GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	**:**	**DIPLOMA IN CM/IT**
LEVEL NAME	**:**	**ENGINEERING SCIENCE AND TECHNICAL ARTS COURSES**
COURSE CODE	**:**	**CM302E**
COURSE TITLE	**:**	**COMPUTER NETWORK**
PREREQUISITE	**:**	**NIL**
TEACHING SCHEME	**:**	**TH: 04; TU: 00; PR: 02(CLOCK HRs.)**
TOTAL CREDITS	**:**	**05 (1 TH/TU CREDIT = 01 CLOCK HR., 01 PR CREDIT = 02 CLOCK HR.)**
TH. TEE EXAM	**:**	**03 HRs**
PR. TEE EXAM	**:**	**02 HRs (Internal)**
PT. EXAM	**:**	**01 HR**

❖ RATIONALE:

The day-to-day business transaction in banks, railways reservation, industrial sale, purchase, industrial automation / process and educational environments are all dependent on computers that are connected on networks. This subject will enable to learn the basic concepts of computer network and its applications, topologies, communication media, protocols used and OSI reference model.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Illustrate various protocols, models in networks.
2. Recognize 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. Develop a simple computer network.
5. Share files, directories and printers on local area network.
6. Install networking devices and wireless networks.

❖ **COURSE DETAILS:**

A. THEORY :

Units	**Specific Learning Outcomes (Cognitive Domain)**	**Topics and subtopics**	**Hrs.**
1. Basics of Computer Network	1. Define the term network and identify several networks 2. List the applications of Computer Network 3. Identify the roles of the client and server in client-server architecture 4. Categories computer network based on scope and connection 5. Identify the use of various types of server.	1.1Introduction to Computer Network: Computer network, sharing information, sharing resources, file sharing 1.2 Categories of network: Based on scope - LAN, MAN, WAN Based on Connection - Peer to Peer network, Client- Server Network, Centralized network, Distributed network. 1.3 Network Architecture:- Features and Applications 1.4 Applications and features of different types of servers: File server, Mail Server, Web Server, Proxy Server.	08
2.Network Topologies and Networking Standard	1. Draw stated logical network topology. 2. Design a computer network considering particular topology 3. Identify the use of different networking standards	2.1 Types of topology: Bus topology , Ring topology, Star topology, Mesh topology, Tree topology, Hybrid topology 2.2 IEEE Networking Standards:802.2, 802.3,802.5,802.11Standard	08
3. The Reference Model	1. List 7 layers of the OSI Model and compare them to the layering used in the Internet model 2. Describe the basis and structure of an abstract layered protocol model. 3. Describe, analyse and compare a number of datalink, network, and transport layer protocols	3.1 OSI Reference Model: Physical Layer, Data link layer, Network layer, Transport Layer, Session Layer, Application Layer. 3.2 TCP/IP Reference Model: Link, Internet, Transport, Application layer 3.3 Comparisons of OSI and TCP/IP reference model	12

	4. Differentiate between connection oriented and connectionless approach 5. Analyse theservices and features of the various layers of data networks		
4. Transmission Media	1. Identify a variety of cables and ports used on PCs 2. List guided and unguided transmission media 3. Select appropriate transmission media for a given network 4. Describe the characteristics of each cable 5. Describe the characteristics of each connectors	4.1Types of Transmission media 4.2Guided Media: Twisted pair wire, Coaxial cable, Fibre optic cable 4.3 Connectors: BNC Connectors,RJ45 Connectors, AUI Connectors, Fibre Connectors 4.4 Unguided Media: Electromagnetic spectrum, Radio transmission, Microwave Transmission, Infrared Transmission, Satellite Communication 4.5 IEEE 802.3 standard : 10Base2,10base5,10BaseT, Fast Ethernet, Gigabit Ethernet	12
5. Network Devices	1. Describe the differences between a hub, switch (bridge), and a router. 2. Recognize the different internetworking devices and their functions. 3. Differentiate Layer2 and Layer3 Switches 4. State the use of Network Management Software	5.1 Hubs 5.2 Repeaters 5.3 Switches 5.4 Routers 5.5 Bridges 5.6 Gateways 5.7 Access Points 5.8 Modems 5.9 Difference between Layer 2 and layer 3 Switches 5.10 Introduction of Network management software	12
6 IP Protocol and Network Applications	1. Describe networking protocols and their hierarchical relationship hardware and software 2. Analyse the features and operations of various application layer protocols such as HTTP, DNS, subnet masking	6.1 IP Protocol – IP v4, IP v6 6.2 Addressing Schemes 6.3 Subnet and Masking 6.4 DNS 6.5 Email 6.6 FTP 6.7 HTTP 6.8 Framing, Flow and Error Control in Data Link Layer 6.9Concept of Routing	12

	3. Select appropriate class for given network size. 4. Illustrate subnet and usage of subnet masking.		
		Total Hrs.	**64**

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	**Specific Learning Outcomes (Psychomotor Domain)**	**Units**	**Hrs.**
1	Install and configure network interface card	Basics of Computer Network	**2**
2	Develop a small network	Basics of Computer Network & The Reference Model	**4**
3	Troubleshoot the network devices.		**2**
4	Install and configure File server, Print server, Mail Server	Basics of Computer Network	**4**
5	Install proxy server		**4**
6	Share a printer on a network & print a document on it from a different computer on a network		**2**
7	Share files and directories from one computer to second computer on the network		**2**
8	Prepare and test straight and cross UTP cables	Transmission Media	**2**
9	Crimp Network cables using tools available		**2**
10	Install and test router, repeater and bridge	Network Devices	**2**
11	Install a small wireless network using access points		**2**
12	Configure networking commands like ping, ipconfig, netstat, nslookup, traceroute	IP Protocol and Network Applications	**2**
		Skill Assessment	**2**
		Total Hrs	**32**

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Basics of Computer Network	06(00)	04(04)	00(00)	**10(04)**
02	Network Topologies and Networking Standard	00(00)	04(00)	06(06)	**10(06)**
03	The Reference Model	02(00)	08(04)	00(00)	**10(04)**
04	Transmission Media	00(04)	08(04)	06(00)	**14(08)**
05	Network Devices	02(04)	04(04)	06(00)	**12(08)**
06	IP Protocol and Network Applications	00(00)	08(04)	06(06)	**14(10)**
	Total	**10(08)**	**36(20)**	**24(12)**	**70 (40)**

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			Option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	1	R	2	1	R	2	3	R	2	5	R	2	4	R	2	**5/7**
	4	R	2																
02	1	U	4	2	U	4	3	U	4	1	U	4	3	U	4				**3/5**
03	3	U	4	4	U	4	4	U	4	4	U	4	5	R	4				**3/5**
04	5	U	4	6	U	4	6	U	4	5	U	4	6	U	4				**3/5**
05	2	A	6	4	A	6	2	A	6										**2/3**
06	5	A	6	6	A	6	6	A	6										**2/3**

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
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**70**	**28**	Theory Answer Sheets	1, 2, 3
				Total	**100**	**40**		
Direct Assessment Practical	**CA** (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	**25**	**10**		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**50**	**20**	Rubrics & Practical Answer Sheets	4,5,6
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
1	Install and configure network interface card, File server, print server, mail server, share files, directories and printer	10
2	Performance	20
3	Identify variety of tables and codes used on PC, crimp network cables using tools	10
5	Viva voce	10
	TOTAL	**50**

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:

1. Computer Engineering:-

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	PSO1	PSO2
1	3	3	-	-	-	-	-	-	-	-	-	3
2	3	3	-	-	3	-	-	-	-	-	-	3
3	3	3	-	-	3	-	-	-	-	-	-	3
4	3	3	2	2	-	-	-	2	2	2	-	3
5	3	3	2	2	-	-	-	2	2	2	-	3
6	3	3	2	2	-	-	-	2	2	2	-	3

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

2. Information Technology:-

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	PSO1	PSO2
1	3	3	-	-	-	-	-	-	-	-	3	-
2	3	3	-	-	3	-	-	-	-	-	3	-
3	3	3	-	-	3	-	-	-	-	-	3	-
4	3	3	2	2	-	-	-	2	2	2	3	-
5	3	3	2	2	-	-	-	2	2	2	3	-
6	3	3	2	2	-	-	-	2	2	2	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, Pearson Education, 5thEdition, 2013	13:9789332518742
2.	Computer Networking: A Top-Down Approach	Behrouz Forouzan, Tata McGraw Hill, Special Indian Edition ,2011	13:9781259001567
3.	Data & Computer Communication,	Williams Stallings , Prentice Hall of India 7th Edition,2011	13: 978-0131006812
4.	Computer Networking: A Top-Down Approach	James F. Kurose , Pearson Education, 5th Edition, 2012	13:9788131790540
5.	Computer Networks: Networking Equipment, Cabling, Setup, Sharing, TCP/IP, Layers	N. S. Reddy, NEO Publishing House, Kindle Edition 2016	--

❖ E-REFERENCES:

- http://www.nptelvideos.in/2012/11/computer-networks.html?m=1,**assessed on 05th April 2016**
- https://www.slideshare.net//mobile/makyong1/basic-concepts-of-computer-networks ,**assessed on 05th Sept 2016**

❖ LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION

1. Computer systems
2. Network Cable Cat 5/Cat 6.
3. Crimping Tool
4. UTP Cable Tester
5. Layer 2 Switch
6. Wireless Access point and wireless router
7. Impacting Tool
8. Network cable connectors
9. Network Trainer Kit

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

S.N.	Name	Designation	Institute / Industry
1.	Mr. S. P. Lambhade	HOD, Dept. of Computer Engineering	Government Polytechnic, Nagpur.
2.	Ms. G. B. Chavan	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
3.	Ms. D. M. Shirkey	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
4.	Mr. L. D. Vilhekar	Lecturer in Information Technology	Government Polytechnic, Nagpur.
5.	Prof. Manoj Jethawa	HOD Computer Science	Shri Datta Meghe Polytechnic, Nagpur
6	Prof. N.V.Chaudhari	Asst. Professor (CSE)	DBACEO, Wanadongari, Nagpur
7	Mr. Atul Upadhay	CEO	Vista Computers, Ram Nagar, Nagpur

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