



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Computer Engineering / Computer Science & Engineering

Subject Code : DI03000051

Subject Name : Computer Networks

w. e. f. Academic Year:	2024-25
Semester:	3 rd
Category of the Course:	PCC

Prerequisite:	---
Rationale:	Computers and computer networks are the sole of the computer-based information systems. In present times, whether it is small or big organization they own their private computer networks to handle computer-based information systems. Therefore in every organization, establishing, commissioning (making operational) and maintaining secure computer networks has becomes one of the essential jobs of a diploma computer engineer too. This course is therefore designed to help the computer engineering diploma holders to develop this competency

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Classify various types of networks base on their construction, usage and scope.	Apply
02	Differentiate OSI and TCP/IP models.	Apply
03	Select proper transmission media and devices based on network requirements.	Apply
04	Compare IPv4 and IPv6 addressing scheme.	Apply
05	Identify various types of network security threats.	Apply

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

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



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Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	Basics of Computer Network <ul style="list-style-type: none">• Definition & need of networks, Computer Network Applications,• Types of connection: Point to Point, Multipoint• Types of Computer Networks and their use: Local Area Network, Metropolitan Area Network, Wide Area Network, Internet• Network Topology: Definition, Use, Advantage and Disadvantage of Following: Bus, Star, Ring, Mesh, Hybrid, Tree• Standard Organizations and Protocols : IEEE, ISOC, IETF, ISO, IRTF• Applications and features of different types of servers: File server, Pint Server, Mail Server, Web Server, Proxy Server	08	18
2.	The Reference Model for network communication <ul style="list-style-type: none">• OSI model & function of each Layer with diagram• TCP/ IP model& function of each Layer with diagram:• Comparison of OSI & TCP/IP Models	08	18



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3.	<p>Transmission Media & Network Devices</p> <p>Guided Media: Definition, connectors, applications, advantage and disadvantage of Following:</p> <ul style="list-style-type: none">• Twisted Pair (Shielded Twisted Pair, Unshielded Twisted Pair)• Coaxial Cable• Fiber Optics cable <p>Un Guided Media: Definition and Application of following:</p> <ul style="list-style-type: none">• Propagation Methods (Ground Propagation, Sky Propagation, Line of Sight Propagation),• Electromagnetic spectrum,• Radio Transmission,• Microwave Transmission,• Infrared Transmission,• Satellite Transmission <p>Network Devices: Definition, Use, Advantage and Disadvantage of following:</p> <ul style="list-style-type: none">• Repeaters, Hubs, Switches, Routers, Access Points, Gateways, Bridges , Network Interface card (NIC): Types of NIC (Ethernet, wifi), List Components of NIC <p>Difference between Layer 2 and Layer 3 Switches.</p>	10	22
4.	<p>IP Protocol</p> <ul style="list-style-type: none">• IPV4: Characteristics, Advantages and Disadvantages, Classful Addressing Scheme, Classless Addressing Scheme, Subnet & Masking, Reserved Address• IPV6: Characteristics, Addressing modes, Address types, Special Address• Difference between IPv4 and IPv6	10	22



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5.	Network Security Aspects <ul style="list-style-type: none">• Security Basics introduction: Confidentiality, Integrity, Availability• Threats to security: Viruses and Worms, Intruders, Insiders, Criminal organizations, Terrorists, Information warfare• Firewalls: Working and Design Principle, Packet Filter Firewall , Proxy Firewall	09	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
31	49	20	0	0	0

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. Andrew Tanenbaum, "Computer Networks", Pearson.
2. A. Behrouz Forouzan, "Data Communication & Networking,", Tata McGraw Hill, Latest Edition
3. Bhushan Trivedi, "Computer Networks", Oxford University Press.

(b) Open source software and website:

1. www.nptel.iitm.ac.in
2. www.vlab.co.in

Suggested Course Practical List:

1. Connect computer using given topology with wired media. Assume six devices are arranged, if in:

a) Bus topology	b) Ring topology
c) Star topology	d) Mesh topology

Find out number of cables(links), ports needed in each device and total number of ports



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needed in entire network for each of above stated topology.

2. Study about OSI model network Layers.
3. Prepare and Test Straight UTP Cable and Cross UTP Cable.
4. Study and Test various Network devices available at Department/Institute. (Repeater, Hub, Switch, Bridge, Router and Gateway).
5. Determine whether following IPv4 address are valid or invalid. If valid IPv4 address then find class, Network and Host ID of an IPv4 address. If invalid IPv4 address then write reason for the same.

a) 298.27.5.6	b) 1.4.5.5
c) 11100010.23.14.67	d) 192.226.12.11.9

6. Determine Class and Network Address for given IPv4 address and subnet mask.

IPv4 address	Subnet Mask	Class	Subnet
172.16.2.10	255.255.255.0		
10.6.24.20	255.255.240.0		
10.30.36.12	255.255.255.0		

7. Subnet the IP address 216.21.5.0/24 into 30 hosts in each subnet.
8. Identify valid IPv6 addresses and if invalid IPv6 address then write reason for the same:

2001: db8: 3333: 4444: 5555: 6666: 7777: 8888
2001:0db8:0001:0000: 0000:0ab9:C0A8:0102
225.1.4.2
::
fe80:2030:31:24

9. Study of firewall in providing network security.



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10. Run basic utilities and network commands: ipconfig, ping, tracert, netstat, pathping, route
11. List different adapters in any computer/ laptop and configure network connection in your institute/ premises LAN.

List of Laboratory/Learning Resources Required:

- a) Computer with latest Configuration with network management software
- b) Network Devices Hub, Switch, Router, Network Access point
- c) Network Cables Twisted Pair, Coaxial and Fiber Optics
- d) Crimping Tool
- e) Cable tester
- f) Network Cable Connector

Suggested Activities for Students:

- a) Construct a Chart of Small Network
- b) Undertake micro-projects in teams.
- c) Prepare charts to explain types of Network.
- d) Students are encouraged to register themselves in various MOOCs such as: Swayam to further enhance their learning.
- e) Visit your Institute server room and various places where Racks and servers installed, identify various Network components, collect information about installation of necessary hardware and software.

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