Ref No:

< SRI KRISHNA INSTITUTE OF TECHNOLOGY BANGALORE>

COURSE PLAN

Academic Year 2019-2020

Program:	B E – Electronics & Communication Engineering
Semester :	6
Course Code:	17EC64
Course Title:	COMPUTER COMMUNICATION NETWORKS
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	ASHA B R

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Note : Remove "Table of Content" before including in CP Book
Each Course Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	EC
Semester:	6	Academic Year:	2019-2020

Course Title:	Computer Communication Networks	Course Code:	17EC64
Credit / L-T-P:	4 / 4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50 Hours	SEE Marks:	60 Marks
CIA Marks:	40 Marks	Assignment	1 / Module
Course Plan Author:	Asha B R	Sign ..	Dt:
Checked By:		Sign ..	Dt:
CO Targets	CIA Target : ..... %	SEE Target:	..... %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Module	Content	Teaching Hours	Blooms Learning Levels
1	Data Communications: Components, Representations, Data Flow, Networks: Physical Structures, Network Types: LAN, WAN, Switching, Internet. Network Models: Protocol Layering: Scenarios, Principles, Logical Connections, TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite, Description of layers, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model: OSI Versus TCP/IP. Data-Link Layer: Introduction: Nodes and Links, Services, Categories' of link, Sublayers, Link Layer addressing: Types of addresses, ARP. Data Link Control (DLC) services: Framing, Flow and Error Control, Data Link Layer Protocols: Simple Protocol, Stop and Wait protocol, Piggybacking.	10	L2
2	Module-2 Media Access Control: Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access: Reservation, Polling, Token Passing. Wired LANs: Ethernet: Ethernet Protocol: IEEE802, Ethernet Evolution, Standard Ethernet: Characteristics, Addressing, Access Method, Efficiency, Implementation, Fast Ethernet: Access Method, Physical Layer, Gigabit Ethernet: MAC Sublayer, Physical Layer, 10 Gigabit Ethernet. L1, L2	10	L2
3	Module-3 Wireless LANs: Introduction: Architectural Comparison, Characteristics, IEEE 802.11: Architecture, MAC Sublayer, Addressing Mechanism, Physical Layer, Bluetooth: Architecture, Layers. Connecting Devices: Hubs, Switches, Virtual LANs: Membership, Configuration, Communication between Switches and Routers, Advantages. Network Layer: Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services, Packet Switching: Datagram Approach, Virtual Circuit Approach, IPV4 Addresses: Address Space, Classful Addressing, Classless Addressing, DHCP, Network Address Resolution, Forwarding of IP Packets: Based on destination Address and Label. `	10	L2
4	Module-4 Network Layer Protocols: Internet Protocol (IP): Datagram Format, Fragmentation,Options, Security of IPv4 Datagrams, ICMPv4: Messages, Debugging Tools, Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP. Unicast Routing: Introduction, Routing Algorithms: Distance Vector Routing, Link State Routing, Path vector routing, Unicast Routing Protocol: Internet Structure, Routing Information Protocol, Open Shortest Path First, Border	10	L3

	Gateway Protocol Version 4.		
5	Module-5 Transport Layer: Introduction: Transport Layer Services, Connectionless and Connection oriented Protocols, Transport Layer Protocols: Simple protocol, Stop and wait protocol, Go-Back-N Protocol, Selective repeat protocol, User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Segment, Connection, State Transition diagram, Windows in TCP, Flow control, Error control, TCP congestion control	10	L2
-			

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).
1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1	Data Communications and Networking , Forouzan, 5th Edition, McGraw Hill, 2016 ISBN: 1-25-906475-3	1,2,9,10,11,12,1315,17,18,19,20,23,24	In Lib & Dept
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1	Computer Networks, James J Kurose, Keith W Ross, Pearson Education, 2013, ISBN: 0-273-76896-4		In Lib and Dept
2	Introduction to Data Communication and Networking, Wayarles Tomasi, Pearson Education, 2007, ISBN:0130138282		
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
C1	Lab : CCN lab		
D	**Software Tools for Design**	**-**	**-**
1	Network Simulator Tool NS2/NS3		
E	**Recent Developments for Research**	**-**	**-**
1	Improve efficiency – http:// www3.nd.edu		
2	CCN use of modern information technologies – web.simmons.edu		
3	Evolution of computer network – ecomputernotes.com		
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1	https://youtu.be/JHJQ6Ke2mYU		
2	https://youtu.be/G0h0dC4Zycs		
3	https://youtu.be/AWPgmEHVp1c		
4	https://youtu.be/hDjylWgWy10		
5	https://youtu.be/wTNVM7WrJpc		

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
1	15EC45	Principles of Communication	Basics of communication, multiplexin modulation demodulation	4		L2
-						
-						

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	Use of modern information Technologies for information retrieval and dissemination in Computer communication networks	Communication Networks	Recent Developments required to be known for placements and Course projects.	L2
2	Remote data entry stations	Communication Networks	Recent Developments required to be known for placements and Course projects.	L2
3,4	Distributed data processing networks	Communication Networks	Recent Developments required to be known for placements and Course projects.	L2
2,5	GPSS packet Assembler/Dissembler	Communication Networks	Recent Developments required to be known for placements and Course projects.	L2
-				
-				

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	17EC64.1	Identify the protocols and services of Data link layer.	10	Data Communication	Chalk & Board	Questionnaire and Assignment	L2 Understand
2	17EC64.2	Identify the protocols and functions associated with the transport layer services.	10	Computer Network architecture	Lecture	CIA	L2
3	17EC64.3	Describe the layering architecture of computer networks and	10	Link Layer services	Lecture	Slip test quiz	L2

		distinguish between the OSI reference model and TCP/IP protocol suite.					
4	17EC64.4	Distinguish the basic network configurations and standards associated with each network.	10	Methods to access and control media	Lecture	Assignmentand CIA	L3
5	17EC64.5	Construct a network model and determine the routing of packets using different routing algorithms.	10	characteristics of wired networking	Lecture	CIA slip test	L2
-		**Total**	**50**	**-**	**-**		**L2-L3**

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	The transmission media (often referred to in the literature as the *physical media*) used to link devices to form a computer network include electrical cable,optical fiber, and radio waves. In the OSI model, these are defined at layers 1 and 2 — the physical layer and the data link layer.	CO1	L2
1	*Coaxial cable*s widely used for cable television systems, office buildings, and other work-sites for local area networks. Transmission speed ranges from 200 million bits per second to more than 500 million bits per second.[*citation needed*] •ITU-TG.hn technology uses existing home wiring (coaxial cable, phone lines and power lines) to create a high-speed local area network. •Twisted pair cabling is used for wired Ethernet and other standards. It typically consists of 4 pairs of copper cabling that can be utilized for both voice and data transmission. The use of two wires twisted together helps to reduce crosstalk and electromagnetic induction.	CO1	L2
2	*Terrestrial microwave* – Terrestrial microwave communication uses Earth-based transmitters and receivers *Communications satellites*– Satellites communicate via microwave radio waves, which are not deflected by the Earth's atmosphere. The satellites are stationed in space, typically in geosynchronous orbit 35,400km (22,000mi) above the equator. These Earth-orbiting systems are capable of receiving and relaying voice, data, and TV signals.	CO2	L2
2	A network interface controller (NIC) is computer hardware that provides a computer with the ability to access the transmission media, and has the ability to process low-level network information. For example, the NIC may have a connector for accepting a cable, or an aerial for wireless transmission and reception, and the associated circuitry.	CO2	L2
3	Ethernet networks, each network interface controller has a unique Media Access Control(MAC) address—usually stored in the controller's permanent memory. To avoid address conflicts between network devices, the Institute of Electrical and Electronics Engineers(IEEE) maintains and administers MAC address uniqueness. The size of an Ethernet MAC address is six octets	CO3	L2
3	Repeaters and hubs A repeater is an electronic device that receives a network signal, cleans it of unnecessary noise and regenerates it. The signal is retransmitted at a higher power level, or to the other side of an obstruction, so that the signal can cover longer distances without degradation. In most twisted pair Ethernet configurations, repeaters are required for cable that runs longer than 100 meters	CO3	L2
4	A repeater with multiple ports is known as an Ethernet hub. Repeaters work on the physical layer of the OSI model. Repeaters require a small amount of time to regenerate the signal	CO4	L2
4	Routers A router is an internetworking device that forwards packets between networks by processing the routing information included in the packet or datagram (Internet	CO4	L3

	protocol information from layer		
5	The use of protocol layering is today ubiquitous across the field of computer networking. An important example of a protocol stack is HTTP (the World Wide Web protocol) running over TCP over IP(the Internet protocols) over IEEE 802.11 (the Wi-Fi protocol). This stack is used between the wireless router and the home user's personal computer when the user is surfing the web.	CO5	L2
5	IEEE 802 is a family of IEEE standards dealing with local area networks and metropolitan area networks. The complete IEEE 802 protocol suite provides a diverse set of networking capabilities. The protocols have a flat addressing scheme. They operate mostly at levels 1 and 2 of the OSI model.	CO5	L2
	Intranet An intranet is a set of networks that are under the control of a single administrative entity. The intranet uses the IP protocol and IP-based tools such as web browsers and file transfer applications. The administrative entity limits use of the intranet to its authorized users. Most commonly, an intranet is the internal LAN of an organization. **Extranet** An extranet is a network that is also under the administrative control of a single organization, but supports a limited connection to a specific external network. For example, an organization may provide access to some aspects of its intranet to share data with its business partners or customers. **Internetwork** An internetwork is the connection of multiple computer networks via a common routing technology using routers **Internet** The Internet is the largest example of an internetwork. It is a global system of interconnected governmental, academic, corporate, public, and private computer networks. It is based on the networking technologies of the Internet Protocol Suite. Darknet A darknet is an overlay network, typically running on the Internet, that is only accessible through specialized software. A darknet is an anonymizing network where connections are made only between trusted peers — sometimes called "friends"		

3. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes														-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Level
1	17EC64.1	Identify the protocols and services of Data link layer.	2	2	1													L2
2	17EC64.2	Identify the protocols and functions associated with the transport layer services.	1	3	3													L2
3	17EC64.3	Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.	2	2	2		1											L2
4	17EC64.4	Distinguish the basic network configurations and standards associated with each network.	3	3			2											L3
5	17EC64.5	Construct a network model and determine the routing of packets using different routing algorithms.	2	2														L2
-		**Average attainment (1, 2, or 3)**																**-**
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning;*																

		S1.Software Engineering; S2.Data Base Management; S3.Web Design

4. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Modules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Modules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Data Communications,Network models and Data-Link Layer	10	2	-	-			2	CO1	L2
2	MediaAccess Control ,Wired LANs	10	2	-	-			2	CO2	L2
3	Wireless LANs,Connecting Devices	10	-	2	-			2	CO3	L2
4	Network Layer Protocols .Unicast Routing	10	-	2	-			2	CO4	L3
5	Transport Layer	10	-	-	4			2	CO5	L2
-		**50**	**4**	**4**	**4**	**10**	**10**	**10**		

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Modules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam – 1	30	CO1, CO2, CO3,CO4	L2
3, 4	CIA Exam – 2	30	CO5, CO6,CO7,CO8	L2,L3
5	CIA Exam – 3	30	CO9,CO10	L2
1, 2	Assignment - 1	10	CO1, CO2, CO3,CO4	L2
3, 4	Assignment - 2	10	CO5, CO6,CO7,CO8	L2,L3
5	Assignment - 3	10	CO9,CO10	L2
1, 2	Seminar - 1		-	-
3, 4	Seminar - 2		-	-
5	Seminar - 3		-	-
1, 2	Quiz - 1		-	-
3, 4	Quiz - 2		-	-
5	Quiz - 3		-	-
1 - 5	Other Activities – Mini Project	-	-	-
	Final CIA Marks	**40**	**-**	**-**

D1. TEACHING PLAN - 1

Module - 1

Title:	Data Communication ,Network model Data link Layer	Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Identify the protocols and services of Data link layer.	CO1	L2
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Data Communications: Components, Representations, Data Flow,:	CO1	L2
2	Physical Structures, Network Types: LAN, WAN, Switching, Internet	CO1	L2
3	Models: Protocol Layering: Scenarios, Principles, Logical Connections	CO1	L2
4	TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite, Description of layers,	CO1	L2
5	Encapsulation and Decapsulation	CO1	L2
6	Addressing, Multiplexing and Demultiplexing, The OSI Model: OSI Versus TCP/IP.	CO1	L2
7	Data-Link Layer: Introduction: Nodes and Links, Services, Categories' of link, Sublayers,	CO1	L2
8	Link Layer addressing: Types of addresses, ARP.	CO1	L2
9	Data Link Control (DLC) services, Framing, Flow and Error Control	CO1	L2
10	Data Link Layer Protocols:Simple Protocol, Stop and Wait protocol, Piggybacking.	CO1	L2
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	The transmission media (often referred to in the literature as the *physical media*) used to link devices to form a computer network include electrical cable,optical fiber, and radio waves.	CO1	L2
2	*Coaxial cable*s widely used for cable television systems, office buildings, and other work-sites for local area networks. Transmission speed ranges from 200 million bits per second to more than 500 million bits per second.[*citation needed*] •ITU-TG.hn technology uses existing home wiring (coaxial cable, phone lines and power lines) to create a high-speed local area network. •Twisted pair cabling is used for wired Ethernet and other standards. It typically consists of 4 pairs of copper cabling that can be utilized for both voice and data transmission. The use of two wires twisted together helps to reduce crosstalk and electromagnetic induction.	CO1	L2
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Explain the different components of data communication.	CO1	L2
2	Explain the different physical networks for LAN and WAN.	CO1	L2
3	Describe the ISO-OSI reference model of a computer network discuss the function of each layer.	CO1	L2
4	Explain the layered architecture of TCP/IP protocol suite	CO1	L2
5	Explain the Encapsulation and Decapsulation process in data communication	CO1	L2
6	Explain the following with reference to TCP/IP i)Addressing ii)Multiplexing and iii) Demultiplexing.	CO1	L2
7	Compare the two models OSI/ISO with TCP/IP	CO1	L2
8	Explain the link layer addressing with necessary diagrams	CO1	L2

9	Explain the process of working of Address Resolution Protocol.	CO1	L2
10	Explain the services of data link control.	CO1	L2
11	Explain the framing process 1) Bit oriented 2) Byte oriented	CO1	L2
12	Explain the Simple protocol of DLL with necessary diagram	CO1	L2
13	Explain the stop and wait protocol of DLL with necessary diagram	CO1	L2
e	**Experiences**	-	-
1			
2			

Module – 2

Title:		Appr Time:	12 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Identify the protocols and functions associated with the transport layer services.	CO2	L2
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	Random Access: ALOHA	CO2	L2
2	CSMA,	CO2	L2
3	CSMA/CD, CSMA/CA.	CO2	L2
4	Controlled Access: Reservation,	CO2	L2
5	Polling, Token Passing.	CO2	L2
6	Wired LANs: Ethernet Protocol: IEEE802	CO2	L2
7	Ethernet Evolution, Standard Ethernet	CO2	L2
8	Efficiency, Implementation	CO2	L2
9	Fast Ethernet: Access Method, Physical Layer	CO2	L2
10	Gigabit Ethernet: MAC Sublayer,10 Gigabit Ethernet.	CO2	L2
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	**IEEE 802** is a family of IEEE standards dealing with local area networks and metropolitan area networks. The complete IEEE 802 protocol suite provides a diverse set of networking capabilities. The protocols have a flat addressing scheme. They operate mostly at levels 1 and 2 of the OSI model.	CO4	L2
2	Ethernet networks, each network interface controller has a unique Media Access Control(MAC) address—usually stored in the controller's permanent memory. To avoid address conflicts between network devices, the Institute of Electrical and Electronics Engineers(IEEE) maintains and administers MAC address uniqueness. The size of an Ethernet MAC address is six octets	CO5	L2
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Explain the features of pure ALOHA	CO2	L2
2	Explain the features of slotted ALOHA	CO2	L2
3	Compare pure ALOHA with slotted ALOHA . What are the reasons for poor channel utilization in ALOHA systems?	CO2	L2
4	Explain the characteristics of CSMA system	CO2	L2
5	Explain the different types of controlled access protocols used in multiple access. channels	CO2	L2
6	Explain the CSMA/CD process of collision detection and channel access with necessary flow chart	CO2	L2
7	Explain the different persistence methods with relevant flow charts.	CO2	L2
8	Explain the CSMA/CA process of collision avoidance and channel access with	CO2	L2

	necessary flow chart		
9	Explain the IEEE802 Ethernet protocol	CO2	L2
10	Explain the characteristics and addressing of standard Ethernet	CO2	L2
11	Explain the Access methods of standard Ethernet	CO2	L2
12	Explain the Efficiency and implemetation methods of standard Ethernet	CO2	L2
13	Explain the Physical and MAC sublayers of Gigabit Ethernet	CO2	L2
14	Explain the access methods of fast Ethernet	CO2	L2
15	Explain the features of 10 Gigabit Ethernet.	CO2	L2
e	**Experiences**	-	-
1			
2			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17EC71	Sem:	VII	Marks:	30	Time:	75 minutes		
Course:	COMPUTER COMMUNICATION NETWORK								
-	**-**	**Note: Answer all questions, each carry equal marks. Module : 1, 2**					**Marks**	**CO**	**Level**
1	a	Explain the different components of data communication					15	CO1	L2
	b	With neat diagrams explain different physical structures.						CO1	L2
		OR							
2	a	Explain in detail, the layers of TCP/IP protocol suite.					15	CO1	L2
	b	Explain the process of working of Address Resolution Protocol.						CO1	L2
3	a	Explain the IEEE802 Ethernet protocol					15	CO2	L2
	b	Explain the characteristics and addressing of standard Ethernet						CO2	L2
		OR							
4	a	Explain the access methods of fast Ethernet					15	CO2	L2
	b	Explain the features of 10 Gigabit Ethernet.						CO2	L2

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions									
Crs Code:	17EC64	Sem:	VI	Marks:	10	Time:	90 – 120 minutes		
Course:					Module : 1, 2				
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.									
SL.NO		**Assignment Description**					**Marks**	**CO**	**Level**
1		Explain the different components of data communication.					10	CO1	L2
2		Explain the different physical networks for LAN and WAN.					10	CO1	L2
3		Describe the ISO-OSI reference model of a computer network discuss the function of each layer.					10	CO1	L2
4		Explain the layered architecture of TCP/IP protocol suite					10	CO1	L2
5		Explain the Encapsulation and Decapsulation process in data communication					10	CO1	L2
6		Explain the following with reference to TCP/IP i)Addressing ii)Multiplexing and iii) Demultiplexing.					10	CO1	L2
7		Compare the two models OSI/ISO with TCP/IP					10	CO1	L2
8		Explain the link layer addressing with necessary diagrams					10	CO1	L2
9		Explain the process of working of Address Resolution Protocol.					10	CO2	L2
10		Explain the services of data link control.					10	CO2	L2
11		Explain the framing process 1) Bit oriented 2) Byte oriented					10	CO2	L2
12		Explain the Simple protocol of DLL with necessary diagram					10	CO2	L2
13		Explain the stop and wait protocol of DLL with necessary diagram					10	CO2	L2
14		Explain the features of pure ALOHA					10	CO2	L2

15		Explain the features of slotted ALOHA	10	CO2	L2
16		Compare pure ALOHA with slotted ALOHA . What are the reasons for poor channel utilization in ALOHA systems?	10	CO2	L2
17		Explain the characteristics of CSMA system	10	CO2	L2
18		Explain the different types of controlled access protocols used in multiple access. channels	10	CO2	L2
19		Explain the CSMA/CD process of collision detection and channel access with necessary flow chart	10	CO2	L2
20		Explain the different persistence methods with relevant flow charts.	10	CO2	L2
21		Explain the CSMA/CA process of collision avoidance and channel access with necessary flow chart	10	CO2	L2
22		Explain the IEEE802 Ethernet protocol	10	CO2	L2
23		Explain the characteristics and addressing of standard Ethernet	10	CO2	L2
24		Explain the Access methods of standard Ethernet	10	CO2	L2
25		Explain the Efficiency and implemetation methods of standard Ethernet	10	CO2	L2
26		Explain the Physical and MAC sublayers of Gigabit Ethernet	10	CO2	L2
27		Explain the access methods of fast Ethernet	10	CO2	L2
28		Explain the features of 10 Gigabit Ethernet.	10	CO2	L2

D2. TEACHING PLAN - 2

Module – 3

Title:	WLANS and Connecting Devices	Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Describe the layering architecture of computer networks and distinguish	CO3	L2
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	Wireless LANs: Introduction: Architectural Comparison, Characteristics, IEEE 802.11: Architecture, MAC Sublayer.	CO3	L2
2	Addressing Mechanism, Physical Layer, Bluetooth: Architecture, Layers	CO3	L2
3	Connecting Devices: Hubs, Switches	CO3	L2
4	Virtual LANs: Membership, Configuration	CO3	L2
5	Communication between Switches and Routers, Advantages	CO3	L2
6	Network Layer: Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services	CO3	L2
7	Packet Switching: Datagram Approach, Virtual Circuit Approach	CO3	L2
8	IPV4 Addresses: Address Space, Classful Addressing, Classless Addressing	CO3	L2
9	DHCP, Network Address Resolution,	CO3	L2
10	Forwarding of IP Packets: Based on destination Address and Label.	CO3	L2
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	**Repeaters and hubs** A repeater is an electronic device that receives a network signal, cleans it of unnecessary noise and regenerates it. The signal is retransmitted at a higher power level, or to the other side of an obstruction, so that the signal can cover longer distances without degradation. In most twisted pair Ethernet configurations, repeaters are required for cable that runs longer than 100 meters	CO3	L2
2	A repeater with multiple ports is known as an Ethernet hub. Repeaters work on the physical layer of the OSI model. Repeaters require a small amount of time to regenerate the signal	CO3	L2
	Routers	CO3	

	A router is an internetworking device that forwards packets between networks by processing the routing information included in the packet or datagram (Internet protocol information from layer		
d	Review Questions	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Explain the Characteristics of IEEE802.11	CO3	L2
2	Give the architectural comparison between Wired and Wireless LAN	CO3	L2
3	Explain the layered architecture of Bluetooth technology	CO3	L2
4	Give a brief note on connecting devices Hubs and switches.	CO3	L2
5	What is the basis for membership in a VLAN	CO3	L2
6	How are the stations configured into different VLANS	CO3	L2
7	Explain how communication takes place between switches	CO3	L2
8	Mention the advantages with VLAN	CO3	L2
9	Describe briefly the services offered by the Network Layer	CO3	L2
10	Explain the packet switching using Datagram approach	CO3	L2
11	Explain the packet switching using Virtual circuit approach	CO3	L2
e	**Experiences**		
1			
2			
3			

Module – 4

Title:	Network Layer	Appr Time:	13 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Distinguish the basic network configurations and standards associated with each network.	CO4	L3
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Network Layer Protocols: Internet Protocol (IP): Datagram Format, Fragmentation,Options.	CO4	L2
2	Security of IPv4 Datagrams,	CO4	L2
3	ICMPv4: Messages, Debugging Tools	CO4	L3
4	Mobile IP: Addressing, Agents, Three Phases.	CO4	L2
5	Inefficiency in Mobile IP. Unicast Routing: Introduction	CO4	L3
6	Routing Algorithms: Distance Vector Routing, Link State Routing	CO4	L3
7	Path vector routing	CO4	L2
8	Unicast Routing Protocol	CO4	L3
9	Internet Structure	CO4	L3
10	Routing Information Protocol	CO4	L3
11	Open Shortest Path First	CO4	L2
12	Border Gateway Protocol Version 4	CO4	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .		-
1	**Routers** A router is an internetworking device that forwards packets between networks by processing the routing information included in the packet or datagram (Internet protocol information from layer	CO4	L2
2	**Internetwork** An internetwork is the connection of multiple computer networks	CO4	L3

	via a common routing technology using router **Internet** The Internet is the largest example of an internetwork. It is a global system of interconnected governmental, academic, corporate, public, and private computer networks. It is based on the networking technologies of the Internet Protocol Suite.		
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Explain the working of Internet Protocol with necessary diagram	CO4	L2
2	Explain the format of a datagram packet	CO4	L2
3	Explain the process of Fragmentation in Network layer	CO4	L2
4	Discuss the security Issues of IPv4 datagram	CO4	L2
5	Explain the concept of messages in ICMPv4 with necessary diagrams	CO4	L2
6	Explain the debugging tools of ICMPv4	CO4	L2
7	Explain Mobile IP addressing with necessary diagrams	CO4	L2
8	Explain the distance vector algorithm with neat diagrams	CO4	L2
9	Explain the Link state routing algorithm with neat diagrams	CO4	L2
10	Describe the Internet Structure with necessary diagrams	CO4	L2
11	Describe the Routing Information protocol with diagrams	CO4	L2
12	Describe the working of Open Shortest Path First algorithm	CO4	L2
13	Describe the Border Gateway Protocol with diagrams	CO4	L2

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17EC64	Sem:	VI	Marks:	30	Time:	75 minutes		
Course	Computer Communication Network								
-	**-**	**Note: Answer all questions, each carry equal marks. Module : 3, 4**					**Marks**	**CO**	**Level**
1	a	Explain the Characteristics of IEEE802.11					15	CO3	L2
	b	Explain the layered architecture of Bluetooth technology						CO3	L2
		OR							
2	a	Give a brief note on connecting devices Hubs and switches.					15	CO3	L2
	b	What is the basis for membership in a VLAN						CO3	L2
3	a	Explain with necessary diagrams the working of Internet Protocol					15	CO4	L2
	b	Write a breif note on security of IPv4 Datagrams						CO4	L3
		OR							
4	a	Explain with necessary flow chart ,Link state routing protocol					15	CO4	L2
	b	Explain the following I) Distance vector routing ii) Path vector routing						CO4	L3

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17EC64	Sem:	VI	Marks:	10	Time:	90 – 120 minutes
Course:	Computer Communication Network				Module : 3, 4		

SNo	Assignment Description	CO	Level	Marks
1	Explain the Characteristics of IEEE802.11	CO3	L2	10

2	Give the architectural comparison between Wired and Wireless LAN	CO3	L2	10
3	Explain the layered architecture of Bluetooth technology	CO3	L2	10
4	Give a brief note on connecting devices Hubs and switches.	CO3	L2	10
5	What is the basis for membership in a VLAN	CO3	L2	10
6	How are the stations configured into different VLANS	CO3	L2	10
7	Explain how communication takes place between switches	CO3	L2	10
8	Mention the advantages with VLAN	CO3	L2	10
9	Describe briefly the services offered by the Network Layer	CO3	L2	10
10	Explain the packet switching using Datagram approach	CO3	L2	10
11	Explain the packet switching using Virtual circuit approach	CO3	L2	10
12	Explain the working of Internet Protocol with necessary diagram	CO4	L2	10
13	Explain the format of a datagram packet	CO4	L2	10
14	Explain the process of Fragmentation in Network layer	CO4	L2	10
15	Discuss the security Issues of IPv4 datagram	CO4	L2	10
16	Explain the concept of messages in ICMPv4 with necessary diagrams	CO4	L2	10
17	Explain the debugging tools of ICMPv4	CO4	L2	10
18	Explain Mobile IP addressing with necessary diagrams	CO4	L2	10
19	Explain the distance vector algorithm with neat diagrams	CO4	L2	10
20	Explain the Link state routing algorithm with neat diagrams	CO4	L2	10
21	Describe the Internet Structure with necessary diagrams	CO4	L2	10
22	Describe the Routing Information protocol with diagrams	CO4	L2	10
23	Describe the working of Open Shortest Path First algorithm	CO4	L2	10
24	Describe the Border Gateway Protocol with diagrams	CO4	L2	10

D3. TEACHING PLAN - 3

Module – 5

Title:	Transport Layer	Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Construct a network model and determine the routing of packets using different routing algorithms.	C5	L2
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Transport Layer: Introduction: Transport Layer Services, Connection less and Connection oriented Protocols, ,	CO5	L2
2	Transport Layer Protocols: Simple protocol	CO5	L2
3	Stop and wait protocol	CO5	L2
4	Go-Back-N Protocol,	CO5	L2
5	Selective repeat protocol	CO5	L2
6	User Datagram Protocol: User Datagram, UDP Services	CO5	L2
7	UDP Applications,	CO5	L2
8	Transmission Control Protocol: TCP Services	CO5	L2
9	TCP Features	CO5	L2
10	TCP Features and revision		
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	**Internetwork** An internetwork is the connection of multiple computer networks via a common routing technology using routers	CO5	L2

2	**Internet** The Internet is the largest example of an internetwork. It is a global system of interconnected governmental, academic, corporate, public, and private computer networks. It is based on the networking technologies of the Internet Protocol Suite.	CO5	L2
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Explain the services offered by Transport Layer	CO5	L2
2	Explain the Simple protocol of transport layer with necessary diagrams	CO5	L2
3	Explain stop and wait protocol of transport layer with diagram	CO5	L2
4	Explain Go-Back-N protocol of Transport layer	CO5	L2
5	Explain Selective repeat protocol of transport layer.	CO5	L2
6	Explain User datagram packet format	CO5	L2
7	Explain UDP services and applications with necessary diagrams	CO5	L2
8	Explain the TCP protocol with necessary flow chart	CO5	L2
9	Explain the servicves of TCP	CO5	L2
10	Expain the features , segment of TCP	CO5	L2
11	Explain TCP connection and state transition diagram.	CO5	L2
12	Explain flow control and Error control in TCP	CO5	L2
13	Explain congestion control in TCP	CO5	L2
e	**Experiences**	-	-
1			
2			

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	17EC64	Sem:	VI	Marks:	30	Time:	75 minutes
Course:	Computer Communication Network						

-	-	**Note: Answer all questions, each carry equal marks. Module : 5**	**Marks**	**CO**	**Level**
1	a	Explain the services offered by Transport Layer	15	CO5	L2
	b	Explain Go-Back-N protocol of Transport layer		CO5	L2
		OR			
2	a	Explain User datagram packet format	15	CO5	L2
	b	Explain congestion control in TCP		CO5	L2
3	a	Explain Selective repeat protocol of transport layer.	15	CO5	L2
	b	Explain the TCP protocol with necessary flow chart		CO5	L2
		OR			
4	a	Explain TCP connection and state transition diagram.	15	CO5	L2
	b	Explain flow control and Error control in TCP		CO5	L2

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	15EC64	Sem:	VI	Marks:	10	Time:	90 – 120 minutes
Course:	Computer Communication Network				Module : 3, 4		

SNo	**Assignment Description**	**Marks**	**CO**	**Level**
1	Explain the services offered by Transport Layer	10	CO5	L2
2	Explain the Simple protocol of transport layer with necessary	10	CO5	L2

	diagrams			
3	Explain stop and wait protocol of transport layer with diagram	10	CO5	L2
4	Explain Go-Back-N protocol of Transport layer	10	CO5	L2
5	Explain Selective repeat protocol of transport layer.	10	CO5	L2
6	Explain User datagram packet format	10	CO5	L2
7	Explain UDP services and applications with necessary diagrams	10	CO5	L2
8	Explain the TCP protocol with necessary flow chart	10	CO5	L2
9	Explain the servicves of TCP	10	CO5	L2
10	Expain the features , segment of TCP	10	CO5	L2
11	Explain TCP connection and state transition diagram.	10	CO5	L2
12	Explain flow control and Error control in TCP	10	CO5	L2
13	Explain congestion control in TCP	10	CO5	L2

F. EXAM PREPARATION

1. University Model Question Paper

Course	Computer Communication Network					Month / Year	May /2018	
Crs Code:	17EC64	Sem:	VI	Marks:	60	Time:	180 minutes	
Module	**Note**	Answer all FIVE full questions. All questions carry equal marks.				**Marks**	**CO**	**Level**
1	a	Explain the significance of TCP/IP protocol suit with neat diagram				16 / 20	CO1	L2
	b	Illustrate with an example bit stuffing and byte stuffing						
	c	Explain briefly the topologies of physical layer					CO1	L2
1	a	Explain the ARP operation and ARP packet format with neat diagram				16 / 20	CO1	L2
	b	Explain the operation and FSM of STOP & WAIT protocol					CO1	L2
2	a	Explain the three strategies used in CSMA/CA collision avoidance				16 / 20	C02	L2
	b	A pure ALOHA network transmits 200 bit frames on a shared channel of 200kbps. What is the throughput if the system produces i)1000 frames per sec ii) 500 frames per sec iii) 250 frames per sec					CO2	L3
	c	With neat diagram explain the ETHERNET frame format					CO2	L2
	d							
2	a	Describe the persistence methods in CSMA with flow diagram				16 / 20	CO2	L2
	b	Write short notes on 10 Base 5 Ethernet and 10 Base 2 Ethernet					CO2	L2
	c	Describe polling in controlled access Method						
	d							
3	a	Explain hidden stations problem in wireless networks				16 / 20	CO3	L2
	b	Describe the spanning tree problem with an example					CO3	L2
	c	Explain the datagram approach in connectionless service to route the packet					CO3	L2
	d							
	a	With neat diagram explain the two kinds of services of wireless architecture				16 / 20	CO3	L2
3	b	Explain with neat diagram VLAN, membership and configuration of VLAN					CO3	L2
	c	Explain the simple implementation of network address translation and address translation with neat diagram.					CO3	L2
4	a	Explain the IPV4 datagram format				16 /	CO4	L3

			20		
	b	Explain with neat diagram Distance Vector Algorithm		CO4	L2
4	a	Explain with neat diagram the three phases of mobile host communication	16 / 20	CO4	L2
	b	Explain with an example Link state Routing and apply Dijksthra algorithm to find the least cost path tree.		CO4	L3
5	a	Explain why send window size for Go Back N must be less than 2^m	16 /20	CO5	L2
	b	Explain sending and receiving buffers in TCP		CO5	L2
	c	Explain with neat diagram explain the TCP segment format		CO5	L2
	d				
5	a	Explain why size of send and receive window in selective repeat can be atmost one half of 2^m	16	CO5	L2
	b	Describe the general services provided by UDP		CO5	L2
	c	Explain with neat diagram connection establishment with three way handshaking in TCP		CO5	L2

2. SEE Important Questions

Course:		Computer Communication Network						Month / Year	May /2018	
Crs Code:		17EC64	Sem:	6	Marks:	60		Time:	180 minutes	
	Note	Answer all FIVE full questions. All questions carry equal marks.						-	-	
Module	Qno.	Important Question						**Marks**	**CO**	**Year**
1	a	Compare the two models OSI/ISO with TCP/IP						4	CO1	2016
	b	Explain the link layer addressing with necessary diagrams						6	CO1	
	c	Explain the process of working of Address Resolution Protocol.						6	CO1	
2	a	Explain the ARP operation and ARP packet format with neat diagram						8	CO2	2018
	b	Explain the operation and FSM of STOP & WAIT protocol						8	CO2	
	c									
3	a	Explain the layered architecture of Bluetooth technology						8	CO3	
	b	Give a brief note on connecting devices Hubs and switches.						8	CO3	
	c									
4	a	Explain TCP connection and state transition diagram.						6	CO4	2016
	b	Explain flow control and Error control in TCP						6	CO4	
	c	Explain congestion control in TCP						4	CO4	
5	a	Explain why size of send and receive window in selective repeat can be atmost one half of 2^m						6	CO5	2018
	b	Describe the general services provided by UDP						4	CO5	
	c	Explain with neat diagram connection establishment with three way handshaking in TCP						6	CO5	
