

**Department of Information Technology**

# **COMPUTER NETWORKS**

**III B.Tech -I Sem**



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## Results Target

### Total Strength of the Class:

S. No	Class / Division	No. of Students
a.	First Class with Distinction	
b.	First Class	
c.	Pass Class	

### Method of Evaluation

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a.	Internal Examination	2
b.	Unit Wise Assignments	4
c.	Descriptive Exam	2
d.	Objective	2
e.	Final Examination	1

### Course Objective

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This course examines principles, design, implementation, and performance of computer networks. A focus will be placed on wireless networking, reflecting rapid advances in this area. Topics include: Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, peer-to-peer networking, network security, and other current research topics. The coursework will involve readings from text, midterm (late in the term), two programming assignments, final project, and presentation. Students may formulate their own final projects based on their interests and background. The course will be conducted in a more seminar-like manner than lectures, but will have a more formal schedule.

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## JNTU Syllabus

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<b>Unit – I</b>	<b>Introduction to networks, internet, Protocols and standards, the OSI model, Layers in OSI model, TCP/IP suite, Addressing, Analog and digital signals.</b>
<b>Unit – II</b>	Physical Layer:digital transmission, multiplexing,transmission media,circuit switched networks, Datagram networks, Virtual circuit networks, switch and Telephone network.
<b>Unit – III</b>	Data link Layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to point rotocols.
<b>Unit – IV</b>	Medium Access sub Layer: Random access, controlled access, channelization,IEEE standards, Ethernet, Fast Ethrnet,Giga-Bit Ethrtnet,Wireless LANs.
<b>Unit – V</b>	Connecting LANs, backbone networks and virtual LANs, Wireless WANs,SONET, frame relay and ATM.
<b>Unit - VI</b>	Network Layer: Logical addressing, internetworking, tunneling,address mapping,ICMP,IGMP,forwarding, uni-cast routing protocols, multicast routing protocols.
<b>Unit - VII</b>	Tranport Layer: Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control,QoS, integrated services, differentiated services,QoS in switched networks.
<b>Unit - VIII</b>	Application Layer- Domain name space, DNS n internet, electronic mail, FTP, WWW, HTTP,SNMP, multi-media, network security.

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## Guidelines to Students

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**Where will this subject help?**

**In Systems Networking.**

## Books / Material

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<b>Text Books</b>
<ol style="list-style-type: none"><li><b>1. Data communications and networking- Behrouz. A. Forouzan, Fourth Edition TMH,2006.</b></li><li><b>2. Computer Networks – Andrew S Tanenbaum, Fourth Edition, Pearson Education.</b></li></ol>



<b>Suggested / Reference Books</b>
<ol style="list-style-type: none"><li><b>1. An Engineering Approach to Computer Networks- S.Keshav, 2<sup>nd</sup> Edition, Pearson Education.</b></li><li><b>2. Data communications and Computer Networks, P.C. Gupta, PHI</b></li><li><b>3. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K. W .Ross, 3<sup>rd</sup> Edition, Pearson Education.</b></li></ol>

## Course Schedule

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Number of Hours / lectures available in this Semester / Year

65

### Distribution of Hours Unit – Wise

Unit	Topic	Total No. of Hours
I	Introduction to networks, internet, Protocols and standards, the OSI model, Layers in OSI model, TCP/IP suite, Addressing, Analog and digital signals.	11
II	<i>Physical Layer: digital transmission, multiplexing, transmission media, circuit switched networks, Datagram networks, Virtual circuit networks, switch and Telephone network.</i>	11
III	Data link Layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to point protocols.	8
IV	Medium Access sub Layer: Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet, Wireless LANs.	5
V	Connecting LANs, backbone networks and virtual LANs, Wireless WANs, SONET, frame relay and ATM.	06
VI	Network Layer: Logical addressing, internetworking, tunneling, address mapping, ICMP, IGMP, forwarding, uni-cast routing protocols, multicast routing protocols.	06
VII	Transport Layer: Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control, QoS, integrated services, differentiated services, QoS in switched networks.	08
VIII	Application Layer- Domain name space, DNS in internet, electronic mail, FTP, WWW, HTTP, SNMP, multi-media, network security.	09
	<b>Total</b>	<b>65</b>

## Topic wise Coverage:

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### Unit I: Introduction to networks

#### LEARNING OBJECTIVES:

#### LECTURE PLAN:

Total no\_ of classes: 08

S.No	Name of the Topic	Reference book code	No. of classes required
1	Introduction to networks, internet	3	2
2	Protocols and standards, The OSI model,	1,3	1
3	Layers in OSI model, TCP/IP suite	3	1
4	TCP/IP suite ,Addressing	3	2
5	Analog and Digital signals	3	1
6	Overview	3	2
7	Conclusion	3	2

#### LESSON PLAN :

Subject Name : COMPUTER NETWORK S

Class : III B.Tech

Subject Code : 55051

Faculty Name : S.Sriramamurthy

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### Unit I: Introduction to networks

#### LECTURE PLAN:

Total no\_ of classes: 11

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list)	Question Bank			Hand outs
				OQ	DQ	AQ	
I	Introduction to networks, internet	1	T2				
II	Protocols and standards, The OSI model,	1	T1				
III	Layers in OSI model, TCP/IP suite	1	T				
IV	TCP/IP suite ,Addressing	1	T1				
V	Analog and Digital signals	1	T1				
VI	Overview						
VII	Conclusion						

## **OBJECTIVE QUESTIONS :**

- 1. Which of the following protocols are examples of TCP/IP transport layer protocols?**
- a. Ethernet
  - b. HTTP
  - c. IP
  - d. UDP
  - e. SMTP
  - f. TCP

**2. Ans: c**

- 2. Which of the following protocols are examples of TCP/IP network access layer protocols?**

- a. Ethernet
- b. HTTP
- c. IP
- d. UDP
- e. SMTP
- f. TCP
- g. PPP

Ans: f

- 3. The process of HTTP asking TCP to send some data and make sure that it is received correctly is an example of what?**

- a. Same-layer interaction
- b. Adjacent-layer interaction
- c. The OSI model
- d. All the other answers are correct.

Ans: d

- 4. The process of TCP on one computer marking a segment as segment 1, and the receiving computer then acknowledging the receipt of segment 1, is an example of what?**

- a. Data encapsulation
- b. Same-layer interaction
- c. Adjacent-layer interaction
- d. The OSI model
- e. None of these answers are correct

Ans: e.

- 5. The process of a web server adding a TCP header to a web page, followed by adding an IP header, and then a data link header and trailer is an example of what?**

- a.Dataencapsulation
- b.Same-layerinteraction
- c.TheOSImodel
- d. All of these answers are correct.

Ans:d

**6. Which of the following terms is used specifically to identify the entity that is created when encapsulating data inside data link layer headers and trailers?**

- a.Data
- b.Chunk
- c.Segment
- d.Frame
- e.Packet
- f. None of these there is no encapsulation by the data link layer.

Ans: f

**7. Which OSI layer defines the functions of logical network-wide addressing and routing?**

- a.Layer1
- b.Layer2
- c.Layer3
- d.Layer4
- e.Layer5
- f.Layer6
- g. Layer7

Ans : c

**8. Which OSI layer defines the standards for cabling and connectors?**

- a.Layer1
- b.Layer2
- c.Layer3
- d.Layer4
- e.Layer5
- f.Layer6
- g. Layer7

Ans:a

**9. Which OSI layer defines the standards for data formats and encryption?**

- a.Layer1
- b.Layer2
- c.Layer3
- d.Layer4
- e.Layer5

- f.Layer6
- g. Layer 7

Ans :f

**10. Which of the following terms are not valid terms for the names of the seven OSI layers?**

- a.Application
- b.Datalink
- c.Transmission
- d.Presentation
- e.Internet
- f. Session

**Ans:c**

DESCRIPTIVE QUESTIONS :

**1. Short Answer Questions:**

**Q-1. List out the advantages and drawbacks of bus topology.**

Ans: Advantages:

- i) Easy to implement
- ii) It is very cost effective because only a single segment required
- iii) It is very flexible
- iv) Moderate reliability.
- v) Can add new station or delete any station easily (scalable)

Disadvantages:

- i) Required suitable medium access control technique.
- ii) Maximum cable length restriction imposed due to delay and signal unbalancing problem.

**Q-2. List out the advantages and drawbacks of ring topology.**

Ans: Advantages:

- i) Data insertion, data reception and data removal can be provided by repeater
- ii) It can provide multicast addressing.
- iii) Point-to-point links to its adjacent nodes (moderate cost)

Disadvantages:

- i) The repeater introduces a delay
- ii) The topology fails if any link disconnects or a node fails.
- iii) Direct link not provided
- iv) It provides complex management

**Q-3. Why star topology is commonly preferred?**

Ans: It gives high reliability, more flexible and higher bandwidth. Since there is a central control point, the control of network is easy and priority can be given to selected nodes.

**Q-4. Is there any relationship between transmission media and topology?**

Ans: Yes, medium should be selected based on the topology. For example, for bus topology coaxial cable medium is suitable, and for ring/star topology twisted-pair or optical fiber can be used.

**ASSIGNMENT QUESTIONS:**

- 1. Protocols and standards, the OSI model,**
- 2. Layers in OSI model, TCP/IP model.**

**UNIT-II : Physical Layer**

**LEARNING OBJECTIVES:**

**LECTURE PLAN:**

**Total No\_ of Classes:**

S.No	Name of the Topic	Reference book code	No. of classes required
8	digital transmission, multiplexing, transmission media, circuit	4	2
9	switched networks, Datagram networks	4	2
10	Virtual circuit networks, switch and Telephone network.	4	2
11	Overview and conclusion	4	2

**LECTURE PLAN:**

**Total no\_ of classes: 13**

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list)	Question Bank			Hand outs
				OQ	DQ	AQ	
I	digital transmission, multiplexing, transmission media, circuit	2	T2				
II	switched networks, Datagram networks	2	T1, T2				

III	Virtual circuit networks, switch and Telephone network.	2	T1,T2,R1		
IV	Overview	2	T1,T2,R1		
V	Conclusion				

### **OBJECTIVE QUESTIONS :**

1. Number of links to connect n nodes in a mesh topology is
2. Mesh Topology is flexible and has a expandability
3. In BUS topology, at each end of the bus is a which absorbs any signal, removing it from the bus.
4. In BUS topology, One can easily add any new node or delete any node with-out affecting other nodes; this makes this topology easily
5. Bus and will force a maximum length of shared medium which can be used in BUS topology.
6. The two alternatives for the operation of the central node in STAR topology are:  
and
7. In Ring Topology, the links are that is, data are transmitted in direction only and all are oriented in the same way
8. In Ring Topology, Repeater works in 3 modes:
9. \_ topology can be considered as an extension to BUS topology.
10. is suitable for use in star and ring topologies
11. Coaxial cable is suitable for use in topology.

### **Solutions:**

1.  $n(n-1)/2$
2. not, poor
3. terminator
4. expandable.
5. Delay, signal unbalancing
6. repeater, switch
7. unidirectional, one
8. Listen, Transmit, By-Pass
9. Tree
10. Twisted pair
11. BUS

### **DESCRIPTIVE QUESTIONS :**

#### **Q1. List out the advantages and drawbacks of bus topology.**

Ans: Advantages:

- i) Easy to implement
- ii) It is very cost effective because only a single segment required
- iii) It is very flexible
- iv) Moderate reliability.
- v) Can add new station or delete any station easily (scalable)

Disadvantages:

- i) Required suitable medium access control technique.
- ii) Maximum cable length restriction imposed due to delay and signal unbalancing problem.

**Q-2. List out the advantages and drawbacks of ring topology.**

Ans: Advantages:

- i) Data insertion, data reception and data removal can be provided by repeater
- ii) It can provide multicast addressing.
- iii) Point-to-point links to its adjacent nodes (moderate cost)

Disadvantages:

- i) The repeater introduces a delay
- ii) The topology fails if any link disconnects or a node fails.
- iii) Direct link not provided
- iv) It provides complex management

**Q3. Why star topology is commonly preferred?**

Ans: It gives high reliability, more flexible and higher bandwidth. Since there is a central control point, the control of network is easy and priority can be given to selected nodes.

**Q4. Is there any relationship between transmission media and topology?**

Ans: Yes, medium should be selected based on the topology. For example, for bus topology coaxial cable medium is suitable, and for ring/star topology twisted-pair or optical fiber can be used.

**ASSIGNMENT QUESTIONS:**

- 1.Explain Twisted pair cables.
- 2.What is Transmission Media?
- 3. What are the reasons for using layered protocols ?
- 4.Enumerate the main responsibilities of data link layer ?

**UNIT-III : Data link Layer**

**❖ LEARNING OBJECTIVES:**

**LECTURE PLAN:**

**Total No\_ of Classes:**

S.No	Name of the Topic	Reference book code	No. of classes required
12	Data link Layer: Introduction, Block	1,2	2

	coding, cyclic codes,		
13	checksum, framing	1,2	1
14	flow and error control, Noiseless channels,	1,2	1
15	noisy channels, HDLC, point to point rotocols.	1,2,3	2
16	Data link Layer sub Layers	1,3	1
17	Conclusion	1,3	1

### LECTURE PLAN:

Total no\_ of classes: 13

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list)	Question Bank			Hand outs
				OQ	DQ	AQ	
I	digital transmission, multiplexing, transmission media, circuit	2	T2				
II	switched networks, Datagram networks	2	T1, T2				
III	Virtual circuit networks, switch and Telephone network.	2	T1, T2, R1				
IV	Overview	2	T1, T2, R1				
V	Conclusion						

### OBJECTIVE QUESTIONS :

1. The basic question which has to be answered by the medium-access control techniques is "How Goes"
2. In technique, each node gets a chance to access the medium by rotation.
3. The key issues involved in MAC protocol are - Where and the control is exercised.
4. 'Where' refers to whether the control is exercised in a or manner.
5. The techniques can be broadly categorized into three types; Round-Robin, Reservation and
6. is an example of centralized control and is an example of distributed control
- Version 2 CSE IIT, Kharagpur 7. In Polling technique, if there is no data, usually a message is sent back.
8. In pure ALOHA, channel utilization, expressed as throughput S, in terms of the offered load G is given by
9. In slotted ALOHA, a maximum throughput of percent at 100 percent of offered load can be achieved, while it is percentage for pure ALOHA.
10. is abbreviated as CSMA/CD and is also known as
11. To achieve stability in CSMA/CD back off scheme, a technique known as is used

**Solutions:**

1. Next
2. token passing
3. How
4. centralized, distributed
5. asynchronous, Contention
6. Polling, token passing
7. poll reject
8.  $S = G e^{-2G}$
9. 37, 18
10. Carrier Sensed Multiple Access with Collision Detection, Listen-While-Talk .
11. binary exponential back off

## DESCRIPTIVE QUESTIONS :

**1. In what situations contention based MAC protocols are suitable?**

Ans: Contention based MAC protocols are suitable for bursty nature of traffic under light to moderate load. These techniques are always decentralized, simple and easy to implement.

**Q-2. What is vulnerable period? How it affects the performance in MAC protocols?**

Ans: The total period of time when collision may occur for a packet is called vulnerable period. Let, all packets have a fixed duration  $\lambda$ . Then vulnerable period is  $2\lambda$  in pure ALOHA scheme and  $\lambda$  in slotted ALOHA scheme. If vulnerable period is long, probability of the occurrence collision increases leading to reduction in throughput.

**Q-3. How throughput is improved in slotted ALOHA over pure ALOHA?**

Ans: In pure ALOHA vulnerable period is  $2\lambda$ .

So,  $S/G = e^{-2G}$  or throughput  $S = G e^{-2G}$ , where  $G$  is the total number of packets.

Maximum value of  $G = 0.5$  or maximum throughput  $S_{max} = 1/2e$ .

In slotted ALOHA, vulnerable period is  $\lambda$  and  $S/G = e^{-G}$  or throughput  $S = G e^{-G}$ . Here, maximum value of  $G$  is 1 and maximum throughput  $S_{max} = 1/e$ .

**Q-4. What is the parameter 'a'? How does it affect the performance of the CSMA protocol?**

Ans: The efficiency of CSMA scheme depends on propagation delay, which is represented by a parameter 'a' as defined below.

$$a = \frac{\text{propagation delay}}{\text{packet transmission time}}$$

Smaller the value of propagation delay, lower is the vulnerable period and higher is the efficiency. If propagation delay is zero, collision cannot occur in CSMA scheme. But in practice, there is some delay and depending on the value of 'a' collision occurs.

**Q-5. How performance is improved in CSMA/CD protocol compared to CSMA protocol?**

Ans: In CSMA scheme, a station monitors the channel before sending a packet. Whenever a collision is detected, it does not stop transmission leading to some wastage of time. On the other hand, in CSMA/CD scheme, whenever a station detects a collision, it sends a jamming signal by which other station comes to know that a collision occurs. As a result, wastage of time is reduced leading to improvement in performance.

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## ASSIGNMENT QUESTIONS

**1. Write Data link Layer Sublayers**

**2. Explain about CSMA and CSMA/CD**

3. Compare the maximum window size in go-back-N and selective-repeat ARQs.

4. Why does ATM use the cell of small and fixed length

### UNIT-IV : Medium Access sub Layer

#### ❖ LEARNING OBJECTIVES:

#### LECTURE PLAN:

**Total No\_ of Classes: 15**

S.No	Name of the Topic	Reference book code	No. of classes required
18	Medium Access sub Layer: Random access, controlled access, channelization.	1,2,3	2
19	IEEE standards,	1,3	1
20	Ethernet, Fast Ethrnet	1,2	1
21	Giga-Bit Ethrtnet, Wireless LANs	1,3	1

#### LECTURE PLAN:

**Total no\_ of classes: 15**

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list	Question Bank			Hand outs
				OQ	DQ	AQ	
I	Medium Access sub Layer: Random access, controlled access, channelization.	2	T2				
II	IEEE standards	2	T1,T2				
III	Virtual circuit networks, switch and Telephone network.	2	T1,T2,R1				
IV	Overview	2	T1,T2,R1				
V	Conclusion						

## **OBJECTIVE QUESTIONS :**

1. The basic question which has to be answered by the medium-access control techniques is “How Goes
2. In technique, each node gets a chance to access the medium by rotation.
3. The key issues involved in MAC protocol are - Where and the control is exercised.
4. ‘Where’ refers to whether the control is exercised in a or manner.
5. The techniques can be broadly categorized into three types; Round-Robin, Reservation and
6. is an example of centralized control and is an example of distributed control
- Version 2 CSE IIT, Kharagpur 7. In Polling technique, if there is no data, usually a message is sent back.
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9. In slotted ALOHA, a maximum throughput of percent at 100 percent of offered load can be achieved, while it is percentage for pure ALOHA.
10. is abbreviated as CSMA/CD and is also known as
11. To achieve stability in CSMA/CD back off scheme, a technique known as is used

### **Solutions:**

1. Next
2. token passing
3. How
4. centralized, distributed
5. asynchronous, Contention
6. Polling, token passing
7. poll reject
8.  $S = G e^{-2G}$
9. 37, 18
10. Carrier Sensed Multiple Access with Collision Detection, Listen-While-Talk .
11. binary exponential back off

## **DESCRIPTIVE QUESTIONS :**

### **1. In what situations contention based MAC protocols are suitable?**

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Ans: The total period of time when collision may occur for a packet is called vulnerable period. Let, all packets have a fixed duration  $\lambda$ . Then vulnerable period is  $2\lambda$  in pure ALOHA scheme and  $\lambda$  in slotted ALOHA scheme. If vulnerable period is long, probability of the occurrence collision increases leading to reduction in throughput.

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Ans: In CSMA scheme, a station monitors the channel before sending a packet. Whenever a collision is detected, it does not stop transmission leading to some wastage of time. On the other hand, in CSMA/CD scheme, whenever a station detects a collision, it sends a jamming signal by which other station comes to know that a collision occurs. As a result, wastage of time is reduced leading to improvement in performance.

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**ASSIGNMENT QUESTIONS**

1. Write Data link Layer Sublayers
2. Explain about CSMA and CSMA/CD
3. How can you Justify Aloha data rate is 18.5.
4. Explain pure aloha and aloha.

**UNIT-V: Connecting LANs.**

**❖ LEARNING OBJECTIVES:**

**LECTURE PLAN:**

**Total No\_ of Classes:**

S.No	Name of the Topic	Reference book code	No. of classes required
22	Connecting LANs, backbone networks and virtual LANs.	1,2	2
23	backbone networks and virtual LANs.	1,2,3	2
24	Virtual circuit networks, switch and Telephone network.	1,2	2
25	Over view	1,3	2
26	Conclusion	1,3	1

**LECTURE PLAN:****Total no\_ of classes: 12**

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list)	Question Bank			Hand outs
				OQ	DQ	AQ	
I	. Connecting LANs, backbone networks and virtual LANs.	2	T2				
II	backbone networks and virtual LANs	2	T1,T2				
III	Virtual circuit networks, switch and Telephone network.	2	T1,T2,R1				
IV	Overview	2	T1,T2,R1				
V	Conclusion						

**UNIT-VI: Network Layer****❖ LEARNING OBJECTIVES:****LECTURE PLAN:****Total No\_ of Classes:**

S.No	Name of the Topic	Reference book code	No. of Lecture classes required
27	Network Layer: Logical addressing, internetworking.	1	2
28	tunneling, address mapping, ICMP, IGMP, forwarding.	1	2
29	uni-cast routing protocols, multicast routing protocols.	1	2

**LECTURE PLAN:****Total no\_ of classes: 12**

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list)	Question Bank			Hand outs
				OQ	DQ	AQ	
I	. Network Layer: Logical addressing, internetworking.	2	T2				
II	tunneling, address mapping, ICMP, IGMP, forwarding.	2	T1,T2				

III	uni-cast routing protocols, multicast routing protocols.	2	T1,T2,R1		
IV	Overview	2	T1,T2,R1		
V	Conclusion				

### **OBJECTIVE QUESTIONS :**

1. The 802.2 standard describes the which is the upper part of the data link layer.
2. LLC offers three types services: Unreliable datagram service, and
3. IEEE 802 bundle also includes a MAN standard IEEE 802.6 which is also known as
4. 100Base-T2 means
5. 100 Mbps, baseband, long wavelength over optical fiber cable will be abbreviated as
6. Ethernet uses encoding

#### **Answers:**

1. LLC (logical link layer)
2. Acknowledged datagram service, Reliable connection oriental service
3. Distributed Queue Dual Bus (DQDB)
4. 100 Mbps, baseband, over two twisted-pair cables
5. 1000Base F
6. Bi-phase Manchester

### **DESCRIPTIVE QUESTIONS**

#### **Q-1 What are the goals in mind of IEEE 802 committee?**

Ans: IEEE 802 committee has few goals in mind, namely

- To promote compatibility
- Implementation with minimum efforts
- Accommodate diverse applications

#### **Q-2. List the functions performed by the physical layer of 802.3 standard?**

Ans. Functions of physical layer are:

- i) Data encoding/decoding (To facilitate synchronization and efficient transfer of signal through the medium).
- ii) Collision detection (It detects at the transmit side)
- iii) Carrier sensing (Channel access senses a carrier on the channel at both the transmit and receive sides)
- iv) Transmit/receive the packets (Frame transmitted to all stations connected to the channel)
- v) Topology and medium used (Mediums are co-axial cable, twisted pair and fiber optic cable)

#### **Q-3. Why do you require a limit on the minimum size of Ethernet frame?**

Ans. To detect collision, it is essential that a sender continue sending a frame and at the same time receives another frame sent by another station. Considering maximum delay with five Ethernet segments in cascade, the size of frame has been found to be 64 bytes such that the above condition is satisfied.

#### **Q-4. What are the different types of cabling supported by Ethernet standard?**

Ans. Types of cabling are:

- i) 10 BASE 5 - Maximum cable length is 500 meters using 4” diameter coaxial cable.
- ii) 10 BASE 2 - Maximum cable length is 185 meters using 0.25” diameter CATV cable.
- iii) 10 BASE T - Maximum cable length is 100 meters using twisted-pair cable (CAT-3 UTP).
- iv) 10 BASE FL - Maximum cable length is 2 Km using multimode fiber optic cable (125/62.5 micrometer).

**ASSIGNMENT QUESTIONS:**

- 1.Explain Different Connecting LANS.**
- 2.What is SONET. Give Advantages of SONET.**
- 3.Explain about the ATM(Asynchronous Trammission Mode).**
- 4. Explain Wireless Connections.**

**UNIT-VII: Tranport Layer**

**❖ LEARNING OBJECTIVES:**

**LECTURE PLAN:**

**Total No\_ of Classes:**

S.No	Name of the Topic	Reference book code	No. of classes required
30	Tranport Layer: Process to process delivery.	1,3	1
31	UDP and TCP protocols.	1,3	2
32	SCTP, data traffic, congestion, congestion control,QoS.,	1,3	2
33	integrated services.	1,3	2
34	differentiated services.	1	1
35	QoS in switched networks	1	1

**LECTURE PLAN:**

**Total no\_ of classes: 12**

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list	Question Bank			Hand outs
				OQ	DQ	AQ	
I	Tranport Layer: Process to process delivery.	2	T2				
II	UDP and TCP protocols.	2	T1,T2				
III	SCTP, data traffic, congestion,	2	T1,T2,R1				

	congestion control, QoS.,				
IV	integrated services.	2	T1, T2, R1		
V	OverView and Conclusion				

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### **OBJECTIVE QUESTIONS :**

1. Switched Ethernet gives dedicated 10 Mb/s bandwidth on of its ports.
2. In Ethernet (IEEE 802.3) the topology, though physically is but logically is BUS. i.e. the collision domain of all the nodes in a LAN is
4. There are two techniques used in the implementation of Ethernet switches: and
5. IEEE has designed two categories of Fast Ethernet and 6. 100-Base-X itself is divided into two:
7. The Gigabit Ethernet Alliance was formed in by companies.
8. The GMII is the interface between the layer and the layer.
9. a sublayer of GMII provides a medium-independent means for the PCS to support various serial bit-oriented physical media.
10. Packet Bursting is an extension of. Packet Bursting is "Carrier Extension plus a

### **Solutions:**

1. each
2. star, common
3. switch
4. store-and-forward, cut-through
5. 100Base-X, 100Base-T4
6. 100Base-TX, 100base-FX.
7. May 1996, 11
8. MAC, Physical
9. PMA (Physical Medium Attachment)
10. Carrier Extension, burst of packets

### **DESCRIPTIVE QUESTIONS:**

#### **Q1. Explain the basic difference between IEEE 802.3 and switched Ethernet, as far as implementation is concerned.**

Ans: In Ethernet (IEEE 802.3) the topology, though physically is start but logically is BUS. i.e. the collision domain of all the nodes in a LAN is common. In this situation only one frame can send the frame, if more than one station sends the frame, there is a collision.

In Switched Ethernet, this collision domain is separated. Hub is replaced by a switch, a device that can recognize the destination address and can route the frame to the port to which the destination station is connected, the rest of the media is not involved in the transmission process. The switch can receive another frame from another station at the same time and can route this frame to its own final destination.

**Q2. Explain the two techniques for implementing Ethernet switches.**

Ans: There are two techniques used in the implementation of Ethernet switches: store-and-forward and cut-through. In the first case, the entire frame is captured at the incoming port, stored in the switch's memory, and after an address lookup to determine the LAN destination port, forwarded to the appropriate port. The lookup table is automatically built up. On the other hand, a cut-through switch begins to transmit the frame to the destination port as soon as it decodes the destination address from the frame header.

Store-and-forward approach provides a greater level of error detection because damaged frames are not forwarded to the destination port. But, it introduces longer delay of about 1.2 msec for forwarding a frame and suffers from the chance of losing data due to reliance on buffer memory. The cut-through switches, on the other hand, has reduced latency but has higher switch cost.

**Q3. What are the different categories of Fast Ethernet?**

Ans: IEEE has designed two categories of Fast Ethernet: 100Base-X and 100Base-T4. 100Base-X uses two cables between hub and the station while 100Base-T4 uses four. 100Base-X itself is divided into two: 100Base-TX and 100base-FX. \* 100 BASE-T4: This option is designed to avoid overwriting. It is used for half-duplex communication using four wire-pairs of the existing category 3 UTP cable, which is already available for telephone services in homes/offices. Two of four pairs are bi-directional; other two are unidirectional. This means that there are 3 pairs to be used for carrying data, in each direction (2 bi-directional and 1 unidirectional). Because 100Mbps data cannot be handled by voicegrade UTP, this specification splits the 100 Mbps flow into three 33.66Mbps flow.

\*100 BASE TX: This option uses two category 5 UTP or two shielded (STP) cable to connect a station to hub. One pair is used to carry frames from the hub to the station and other to carry frames from station to hub. Encoding is 4B/5B to handle 100 Mbps; signaling is NRZ-I. The distance between station and hub should be less than 100 meters.

\*100 BASE FX: This option uses two Fiber optic cables, one carry frames from station to hub and other from hub to station. The encoding is 4B/5B and signaling in NRZ-I. the distance between station and hub should be less than 2000 meters.

**Q4. What are the Objectives of The Gigabit Ethernet Alliance?**

Ans: The objectives of the alliance are:

- supporting extension of existing Ethernet and Fast Ethernet technology in response to demand for higher network bandwidth.
- developing technical proposals for the inclusion in the standard
- establishment of inter-operability test procedures and processes

**Q5. Explain GMII (Gigabit Media Independent Interface) in brief.**

Ans: The GMII is the interface between the MAC layer and the Physical layer. It allows any physical layer to be used with the MAC layer. It is an extension of the MII (Media Independent Interface) used in Fast Ethernet. It uses the same management interface as MII. It supports 10, 100 and 1000 Mbps data rates. It provides separate 8-bit wide receive and transmit data paths, so it can support both full-duplex as well as half-duplex operation.

The GMII provides 2 media status signals: one indicates presence of the carrier, and the other indicates absence of collision. With the GMII, it is possible to connect various media types such as shielded and unshielded twisted pair, and single-mode and multi mode optical fiber, while using the same MAC controller. It has three sub-layers namely: PCS (Physical Coding Sublayer), PMA (Physical Medium Attachment) and PMD (Physical Medium Dependent).

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**ASSIGNMENT QUESTIONS:**

1. Draw the IP datagram header format. "IP datagram has a checksum field still it is called an unreliable protocol". Justify?
2. What are the principles that were applied to arrive at the seven layers in OSI model?
3. Explain the working of 3 bit sliding window protocol with suitable example.
4. Explain the following ARQ techniques in detail
  1. Stop and wait ARQ
  2. Selective repeat ARQ
5. What are the reasons for using layered protocols ?
6. 10 Enumerate the main responsibilities of data link layer ?
7. Is the nyquist theorem true for optical fibre or only for copper wire ? Explain.
8. Why do data link layer protocols position the checksum in the trailer and not in the header ?
9. Compare the maximum window size in go-back-N and selective-repeat ARQs.
10. Why does ATM use the cell of small and fixed length

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**UNITVIII: Application Layer****❖ LEARNING OBJECTIVES:**

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**LECTURE PLAN:****Total No\_ of Classes:**

S.No	Name of the Topic	Reference book code	No. of classes required
36	Application Layer- Domain name space, HTTP,SNMP,	1,2,3	2
37	DNS n internet, electronic mail	1	2
38	FTP, WWW.	1	1
39	multi-media, network security.	1,2	2
40		1,2	2

**LECTURE PLAN:****Total no\_ of classes: 12**

Unit #	Topic as per JNTU syllabus	Lesson #	Suggested Books ** (Refer the list)	Question Bank			Hand outs
				OQ	DQ	AQ	
I	Application Layer- Domain name space, HTTP,SNMP,	7	T2				
II	DNS n internet, electronic mail	7	T1,T2				
III	FTP, WWW	7	T1,T2,R1				
IV	integrated services.	7	T1,T2,R1				
V	multi-media, network security.	7	T1,T2,R1.R2				
VI	Overview and Conclusion						

**OBJECTIVE QUESTIONS :**

- 1.SNMP depends on a companion specification called the -----
  - a) SIP
  - b) GET
  - c) SET
  - d) MIB
2. To partition the hierarchy into subtrees called -----
  - a) Branch
  - b) Node
  - c) Region
  - d) Zones
- 3.----- is a character string that identifies a resource
  - a) URL
  - b) IMP
  - c) UDP
  - d) URI
4. <CRLF> stands for
  - a) Carriage – return – line – first
  - b) Carriage – return – line – feed
  - c) Control – return – line – feed
  - d) Control – return – line – first
5. ----- also define a set of message attributes that are exchanged as part of other Command , independent of transferring the message itself
  - a) TCP
  - b) SMTP
  - c) SNMP
  - d) IMAP

6. MIME uses a straightforward encoding of binary data into the ASCII character set .

The encoding is called

- a) base46
- b) base64
- c) base23
- d) base10

7.Each protocol defines-----and-----.

a)packet interface,broadcast interface

**b)service interface,peer interface**

c)reliable interface,multicast interface

d)peer interface,multicast interface.

8. Function of switch is

a)forward the packet

b)connect different networks

**c)store and forward packets**

d)none of the above

9. In 4B/5B encoding, 5-bit code for 0110 and 1001 is respectively

a. 01110, 11001

b. 01110,10011

c. 01010, 11001

d. 00110, 11011

10.Electromagnetic waves traveling through is considered as  $2/3^{\text{rd}}$  the speed of Light in a vacuum.;a 300 Hz wave traveling through copper would have a wavelength of

a.  $66.7 \times 10^3$  METERS

b.  $6.67 \times 10^3$  METERS

c.  $667 \times 10^3$  METERS

d.  $6.67 \times 10^6$  METERS

11.suppose a workstation can perform all necessary processing to switch 1 million packets each second .If the average packet is short, say, 64 bytes then the throughput is

e. 512 bps

**f. 512Mbps**

g. 1Gbps

h. 64kbps

12.802.16 and 802.15.1 are respectively

i. Bluetooth and Wi-Fi

j. Bluetooth and WiMAX

k. Wi-Fi and WiMAX

**l. WiMax and Bluetooth**

13. In Token-ring Maintenance, to detect a missing token, the monitor watches for a passing token and maintains a timer equal to the maximum possible token rotation time. This interval equals

m.  $\text{NumStations} \times \text{THT} + \text{RingLatency}$

n.  $\text{NumStations} + \text{RingLatency} \times \text{THT}$

o.  $\text{THT} + \text{RingLatency} \times \text{NumStations}$

p.  $\text{NumStations} + \text{THT} + \text{RingLatency}$

#### DESCRIPTIVE QUESTIONS :

##### 1. What Is **Application Layer Protocol**?

Protocols are sets of standards, or guidelines, used to manage how data is transferred via computer networks. Certain protocols in computer networks are made up of layers, each of which serves a major function in data communication and tran... [Read More »](#)

Source: [http://www.ehow.com/facts\\_7452589\\_application-layer-protocol\\_.htm...](http://www.ehow.com/facts_7452589_application-layer-protocol_.htm...)

##### 2. What **protocols** operate at the **application layer** of the OSI model?

BGP · DHCP · DNS · FTP · Gopher · GTP · HTTP · IMAP · IRC · NNTP · NTP · POP · RIP · RPC · RTCP · RTP · RTSP · SDP · SIP · SMTP · SNMP · SOAP · SSH · STUN · Telnet · TIME · TLS/SSL · XMPP · to name a few bittorrent also... if you have to ch... [Read More »](#)

Source: [http://wiki.answers.com/Q/What\\_3\\_protocols\\_operate\\_at\\_the\\_applica...](http://wiki.answers.com/Q/What_3_protocols_operate_at_the_applica...)

##### 3. What **protocols** are at the TCP-IP **application layer**?

The TCP/IP suite includes the following protocols  
Data Link Layer: ARP/RARP Address Resolution Protocol/Reverse Address DCAP Data Link Switching Client Access Protocol  
Network Layer: DHCP Dynamic Host Configuration Protocol DVMRP Distance

#### ASSIGNMENT QUESTIONS:

1. Explain about the Application Layer.
2. Briefly explain TFP,SNMP,SNTP.
3. What is Multi media?
4. Write applications of network security.

## INDIVIDUAL TIME TABLE

NAME OF THE FACULTY: S.Sri rama murthy

Period	1	2	3	4		5	6	7
Day/Time	9.00-9.50	9.50-10.40	10.40-11.30	11.30-12.20	L U N C H	12.50-1.40	1.40-2.30	2.30-3.20
Mon		CN		CN				
Tue							CN	
Wed	CN	CN						
Thu	CN	CN						
Fri		CN					CN	
Sat							CN	

Computer Networks:

Total no of theory classes : 10

Total no of practical classes : 12

Total no of classes : 22

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**J. B. Institute of Engineering & Technology**  
**III B.Tech -2010-Batch/I SEM (Sample I-MID DESCRIPTIVE)**  
**BRANCH: INFORMATION TECHNOLOGY**  
**SUB: Computer Networks**

**TIME: 60 MINUTES**

**Marks: 10**

**SECTION-A**

**Answer any TWO of the following:**

**(2x5=20M)**

1. Explain OSI Reference Model
    - a) Analog and digital Sinaling
    - b) need of Internet
  
  2. Explain Physical Layer in OSI Model
    - a) digital transmission,
    - b) multiplexing, transmission
    - c) media, circuit
  
  3. Explain About Data link Layer ,Block coding, cyclic codes.
  
  4. What is control Flow, Error Detection?
- 

**Paper Set By**  
**S.Sri rama murthy**  
**Asst.professor**

### **Marks for Internal Theory Examination**

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<b>ROLL.NO</b>	<b>NAME OF THE STUDENT</b>	<b>I MID (Des+Obj+Assign))</b>	<b>II MID (Des+Obj+Assign))</b>

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