header - Subnetting and Supernetting - Network address translation - Advantages, Disadvantages 2.7 IPV6 Addressing - Need for IPv6 migration - IPv6 advantages		
3.	**Introduction to Mobile Computing** 3.1 Evolution of Mobile Computing 3.2 Architecture for Mobile Computing 3.3 Networks (Brief) - Wireless Networks - Ad-hoc networks - Bearer 3.4 Middleware and Gateways (Brief) - Communication middleware - Transaction processing Communication middleware - Behavior management middleware - Communication Gateways 3.5 Application and Services 3.6 Security and Standards	08	18
4.	**Mobile Network and Transport Layer** 4.1 Mobile IP - Goals, assumptions and requirements - Entities and terminology 4.2 Packet Delivery, handover management and Location management 4.3 Registration, Tunneling and encapsulation 4.4 Dynamic host configuration (Introduction) 4.5 Indirect TCP, snooping TCP and Mobile TCP 4.6 TCP over 3.0 G mobile	10	22
5.	**Technologies in Trends** 5.1 WLAN - Introduction of WLAN - Architecture of WLAN	08	18

	- Types of WLAN 5.2 WPAN - Introduction of WPAN - Applications in WPAN - Bluetooth, architecture and Bluetooth protocol stack 5.3 Mobile Networks - 4G, 5G, 6G (Introduction, features)		
	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**
26	**63**	**11**	**-**	**-**	**-**

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:

Sr. No.	**Title of Book**	**Author**	**Publication with place, year and ISBN**
1	Data Communication & Networking	Forouzan	Tata McGraw Hill
2	Computer Networks	Andrew S Tannebaum & David J Wetherall	Pearson, 2012
3	Wireless Communications & Networks,	William Stallings	Pearson
4	Mobile Computing: Technology Applications & Service Creation, 2nd Edition	Asoke K Talukdar	Tata McGraw Hill
5	Mobile communication	Rappaport	PHI

6	Mobile communication	Jochen Schiller	PHI

(b) Open source software and website:

1. https://www.netacad.com/cisco-packet-tracer
2. https://www.wireshark.org/
3. https://subnetipv4.com/
4. https://web.cs.wpi.edu/~cs4514/b98/week3-dllprot/week3-dllprot.html
5. https://www.tutorialspoint.com/gsm/gsm_architecture.htm
6. https://mobilepacketcore.com/lte-4g-network-architecture/
7. https://docs.oracle.com/cd/E19455-01/806-7600/6jgfbep0v/index.html
8. https://www.packtpub.com/en-us/learning/how-to-tutorials/understanding-address-spaces-and-subnetting-in-ipv4-tutorial/

Suggested Course Tutorials:

Sr. No.	Tutorial Topics	Unit No.	Approx. Hrs. required
1	Explore the process of creating and verifying a client–server network.	**1**	**1**
2	Explore the process of creating and verifying a peer to peer network.	**1**	**1**
3	Getting Started with Wireshark: Installation and Setup	**1**	**1**
4	Introduction to TCP Packet Analysis with Wireshark	**1**	**1**
5	Given the following IPv4 addresses, determine their validity. For valid addresses, identify the class, Network ID, and Host ID. For invalid addresses, provide a reason. (Additional problems can be provided by the faculty.) • 1.0.4.5 • 80.54.256.14 • 11.025.56.8 • 192.108.102.101 • 1.100.11100010.10 • 228.4.10.25.208	**2**	**1**

6	Given any class IP address, determine suitable subnet masks to accommodate a specified number of hosts. For instance, in a Class C network, suggest an appropriate subnet mask to create 6 subnets with host capacities of 30, 25, 20, 15, 10, and 5, respectively.	**2**	**2**
7	7.(a) Consider a class 'C' IP with 192.192.192 as the network ID then identify (i) No. of bits identified from host id and their position (in 32 bit) (ii) No. of subnets possible and their id's (subnet mask id) (iii) No. of systems per subnet and their range of IP addresses. calculate above three for subnet mask 255.255.255.192 and 255.255.255.193 7.(b) Determine the subnet ID and host ID for the data packet having destination IP address 192.192.192.120 and subnet mask is 255.255.255.240	**2**	**2**
8	Determine valid IPv6 addresses. For invalid IPv6 addresses, state the reason and correct it. (Faculty may add more problems): (a) ::: (b) ::1:: (c) ::g (d) 2001:0db8:85a3:00000:0:8A2E:0370:7334 (e) 2001:0db8:85a3:0000:0000:8A2E:0370:7334:abcd (f) 2001:::1 (g) ::1.2.3.4	**2**	**1**
9	Study wireless ad-hoc network and show its working in windows operating system.	**3**	**2**
10	Study IP packet delivery in Mobile IP.	**4**	**1**
11	Study Agent discovery and agent registration in Mobile IP.	**4**	**1**
12	Study Bluetooth protocol stack.	**5**	**1**
	Total		**15**

Note :-

More Practical Exercises can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.

List of Learning Resources Required:

Sr. No.	Learning Resources with Broad Specifications	PrO. No.
1	Computer system with operating system	All
2	Wireshark packet analyzer, Open Source Software, Cisco packet tracer	

Suggested Project List:

Only one project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. The project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each project should encompass two or more Cos. Each student will have to maintain a dated work diary consisting of individual contributions in the project work and give a seminar presentation of it before submission.

A suggestive list of projects is given here. This has to match the COs. Similar projects could be added by the concerned course faculty:

- Case study on any one layer of OSI model.
- Case study on different types of Network devices available at each layer.
- Case study on IPv4 Address scheme with subnetting and supernetting. (Faculty can give a network to design in which student has to use subnetting and supernetting)
- Conduct a comparative analysis of TCP's performance over various mobile networks, including 3G, 4G (LTE), and 5G.
- Case study on GSM architecture.

Suggested Activities for Students:

Other than the classroom and laboratory learning, following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- List different types of Network operating system.
- Give a seminar on any relevant topics.
- Identify the type of Network in your Institute.

- Students are encouraged to register themselves in MOOC courses available on various MOOC platforms such as: Swayam, edx, Coursera, Udemy etc to further enhance their learning.

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