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 Semester

1. RATIONALE

The objective of Information Communication Technology is to make students clear over how communication and Information Technology is inseparable. This course covers basic underlying concepts and techniques used most recently. After going through this course student will be able to differentiate between analogue and digital data techniques in communication technology. They will learn about traditional communication structure, its modulation, multiplexing and other important parameters. They will also learn significance of various network topologies, hardware and protocols deployed at each OSI model layer.

2. COMPETENCIES

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 competencies:

- **Explain basics of Information communication Technology and IT Ethics.**
- **Identify and explain functioning of various networks technologies, servers and protocols.**

3. COURSE OUTCOMES:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Describe importance of information and information communication technology.
ii. Explain basic concept of analog communication.
iii. Identify network, severs, topologies and networking component
iv. Explain 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	150
4	0	2	6	70	30	20	30	

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 (in cognitive domain)	Topics and Sub-topics
Unit – I **ICT Fundamentals**	1a.Explain various concepts related to 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.Describe basic of communication	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. Understand 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. Explain network Computing model	2.1 Models of Network Computing (Centralize Computing, distributed Computing, collaborative Computing) 2.2 Client Server Network and Peer to Peer Network
	2b. Explain 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)

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	2c. Explain layered structure of communication	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. Describe 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. Describe media and standards of transmission of signals	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. 3.3 Network Connecting devices(Switch,Router, Repeater, Bridges, Gateway) 3.4 IEEE standards for LAN(Introduction only)
Unit – IV **Network Addressing**	4a. Explain 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, netid, hostid 4.1.5 Sub-netting and super-netting 4.1.6 Classful and classless notations 4.1.7 Network address translations
	4b. Explain 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.Use of Ping and Trace route to troubleshoot network	4.3 Address mapping(logical to physical, physical to logical) 4.4 Ping and trace-route commands
Unit - V **Protocols and Data**	5a. Explain 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

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Transportation		UDP and TCP protocols
	5b. Explain data traffic	5.2 Data traffic and congestion management
	5c.Explain 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.Explain Various TCP/IP Protocols	5.5 Protocols(introduction only) 5.6 Data link layer protocols 5.6.1 ARP,RARP,ICMP protocols (only brief explanation) 5.7 Routing (brief explanation) 5.7.1 Routing table, Uni-cast routing protocols and multicast routing protocols) 5.8 SMTP, POP, IMAP 5.9 WWW and HTTP

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 skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. 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 certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*
Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

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 Peer to Peer model.	2
6		Test and implement Client –Server	2
7		Test and implement BUS Topology	2
8		Test and implement STAR Topology	2
9			2
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	III	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	4
18		Identification of IP address	2
Total Hours (practical for 28 hours from above representing each unit may be selected)			36

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:

i. Study LAN setup in the institute
ii. Understanding configuration of LAN and H/w and S/w required for the same
iii. Understanding of Indian IT act

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book	Author	Publication
1	Data Communications and Networking	Behrouz Forouzan	TMH
2	Computer Networks	Bhushan Trivedi	OXFORD
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

B) List of Software/Learning Websites

a. NetSys simulator
b. Multisim

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. Manoj Parmar,** Incharge Head Department of IT , Government Polytechnic, Ahmadabad.
- **Prof. Nandu Fatak,** Lecturer (IT), Government Polytechnic, Ahmedabad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. M. A. Rizvi,** Associate Professor, Dept. of Computer Engineering and Applications.
- **Dr. R. K. Kapoor**, Associate Professor, Dept. of Computer Engineering and Applications, NITTTR.