

Doc. No.: DCE/0/15

Revision: 00

Lecture Plan -5

Semester:-VII Class:-ECE
Subject:- Data Communication

Course Code:-ECE-407-F
Unit:-1

S. No.	Topic: - QAM, and clock recovery. Differential Phase Shift Keying	Time Allotted:-
1.	Introduction Revision of digital modulation techniques.	<u>10 min</u>
2	Division of the Topic Quadrature Amplitude Modulation (QAM). Defined as combination of ASK and PSK. Constellation Diagrams showing 4, 8 and 16 QAM Band width for QAM. Carrier and clock recovery a)why is it required? b) how it is done Diagram showing the method.	<u>20-25 min</u>
3.	Conclusion A system which does not varies with time & obeys superposition principal is LTI sys & being used in most of the applications.	
4	Question / Answer Define QAM. A1-It is defined as combination of ASK&PSK. Q2- What is the bandwidth required for QPSK? A2- .Band width required will be same as required forASK&PSK transmission.	<u>10 min</u>
		<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :-1 Electronic communication systems by Wayne Tomasi.

2. . Data Comm By Forauzan

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Lecture Plan -6

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-1

S. No.	Topic:- QAM, Carrier recovery & Clock recovery	Time Allotted:-
1.	Introduction Throughput can be increased manifold for a given band width by using Quadrature Amplitude Modulation. It is combination of ASK and PSK. It has better immunity to noise/interference. However the sig level should be stable and of good strength. Is good for adaptive networks such as WiMax.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Definition- Different combinations resulting in 4-QAM, 8-QAM& 16-QAM- Diagrams showing amplitude phase relationship, time domain characteristics of 8-QAM and 16-QAM constellation.- Carrier and clock recovery techniques.	<u>20-25 min</u>
3.	Conclusion QAM is most efficient way of modulation which is also quite immune to interference. It is used in wireless commn networks where BW is a constraint.	<u>10 min</u>
4	Q1- Define QAM. A1-It is defined as combination of ASK&PSK. Q2- What is the bandwidth required for QPSK? A2- .Band width required will be same as required forASK&PSK transmission.	<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan -7

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-1

S. No.	Topic:- Trelli's encoding	Time Allotted:-
1.	Introduction Trelling encoding is type of encoding according to the bandwidth required. Generally it is required to increase transmission rates beyond 56 kbps.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- .Define trelling encoding.- Types of encoding.- Advantages of trelling encoding- Disadvantages of trelling encoding-	<u>20-25 min</u>
3.	Conclusion Trelling encoding over standard Telephone circuits involves convolutional or tree codes which combines encoding modulation to reduce the probability of error.	<u>10 min</u>
4	Q1- Define trelling encoding. A1- Method to increase transmission rates beyond 56kbps. Q2- state advantages of trelling encoding. A2- . transmission rates beyond 56kbps are achieved.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1 Electronic communication systems by Wayne Tomasi.
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Lecture Plan -8

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 2

S. No.	Topic:- Data Communication hardware	Time Allotted:-
1.	Introduction Hardware of data communication consists of Interfaces, modems and printers. Interfaces are of two types Serial and parallel. Mouse is serial interface and printer is parallel interface.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Data communication hardwares- Types of hardware- Serial interfaces- Parallel Interfaces	<u>20-25 min</u>
3.	Conclusion Data communication includes hardware and software. Different standards are available for hardware depending upon system compatibility.	
4	Q1 State different parts of data communication. A1 Hardware and software. Q2 What are different interface ? A2 Serial and parallel interface.	<u>10 min</u>
		<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- 1. Electronic communication systems by Wayne Tomasi.

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Lecture Plan -9

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 2

S. No.	Topic:- History and standards of Data Communication	Time Allotted:-
1.	Introduction Data communication networks are systems of interrelated computers and equipments and can be as simple as a p.c. connected to a printer or two p.c. History started from 1833 and still upgradations are coming.	<u>10 min</u>
2	Division of the Topic - History of Data communication - Different standards	<u>20-25 min</u>
3.	Conclusion Recent developments in data communication networking such as Internets , intranet and www are modern technologies.	<u>10 min</u>
4	Q1 What is used to communicate data ? A1 Different protocols. Q2 What is network architecture? A2 It consists of equipments, transmission media and interfaces and protocols.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1. Electronic communication systems by Wayne Tomasi.

2. Data Comm by Forouzan

Lecture Plan -10

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 2

S. No.	Topic:- Communication codes & Error Control and synchronization.	Time Allotted:-
1.	<p>Introduction Unpredictable errors occur due to interference, noise and change in shape of original data, during transmission. In case single bit error only one 0/1 bi Only one 0/1 changes to 1 / 0. Usually a burst of noise causes multiple bit error called burst error.</p>	<u>10 min</u>
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - Kinds of error - Detection of error in received data. - Concept of redundancy. - Cyclic Redundancy Check (CRC). - Checksum. - Error correction for received data stream. 	<u>20-25 min</u>
3.	<p>Conclusion Errors are unavoidable in a normal transmission media such as co-axial cable or free space. Burst error is most likely to occur in serial transmission. Two dimensional parity check can check burst error with quite high probability but cyclic redundancy check is the most powerful method. Checksum detects all errors involving odd number of bits as well as those involving most of the even number bits. Error correct is handled usually by retransmission. But some times sophisticated error correcting codes are also used.</p>	<u>10 min</u>
4	<p>Q1- How does single bit error differ from burst error? A1- In single bit error only one bit changes from 0to 1/1to0.In serial transmission burst error are common when multiple bits are affected. Q2- What types of redundancy checks are used in data transmission? A2- . Parity check, cyclic redundancy check and check sum.</p>	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1. Electronic communication systems by Wayne Tomasi.
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Lecture Plan -11

Semester:-VII Class:-ECE
Subject: - Data Communication

Course Code:-ECE-407-F
Unit:-2

S. No.	Topic:- Data Synchronization & Data communication Hardware	Time Allotted:-
1.	Introduction Data Communication synchronization is essential to ensure that correct data has been reached at destination Data communication hardware consists of repeaters, Hubs, routers, gateways, bridges etc.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Definition of .data synchronization- Define data communication- Data communication hardware.- Brief about different hardwares .- Advantages of different hardwares.	<u>20-25 min</u>
3.	Conclusion Data communication and synchronization are mandatory processes to send any type of the data.	<u>10 min</u>
4	Q1- What are different types of data communication hardwares? A1- Repeaters, bridges, hubs, routers, gateways are different types of hardwares. Q2- What is router ? A2- . It is the device applied at network layer which consists of hardware and software..	<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan -12

Semester:-VII Class:-ECE
Subject: - Data Communication

Course Code:-ECE-407-F
Unit:-2

S. No.	Topic:- Serial Interface – RS – 232, RS -445, RS – 530	Time Allotted:-
1.	Introduction EIA have developed EIA- 232, EIA-442, EIA449, and so on. ITU-T standards are called V series and X series. EIA- 232, also known as RS- 232 (originally they were called Recommended Standard) is the most important one. It defines the mechanical, electrical and functional characteristics of the interface between DTE and DCE. Recent ones such as EIA 232-D, also define specific cable and plug.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Mechanical specifications of RS-232.- Electrical Specifications, voltage levels and type of signals between DTE and DCE.- Functional Specifications (DB-25 and DB-9).- RS-445 and RS-530.	<u>20-25 min</u>
3.	Conclusion RS-232 defines a widely used DTE –DCE interface that consists of a 25-pin connector. RS-445 and RS530 provide better data rate and distance capability than the RS-232 standard	<u>10 min</u>
4	Q1- What does the functional specification of RS-232 describe? A1- It defines functions assigned to each of the pins in DB-25 connector. Each communication function has mirror or answering function on male and female connector to allow for full duplex operation. Q2- What type of coding is recommended in RS-232 and other EIA electrical standards? A2-NRZ-L encoding, +15V representing 0 and -15v representing 1 .	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1 Electronic communication systems by Wayne Tomasi
2. Data Comm.By Forauzan

Lecture Plan -13

Semester:-VIIClass:-ECECourse Code:-ECE-407-FSubject: - Data CommunicationUnit:-2

S. No.	Topic:- Parallel Interface	Time Allotted:-
1.	<p>Introduction</p> <p>Computers consume data in group of 8(byte),16, 32 , 64 and so on. We can send data in a group instead of bit by bit. This is called parallel transmission. It uses n-wires to send data consisting of n bits, each bit having its own wire. Advantage of parallel interface is speed, being n-times over serial transmission. Since using n-communication lines is expensive, parallel transmission is usually limited to short distances.</p>	<u>10 min</u>
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - .Types of Interfaces - Types of Parallel Interface. - Centronics - IEEE 4888 - Different standards. 	<u>20-25 min</u>
3.	<p>Conclusion</p> <p>Parallel Interface is faster in speed than serial interface.</p>	<u>10 min</u>
4	<p>Q1- What is centronics ?</p> <p>A1- It is parallel interface consisting of either 36 or 50 pins.</p> <p>Q2- What is other advantage of parallel interface ?</p> <p>A2- . It is applicable at longer distance.</p>	<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan 14

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-2

S. No.	Topic: - Telephone & Private Networks.	Time Allotted:-
1.	Introduction Telephone networks are of different types. PSTN, ISDN ISDN is a broadband concept. PTN is switched data communication networks network designed for transferring the data with the help of switching nodes & transmission media.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- .Types of telephone networks.- Brief about PSTN- Brief about ISDN- Public Network- Private network.	<u>20-25 min</u>
3.	Conclusion PTN is switched data communication networks network designed for transferring the data with the help of switching nodes & transmission media	<u>10 min</u>
4	Q1- Define telephone network. A1- PTN is switched data communication networks network designed for transferring the data with the help of switching nodes & transmission media Q2- What are different types of networks? A2- . Circuit switching network & Packet switching network.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1 Electronic communication systems by Wayne Tomasi

2. Data Comm. By Forauzan

Lecture Plan -15

Semester:-VIIClass:-ECECourse Code:-ECE-407-FSubject: - Data CommunicationUnit:-2

S. No.	Topic:- Data, Synchronous & Asynchronous Modems	Time Allotted:-
1.	<p>Introduction</p> <p>Digital data can be transmitted on a normal voice grade copper lines by using modems. Digital binary data is converted to voice frequency using FSK/PSK techniques inside the modem. RS 232 Interface cable connector is used to connect DTE at either end with corresponding DCE.</p>	<u>10 min</u>
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - Digital Data Transmission - Parallel Transmission - Serial Transmission - Asynchronous Transmission - Synchronous Transmission - DTE-DCE Interface - Other Interface Standards - Modems - 	<u>20-25 min</u>
3.	<p>Conclusion</p> <p>Modems are an easy and convenient devices which allow communication between computer(s) and computer networks including internet through normal PSTN. They have limitation of speed which is restricted to 56K.</p>	<u>10 min</u>
4	<p>Q1- What is the limitation of modem ? A1- 56k normally. Q2- Define modem. A2- . It is device which allows communication between DTE & DCE.</p>	<u>5 min</u>

Assignment to be given:-NILReference Readings:- - 1 Electronic communication systems by Wayne Tomasi.

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Lecture Plan -16

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-3

S. No.	Topic:- Data Communication Protocols	Time Allotted:-
1.	<p>Introduction</p> <p>Open System Interconnection (OSI) model is an ISO standard that allows any two different systems to communicate without requiring to the logic of the underlying hardware and software. It is not a protocol; it is a model for understanding and designing a network architecture that is flexible, robust, and interoperable. It is a layered framework that allows for communication across all types of computer systems.</p>	<u>10 min</u>
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - OSI. - Data transmission modes. - Asynchronous protocols - Synchronous protocols - `Public Data Network. 	<u>20-25 min</u>
3.	<p>Conclusion</p> <p>The seven layers of OSI Reference model developed by ISO is ideal and excellent guide to protocols of CCN. It is “Open” to any machine for interconnection to any CCN. Lower layers re hardware oriented whereas higher layers are more software based</p>	<u>10 min</u>
4	<p>Q1- Why do you need communication protocol for DC? A1- Unlike voice network, CCN operates without human intervention. So it requires rigorous set of rules to ensure proper communication.</p> <p>Q2- How do the different layers perform their functions. A2- . Each layer adds a header at transmitting end. Corresponding header is then removed at the receiving end to fin the relevant information about the function to be performed.</p>	<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan -17

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-3

S. No.	Topic:- Public Data Comm. Networks	Time Allotted:-
1.	Introduction The public telephone network uses the largest computer network in the world to interconnect millions of subscribers in such a way so that the companies act as a single entity.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Define PTN- Differentiate between private & public Telephone.- Define Circuit switching.- Define packet switching.- Brief for Local loop and trunk circuits.-	<u>20-25 min</u>
3.	Conclusion PTN accommodates two types , public & private. Leased lines are private networks. Public networks are generally referred as service providers.	<u>10 min</u>
4	Q1- What is PTN ? A1- It is network connecting several links resulting in single entity. Q2- What are types of PTN ? A2- . Private & Public are the types of PTN.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :-1 Electronic communication systems by Wayne Tomasi.

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Lecture Plan -19

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 3

S. No.	Topic:- OSI reference Model	Time Allotted:-
1.	Introduction OSI reference model consists of seven layers. Uppermost layer is application layer. Lowermost layer is physical layer. This model is nothing but logical functioning of any system.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- OSI reference model- Different layers- Functions of different layers.	<u>20-25 min</u>
3.	Conclusion OSI is standard model referred by ISO standard. It is followed internationally.	
4	Q1 How many layers are there in OSI ? A1 Seven Q2 Which is uppermost layer ? A2 Application layer.	<u>10 min</u>
		<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1. Electronic communication systems by Wayne Tomasi.

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Lecture Plan -20

Semester:-VII

Class:-ECE

Course Code:-EE-407 E

Subject: - Data Communication

Unit:- 3

S. No.	Topic:- Functions of OSI	Time Allotted:-
1.	Introduction All the seven layers are assigned different functions. The application layer is responsible for functions like login. Physical layer is responsible for physical connections.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Detailing of OSI- Block Diagram of OSI- Functions of application layer- Functions of Session layer.	<u>20-25 min</u>
3.	Conclusion OSI model is followed with the help of protocols to communicate the smoothly	
4	Q1 State the function of application layer . A1 login Q2 State the function A2 Network availability.	<u>10 min</u>
		<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- 1. Electronic communication systems by Wayne Tomasi.

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Lecture Plan -21

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 3

S. No.	Topic:- Functions of presentation layer and transport layer.	Time Allotted:-
1.	Introduction Presentation layer has a function to provide independence to the application processes by addressing any code or syntax. Transport layer is responsible for controlling end to end delivery and integrity.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Detailed study o layer- Functions- Detailed study of transport layer.- Functions- Diagrametic representation.	<u>20-25 min</u>
3.	Conclusion Transport layer checks end to end delivery and ensures the communication.	
4	Q1 State the function of presentation layer . A1 To provide independence to application processes. Q2 State the function of transport layer. A2 End to end delivery.	<u>10 min</u>
		<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan -22

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 3

S. No.	Topic:- Functions of Physical layer, data link layer and network layer	Time Allotted:-
1.	Introduction Physical layer is responsible for actual propagation of data which is unstructured. It connects the physical link. Data link layer provides error and flow control. Network layer provides routing with the help of routing table.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Detailed study of lower three layers- Functions of physical layer- Functions of data link layer- Functions of network layer.- Diagram	<u>20-25 min</u>
3.	Conclusion Lowermost three layers are mainly responsible for functions like connectivity and error checking.	
4	Q1 State the function of physical layer. A1 Actual propagation of unstructured data. Q2 State the function of data link layer. A2 Error control and synchronization.	<u>10 min</u>
		<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1. Electronic communication systems by Wayne Tomasi.

2. Data Comm by Forouzan

Lecture Plan -23Semester:-VIIClass:-ECECourse Code:-ECE-407-FSubject: - Data CommunicationUnit:- 3

S. No.	Topic:- Protocols of TCP /IP	Time Allotted:-
1.	Introduction:- The (transmission control protocol/internet protocol) Was actually development by the department of defense before the inception of the seven –layer OSI model? TCP/IP is comprised of several interactive modules that provide specific functionality without necessarily operating independent of one other	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none"> - network access layer - internet layer - host- to host layer - process layer 	<u>20-25 min</u>
3.	Conclusion Is probably the dominant communication protocol in use today. it provides a common dominant .it provides common denominator ,allowing many different types of devices to communicate over network system	<u>10 min</u>
4	Q1 Network access layer? A1 provides a means of physically delivering data packet using frames or cell. Q2 Internet layer? A2 Contains information that pertains t how data can be routed through the network	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1. Electronic communication systems by Wayne Tomasi.

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Lecture Plan -24

Semester:-VII

Class:-ECE

Course Code:-ECE-407-

F

Subject: - Data Communication

Unit:- 3

S. No.	Topic:- Comparison of OSI and TCP/IP	Time Allotted:-
1.	Introduction TCP/IP Protocols are considered to be standards around which the internet has developed. The OSI model however is a generic, protocol- independent standard. TCP/IP combines the OSI data link and physical layers into the network access layer.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- similarities- differences	<u>20-25 min</u>
3.	Conclusion The OSI model consists of 7 architectural layers whereas the TCP/IP only has 4 layers. Both models assume that packets are switched.- Basically this means that individual packets may take differing paths in order to reach the same destination	<u>10 min</u>
4	Q1 Give one difference between OSI and TCP/IP model A1 TCP/IP combines the OSI data link and physical layers into the network access layer. Q2 Give one similarity between OSI and TCP/IP model A2 They share a common application layer.- Both of the models share a common "application layer". However in practice this layer includes different services depending upon each model.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- 1. Electronic communication systems by Wayne Tomasi.
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Lecture Plan -25

Semester:-VII Class:-EC
Subject: - Data Communication

Course Code:-ECE-407-F
Unit:-3

S. No.	Topic:- LANs, Token Ring & Ethernet.	Time Allotted:-
1.	Introduction LAN is network which can be implemented in the range of 10km. There are different protocols used for LAN. E.g. Token Ring, Ethernet, FDDI. Each protocol has its unique international standard .	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- .Define LAN.- What are different International standarads.- What is Ethernt ?- What is Token Ring ?- Difference between them.	<u>20-25 min</u>
3.	Conclusion LAN is the network which works within 10 km area. It can be extended further with the help of repaters. It works with the help of protocols like Token Ring, Ethernet, FDDI	<u>10 min</u>
4	Q1- What are the the different protocols used in LAN ? A1- Token Ring, Ethernet, FDDI. Q2- What is IEEE.X standard for Ethernet ? A2- . IEEE 802.5	<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan-26

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 4

S. No.	Topic: - Introduction to time division multiplexing.	Time Allotted:-
1.	Introduction TDM can be handled entirely by digital electronics, so it has become far more wide spread in recent years than FDM. The analogue telephone voice signals need to be digitized and combined onto a single outgoing digital trunk. This is done by a device called a codec, producing 7 or 8 bit number from 8000 samples per second. This technique is called PCM. T1 carrier consists of 24 voice channels multiplexed together TDM is used to allow T1 carriers to be multiplexed into higher order T2, T 3, and T4 carriers.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Synchronous TDM.- Interleaving.- Framing bits- Bit stuffing.- Asynchronous or statistical TDM.- Addressing overhead.- Variable-Length Time Slots- Inverse Multiplexing.	<u>20-25 min</u>
3.	Conclusion Multiplexing has been an essential tool of telephone industry. FDM is being replaced by TDM because of great strides in digital electronics and digital data communication.	<u>10 min</u>
4	Q1- Why do we require framing bits in synchronous TDM? A1- These bits allow the demultiplexer to synchronize with incoming stream so that it can separate the time slots accurately. Q2- What are the different types of interleaving methods used in TDM? A2- . It can be by bit, by byte or by any other data unit. In a given system interleaved units will always be of the same size.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:-
1. Electronic communication systems by Wayne Tomasi
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Lecture Plan-27

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 4

S. No.	Topic:- T1 Digital system, CCITT Standards CODECS & COMBO chips	Time Allotted:-
1.	Introduction T1 carrier systems were designed to combine PCM & TDM techniques for short haul transmission of 24 64kbps channels with each channel capable of carrying digitally encoded with voice band telephone signals or data.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- T1 carrier systems- CCCITT standards.- CODEC chips.- COMBO chips .- Uses of both.	<u>20-25 min</u>
3.	Conclusion The transmission bit rate of T1 carrier is 1.544 bps, including 8 kbps framing bit.	<u>10 min</u>
4	Q1- What is T1 digital system? A1- The system which gives the transmission b. Q2- What COMBO ? A2- . CODEC chip along with filter circuit is called as COMBO.	<u>5 min</u>

Assignment to be given:-NIL

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Lecture Plan-28

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 4

S. No.	Topic:-Line Encoding & T carriers	Time Allotted:-
1.	Introduction Digital line encoding involves converting standard logic levels (TTL, CMOS, etc.) to a form more suitable to telephone line transmission. T carriers are used for PCM encoded TDM digital signals. Digital line encoding involves converting standard logic levels (TTL, CMOS, etc.) to a form more suitable to telephone line transmission.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- .Line encoding details- T carrier systems- Types of line encoding.- Types of T carrier systems.- Composite baseband signal.	<u>20-25 min</u>
3.	Conclusion Digital line encoding involves converting standard logic levels (TTL, CMOS, etc.) to a form more suitable to telephone line transmission.	<u>10 min</u>
4	Q1- What line encoding ? A1- Digital line encoding involves converting standard logic levels (TTL, CMOS, etc.) to a form more suitable to telephone line transmission. Q2- What are T carriers ? A2- .. T carriers are used for PCM encoded TDM digital signals.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :-1 Electronic communication systems by Wayne Tomasi

2 Data Comm.. By Forauzan

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Lecture Plan-29

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 4

S. No.	Topic:- Bit Interleaving Vs. Word Interleaving	Time Allotted:-
1.	Introduction Bit Interleaving is the process when TDM is implemented on two PCM systems in which it becomes necessary to interleave the transmission from various terminals in time domain.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- .Define Bit Interleaving.- Define Word Interleaving.-- Difference between bit & word interleaving.	<u>20-25 min</u>
3.	Conclusion Bit Interleaving is the process when TDM is implemented on two PCM systems in which it becomes necessary to interleave the transmission from various terminals in time domain.	<u>10 min</u>
4	Q1- On which factor the decision to use interleaving is dependant ? A1- It is dependant upon the nature of the signals to be multiplexed. Q2- Give example which use bit interleaving ? A2- . Higher speed TDM systems and delta modulation are the two example.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:-
1 Data Communication Networks by . Sanjay Sharma
2. Data Comm.. By Forauzan

Lecture Plan-30

Semester:-VIIClass:-ECECourse Code:-ECE-407-FSubject: - Data CommunicationUnit:- 4

S. No.	Topic:- Composite Base Band signals	Time Allotted:-
1.	<p>Introduction</p> <p>Composite baseband signal is the total intelligence signal prior to modulation of final carrier. The formation of composite baseband signal includes channel, group, supergroup, mastergroup banks, depending the capacity of the system.</p>	<u>10 min</u>
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - .Define composite baseband signal. - Explanation of cbs. - Types of groups formed. - Formation of groups. - Mastergroup formation. 	<u>20-25 min</u>
3.	<p>Conclusion</p> <p>Composite baseband signal is the total intelligence signal prior to modulation of final carrier. The formation of composite baseband signal includes channel, group, supergroup, mastergroup banks, depending the capacity of the system</p>	<u>10 min</u>
4	<p>Q1- What are the factors which include composite baseband signal</p> <p>A1- Channels, group, supergroup, mastergroup.</p> <p>Q2- Define composite baseband signal.</p> <p>A2- . Composite baseband signal is the total intelligence signal prior to modulation of final carrier</p>	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- . 1 Electronic communication systems by Wayne Tomasi
2. Data Comm. By Forauzan

Doc. No.: DCE/0/15

Revision: 00

Lecture Plan-31

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:- 4

S. No.	Topic:- Formation of Master Group	Time Allotted:-
1.	Introduction The mastergroup is of two types. L600, U600. The L600 is used for low capacity microwave systems. U600 group is used for higher capacity microwave radio systems.	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- Define Mastergroup- Types of Mastergroup- Brief L600- Brief U600 group- Formation of Mastergroup.	<u>20-25 min</u>
3.	Conclusion The mastergroup is of two types. L600, U600. The L600 is used for low capacity microwave systems. U600 group is used for higher capacity microwave radio systems.	<u>10 min</u>
4	Q1- State the application of L600 group. A1- For low capacity microwave systems Q2- State the application of U600 group. A2- . . U600 group is used for higher capacity microwave radio systems	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :-1 Electronic communication systems by Wayne Tomasi
2 Data Comm.. By Forauzan

Doc. No.: DCE/0/15

Revision: 00

Lecture Plan-32

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-5

S. No.	Topic:- Internet Vs. TCP/IP	Time Allotted:-
1.	Introduction:- Internet is the network of networks..Millions of people in more than 100 countries, access the internet, rightly called information Superhighway or cyberspace.Historically it was launched by ARPA(Advanced Research Agency). Three different organizations that keep it running are,ICANN,IETF and ISOC	<u>10 min</u>
2	Division of the Topic <ul style="list-style-type: none">- .Accessing and use of Internet.- TCP/IP layers and OSI model- IP packets. IP headers fields.- IP addresses- TCP header fields.- UDP header fields	<u>20-25 min</u>
3.	Conclusion <p>Internet access has grown exponentially over the years and is providing btter and better services day by day. Two important limitations of IPv.4 are inadequate address space and inability to support realtime (time sensitive) services. IPv.6 is proposed to address both these problems.</p>	<u>10 min</u>
4	Q1- What are the binding rules of using subnet mask? A1- (a) Each host must have unique IPaddress. (b) Each network must have a unique classful IP address.(c) Each network segment must use unique subnet address space(d) All hosts/nodes on a network segment must use same subnet mask. Q2- How is TCP reliable transport? A2- The TCP is reliable transport because (a) the sequence number and acknowledgement number together take care of loss identification and recovery.(b)because flow control mechanism used.	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :-1 Data Communication Networks by Sanjay Sharma.

2. Data Comm. By Forauzan

Lecture Plan-33

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-5

S. No.	Topic:- Accessing & use of Internet	Time Allotted:-
1.	<p>Introduction</p> <p>New convergence network technologies today permit any computer to be linked any other computer(s) on the worldwide global network called Internet, for real-time, off-line communication and information exchange. Although it is mainly used for data communication, soon the time sensitive services like voice and video would become common over Internet.</p>	<u>10 min</u>
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> - DNS in the Internet - E-mail Address - Message Categories - Universal Resource Locator - Browser Architecture - Categories of Web Documents 	<u>20-25 min</u>
3.	<p>Conclusion</p> <p>Internet has become part and parcel of modern era. Due to competitive global business process and classified information exchange the security threats have been increasing exponentially. Several advanced data encryption standards have been introduced.</p>	<u>10 min</u>
4	<p>Q1- What are the common uses of internet? A1- Information exchange is main use. E-Mail is the next most common use.</p> <p>Q2- How do you find information and e-mail on internet? A2- . Internet explorer applications, various search engines and ftp facilitate use of internet.</p>	<u>5 min</u>

Assignment to be given:-NIL Reference Readings:-

- 1 Data Communication Networks by Sanjay Sharma.
2. Data Comm. By Forauzan

Lecture Plan-34

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-5

S. No.	Topic:- Security on internet	Time Allotted:-
1.	Introduction:- Security has become one of the primary concerns when an organization connects its private network to the Internet. Regardless of the business, an increasing number of users on private networks are demanding access to Internet services such as the World Wide Web (WWW), Internet mail, Telnet, and File Transfer Protocol (FTP).	<u>10 min</u>
2	Division of the Topic Internet Firewalls The Hacker's Toolbox	<u>20-25 min</u>
3.	Conclusion Network administrators have increasing concerns about the security of their networks when they expose their organization's private data and networking infrastructure to Internet crackers. To provide the required level of protection, an organization needs a security policy to prevent unauthorized users from accessing resources on the private network and to protect against the unauthorized export of private information.	<u>10 min</u>
4	NS - Domain Name Service FTP - File Transfer Protocol ICMP - Internet Control Message Protocol ISP - Internet service provider ISS - Internet Security Scanner	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- Data Communication Networks by
2 Forauzan

Lecture Plan-35

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-5

S. No.	Topic:-	Time Allotted:-
1.	Introduction:- An Internet firewall is a system or group of systems that enforces a security policy between an organization's network and the Internet. The firewall determines which inside services may be accessed from the outside, which outsiders are permitted access to the permitted inside services, and which outside services may be accessed by insiders. For a firewall to be effective, all traffic to and from the Internet must pass through the firewall	<u>10 min</u>
2	Division of the Topic Internet Firewalls Benefits of an Internet Firewall Limitations of an Internet Firewall Components of the Firewall System	<u>20-25 min</u>
3.	Conclusion Internet firewalls allow the network administrator to define a centralized "choke point" that keeps unauthorized users such as hackers, crackers, vandals, and spies out of the protected network; prohibits potentially vulnerable services from entering or leaving the protected network; and provides protection from various types of routing attacks..	<u>10 min</u>
4	Q1: what are the limitation of fire wall? A1: An Internet firewall cannot protect against attacks that do not go through the firewall. Q2: what are the components of fire wall? <ul style="list-style-type: none">• A2: Packet-filtering router• Application-level gateway (or proxy server)• Circuit-level gateway	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- Data Communication Networks by 1. Sanjay Sharma
Forauzan

Lecture Plan-36

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-5

S. No.	Topic:- The Ideal LAN	Time Allotted:-
1.	<p>Introduction:- It would be an information distribution system that is as easy to use as the conventional AC power distribution system in a building. So adding a data terminal, processor, or peripheral to a local area network should require nothing more than plugging it into a conveniently located access port.</p>	<u>10 min</u>
2	<p>Division of the Topic Features Obstacles Standards</p>	<u>20-25 min</u>
3.	<p>Conclusion .. Providing a network with a desired data rates and distances is only one item that can be considered in data communication</p>	<u>10 min</u>
4	<p>Q1;State any two features of ideal LAN A1; 1. Excess capacity 2. Easy maintenance Q2:State any two obstacles of ideal LAN A2:1: Diverse requirements 2.Costly transmission media</p>	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- Data Communication Networks by 1. Sanjay Sharma
Forouzan

Lecture Plan-37

Semester:-VII

Class:-ECE

Course Code:-ECE-407-F

Subject: - Data Communication

Unit:-5

S. No.	Topic:- Gigabit Ethernet	Time Allotted:-
1.	<p>Introduction:- It represents the latest version of Ethernet by IEEE. It has transmission capacity 10 times that of fast Ethernet & 100 times that of original Ethernet</p>	<u>10 min</u>
2	<p>Division of the Topic Media Support MAC layer operation Packet bursting.</p>	<u>20-25 min</u>
3.	<p>Conclusion Gigabit represents an emerging Ethernet standard. The goal of this emerging standard is to preserve the Ethernet frame format to include its minimum & maximum frame length.</p> <p>Q.No.1 What is the capacity of gigabit Ethernet? Ans 1 Gbps</p> <p>Q.No.2 What is full form of SX? Ans Shortwave laser operating at 850 nanometer</p>	<u>10 min</u>
4	•	<u>5 min</u>

Assignment to be given:-NIL

Reference Readings:- :- Data Communication Networks by 1. Sanjay Sharma
Forouzan