

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**  
**K.S.R. COLLEGE OF ENGINEERING (Autonomous), TIRUCHENGODE – 637 215.**  
**COURSE / LESSON PLAN SCHEDULE: 2018-2019(ODD)**

**NAME : Dr.J.Gnanambigai,**  
**SUBJECT : 16EC541-Computer Networks**

**CLASS: III/ECE-A, B,**

**A) TEXT BOOKS:**

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 4th Edition, 2006.
2. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, 4th Edition, 2010.

**B) REFERENCE BOOKS:**

1. Wayne Tomasi, “Introduction to Data Communication and Networking”, Pearson Education, 1st Edition, 2007.
2. William Stallings, “Data and Computer Communication”, Pearson Education, 8th Edition, 2006.
3. James .F. Kurose& W. Rouse, “Computer Networking: A Top down Approach Featuring”, Pearson Education, 3rd Edition, 2011.
4. Greg Tomshon, Ed Tittel, David Johnson. “Guide to Networking Essentials”, Thomson India Learning, 5th Edition, 2007.

**C). LEGEND:**

L - Lecture BB-Block      Board TX-Text      OHP- Over Head Projector Rx –Reference      pp – Pages  
PPT -Power Point Presentation

S. No.	Lecture hour	Topic(s) to be covered	Teaching aid required	Book No./Page No.
<b>UNIT I- PHYSICAL LAYER</b>				
1	L1	Data communications	BB	Tx 1/pp3-7, Tx 2/pp85-89, Rx 1/pp39-55,
2	L2	Networks: Network criteria,connection types, Network topology	BB	Tx 1/pp7-15,Tx 2/pp37-41
3	L3	Networks models :OSI model, Layers in TCP / IP protocol suite	BB	Tx 1/pp27-45, Tx 2/pp85-89, Rx 1/pp31-36, Rx 4/pp161-171
4	L4	Addressing, Guided transmission media	BB	Tx 1/pp45-50, Tx 1/pp191-203, Tx 2/pp41-46, Rx 1/pp55
5	L5	Unguided Transmission media	BB+PPT	Tx 1/pp203-208, Rx 1/pp97
6	L6	Switching: Circuit switched networks	BB+PPT	Tx 1/pp213-218, Tx 2/pp147-149, Rx 1/pp304, Rx 3/pp301-304, Rx 2/pp301-304
7	L7	Datagram Networks	BB	Tx 1/pp218-221, Rx 3/pp310
8	L8	Virtual circuit networks, Cable networks for data transmission	BB+PPT	Tx 1/pp221-227, Tx 1/pp256-261,Rx 1/pp24,Rx3/pp307
9	L9	Dialup modems – DSL,Cable TV networks, <b>Network Performance</b>	BB	Tx 1/pp248-255, Tx 2/pp169-175, Tx 1/pp 89-94
<b>UNIT II-DATA LINK LAYER</b>				
10	L10	Data link control: Framing, Flow and error control	BB	Tx 1/pp307-311, Tx 2/pp187-192, Rx 1/pp497-498, Rx 4/pp207
11	L11 L12	Protocols: Simple protocol, Stop and wait, Sliding window, Go back N, Selective repeat	BB+PPT	Tx 1/pp311-340, Tx 2/pp234-270, Rx 2/pp222
12	L13	HDLC	BB	Tx 1/pp340-346, Tx 2/pp251-270, Rx 1/pp572-577
13	L14 L15	Multiple access: Random access, Controlled access	BB+PPT	Tx 1/pp363-383, Tx 2/pp292-299, Rx 1/pp589-603
14	L16	iEEE802.3: Standard Ethernet	BB	Tx 1/pp395-405, Rx 1/pp602
15	L17	Changes in the standard, Fast Ethernet, Gigabit Ethernet.	BB	Tx 1/pp406-416, Tx 2/pp310-316, Rx 3/pp69-98
16	L18	Connecting devices: Hub, Switches, Bridges, Routers and Gateways, <b>Wireless LANS</b>	BB+PPT	Tx 1/pp445-456, Tx 2/pp329-337, Tx 1/pp421-434
<b>UNIT III-NETWORK LAYER</b>				
17	L19 L20	Logical addressing: IPv4, IPv6 addresses	BB+PPT	Tx1/pp 549-572,Tx 2/pp430-444 Rx 3/pp331, Rx3/pp344,Rx 2/pp 586
18	L21 L22	Internet Protocol: Internetworking, IPv4, IPv6,transition fromIPV4 to IPV6	BB+ PPT	Tx1/pp 579-605, Tx 2/pp430-444
19	L23	Address mapping, Delivery, Forwarding	BB+ PPT	Tx1/pp 611-640, Tx1/pp 647-658,Tx 2/pp430-444,Tx 2/pp453-454, Rx 1pp675-683, Rx 1pp647-687, Rx 1pp832-850, Rx 3/pp331, Rx 3/pp447, Rx 1/pp827-850

20	L24	Routing protocols: Intra and inter domain routing, Distance vector routing	BB+ PPT	Tx1/pp 658-660, Tx1/pp 660-666, Tx 2/pp453-454, Tx 2/pp608-609, Tx 2/pp462
21	L25 L26	Link state routing, Path vector routing	BB+PPT	Tx1/pp 666-678,Rx 2/pp300-304, Rx3/pp351-370
22	L27	Multicast routing protocols, <b>Transition from IPV4to IPV6</b>	BB+PPT	Tx1/pp 678-693,Tx 2/pp370-372 Rx 3/pp391-398, Tx1/pp 603-605
<b>UNIT IV-TRANSPORT LAYER</b>				
23	L28	Transport layer services	BB	Tx 1/pp701-709
24	L29	Multiplexing and demultiplexing	BB	Tx 1/pp707-709,Tx 2/pp524-530, Rx 1/pp756-763, Rx2 /pp196-200
25	L30 L31	User Datagram Protocol (UDP)	BB+PPT	Tx 1/pp709-715,Tx 2/pp530-554, Rx 1/pp763-785, Rx 3/pp228-249
26	L32 L33	Transmission Control Protocol (TCP)	BB+PPT	Tx 1/pp715-735,Rx 3/pp254-261, Rx 2/pp383
27	L34	Congestion Control	BB+PPT	Tx 1/pp763-774
28	L35	Quality of services (QoS)	BB	Tx 1/pp775-776
29	L36	Techniques to improve QoS, <b>SCTP</b>	PPT	Tx 1/pp780, Tx 1/pp736-738
<b>UNIT V-APPLICATION LAYER</b>				
30	L37 L38	Domain Name System (DNS)	BB	Tx1/pp797-812,Tx 2/pp579-586, Rx 3/pp130-131, Rx 2/pp774
31	L39 L40	E-mail – FTP – WWW – HTTP	BB	Tx1/pp824-840, Tx1/pp 840-844, Tx1/pp 845-861, Tx1/pp 861-868, Rx 1/pp872-882,Tx 2/pp588-662, Rx 1/pp904-912, Rx 3/pp87-120, Rx 2/pp745, Rx 2/pp784
32	L41	Network Security :Cryptography ,Symmetric key and Public Key algorithms	BB+PPT	Tx1/pp 931-934, Tx1/pp 935-956,Tx 2/pp737-755, Rx 3/pp657-664
33	L42	Digital signature	BB	Tx1/pp 971-976,Tx 2/pp755-763, Rx 2/pp720
34	L43	Management of Public keys	BB+PPT	Tx1/pp 981-990,Tx 2/pp765-771
35	L44	Communication Security,		Tx 2/pp785-799,
36	L45	Authentication Protocols, <b>Entity Authentication</b>	BB+PPT	Rx 3/pp610-674 , Tx1/pp 976-981

**UNIT-I**

(CO1)

**PART-A**

- Differentiate the Guided and Unguided Transmission Medium (Dec2016, May/June2013)(Analyzing)**  
Guided transmission is physical media that provides a specific path, like copper wiring or optical fiber. Unguided travels in all directions through free space, like radio transmission.
- What are the similarities between Transport and Data link Layer (Nov/Dec2013) (Remembering)**  
**Flow control:** Like the data link layer, the transport layer is responsible for flow control. However, flow control at this layer is performed end to end rather than across a single link.  
**Error control:** Like the data link layer, the transport layer is responsible for error control.
- What are the features of Datagram Networks (Nov/Dec2013)(Remembering)**  
A datagram is a basic transfer unit associated with a packet-switched network in which the delivery, arrival time, and order of arrival are not guaranteed by the network.A datagram supports a maximum of 65,535 bytes at a time; thus, it is a very small amount of data.
- What is the role of DSL Modem (May/June 2012) (Remembering)**  
A digital subscriber line (DSL) modem is a device used to connect a computer or router to a telephone line which provides the digital subscriber lineservice for connectivity to the Internet, which is often called DSL broadband.
- What is a Protocol (June 2016, May/June 2012) (Remembering)**  
A protocol is a set of rules that govern all aspects of information communication
- What is TCP/IP? (Nov/Dec 2012) (Remembering)**  
TCP/IP, Transmission Control Protocol/Internet Protocol, is a suite of communications protocols used to network devices on the Internet. TCP/IP implements layers of protocol stacks, and each layer provides a well-defined network services to the upper layer protocol. TCP and IP are the two protocols used by TCP/IP, as well as the (higher) application, (lower) data link and (lower) physical layer protocols.
- Compare virtual circuit and datagram (Nov/Dec 2012)(Analyzing)**  
**Virtual Circuit Packet Switching**

1. Virtual circuits allow packets to contain circuit number instead of full destination address so less router memory and bandwidth require. Thus cost wise it is cheaper.
2. Virtual circuit requires a setup phase, which takes time and consume resources.
3. In virtual circuit, router just uses the circuit number to index into a table to find out where the packet goes.
4. Virtual circuit has some advantages in avoiding congestion within the subnet because resources can be reserved in advance, when the connection is established.
5. Virtual circuit has some problem. If a router crashes and loses its memory, even it come back up a second later, all the virtual circuits passing through it will have to be aborted.
6. The loss fault on communication line vanishes the virtual circuits.
7. In virtual circuit a fixed path is used during transmission so traffic throughout the subnet cannot be balanced. It cause congestion problem.
8. A virtual circuit is a implementation of connection oriented service.

#### **Datagram Packet Switching**

1. Datagram circuits allow packets to contain full address instead of circuit number so each packet has significant amount of overhead, and hence wasted band width. Thus it is costly.
  2. Datagram circuit does not require setup phase, so no resources are consumed.
  3. In datagram circuit, a more complicated procedure is required to determine where the packet goes.
  4. In a datagram subnet, congestion avoidance is more difficult.
  5. In datagram circuit if a router goes down only that user whose packets were queued up in the router at the time will suffer.
  6. The loss or fault on communication line can be easily compensated in datagram circuits.
  7. Datagram allows the router to balance the traffic throughout the subnet, since router can be changed halfway through a connection.
8. **What are the four basic network topologies? (April/May 2011, Dec2016) (Remembering)**  
Star, Bus, Mesh, Ring Topologies
  9. **Distinguish between ADSL and SDSL (April/May 2011) (Analyzing)**  
**ADSL** (Asymmetric Digital Subscriber Line): has "Asymmetric" line speeds, that is, the speed from the internet to you, and you to the internet, are different. This is the most common setup for broadband, as people don't require these speeds be the same for general internet access.  
**SDSL** (Symmetric Digital Subscriber Line) is "symmetric", that is, the speeds between you and the internet are the same in both directions. Currently, for residential and basic business applications, SDSL is available on special request from some providers, but costs considerably more than regular ADSL. It's only usually used for larger businesses that need dedicated high speed internet access.
  10. **Define data communication (May/June 2011, Nov/Dec 2011) (Remembering)**  
Data communication is the exchange of data (in the form of 1s and 0s) between two devices via some form of transmission medium (such as a wire cable).
  11. **What is the main function of physical layer (May/June 2011) (Remembering)**  
Physical layer coordinates the functions required to transmit a bit stream over a physical medium.  
a. Physical characteristics of interfaces and media, b. Representation of bits, c. Data rate, d. Synchronization of bits, e. Line configuration, f. Physical topology, g. Transmission mode
  12. **What are the problems of interconnecting various networks (Nov/Dec 2011) (Remembering)**
    - i. Dimension and size of network: It should be decided how many PE's are there in the network and what the dimensionality of the network is i.e. with how many neighbors, each processor is connected.
    - ii. Symmetry of the network: It is important to consider whether the network is symmetric or not i.e., whether all processors are connected with same number of processing elements, or the processing elements of corners or edges have different number of adjacent elements.
    - iii. What is data communication strategy? Whether all processors are communicating with each other in one time unit synchronously or asynchronously on demand basis.
    - iv. Message Size: What is message size? How much data a processor can send in one time unit.
    - v. Start up time: What is the time required to initiate the communication process.
    - vi. Data transfer time: How long does it take for a message to reach to another processor. Whether this time is a function of link distance between two processors or it depends upon the number of nodes coming in between.
    - vii. The interconnection network is static or dynamic: That means whether the configuration of interconnection network is governed by algorithm or the algorithm allows flexibility in choosing the path.
  13. **What are the network support layers and the user support layers? (Remembering)**  
**Network support layers:** The network support layers are Physical layer, Data link layer and Network layer. It deals with electrical specifications, physical connection, transport timing and reliability.  
**User support layers:** The user support layers are: Session layer, Presentation layer, Application layer. These allow interoperability among unrelated software system

**14. Explain the relationship of IEEE Project to the OSI model? (Remembering)**

The IEEE has subdivided the data link layer into two sub layers: Logical link control (LLC), Medium access control (MAC) LLC is non-architecture specific. The MAC sub layer contains a number of distinct modules, each carries proprietary information specific to the LAN product being used.

**15. What are the responsibilities of network layer? (Remembering)**

The network layer is responsible for the source-to-destination delivery of packet across multiple network links. The specific responsibilities of network layer include the following: • Logical addressing. • Routing.

**16. Define Routers. (Remembering)**

Routers relay packets among multiple interconnected networks. They Route packets from one network to any of a number of potential destination networks on internet routers operate in the physical, data link and network layer of OSI model.

**17. What is meant by brouter? (Remembering)**

A brouter is a single protocol or multiprotocol routers that sometimes acts as a router and sometimes act as a bridge.

**18. What are the four internetworking devices? (Remembering)**

The four internetworking devices are • Repeaters • Bridges • Routers • Gateway

**19. What is Token Bus? (Remembering)**

Token Bus is a physical bus that operates as a logical ring using tokens. Here stations are logically organized into a ring. A token is passed among stations. If station wants to send data, it must wait and capture the token. Like Ethernet, station communicates via a common bus.

**20. Define Gateway. (Remembering)**

A device used to connect two separate networks that use different communication protocols.

**21. What are the three criteria necessary for an effective and efficient network? (Remembering)**

The most important criteria are performance, reliability and security.

**Performance** of the network depends on number of users, type of transmission medium, the capabilities of the connected h/w and the efficiency of the s/w.

**Reliability** is measured by frequency of failure, the time it takes a link to recover from the failure and the network's robustness in a catastrophe.

**Security** issues include protecting data from unauthorized access and viruses.

**22. What are the three fundamental characteristics determine the effectiveness of the data communication system? (Remembering)**

The effectiveness of the data communication system depends on three fundamental characteristics:

Delivery: The system must deliver data to the correct destination.

Accuracy: The system must deliver data accurately.

Timeliness: The system must deliver data in a timely manner.

**23. Why are protocols needed? (Remembering)**

In networks, communication occurs between the entities in different systems. Two entities cannot just send bit streams to each other and expect to be understood. For communication, the entities must agree on a protocol. A protocol is a set of rules that govern data communication.

**24. For n devices in a network, what is the number of cable links required for a mesh and ring topology? (Evaluating)**

Mesh topology –  $n(n-1)/2$

Ring topology –  $n$

**25. What is the difference between a passive and an active hub? (Remembering)**

An active hub contains a repeater that regenerates the received bit patterns before sending them out. A passive hub provides a simple physical connection between the attached devices.

**26. What is refraction? (Remembering)**

The phenomenon related to the bending of light when it passes from one medium to another.

**27. What are the disadvantages of optical fiber as a transmission medium? (Remembering)**

The disadvantages of optical fiber are Very expensive, Installation and maintenance is difficult, Fragility.

**28. What are the criteria used to evaluate transmission medium? (Remembering)**

The criteria used to evaluate transmission medium are Throughput, Propagation speed, Propagation time, Wavelength

**29. Give the relationship between propagation speed and propagation time? (Remembering)**

Propagation time = distance / propagation speed

The time required for a signal or a bit to travel from one point to another is called **Propagation time**

**Propagation speed** is the distance, a signal or a bit travel through a medium in one second.

**30. Explain cross talk and what is needed to reduce it? (Remembering)**

Effect of one wire on another is called as cross talk. One wire will be the sending antenna and the other wire will be the receiving antenna. We can use the shielded twisted pair cable or coaxial cable for transmission, which contains metal foil to reduce cross talk.

**31. What is a virtual circuit? (Remembering)**

A logical circuit made between the sending and receiving computer s. The connection is made after both computers do handshaking. After the connection, all packets follow the same route and arrive in sequence.

32. **What are the two types of implementation formats in virtual circuits?** (Remembering)  
Virtual circuit transmission is implemented in 2 formats. • Switched virtual circuit • Permanent virtual circuit.
33. **What is meant by switched virtual circuit?** (Remembering)  
Switched virtual circuit format is comparable conceptually to dial-up line in circuit switching. In this method, a virtual circuit is created whenever it is needed and exists only for the duration of specific exchange.
34. **What is meant by Permanent virtual circuit?** (Remembering)  
Permanent virtual circuits are comparable to leased lines in circuit switching. In this method, the same virtual circuit is provided between two users on a continuous basis. The circuit is dedicated to the specific uses.
35. **List the layers in OSI model.**(May/June 2014)(Analyzing)  
Physical layer, Data link layer, Network layer, Session layer, Transport layer, Presentation layer, Application layer.
36. **Compare circuit switching and packet switching.**(May/June 2014)(Analyzing)  
Packet switching: variable and unpredictable delay not suitable for real time services. Better bandwidth sharing, simple, more efficient, and less costly than circuit switching. But there is no delay in circuit switching.

#### PART-B

37. Describe briefly the various layers and functions of OSI model and compare OSI Model with TCP/IP model. (Dec2016, June 2016, Dec 2015, May/June2013,Nov/Dec2013, Nov/Dec 2012, April/May 2011, May/June 2011,Nov/Dec 2011)Tx1 PP 27-42(Remembering)
38. Explain in details about network dependent and network independent layers of OSI reference model (May/June2013)Tx1 PP 27-42(Remembering)
39. In detail explain about layers of TCP/IP model. (May/June2013)Tx1 PP 42-45(Remembering)
40. Explain the layered architecture of a network and explain the roles (May/June 2012)Tx1 PP 27-42(Remembering)
41. Explain the various classes of addressing & state the need of IP address (May/June 2012)TX1 PP 549-563(Remembering)
42. Explain in detail about circuit switching and datagram switching with diagram(or) Explain in detail about switching networks with its advantages and disadvantages with diagram (Dec2016, Nov/Dec2013 , Nov/Dec 2012, April/May 2011,May/June 2011, Nov/Dec 2011)TX1 PP 213-221(Remembering)
43. Discuss about different categories of network? TX1 PP 213-221(Creating)
44. Describe the Guided media and unguided media in detail?(June 2016, Dec 2015, May/June 2014)TX1 PP 191-208(Remembering)
45. Briefly explain about virtual circuit networks?TX1 PP 221-227(Remembering)
46. Explain about the Dialup modems and DSL technology?TX1 PP 248-255(Remembering)
47. Briefly explain cable TV networks and cable TV for data transfer?(May/June 2014, Nov/Dec2011)TX1 PP 256-261(Remembering)

#### UNIT-II

(CO2)

#### PART-A

48. **What are Virtual LANs** (May/June2013)(Remembering)  
In computer networking, a single layer-2 network may be partitioned to create multiple distinct broadcast domains, which are mutually isolated so that packets can only pass between them via one or more routers; such a domain is referred to as a Virtual Local Area Network, Virtual LAN or VLAN.
49. **State the difference between fast and gigabit Ethernet** (May/June 2012)(Remembering)
  - Speed of the Fast Ethernet is 100Mbps, whereas it is 1000Mbps in Gigabit Ethernet.
  - Better performance and reduced bottlenecks are expected due to higher bandwidth in Gigabit Ethernet than Fast Ethernet.
  - Upgrade from Ethernet to Fast Ethernet is easy and cheaper than upgrading Fast Ethernet to Gigabit Ethernet.
  - Needs specific network devices, which can support 1000Mbps data rate, in Gigabit Ethernet.
  - Devices connected to Gigabit Ethernet needs manual configuration up to some extent, whereas most of the devices connected to Fast Ethernet configure automatically themselves – negotiate the optimum speed and duplexity.
50. **What is HDLC** (May/June 2012)(Remembering)  
It is a bit-oriented data link protocol designed to support both half-duplex and full duplex communication over point to point and midpoint links.
51. **Define flow and Error Control** (June 2016, April/May 2011)(Remembering)  
Flow control is about data buffering, packet formation, data traffic control, stuff that involves getting Data to and from where it needs to go. The error control lies below those functions to detect and Correct stuff like packet malformation, hardware handshaking errors, signal fluctuations, etc.
52. **How Repeater is different from Amplifier** (April/May 2011)(Remembering)
  - Amplifier is used to magnify a signal, whereas repeater is used to receive and retransmit a signal with a power gain.

- Repeater has an amplifier as a part of it.
  - Sometimes, amplifiers introduce some noise to the signal, whereas repeaters contain noise eliminating parts.
- 53. What is the data rate of fast Ethernet (May/June 2011)?**(Remembering)100Mbps
- 54. Define flow control (Nov/Dec 2011)**(Remembering)  
Flow control refers to a set of procedures used to restrict the amount of data. The sender can send before waiting for acknowledgment.
- 55. Compare Switch and Hub (Nov/Dec 2011)**(Analyzing)  
Hub: common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets.  
Switch: In networks, a device that filters and forwards packets between LAN segments. Switches operate at the data link layer (layer 2) and sometimes the network layer (layer 3) of the OSI Reference Model and therefore support any packet protocol. LANs that use switches to join segments are called switched LANs or, in the case of Ethernet networks, switched Ethernet LANs.
- 56. What is the purpose of NIC(May/June2013)**(Remembering)  
Network Interface Cards (NICs) are used by computers to communicate over a network. There are different types of NICs that use different technologies to connect to networks, such as Ethernet and WiFi.
- 57. What are the responsibilities of data link layer? (May/June 2014)**(Remembering)  
Specific responsibilities of data link layer include the following. a) Framing b) Physical addressing c) Flow control d) Error control e) Access control
- 58. Write short notes on CRC checker. (Remembering)**  
A CRC checker functions exactly like a generator. After receiving the data appended with the CRC it does the same modulo-2 division. If the remainder is all 0's the CRC is dropped and the data accepted. Otherwise, the received stream of bits are discarded and the data is resent.
- 59. Define checksum. (Remembering)**  
The error detection method used by the higher layer protocol is called checksum. Checksum is based on the concept of redundancy
- 60. Write short notes on error correction. (Remembering)**  
It is the mechanism to correct the errors and it can be handled in 2 ways. a) When an error is discovered, the receiver can have the sender retransmit the entire data unit. b) A receiver can use an error correcting coder, which automatically corrects certain errors.
- 61. Mention the types of error correcting methods. (Remembering)**  
There are 2 error-correcting methods. a) Single bit error correction b) Burst error correction
- 62. Mention the categories of flow control. (Remembering)**  
There are 2 methods have been developed to control flow of data across communication links. a) Stop and wait- send one frame at a time. b) Sliding window- send several frames at a time.
- 63. What is the function of stop and wait flow control? (Remembering)**  
In this method, the sender sends one frame and waits for an acknowledgement before sending.
- 64. Mention the advantage and disadvantage of stop and wait flow control. (Remembering)**  
Advantage: simplicity, Disadvantage: inefficiency.
- 65. Define ARQ. (Remembering)**  
Error control in the data link layer is based on Automatic repeat request (ARQ), which means retransmission of data in 3 cases. a) Damaged frame b) Lost frame c) Lost acknowledgment.
- 66. Mention the function of go-back N-ARQ. (Remembering)**  
It is the popular mechanism for continuous transmission error control. In the method, if our frame is lost or damaged, all frames sent since the last frame acknowledged are retransmitted.
- 67. What is selective reject ARQ? (Remembering)**  
In selective reject ARQ only the specific damaged or lost frame is retransmitted. If a frame is corrupted in transit, a NAK is returned and the frame is resent out of sequence.
- 68. What are the different communication modes in HDLC? (Remembering)**  
HDLC supports 3 modes of communication between stations. a) Normal response mode (NRM), b) synchronous response mode (ARM), c) Asynchronous balanced mode (ABM)
- 69. Mention the types of frames in HDLC. (Remembering)**  
There are 3 types of HDLC frames. a) Information frames (I-frames) b) Supervisory frames (S-frames) c) Unnumbered frames (U-frames)
- 70. Give the usage of I, S, U frames. (Remembering)**  
I frames – used to transport user data and control information relating to user data. S frames – used only to transport control information, primarily data link layer and error controls. U frames – reserved for systems management.
- 71. Write the types of frame fields contained in HDLC. (Remembering)**

Each frame in HDLC may contain up to 6 fields. a) Beginning flag field b) An address field c) A control field d) An information field e) A frame check sequence (FCS) field f) An ending flag field.

**72. What is meant by bit stuffing?** (Remembering)

Bit stuffing is the process of adding one extra 0 whenever there are 5 consecutive 1s in the data so that the receiver doesn't mistake the data for a flag.

**73. Define LAN.** (Remembering)

A Local Area Network (LAN) is a data communication system that allows a number of independent devices to communicate directly with each other in a limited geographic area.

**74. Mention the various architectures in a LAN.** (Remembering)

LAN is dominated by 4 architectures. a) Ethernet b) Token bus c) Token ring d) Fiber distributed data interface (FDDI)

**75. Define a standard 802.3** (Remembering)

IEEE 802.3 supports a LAN standard originally developed by Xerox and later extended by a joint venture between digital equipment corporations. Intel Corporation and Xerox. This was called 'Ethernet'.

**76. List the most common kinds of Base band 802.3 LAN.** (Remembering)

a) 10 Base 5 b) 10 Base 2 c) 10 Base T d) 1 Base 5 e) 100 Base T

**77. Mention the different kinds of Ethernet networks.** (Remembering)

a) Switched Ethernet b) Fast Ethernet c) Gigabit Ethernet

**78. What is piggy backing?** (June 2016) (Remembering)

Piggy backing means combining data to sent and acknowledgement of the frame received in one single frame.

Piggy backing can save bandwidth because the overhead from a data frame and an ACK frame can be combined in to just one frame

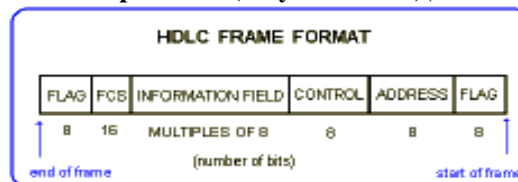
**79. What are the functions of LLC?** (Remembering)

The IEEE project 802 model takes the structure of an HDLC frame and divides it into 2 sets of functions. One set contains the end user portion of the HDLC frame - the logical address, control information, and data. These functions are handled by the IEEE 802.2 logical link control (LLC) protocol.

**80. What are the functions of MAC?** (Remembering)

MAC sub layer resolves the contention for the shared media. It contains synchronization, flag, flow and error control specifications necessary to move information from one place to another, as well as the physical address of the next station to receive and route a packet.

**81. Draw the frame format for bit oriented protocols.** (May/June 2014) (Remembering)



**PART B**

**82. Describe about framing, flow control and error control protocols?** (Dec 2015, May/June 2012, Nov/Dec 2011)

**TX1 PP 307-311** (Remembering)

**83. Explain in detail about these protocols** (Dec 2016) **TX1 PP 311-340** (Remembering)

Simple,

Sliding window, (May/June 2013, May/June 2014)

Stop and wait, (June 2016, May/June 2013)

Go-back-N ARQ, (May/June 2014)

Selective repeat ARQ (May/June 2014)

**84. Explain the HDLC Protocol?** (Nov/Dec 2013, April/May 2011) **TX1 PP 340-346** (Remembering)

**85. Illustrate the ALOHA, CSMA/CD and CSMA/CA access.** (June 2016, April/May 2011) **TX1 PP 363-379** (Understanding)

**86. Describe the Controlled access protocols.** **TX1 PP 379-383** (Remembering)

**87. Discuss about Standard Ethernet in detail (or) types of Ethernet (or) Frame format of Ethernet** (Dec 2015, Nov/Dec 2012, April/May 2011, Nov/Dec 2011) **TX1 PP 395-405** (Creating)

**88. Explain about Fast Ethernet, gigabit Ethernet & 10 gigabit Ethernet.** (May/June 2013, Nov/Dec 2012) **TX1 PP 409-416** (Remembering)

**89. Describe about connecting devices.** (Dec 2016) **TX1 PP 445-456** (Remembering)

**90. Explain about bridge and its features in detail** (Nov/Dec 2011) **TX1 PP 447-454** (Remembering)

**UNIT III**

(CO3)

**PART A**

**91. Why IPV6 preferred than IPV4?** (May/June 2013) (Remembering)

1. Large address space, 2. Better header format, 3. Allowance for extension, 4. Support resource allocation, 5. More security.

**92. What is the use of NAT (May/June2013)(Remembering)**

The technology that allows a private network to use a set of private addresses for internal communication and a set of global Internet addresses for external communication

**93. Compare IPv4 and IPV6 (Nov/Dec2013)(Analyzing)**

	IPv4	IPv6
Address	32 bits (4 bytes), 12:34:56:78	128 bits (16 bytes), 1234:5678:9abc:def0:1234:5678:9abc:def0
Packet size	576 bytes required, fragmentation optional	1280 bytes required without fragmentation
Packet fragmentation	Routers and sending hosts	Sending hosts only
Packet header	Does not identify packet flow for QoS handling	Contains Flow Label field that specifies packet flow for QoS handling
	Includes a checksum	Does not include a checksum
	Includes options up to 40 bytes	Extension headers used for optional data
DNS records	Address (A) records, maps host names	Address (AAAA) records, maps host names
	Pointer (PTR) records, IN-ADDR.ARPA DNS domain	Pointer (PTR) records, IP6.ARPA DNS domain
Address configuration	Manual or via DHCP	Stateless address autoconfiguration (SLAAC) using Internet Control Message Protocol version 6 (ICMPv6) or DHCPv6
IP to MAC resolution	broadcast ARP	Multicast Neighbor Solicitation
Local subnet group management	Internet Group Management Protocol (IGMP)	Multicast Listener Discovery (MLD)
Broadcast	Yes	No
Multicast	Yes	Yes
IPSec	optional, external	required

**94. What is the use of Multicast Routing (Dec2016, Nov/Dec2013) (Remembering)**

In Multicasting, the router may forward the received packets through several of its interfaces.

**95. What is the role of router (May/June 2012, Nov/Dec 2012)(Remembering)**

The router is a special-purpose computer that plays a key role in the operation of any data network. Routers are primarily responsible for interconnecting networks by: Determining the best path to send packets and Forwarding packets towards their destination. Routers perform packet forwarding by learning about remote networks and maintaining routing information. The router is the junction or intersection that connects multiple IP networks. The routers primary forwarding decision is based on Layer 3 information, the destination IP address.

**96. Why we migrate from IPV4 to IPV6 (May/June 2012)(Remembering)**

1.Large address space, 2. Better header format, 3. Allowance for extension, 4.Supports resource allocation, 5.Supports more security.

**97. Define ICMP (Nov/Dec 2012, Dec2016)(Remembering)**

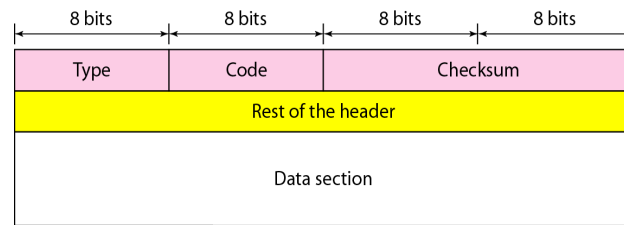
The Internet Control Message Protocol (ICMP) is one of the core protocols of the Internet Protocol Suite. It is used by network devices, like routers, to send error messages indicating, for example, that a requested service is not available or that a host or router could not be reached. ICMP can also be used to relay query messages. It is assigned protocol number 1.ICMP differs from transport protocols such as TCP and UDP in that it is not typically used to exchange data between systems, nor is it regularly employed by end-user network applications (with the exception of some diagnostic tools like ping and trace route)

**98. Write the keys for understanding of distance vector routing (Nov/Dec 2012)(Remembering)**

The three keys for understanding the algorithm are • Knowledge about the whole networks, • Routing only to neighbors, • Information sharing at regular intervals

**99. Draw the general format of ICMP (April/May 2011)(Remembering)**





**100. Find the class of each addresses (April/May 2011)(Evaluating)**

(a) 00000001 00001011 00001011 11101111 – **Class A**

(b) 14.23.120.8 - **Class A**

**101. Define Internetworking (May/June 2011)(Remembering)**

Connecting several networks together using internetworking devices such as routers and gateways.

**102. What do you mean by Unicasting (May/June 2011)(Remembering)**

The sending of packets to just one destination

**103. Write the keys for understanding of Link state routing (Nov/Dec 2011)(Remembering)**

The three keys for understanding the algorithm are • Knowledge about the neighborhood. • Routing to all neighbors. • Information sharing when there is a range.

**104. What are the responsibilities of network layer? (Remembering)**

The network layer is responsible for the source-to-destination delivery of packet across multiple network links.

The specific responsibilities of network layer include the following: • Logical addressing. • Routing.

**105. Define Routers. (Remembering)**

Routers relay packets among multiple interconnected networks. They Route packets from one network to any of a number of potential destination networks on internet routers operate in the physical, data link and network layer of OSI model.

**106. What is time-to-live or packet lifetime? (Remembering)**

As the time-to-live field is generated, each packet is marked with a lifetime, usually the number of hops that are allowed before a packet is considered lost and accordingly, destroyed. The time-to-live determines the lifetime of a packet.

**107. How the packet cost referred in distance vector and link state routing? (Evaluating)**

In distance vector routing, cost refer to hop count while in case of link state routing, cost is a weighted value based on a variety of factors such as security levels, traffic or the state of the link.

**108. How the routers get the information about neighbor? (Analyzing)**

A router gets its information about its neighbors by periodically sending them a short greeting packet. If the neighborhood responds to the greeting as expected, it is assumed to be alive and functioning. If it does not, a change is assumed to have occurred and the sending router then alerts the rest of the network in its next LSP.

**109. Define IP address. (Remembering)**

IP address is the 32-bit number for representing a host or system in the network. One portion of the IP address indicates a networking and the other represents the host in a network.

**110. What is token passing? (Remembering)**

Stations may attempt to send data multiple times before a transmission makes it onto a link. This redundancy may create delays of indeterminable length if the traffic is heavy. Token ring resolves this uncertainty by requiring that stations take turns sending data. Each station may transmit only during its turn and may send only one frame during each turn. The mechanism that coordinates this rotation is called token passing.

**111. Define Masking? (Remembering)**

Masking is the process that extracts the address of the physical network from an IP address.

**112. What is LSP? (Remembering)**

In link state routing, a small packet containing routing information sent by a router to all other router by a packet called link state packet.

**113. What is the need for adaptive routing algorithms?(May/June 2014)(Remembering)**

Router may select a new route for each packet in response to the changes in condition and topology of the networks.

**114. What is the specialty of DHCP?(May/June 2014)(Remembering)**

Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an IP address to a computer from a defined range of numbers (i.e., a scope) configured for a given network.

#### **PART-B**

**115. Draw IPV4 datagram format & explain each term in detail. (Dec 2015, Dec2016, Nov/Dec 2011, May/June 2012) TX1 PP549-566(Remembering)**

**116. Draw IPV6 datagram format & explain each term in detail. (Dec2016, Nov/Dec 2011, May/June2013) TX1 PP566-572(Remembering)**

**117. Explain in detail about internetworking protocol version 4 (IPv4) Addresses. (June 2016, May/June 2014, Apr/May 2011) TX1 PP582-596(Remembering)**

**118. Describe about internetworking protocol version 6 (IPv6) Addresses. (June 2016, Apr/May 2011, May/June 2012) TX1 PP596-605(Remembering)**

**119. Describe about ARP, RARP (May/June 2012, Nov/Dec2013) TX1 PP612-618(Remembering)**

- 120.** Describe about BOOTP, DHCP (Nov/Dec2012) TX1 PP 618-620(Remembering)
- 121.** Explain Internet Group Management Protocol (IGMP). (April/May 2011) TX1 PP 630-638(Remembering)
- 122.** Explain Internet Control Message Protocol (ICMP). (May/June2013,Nov/Dec2013) TX1 PP 621-630(Remembering)
- 123.** Explain in detail about the concept of Forwarding and DeliveryTX1 PP 647-658(Remembering)
- 124.** Give details of Distance vector routing (Dec 2015, June 2016, May/June 2012, April/May 2011) TX1 PP 660-666(Remembering)
- 125.** In detail explain about Link state routing. (June 2016, May/June 2014)TX1 PP 666-674(Remembering)
- 126.** Explain in detail about path vector routing. TX1 PP 674-678(Remembering)
- 127.** Discuss in detail about Multicast Routing. (Dec2016, Nov/Dec2013, Nov/Dec 2011, Nov/Dec 2012) TX1 PP 678-693(Creating)
- 128.** Discuss Salient features of IPV6 (May/June 2011) TX1 PP 566-572(Creating)
- 129.** Explain any one routing method (May/June 2012) TX1 PP 658-693(Remembering)
- 130.** Explain Unicast Routing (Nov/Dec 2011) TX1 PP658-678(Remembering)

#### UNIT IV

(CO4)

#### PART A

- 131. What is Three-Way hand shaking (Dec2016, May/June2013)(Remembering)**

The TCP three-way handshake in Transmission Control Protocol (also called the TCP-handshake; three message handshake and/or SYN-SYN-ACK) is the method used by TCP set up a TCP/IP connection over an Internet Protocol based network. TCP's three way handshaking technique is often referred to as "SYN-SYN-ACK" (or more accurately SYN, SYN-ACK, ACK) because there are three messages transmitted by TCP to negotiate and start a TCP session between two computers. The TCP handshaking mechanism is designed so that two computers attempting to communicate can negotiate the parameters of the network TCP socket connection before transmitting data such as SSH and HTTP web browser requests.

This 3-way handshake process is also designed so that both ends can initiate and negotiate separate TCP socket connections at the same time. Being able to negotiate multiple TCP socket connections in both directions at the same time allows a single physical network interface, such as ethernet, to be multiplexed to transfer multiple streams of TCP data simultaneously.

- 132. Differentiate the CBR and VBR (May/June2013) (Analyzing)**

CBR is Constant Bit Rate, VBR is Variable Bit Rate. In a CBR MPEG stream the encoder uses the same amount of bits for every second of video. The advantage of VBR is that it uses the available space more efficiently. MP3, Opus, WMA, Vorbis, and AAC audio files can optionally be encoded in VBR

- 133. What is meant by choke packet? how it is used for congestion control (Nov/Dec2013)(Remembering)**

A choke packet is used in network maintenance and quality management to inform a specific node or transmitter that its transmitted traffic is creating congestion over the network. This forces the node or transmitter to reduce its output rate.

- 134. Define Deadlock Situation in Congestion (Nov/Dec2013)(Remembering)**

The two adjacent routers A and B are sending packets to each other. Since both are waiting for the other to accept a packet, neither can proceed. This condition is known as a deadlock.

- 135. Differentiate Connection Oriented and Connection Less Protocols (or) differentiate the TCP and UDP (Dec 2015, May/June 2012)(Analyzing)**

TCP	UDP
It is connection oriented protocol	It is connectionless protocol
It provides reliable delivery	It provides unreliable delivery
It has error control, flow control and congestion control mechanism	It has no error control, flow control and congestion control mechanism
More overhead	Minimum overhead

- 136. Name the Parameter of Quality of Service in a Network (May/June 2012)(Remembering)**

Reliability, Delay, Jitter and Bandwidth

- 137. Explain the main idea of UDP (Nov/Dec 2012) (Remembering)**

UDP uses a simple transmission model with a minimum of protocol mechanism. It has no handshaking dialogues, and thus exposes any unreliability of the underlying network protocol to the user's program. As this is normally IP over unreliable media, there is no guarantee of delivery, ordering or duplicate protection. UDP provides checksums for data integrity, and port numbers for addressing different functions at the source and destination of the datagram.

- 138. Mention the techniques used to improve QOS in process to process delivery (April/May 2011)(Remembering)**

Scheduling, Traffic shaping, Resource reservation and admission control

- 139. Define Congestion (May/June 2011)(Remembering)**

Congestion in a network occurs if user sends data into the network at a rate greater than that allowed by network resources.

- 140. Define QOS (Dec2016, May/June 2011, Nov/Dec 2012) (Remembering)**

The quality of service defines a set of attributes related to the performance of the connection. For each connection, the user can request a particular attribute each service class is associated with a set of attributes.

**141. What are the duties of Transport layer? (Dec 2015, Nov/Dec 2011)(Remembering)**

The Transport Layer is responsible for source-to-destination delivery of the entire message.

The services provided by the transport layer End-to-End delivery, Addressing, Reliable delivery, Flow control, Multiplexing, Error control, Connection Control,

**142. What is meant by segment (Nov/Dec 2011)(Remembering)**

When the size of the data unit received from the upper layer is too long for the network layer datagram or data link layer frame to handle, the transport protocol divides it into smaller usable blocks. The dividing process is called segmentation.

**143. What is function of transport layer? (Remembering)**

The protocol in the transport layer takes care in the delivery of data from one application program on one device to an application program on another device. They act as a link between the upper layer protocols and the services provided by the lower layer.

**144. What is the difference between network layer delivery and the transport layer delivery? (Remembering)**

**Network layer delivery**

The network layer is responsible for the source-to-destination delivery of packet across multiple network links.

**Transport layer delivery**

The transport layer is responsible for source-to-destination delivery of the entire message.

**145. What is meant by segment? (Remembering)**

At the sending and receiving end of the transmission, TCP divides long transmissions into smaller data units and packages each into a frame called a segment.

**146. What are the four aspects related to the reliable delivery of data? (Remembering)**

The four aspects are,

Error control, Sequence control, Loss control, Duplication control

**147. What is meant by segmentation? (Remembering)**

When the size of the data unit received from the upper layer is too long for the network layer datagram or data link layer frame to handle, the transport protocol divides it into smaller usable blocks. The dividing process is called segmentation.

**148. What are the techniques used in multiplexing? (Remembering)**

The three basic techniques of multiplexing are,

Frequency-division multiplexing, Time-division multiplexing, Wave-division multiplexing

**149. What is meant by congestion? (Remembering)**

Congestion in a network occur if user send data into the network at a rate greater than that allowed by network resources.

**150. Why the congestion occur in network? (Remembering)**

Congestion occurs because the switches in a network have a limited buffer size to store arrived packets.

**151. How will the congestion be avoided? (Analyzing)**

The congestion may be avoided by two bits BECN - Backward Explicit Congestion Notification

FECN - Forward Explicit Congestion Notification

**152. What is meant by quality of service? (Remembering)**

The quality of service defines a set of attributes related to the performance of the connection. For each connection, the user can request a particular attribute each service class is associated with a set of attributes.

**153. What are the two categories of QoS attributes? (Remembering)**

The two main categories are User Oriented, Network Oriented

**154. What is the difference between service point address, logical address and physical address?**

**Service point addressing (Remembering)**

The transport layer header includes a type of address called a service point address or port address, which a data delivery from a specific process on one computer to a specific process on another computer.

**Logical addressing**

If a packet passes the network boundary we need another addressing to differentiate the source and destination systems. The network layer adds a header, which indicate the logical address of the sender and receiver

**Physical addressing**

If the frames are to be distributed to different systems on the network, the data link layer adds the header, which defines the source machine's address and the destination machine's address.

**155. What is a retransmission timer?(May/June 2014)(Remembering)**

The timer is started during a transmission. A timeout causes a retransmission.

**156. Draw the UDP header.(May/June 2014)(Remembering)**

SOURCE PORT #	DESTINATION PORT #
LENGTH	CHECKSUM
APPLICATION DATAS (MESSAGE)	

**PART-B**

157. Explain about process to process delivery(or) Explain about the transport layer protocol with neat diagrams (Nov/Dec2013) TX1 PP 701-709(Remembering)
158. Discuss in detail about UDP? (June 2016, May/June 2011, Nov/Dec2013) TX1 PP 709-715(Creating)
159. Describe about TCP in detail (or) structure of TCP segment (June 2016, May/June 2012, May/June2013, April/May 2011, May/June 2014) TX1 PP 715-735
160. Explain the congestion control technique. (Dec2016, Nov/Dec2013, May/June 2012, Nov/Dec2012, April/May 2011, May/June 2011, Nov/Dec 2011) TX1 PP 765-774(Remembering)
161. Explain the segment format of TCP & UDP (Dec2016, Nov/Dec2012) TX1 PP 709-712, 721-723(Remembering)
162. Explain about QoS and techniques to improve QoS (June 2016, April/May 2011, Nov/Dec 2011) TX1 PP 775-780(Remembering)
163. Explain the following characteristics(Remembering)  
Reliability, Delay, Jitter, Bandwidth (April/May 2011, May/June2013) TX1 PP 775-776
164. Why UDP said as unreliable discuss (May/June 2012) TX1 PP 709-715(Remembering)
165. Explain about three way hand shake (April/May 2011) TX1 PP 723-728(Remembering)
166. Explain how multiplexing and demultiplexing are carried out at transport layer (Dec 2015) Tx1/pp707-709 (Remembering)
167. Explain the leaky bucket and token bucket algorithm with flow chart (Dec 2015, Nov/Dec 2011) TX1 PP 777-780(Applying)

### UNIT – V

(CO5)

#### PART-A

168. What is Digital Signature (May/June2013, May/June 2011, Nov/Dec 2011)(Remembering)  
A digital signature is a mathematical scheme for demonstrating the authenticity of a digital message or document. A valid digital signature gives a recipient reason to believe that the message was created by a known sender, such that the sender cannot deny having sent the message (authentication and non-repudiation) and that the message was not altered in transit (integrity). Digital signatures are commonly used for software distribution, financial transactions, and in other cases where it is important to detect forgery or tampering.
169. What is meant by DNS (Dec 2015, Nov/Dec2013)(Remembering)  
Domain Name System can map a name to an address and conversely an address to name.
170. Define Kerberos (Dec2016, Nov/Dec2013)(Remembering)  
It is an authentication service developed at the Massachusetts Institute of Technology. Kerberos uses encryption to prevent intruders from discovering passwords and gaining unauthorized access to files.
171. State the role of DNS (May/June 2012)(Remembering)  
Domain Name System can map a name to an address and conversely an address to name.
172. What is Crypt analysis? (May/June 2012)(Remembering)  
The art of breaking ciphers is called crypt analysis
173. How the symmetric key different from public key (Nov/Dec 2012)(Remembering)  
Public-key cryptology, which utilizes two keys - a public key to encrypt messages and a private key to decrypt them. **Public-key encryption** avoids this problem because the public key can be distributed in a non-secure way, and the private key is never transmitted. **Symmetric-key systems** are simpler and faster, but their main drawback is that the two parties must somehow exchange the key in a secure way. Symmetric-key cryptography is sometimes called *secret-key cryptography*. The most popular symmetric-key system is the *Data Encryption Standard (DES)*.
174. Discuss the main divisions of DNS (Nov/Dec 2012)(Creating)  
DNA name Spaces, DNS Messages, DNS Registrar Domain name space is divided into three different: Generic domains, country domains & inverse domain.  
**Generic domain:** Define registered hosts according to their generic behavior, uses generic suffixes.  
**Country domain:** Uses two characters to identify a country as the last suffix.  
**Inverse domain:** Finds the domain name given the IP address.
175. Differentiate the Cipher Text and Plain Text (April/May 2011)(Analyzing)  
Plaintext is the original message and Cipher text is the encrypted message.
176. Why do we need POP3 and IMAP4 for Email? (Dec2016, April/May 2011)(Remembering)  
POP3 is a standard protocol for receiving email and IMAP4 is a standard protocol for checking email.
177. Differentiate Public Key and Private Key (May/June 2011, Nov/Dec 2012)(Analyzing)  
**Public or Asymmetric key cryptography** is a method based on a non-reversible encryption algorithm. It uses two types of keys the **Public key** is known to the public and is used for encryption and **Private Key** is kept by the receiver that is used for decryption.  
**Private or Symmetric key** uses the same key for encryption (sender) and decryption (Receiver).
178. Define the substitutional and transpositional encryption (Nov/Dec 2011)(Remembering)  
Substitution: A character level encryption in which each character is replaced by another character in the set.  
Transposition: A Character level encryption in which the characters retain their plaintext but the position of the character changes.
179. What is the purpose of Domain Name System? (Remembering)

Domain Name System can map a name to an address and conversely an address to name.

**180. Discuss the TCP connections needed in FTP. (Creating)**

FTP establishes two connections between the hosts. One connection is used for data transfer, the other for control information. The control connection uses very simple rules of communication. The data connection needs more complex rules due to the variety of data types transferred.

**181. What is the function of SMTP? (Remembering)**

The TCP/IP protocol supports electronic mail on the Internet is called Simple Mail Transfer (SMTP). It is a system for sending messages to other computer users based on e-mail addresses. SMTP provides mail exchange between users on the same or different computers.

**182. Why is an application such as POP needed for electronic messaging? (Remembering)**

Workstations interact with the SMTP host which receives the mail on behalf of every host in the organization, to retrieve messages by using a client-server protocol such as Post Office Protocol, version 3 (POP3). Although POP3 is used to download messages from the server, the SMTP client still needed on the desktop to forward messages from the workstation user to its SMTP mail server.

**183. Write down the three types of WWW documents. (Remembering)**

The documents in the WWW can be grouped into three broad categories: static, dynamic and active.

**Static:** Fixed-content documents that are created and stored in a server.

**Dynamic:** Created by web server whenever a browser requests the document.

**Active:** A program to be run at the client side.

**184. What is the purpose of HTML? (Remembering)**

HTML is a computer language for specifying the contents and format of a web document. It allows additional text to include codes that define fonts, layouts, embedded graphics and hypertext links.

**185. Define CGI (Remembering)**

CGI is a standard for communication between HTTP servers and executable programs. It is used in creating dynamic documents.

**186. Name four factors needed for a secure network. (Remembering)**

**Privacy:** The sender and the receiver expect confidentiality.

**Authentication:** The receiver is sure of the sender's identity and that an imposter has not sent the message.

**Integrity:** The data must arrive at the receiver exactly as it was sent.

**Non-Repudiation:** The receiver must be able to prove that a received message came from a specific sender.

**187. How is a secret key different from public key? (Remembering)**

In secret key, the same key is used by both parties. The sender uses this key and an encryption algorithm to encrypt data; the receiver uses the same key and the corresponding decryption algorithm to decrypt the data.

In public key, there are two keys: a private key and a public key. The private key is kept by the receiver. The public key is announced to the public.

**188. What is a digital signature? (Remembering)**

Digital signature is a method to authenticate the sender of a message. It is similar to that of signing transactions documents when you do business with a bank. In network transactions, you can create an equivalent of an electronic or digital signature by the way you send data.

**189. What are the advantages & disadvantages of public key encryption? (Remembering)**

**Advantages:**

a) Remove the restriction of a shared secret key between two entities. Here each entity can create a pair of keys, keep the private one, and publicly distribute the other one.

b) The no. of keys needed is reduced tremendously. For one million users to communicate, only two million keys are needed.

**Disadvantage:**

If you use large numbers the method to be effective. Calculating the cipher text using the long keys takes a lot of time. So it is not recommended for large amounts of text.

**190. What are the advantages & disadvantages of secret key encryption? (Remembering)**

**Advantage:**

Secret Key algorithms are efficient: it takes less time to encrypt a message. The reason is that the key is usually smaller. So it is used to encrypt or decrypt long messages.

**Disadvantages:**

a) Each pair of users must have a secret key. If N people in world want to use this method, there needs to be  $N(N-1)/2$  secret keys. For one million people to communicate, a half-billion secret keys are needed.

b) The distribution of the keys between two parties can be difficult.

**191. Define substitutional & transpositional encryption (May/June 2014, Nov/Dec 2011) (Remembering)**

**Substitutional:** A character level encryption in which each character is replaced by another character in the set.

**Transpositional:** A Character level encryption in which the characters retain their plaintext but the position of the character changes.

**192. List the three parts of URL? (May/June 2014) (Understanding)**

1. Method 2. Host 3. Port (optional) 4. Path.

**193.** Define encryption and decryption. (**Dec 2015**) (Remembering)

**Encryption** – Converting plain text to cipher text, **Decryption** – Converting cipher text to plain text.

**PART B**

**194.** Explain in detail about DNS (**Dec2016, June 2016, May/June 2012, Nov/Dec2012**) **TX1 PP 797-812**(Remembering)

**195.** Explain in detail about FTP (**Dec 2015, Nov/Dec2012, April/May 2011, May/June 2011, Nov/Dec 2011**) **TX1 PP 840-844**(Remembering)

**196.** Describe about E-mail. (**May/June 2012, April/May 2011**) **TX1 PP 824-840**(Remembering)

**197.** Explain in detail about WWW (**May/June2013**)**TX1 PP 845-861**(Remembering)

**198.** Explain in detail about HTTP (**Dec2016, Nov/Dec2012, Nov/Dec 2011, May/June 2014**) **TX1 PP 861-868**(Remembering)

**199.** Explain in detail about SMTP (**April/May 2011**) **TX1 PP 834-837**(Remembering)

**200.** Define cryptography? Discuss in detail about symmetric key algorithms. (**June 2016, May/June 2013, Nov/Dec2013, Nov/Dec2012, Nov/Dec 2011**) **TX1 PP 931-934**(Remembering)

**201.** Describe about public key algorithms (**June 2016, May/June 2012, Nov/Dec2012, Nov/Dec 2011**) **TX1 PP 935-956**(Remembering)

**202.** Describe about digital signature (**Dec 2015, May/June 2012, April/May 2011**) **TX1 PP 971-976**(Remembering)

**203.** Describe about management of public keys. **TX1 PP 981-990**(Remembering)

**204.** Explain about communication security. (**Nov/Dec2013**) **TX2 PP 785-799** (Remembering)

**205.** In detail explain about authentication protocols (**Dec2016, May/June 2011, Nov/Dec2013, May/June 2014**) **TX2 PP 785-799**(Remembering)

**206.** Explain the RSA Algorithm with an example (**May/June2013**) **TX1 PP 949-952**(Remembering)

**207.** Explain digitizing audio/video and audio/video compression techniques. **TX1 PP 902-908**(Remembering)

**208.** Write a brief note on streaming stored audio/video. **TX1 PP 908-912**(Remembering)

**209.** write a short note on streaming live audio/video and real-time interactive audio/video **TX1 PP 912-920**

**210.** write short notes on voice over IP **TX1 PP 920-925**(Remembering)

**211.** Explain in detail about RTP and RTCP **TX1 PP 916-920**(Understansing)



Reg. No. :

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**K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215**  
(AUTONOMOUS)

**Question Paper Code : 161109**

**B.E. / B.Tech. DEGREE END SEMESTER EXAMINATION, DEC 2016 / JAN 2017**

**Fifth Semester**

**B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING**

**12EC3505 – Computer Networks**

**(Regulations 2012)**

**Time: Three hours**

**Answer ALL Questions**

**Maximum Marks: 100**

**PART A — (10 x 2 = 20 Marks)**

1. Differentiate guided and unguided transmission medium.
2. List out four basic network topologies.
3. Why Ethernet is said to be I - persistent protocol?
4. What are the advantages of Bluetooth?
5. Define ICMP.
6. What is the use of multicast routing?
7. What is three way handshaking?
8. What is meant by quality of service?
9. Why do we need POP3 or IMAP4 for E - Mail?
10. Define Kerberos.

**PART B — (5 x 16 = 80 Marks)**

11. (a) Discuss about OSI Model with neat sketch. (16)

**(Or)**

(b) Explain the different types of switching networks and mention its advantages and disadvantages. (16)

12. (a) Explain in detail about data link protocol with neat diagram. (16)

**(Or)**

(b) With neat diagram explain Bluetooth protocol stack. (16)

13. (a) Explain the following

(i) Internet protocol (8)

(ii) Routers (8)

**(Or)**

(b) Explain in detail about different multicast forwarding algorithms for routing. (16)

14. (a) Explain about Congestion Control techniques in transport layer. (16)

**(Or)**

(b) Explain the Segment formats for TCP and UDP. (16)

15. (a) Explain in detail about the following

(i) DNS (8)

(ii) HTTP (8)

**(Or)**

(b) With an example explain the authentication using Kerberos and public key cryptography. (16)

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27/5/16

Reg. No. : 

1	3	1	5	5	0	6
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**K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215**  
(AUTONOMOUS)

**Question Paper Code : 152113**

**B. E. / B.Tech. DEGREE END SEMESTER EXAMINATION, JUNE 2016**

**Fifth Semester**

**B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING**

**12EC3505 – Computer Networks**

**(Regulations 2012)**

**Time: Three hours**

**Maximum Marks: 100**

**Answer ALL Questions**

**PART A — (10 x 2 = 20 Marks)**

1. Define Protocol.
2. List out the three major classes of guided media.
3. Compare and contrast flow control and error control.
4. What is piggybacking?
5. What is the class of the following address?  
10011101 10001111 11111100 11001111
6. Where is a routing table maintained? Also state the purpose of maintaining a Routing table.
7. What are the duties provided by transport layer protocol?
8. Write the strategies TCP uses to avoid congestion.
9. What is the purpose of DNS server?
10. Differentiate active attack and passive attack in network.

**PART B — (5 x 16 = 80 Marks)**

11. (a) (i) Explain briefly about the layers present in the OSI reference model. (10)
- (ii) Write short notes on the topologies of network. (6)

(Or)



- (b) (i) With relevant examples differentiate between simplex, half duplex and full duplex communication. (6)
- (ii) Briefly explain three guided transmission media commonly used for data transmission. (10)
12. (a) (i) Explain Cyclic Redundancy Check (CRC) code used for error detection. Use a suitable example. (10)
- (ii) Explain briefly about stop and wait protocol. (6)
- (Or)
- (b) (i) Describe about the IEEE 802.11 LAN architecture. (10)
- (ii) Explain the working of CSMA. Discuss the difference between 1 – persistent and non – persistent CSMA. (6)
13. (a) (i) Explain the principle of Internetworking with a neat diagram. (10)
- (ii) Define Internet Protocol and distinguish IPv4 and IPv6. (6)
- (Or)
- (b) (i) Write short notes on Subnetting. (4)
- (ii) State the major difference between distance vector routing and link state routing. Discuss how these routing techniques works. (12)
14. (a) (i) Compare connection oriented protocol and connectionless protocol. (6)
- (ii) Explain briefly about User datagram protocol. (10)
- (Or)
- (b) (i) Explain briefly about how connection has been established and terminated in TCP? (10)
- (ii) What is QoS in internet working? State the techniques to improve QoS. (6)
15. (a) (i) With relevant example discuss how the domain space is divided? (8)
- (ii) What is HTTP? Discuss the working principle of HTTP and list the features of HTTP. (8)
- (Or)
- (b) (i) Explain briefly about DES algorithm. (8)
- (ii) Explain briefly about Substitution ciphers. (8)

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Reg. No. :

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**K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215**  
(AUTONOMOUS)

<b>Question Paper Code : 151091</b>
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B.E. / B.Tech. DEGREE END SEMESTER EXAMINATION, DEC 2015 / JAN 2016

Fifth Semester

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

12EC3505 – Computer Networks

(Regulations 2012)

Time: Three hours

Maximum Marks: 100

Answer ALL Questions

PART A — (10 x 2 = 20 Marks)

1. Compare and contrast coaxial cable and optical fiber cable. (U)
2. What is the need for layered architecture? (Analyze)
3. What is a datagram socket? What is its use? (U)
4. Mention the layers in which the following networking components operate. (R)  
Hub, Bridge, Router and Gateway.
5. List the design issues related to network layer. (R)
6. What is loop back address and what is its use? (U)
7. Compare UDP and TCP. (U)
8. List the services provided by transport layer. (R)
9. What is Domain Naming System? (R)
10. Define encryption and decryption. (R)



**PART B — (5 x 16 = 80 Marks)**

11. (a) Draw the structure of ISO / OSI reference model and explain the functions performed by each layer. (u) (16)

(Or)

- (b) Explain with neat diagrams the various physical media used in computer networks. Also mention the relative merits and demerits of each one of them. (R) (16)

12. (a) With neat diagram enumerate the Ethernet Frame Format and discuss. (u) (16)

(Or)

- (b) Discuss in detail the various flow control mechanisms used at data link layer. (Analyze) (16)

13. (a) Discuss in detail the IPv4 addressing scheme. (R) (16)

(Or)

- (b) Explain in detail the Distance Vector Routing algorithm. With an example. (Analyze) (16)

14. (a) Explain how multiplexing and demultiplexing are carried out at transport layer. (u) (16)

(Or)

- (b) Discuss in detail how the leaky bucket and token bucket algorithms help in controlling congestion in a network. (u) (16)

15. (a) Explain in detail the functioning of File Transfer Protocol. (u) (16)

(Or)

- (b) What is digital signature ? Explain how it can be generated ? (R) (16)

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Reg. No. :

1	2	1	5	1	2	6
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**K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215**  
(AUTONOMOUS)

**Question Paper Code : X5138**

**B.E. / B.Tech. DEGREE END SEMESTER EXAMINATION, DEC 2014 / JAN 2015**

**Fifth Semester**

**B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING**

**12EC3505 – Computer Networks**

**(Regulations 2012)**

**Time : Three hours**

**Maximum : 100 Marks**

**Answer ALL Questions**

**PART A — (10 x 2 = 20 Marks)**

1. Assume 6 devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?
2. How does guided media differ from unguided transmission media?
3. What is meant by bit stuffing?
4. Define flow control. Mention the categories of flow control.
5. How the packet cost is referred in distance vector and link state routing?
6. Mention the rules for boundary - level masking.
7. Write the difference between network layer delivery and the transport layer delivery.
8. How will the congestion be avoided?
9. State the format of HTTP request message.
10. List the advantages and disadvantages of public key encryption.

**PART B — (5 x 16 = 80 Marks)**

- C<sub>1</sub> 11. (a) Draw neat sketch of ISO's OSI reference model and list out their various functions. *T<sub>1</sub>/M* (16)

**(Or)**

- C<sub>1</sub> (b) (i) Explain any two guided transmission media. *T<sub>1</sub>/M* (8)  
 (ii) Compare Virtual Circuits and Data grams networks. *T<sub>1</sub>/M* (8)

- C 12. (a) Draw the sender and receiver window for a system using Go Back N ARQ and selective repeat ARQ, given the following  
 (i) Frame 0,1,2,3 is sent, Frame 0,1,2,3 is acknowledged. (4)  
 (ii) Error Occurs retransmit packet plus sub sequent packets. (4)  
 (iii) Packet 'n' must not be sent until packet n - WS has been acknowledged. (4)  
 (iv) Selective ARQ with Timer. (4)

**(Or)**

- C<sub>2</sub> (b) (i) What is IEEE 802.3? What are the types of Ethernet? Discuss. *T<sub>2</sub>/M* (10)  
 (ii) Differentiate bridges and routers. *T<sub>2</sub>/M* (6)

- C<sub>3</sub> 13. (a) (i) Explain the IPv4 datagram format and addressing structure in detail. *T<sub>2</sub>/M* (12)  
 (ii) List down the fields present in IPv4 header but not in IPv6 header. *T<sub>2</sub>* (4)

**(Or)**

- (b) Define routing and explain distance vector routing and link state routing. *T<sub>2</sub>/M* (16)

14. (a) (i) Explain in detail the general principles of congestion control. *M* (4)  
 (ii) Explain leaky bucket and token bucket algorithm. *M* (12)

**(Or)**

- C<sub>4</sub> (b) Explain various fields in TCP header and UDP header with neat diagram. *M* (16)

15. (a) What is public key cryptography? Explain RSA in detail with one example. *M* (16)

**(Or)**

- (b) (i) Define DNS and explain the major sections of DNS in detail. *M* (8)  
 (ii) Write short notes on SMTP and WWW. *M* (8)

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28/5/14

Reg. No. : 7 3 1 5 1 1 1 0 6 0 0 1

## Question Paper Code : 51412

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Sixth Semester

Electronics and Communication Engineering

EC 2352/EC 62/10144 EC 603/10144 BME 41 — COMPUTER NETWORKS

(Common to Seventh Semester Biomedical Engineering)

(Regulation 2008/2010)

(Also common to PTEC 2352 – Computer Networks for B.E. (Part-Time) Fifth Semester Electronics and Communication Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

## PART A — (10 × 2 = 20 marks)

1. List the layers in OSI model.
2. Distinguish circuit switching and packet switching.
3. Write any two functions of Data link layer.
4. Draw the frame format for bit-oriented protocols.
5. What is the need for adaptive routing algorithms?
6. What is the speciality of DHCP?
7. What is a retransmission timer?
8. Draw the UDP header.
9. List the three parts of URL.
10. Distinguish substitution and transposition cipher.

Handwritten notes for Part A:

- For Q2: Circuit switching: dedicated path, flow control, error control. Packet switching: no dedicated path, store and forward, up to hop delivery.
- For Q4: Frame format for bit-oriented protocols: Flag, Data, Flag, FCS.
- For Q5: Adaptive routing algorithms: Router may select new route for each packet in response to the changes in conditions topology of the net's.
- For Q7: Retransmission timer: Timer is started during a txn. A timeout causes a retransmission.
- For Q9: URL: Method, Host, Port (optional), Path.

## PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail various guided transmission media.

Or

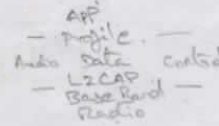
- (b) Explain the data transfer in cable TV.

	Ckt	Pkt	Call set up	Required	Not req.
Time of possible congestion	At set up time	on every packet	Dedicated phy path	Yes	No
Potentially wasted BW	Yes	No	Each packet follows same route	Yes	No
Store & fwd txn	No	Yes	Packets arrive in order	Yes	No
Transposition cipher	Yes	No	Se switch circuit packet	Yes	No
Character	PO min	PO packet	BW available	Fixed	Dynamic

12. (a) Discuss in detail one-bit sliding window protocol, Go Back N and Selective Repeat protocol.

Or

- (b) With diagram, explain Bluetooth protocol stack.



13. (a) Explain link state routing and broadcast routing with example.

Or

- (b) How do IP addresses get mapped onto data link layer addresses, such as Ethernet? Explain with an example.

14. (a) With diagram explain TCP connection establishment in the normal case and call collision case.

Or

- (b) Explain in detail window management in TCP.

15. (a) Explain HTTP with example.

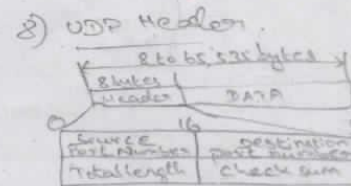
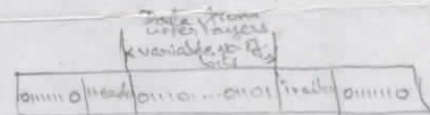
Or

- (b) With example, explain the authentication using kerberos and public key cryptography.

VC - Data link.  
 CS - Switch - Phys.  
 Datagram - NW.

2. Cut  
 Fixed BW  
 Cont. trn of  
 data

Pkt  
 Dynamic BW  
 Transmission of  
 packets.



DHCP - Enables servers to automatically assign IP address to a computer from a defined range of IPs configured for a given NW.

10. Sub → char level encryption in which each character is replaced by another char in the set.  
 Trans → char level encryption in which the char's retain their plaintext but the position of char changes.

**Question Paper Code : 21371**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Sixth Semester

Electronics and Communication Engineering

EC 2352/EC 62/10144 EC 603 — COMPUTER NETWORKS

(Common to Seventh Semester Biomedical Engineering)

(Regulation 2008/2010)

(Also common to PTEC 2352 — Computer Networks for B.E.(Part-Time) Fifth Semester Electronics and Communication Engineering — Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate guided and unguided transmission medium.
2. State the role of Digital Subscriber Line.
3. What is the purpose of Network Interface Card?
4. What are Virtual LANs?
5. Why IPV6 is Preferred than IPV4?
6. What is the use of Network Address Translation?
7. What is Three way hand shaking?
8. Differentiate constant bit rate and variable bit rate.
9. State the difference between fully Qualified and Partially qualified domain name.
10. What is a Digital Signature?



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PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the TCP/IP reference model with a neat sketch. (8)  
 (ii) Compare the performance of TCP/IP and ISO/OSI reference model. (8)

Or

- (b) Explain in detail about Network dependent and Network independent layers of OSI Reference model. (16)
- \* 12. (a) (i) With the help of a neat diagram explain in detail about the stop and wait protocol in detail. (6)  
 (ii) Explain the operation of sliding window flow control protocol. (10)

Or

- (b) (i) Compare the data rates of standard Ethernet, Fast Ethernet, Gigabit Ethernet and Ten-Gigabit Ethernet. (8)  
 (ii) Discuss about piconet and scatter net with diagrams. (8)
- \* 13. (a) Explain the IPV6 addressing schemes in detail. (16)

Or

- (b) Explain the ICMP message format and error reporting in detail. (16)
14. (a) Explain the following characteristics. (4×4=16)  
 (i) Reliability  
 (ii) Delay  
 (iii) Jitter  
 (iv) Bandwidth.

Or

- (b) (i) Explain how connection is established and released in TCP with a neat sketch. (8)  
 (ii) Explain the default timer mechanism followed in TCP. (8)
- \* 15. (a) Draw the Architecture of WWW and explain the various blocks in detail. (16)

Or

- (b) (i) Explain the private key cryptosystem with an example. (8)  
 (ii) Explain the RSA algorithm with an example. (8)

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15/12/14

Reg. No. :

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**Question Paper Code : 91415**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Sixth Semester

Electronics and Communication Engineering

EC 2352/EC 62/10144 EC 603/10144 BME 41 — COMPUTER NETWORKS

(Common to Seventh Semester Biomedical Engineering)

(Regulation 2008/2010)

(Also common to PTEC 2352 – Computer Networks for B.E. (Part-Time)  
Fifth Semester-Electronics and Communication Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate the term segment and packet.
2. List the protocols used in the application layer of OSI model.
3. Differentiate Go-back-n and Selective reject ARQ error control method.
4. Draw 802.3 MAC frame structure.
5. Specify the range of class-c IPv4 address.
6. Differentiate ARP and RARP.
7. Mention the application of TCP and UDP protocol.
8. Specify the port numbers for FTP and HTTP application.
9. What is the purpose of DNS server?
10. Differentiate active attack and passive attack in network.

## PART B — (5 × 16 = 80 marks)

11. (a) Discuss the function of Data link layer and Session layer in detail.

Or

- (b) Explain about Terrestrial microwave and satellite communication with neat diagram.

12. (a) Explain the operation of sliding window protocol with example.

Or

- (b) Explain switched Ethernet, Fast Ethernet and Gigabit Ethernet.

13. (a) Explain the operation of link state routing protocol with example.

Or

- (b) Explain the operation of Distance vector routing protocol with example.

14. (a) Explain the congestion control technique in transport layer of OSI model.

Or

- (b) Discuss in detail about the techniques used to improve QoS.

15. (a) Discuss about WWW in terms of HTML, Hypertext, Hypermedia along with browser architecture.

Or

- (b) Explain symmetric key encryption and decryption algorithm with example.