GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	:	**DIPLOMA IN INFORMATION TECHNOLOGY**
LEVEL NAME	:	**PROFESSIONAL COURSES**
COURSE CODE	:	**IT401E****
COURSE TITLE	:	**DATA COMMUNICATION**
PREREQUISITE	:	**NIL**
TEACHING SCHEME	:	**TH: 03; TU: 00; PR: 00(CLOCK HRs.)**
TOTAL CREDITS	:	**03 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)**
TH.TEE	:	**1 HR (Objective type online examination)**
PR.TEE	:	**NIL**
PT.TEE	:	**15 MINUTES (Objective type Offline examination)**

❖ RATIONALE:

Computer communication through networking becomes essential part of our life. We can manage many application like Air Line Reservation, Railway Reservation, E-banking, E Governance, On-Line shopping, E-learning etc. by clicking mouse button from our own place. Because of this, world become the global village. By considering importance of communication in networking, we here introduce problems related to channel allocation, flow control, error control and congestion control over networks.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Differentiate network topologies, hardware and protocols.
2. Learn network architecture and physical media used to connect computers in network.
3. Identify the layers, principles of operations and operating characteristics of the ISO OSI model.
4. Design simple computer network.
5. Identify different problems related to channel allocation.
6. Identify different problem related to flow control and error control.

❖ **COURSE DETAILS:**

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Introduction to data Communication and Multiplexing	1. Define the term networking protocols, standard organization, and bandwidth and data transmission rate. 2. Define the term analog signal, digital signal, baud rate and Bits per second. 3. List different modes of data transmission. 4. State the need of multiplexing and its application. 5. State the need of Modulation. 6. State the working of simplex, half duplex and full duplex. 7. State the need of Demultiplexing. 8. Differentiate between FDM and TDM. 9. Describe the procedure of Pulse code Modulation and delta Modulation.	1.1.Introduction: Data Communication, protocols, Standards, Standard organizations, Bandwidth and Data Transmission Rate. 1.2.Analog Signal, Analog Transmission, Digital Signal, Digital Transmission, Baud Rate and Bits per second 1.3. Modes of Data Transmission, Parallel and Serial Communication, Asynchronous, Synchronous and Isochronous Communication, Simplex, Half-Duplex, Full Duplex, 1.4.Process of modulation, Multiplexing and Demultiplexing, Types of Multiplexing: TDM,FDM , TDM Vs FDM Digital Modulation Types:- Pulse Code Modulation(PCM)Delta Modulation(DM)	06
2. Error Correction And detection	1. Describe the function of Data Communication Model. 2. State Line Configuration. 3. Define the term Error. 4. State the types of Errors. 5. Perform Hamming code. 6. Perform Vertical redundancy check. 7. Perform Longitudinal redundancy check. 8. Define the term redundancy and Checksum.	2.1 Functions of Data Communication Model, Line Configuration 2.2 Types of Errors, Error Detection 2.3 Redundancy, Vertical Redundancy Check (VRC) 2.4 Longitudinal Redundancy Check(LRC), Cyclic Redundancy Check(CRC) 2.5 CHECKSUM, 2.6 Hamming Code	10
3. Flow Control and	1. Define the term Line Discipline.	3.1.Line Discipline:- ENQ/ACK, Poll/Select,	08

Error control	2. State the types of ENQ/ACK, Poll/Select. 3. State the problem related to Flow control. 4. Describe different protocols of Flow control. 5. State the problem related to Error control. 6. Describe Stop N Wait error control protocol and Sliding Window error control protocol. 7. Draw and describe Go-Back-N ARQ and Selective reject ARQ.	3.2.Flow Control: Stop-and –Wait, Sliding Window flow control. 3.3.Error Control :- Automatic Repeat Request(ARQ) 3.4.Stop-and Wait ARQ, Sliding Window ARQ 3.5.Go-Back-n-ARQ, Selective-Reject ARQ	
4. Multiple Access protocol	1. State the problem related to channel allocation. 2. Describe static and dynamic channel allocation. 3. Describe Pure Aloha and slotted Aloha protocols. 4. Compare FDMA and TDMA. 5. State the problem related to Carrier sense multiple access. 6. Describe CSMA/CD and CSMA/CA. 7. Describe token passing mechanism.	4.1.Random Access, Multiple Access, Channel Allocation problem, static and dynamic channel allocation. 4.2.Pure ALOHA, Slotted ALOHA, FDMA, TDMA Comparison of FDMA and TDMA 4.3.Carrier Sense Multiple Access(CSMA): CSMA/CD,CSMA/CA, Controlled Access 4.4.Token passing mechanism.	10
5. Congestion Control	1. State the problem related to congestion control. 2. State the principles of Congestion control. 3. Describe the policies for Congestion prevention. 4. Define the term choke packets. 5. Describe hop-by-hop choke packets. 6. Describe the terms BECN and FECN. 7. Describe Leaky Bucket Algorithm.	5.1.Introduction: Congestion control, General Principles of Congestion Control, Congestion Prevention Policies 5.2.Choke Packets 5.3.Hop-by-Hop Choke Packets 5.4.BECN,FECN 5.5.Leaky Bucket Algorithm	08

6. WAN Communication.	1. State the need of Frame Relay. 2. Describe the Frame Relay format. 3. Describe Asynchronous transfer mode. 4. Define the terms related to Packet size, ATM cells and switching. 5. Describe different layers of ATM.	6.1 Introduction: Frame Relay, The need for Frame Relay, How Frame Relay works, frame format 6.2 Asynchronous Transfer Mode (ATM) ,Overview of ATM, Packet Size, ATM Cells, Switching, ATM layers	06
		Total Hrs.	**48**

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
NIL			

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Introduction to data Communication and Multiplexing	02(00)	06(00)	00(00)	**08(00)**
02	Error Correction And detection	06(00)	04(00)	00(00)	**10(00)**
03	Flow Control and Error control	02(00)	10(00)	00(00)	**12(00)**
04	Multiple Access protocol	00(00)	08(00)	06(00)	**14(00)**
05	Congestion Control	02(00)	04(00)	06(00)	**12(00)**
06	WAN Communication.	06(00)	04(00)	04(00)	**14(00)**
	Total	**18(00)**	**36(00)**	**16(00)**	**70 (00)**

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			Bit 7		
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M
01 To 35	1	R	2	2	R	2	2	R	2	2	R	2	3	R	2	5	R	2	**6**	**R**	**2**
	6	R	2	6	R	2	1	U	2	1	U	2	1	U	2	2	U	2	2	U	2
	3	U	2	3	U	2	3	U	2	3	R	2	3	U	2	4	U	2	4	U	2
	4	U	2	4	U	2	5	U	2	5	U	2	6	U	2	6	U	2	4	A	2
	4	A	2	4	A	2	5	A	2	5	A	2	5	A	2	6	A	2	6	A	2

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**70**	**28**	Online Exam	1, 2, 3, 4,5,6
				Total	**100**	**40**		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	--	--	Rubrics & Assessment Sheets	--
		Journal Writing		Continuous	--	--	Journal	--
				TOTAL	--	--		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	Rubrics & Practical Answer Sheets	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
NIL		

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	-	-	-	-	-	3	3	3
2	-	3	-	-	-	-	-	-	-	3	3	3
3	-	3	-	-	-	-	-	-	-	3	3	3
4	-	3	-	-	-	-	-	3		3	3	3
5	-	3	-	-	-	-	-	3	-	3	3	3
6	-	3	-	-	-	-	-	3	-	3	3	3

1-Slight (Low) 2-Moderate (Medium) 3- Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Computer Networks	Andrew S Tannenbaum, Tata McGraw-Hill Edition, 2012	0-385-19195-2
2.	Data Communication & Networking	BehrouzForouzan, Special Indian Edition Tata McGraw Hill,2012	100072967757
3.	Data & Computer Communication,	Williams Stallings , Prentice Hall of India	0131392050
4.	Complete Reference Networking	Craig Zacker, Tata McGraw-Hill Edition	9780070474161
5.	Networking + Certification (Second Edition)	Microsoft Press	100070474168

❖ **E-REFERENCES:**

http://www.tutorialspoint.com/data_communication_computer_network/ ,assessed on 25th April 2016

http://www.freetechbooks.com/data-communication-and-networks-f31.html, assessed on 25th April 2016

https://www.youtube.com/watch?v=sG6WGvzmVaw, assessed on 25th April 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION:**

NIL

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Shifa A. Mohammad	Lecturer in Information Technology	Government Polytechnic, Nagpur
2.	V. A Raje	System Analyst(Lecturer in Computer Engineering)	Government Polytechnic, Nagpur
3.	I.G Lokhande	Lecturer in Information Technology	Government Polytechnic, Nagpur
4.	Prof. ManojJethawa	HOD, Computer Science	ShriDattaMeghe Polytechnic, Nagpur
5.	Prof. N. V. Choudhari	Asst. Professor(CSE),	DBACOE, Wanadongari, Nagpur
6.	Mr. Atul Upadhyay	COE	Vista Computers, Ramnagar, Nagpur

(Member Secretary PBOS) **(Chairman PBOS)**