

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

COURSE TITLE: INFORMATION COMMUNICATION TECHNOLOGY

(Code: 3341601)

Diploma Program in which this course is offered	Semester in which offered
Information Technology	4th Sem

1. RATIONALE

The objective of Information Communication Technology is to make students clear over how communication and Information Technology is inseparable. Course covers basic underlying concepts and techniques used most recently. After learning this course student will be able to identify analog, digital and data techniques in communication technology. Students will be able to identify traditional communication structure, its modulation, multiplexing and lots of other important parameters. Student will be able to identify types and significance of various network topologies, hardware and protocols deployed at each OSI layer.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Develop basic understanding of Information communication Technology And IT Ethics.**
- **To develop basic skill to identify and learn various networks, servers and Protocols in wired communication.**

3. COURSE OUTCOMES:

- Understand importance of information and information communication technology.
- Learn basic analog communication concept.
- Identify network, servers, topologies and related component
- Learn protocols and IEEE standards

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
4	0	2	6	70	30	20	30	150

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I ICT Fundamentals	1a.Information Technology	1.1 Information Technology philosophy 1.1.1 Need of information technology 1.1.2 Logic of Information 1.1.3 Cybernetics 1.1.4 Definitions(Peirce, Shannon-Weaver, Bateson) 1.2 Information and society 1.2.1 Information Processing cycle 1.2.2 Impact of information on the society 1.2.3 IT act of India (Just Introduction) 1.3 ICT models (brief) 1.3.1 Analog Communication 1.3.2 Digital Communication 1.3.3 Data Communication
	1b.Basic structure of ICT	1.4 Structure of Communication 1.5 Transmission modes(Simplex, half duplex, Full duplex) 1.6 Synchronous and Asynchronous transmission 1.7 Serial and Parallel communication.
	1c. Analog communication	1.8 Need of Modulation 1.8.1 Antenna Height/length 1.8.2 Energy 1.8.3 Band-Edge Ratio 1.8.4 Multiplexing 1.9 Amplitude modulation 1.9.1 Definition 1.9.2 Mathematical derivation and calculation of modulation index, power 1.9.3 Frequency spectrum 1.10 Frequency modulation 1.10.1 Definition 1.10.2 Mathematical Derivation and calculation of frequency deviation Frequency spectrum
Unit – II Data Networks	2a. Network Computing model	2.1 Models of Network Computing (Centralize Computing, distributed Computing, collaborative Computing)

Unit	Major Learning Outcomes	Topics and Sub-topics
		2.2 Client Server Network and Peer to Peer Network
	2b. Topologies and types of network	2.3 Network Topologies (Bus, Mesh, Star, Ring), 2.4 Various types of computer Network (LAN, MAN, WAN) 2.5 Types of switching network(Circuit and Packet)
	2c. Layered mechanism	2.6 Need of layered mechanism 2.7 OSI Model(brief description of each layer) 2.8 TCP/IP Model(brief description of each layer)
Unit – III Physical View of ICT	3a. Multiplexing and its types	3.1 Multiplexing 3.1.1 Definition and need 3.1.2 Time Division Multiplexing 3.1.3 Frequency Division Multiplexing 3.1.4 Code Division Multiplexing 3.1.5 Orthogonal Frequency Division Multiplexing
	3b. Media and standards	3.2 Identification of various transmission media 3.2.1 Wired media (Coaxial, Twisted Paid cable and their connectors) 3.2.2 Wireless media (Microwave, Radio) 3.2.3 Application of wireless media in satellite Communication, block diagram, important definitions, Types of orbit, Indian achievement in satellite technology (IRNSS, Chandrayan, Mars mission) (Introduction only) Satellite launching) 3.3 Network Connecting devices(Switch, Router, Repeater, Bridges, Gateway) 3.4 IEEE standards for LAN(Introduction only)
Unit – IV Network Addressing	4a. IPv4 addressing	4.1 IPv4 addressing 4.1.1 Need of IP address 4.1.2 IPv4 addressing scheme 4.1.3 Address space and notations 4.1.4 Mask, nedid, hostid 4.1.5 Sub-netting and super-netting 4.1.6 Classful and classless notations Network address translations

Unit	Major Learning Outcomes	Topics and Sub-topics
	4b. IPv6 addressing	4.2 IPv6 addressing 4.2.1 Need for IPv6 migration 4.2.2 IPv6 addressing scheme 4.2.3 Hexadecimal column notation 4.2.4 Uni-cast addresses, multicast addresses, anycast addresses Reserved addresses and local addresses
	4c. Other concepts	4.3 Address mapping(logical to physical, physical to logical) 4.4 Ping and trace-route commands
Unit - V Protocols and Data Transportation	5a. UDP and TCP protocols	5.1 UDP and TCP protocols 5.1.1 Connectionless and connection oriented communication 5.1.2 Reliable and Unreliable communication UDP and TCP protocols
	5b. Data traffic	5.2 Data traffic and congestion management
	5c. Domain Name System	5.5 DNS 5.3.1 Domain, domain name, domain zone, root server 5.3.2 Domain types 5.3.3 Address resolution 5.3.4 Address mapping 5.4 Address, mapping address to names, recursive resolution, iterative resolution, caching)
	5d. Protocols	5.5 Protocols(introduction only) 5.5.1 ARP, RARP, ICMP protocols(brief explanation) 5.6 Routing (brief explanation) 5.6.1 Routing table, Uni-cast routing protocols and multicast routing protocols) 5.7 SMTP, POP, IMAP 5.8 WWW and HTTP 5.9 Data link layer protocols 5.9.1 Simplest, stop and wait, stop and wait ARQ, go back N ARQ, selective Repeat ARQ)

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	ICT Fundamentals	10	2	4	4	10
II	Data Networks	10	2	4	6	12
III	Physical View of ICT	10	4	6	6	16
IV	Network Addressing	12	4	5	6	15
V	Protocols and Data Transportation	14	4	5	8	17
	Total	56	16	24	30	70

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Following is the list of practical exercises for guidance.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain

Sr. No.	Unit No.	Practical Exercises (Outcomes' in Psychomotor Domain)	Hrs. required
1	I	Measurement of modulation index of amplitude modulation.	2
2		Measurement of Frequency deviation of F.M.	2
3		Test and Simulate AM using hardware kit or software	2
4		Test and Simulate FM using hardware kit or software	2
5	II	Test and implement Client –Server	2
6		Test and implement Peer to Peer model.	2
7		Test and implement STAR Topology	2
8		Test and implement BUS Topology	2
9		Test and implement STAR Topology	2

Sr. No.	Unit No.	Practical Exercises (Outcomes' in Psychomotor Domain)	Hrs. required
10	III	Build and Test circuit of T.D.M.	2
11		Build and Test circuit of F.D.M.	2
12		To Configure and test working of switch	2
13		To Demonstrate working of router configuration.	2
14		To Build small LAN using various network components.	2
15		To Prepare CAT-5 , CAT-6 cable for network using crimping tool	2
14		Identify and compare different transmission media	2
15	IV	Demonstration of FTP, HTTP Protocols	2
16		Test of Ping and trace out commands.	2
17	V	Simulation of Data traffic and congestion	2
18		Identification of IP address	2

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- a. LAN setup
- b. Understanding configuration of LAN
- c. Understanding of Indian IT act

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- Application for practical will be assigned to the students by the subject faculty and students will work in a group of 3 – 5
- Assignment can be given based on above topics.

10. SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book	Author	Publication
1	Computer Networks	Bhushan Trivedi	OXFORD
2	Data Communications and Networking	Behrouz Forouzan	TMH
3	Data communication and computer networks	ISRD group	TMH

B) List of Major Equipment/ Instrument with Broad Specifications

- a. Modulation trainer kit

- b. Multiplexing trainer kit
- c. DCN trainer kit
- d. LAN trainer
- e. RJ-45 connector, LAN cables, media and crimping tools

C) List of Software/Learning Websites

- a. NetSys simulator**
- b. Multisim**

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

1. Prof. Manoj Parmar, Incharge Head of department (IT), Government Polytechnic, Ahmedabad.
2. Prof. Nandu Fatak, Lecturer (IT), Government Polytechnic, Ahmedabad.

Coordinator and Faculty Members from NITTTR Bhopal

1. Prof. (Mrs.) Susan S. Mathew
2. Dr. Joshua Earnest,