Question 1:

(a) The Packet Switching approach has a number of advantages over circuit switching. Write three advantages. ***(3 marks)***

(b) Explain:

- Segmentation ***(1 mark)***
- The TDM techniques are in increasingly widespread use. ***(2 mark)***
- The development of high speed LANs, with data rate 100 Mbps to 10 Gbps.***(1 mark)***

Question 2:

(a) In ATM. We want to establish a call using virtual path. If we know that the VPC is not exists. Sketch the algorithm, which shows the procedure of establishment***.(3 marks)***

(b) In satellite networks, we use SS/TDMA operation. Use the following data to sketch the Uplink and Downlink. ***:(4 marks)***

- The system serving two areas (A & B). Each area contains two stations.
- Station 1 transmits within an area A to station 2 & station 4.
- Station 2 transmits within an area A to station 3 only.
- Station 3 transmits within an area B to station 1 and station 2.
- Station 4 transmits within area B to station 3 and station 4
- Use 3 periods.

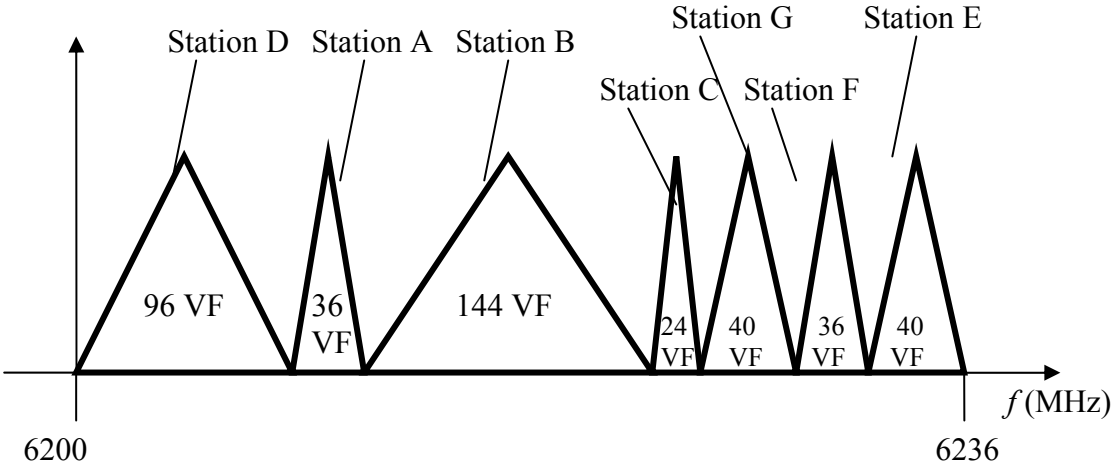
Question 3:

1- FAMA-DAMA, with seven earth stations sharing a bandwidth in transponder uplink diagram as shown in figure below. Determine:

(a) Transmission bandwidth***.(1 mark)***

(b) The bandwidth of station B***.(1 mark)***

(c) The Carrier frequency of station D***.(1 mark)***



Question 4: What is TCP/IP? ***(3 marks)***

Question 1:

(c) The virtual path control mechanism includes three steps, write them.

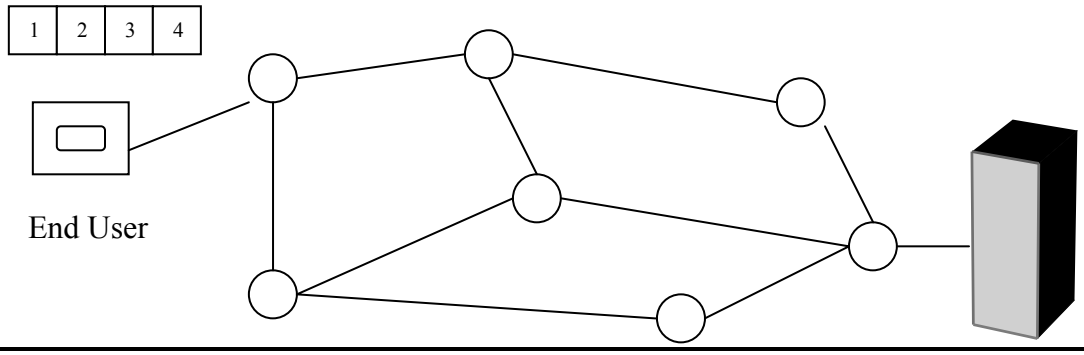
(d) Give the meaning of:

- Virtual path connection (VPC).
- Virtual channel connection (VCC).
- ATM cells.

Question 2:

(c) Sketch the ATM cell format for user-network interface.

(d) In the figure below, show the datagram approach and virtual circuit approach. Explain the packet switching operation.



Question 3:

(d) Explain the technique (single channel per carrier).

(e) Sketch the possible QPSK SCPC transmitter configuration in satellite communication system.

Question 4:

What are the differences between FAMA-TDMA operation and SS/TDMA operation? Give an example illustrating these differences by using figures.

Question 1: (7 marks)

a- Communication via circuit switching involves three phases. Write them.[3]

b- Explain:

1- In packet switching, there is a significant relationship between packet size and transmission time.[2]

2- A synchronous transfer mode (ATM) is streamlined protocol with minimal error and flow control capabilities.[2]

Question 2 :(6 marks)

a- Internetworking among dissimilar subnetworks is achieved by using routers to interconnect the subnetworks. What are the functions that the router must perform?[3]

b- The number of subchannels provided within a satellite channel via FDMA is limited by three factors. Write them.[3]

Question3 :(10 marks)

In GSM, a speech block consists of 480 bits and a frame time of about 5 ms. If we want to send data with a coding delay of 20 ms, calculate:

1- The bit rate if the maximum transmission duration of 0.2 ms.[5]

2- The minimum number of guard bits if the average telephone call is about 130 s and the maximum vehicle speed V_m=130 km/hr.[5]

Question 4 :(8 marks)

a- GSM and many other Cellular schemes use a technique known as Slow Frequency Hopping (SFH). Why?[4]

b- Sketch the mobile IP scenario.[4]

Question 5 :(10 marks)

a- What is the WAP? Write three of its specifications.[6]

b- What are the two principal limitations of wireless Web access?[4]

Question 6 :(9 marks)

a- There are four application areas for wireless LANs. Explain each of them.[6]
b- Write three important requirements for wireless LANs.[3]

Question 1

Choose the correct answer:

1- In circuit switching:
a- At each node en route, the packet is received, stored and passed on the next node.
b- Before any signals can be transmitted, an end-to-end circuit must be established.
c- The connection provides for transmission at a variable data rate.
d- The Packet header includes control information. (2)

2- ATM:
a- allows multiple logical connections to be multiplexed over a single physical interface.
b- is a streamlined protocol with variable packet size to minimize error and flow control capabilities.
c- is Asynchronous Transfer Mode similar to circuit switching.
d- uses the same header format in user-network and network-network interfaces. (2)

3- In datagram approach (Packet switching):
a- each packet is treated independently, with no reference to packets that have gone before.
b- a preplanned route is established before any packets are sent.
c- call setup phase needs less time.
d- fixed packet size. (2)

4- In TCP/IP layers
a- Internet protocol (IP) is used at internet layer to provide the routing function between two end users.
b- TCP is a transmission control protocol ,which provide the function (host-to-host) layer.
c- The physical layer covers the physical interface between two networks.
d- The address of destination computer and priority can be exchanged between two end users, using application layer. (2)

5- The simplest error detection scheme is to :
a- append an odd parity bit to the end of data block.
b- append an even parity bit to the end data block.
c- append a parity bit depending on the number of ones in data block.
d- append a parity bit depending on data block length. (2)

Question 2

We want to transmit an 8-bit data block 1010011 and to detect and correct at receiver using 4-bit Hamming code.

1- determine the hamming code (2)
2- what is the received block without errors. (2)
3- If error was occurred in the forth bit in received data. Write the correcting procedure. (2)

Question 3

Calculate the free space loss for a satellite with distance 12000 km and carrier frequency 2 GHz.

Question1

In satellite communications, the bandwidth can be broken up into a number of channels and the number of channels can be doubled by means of:

a- Frequency hopping.
b- Using two carriers with orthogonal polarization.
c- Time reuse.
d- FDMA.

Question2

Fixed-assignment access-TDMA is:

a- The assignment of capacity within the overall satellite channel is distributed in fixed manner among multiple stations.
b- The capacity assignment is changed as needed to respond optimally to demand changes among the multiple stations.
c- The distribution of variable carriers among one earth station.
d- The using if FM in transmitting.

Question3

Single channel per carrier is a technique that we use to:

a- Group channels in one bandwidth.
b- Group earth stations in one area.
c- Avoid groupings and to divide the bandwidth into individual channels.
d- Transmit a repetitive TDM frame for full- duplex communication.

Question4

In FAMA-TDMA operation:

a- Individual earth stations take turns using the uplink channel and may put a burst of data in the assigned frequency.
b- The satellite repeats all incoming transmissions with high frequencies.
c- The transmission depends on the frequency sharing.
d- Each station uses an assigned slot to transmit a burst of data, consisting of a preamble and user information.

Question5

One of three factors that limit the number of subchannels that can be provided within a satellite channel via FDMA is:

a- The using of FDM.
b- Crosstalk
c- Type of satellite.
d- The modulation technique that we use.

Question6

One of the differences between first and second generation cellular systems is:

a- The using of full-duplex communication in second generation.
b- The encryption in first generation.
c- The time division multiple access in second generation.
d- The large bandwidth in first generation.

Question7

In TDMA design considerations, the maximum transmission duration to be followed by a training sequence depends on:

a- Transmission frequency and number of bits per channel.
b- The maximum vehicle speed and the required bandwidth.

c- The transmission frequency and the maximum vehicle speed.
d- The maximum vehicle speed and number of channels.

Question8

We use guard time to:

a- Avoid the need to frequency division multiplexing.
b- Account for the differing amounts of delay between different mobile units and base station.
c- Calculate the average telephone call.
d- Change the propagation delay caused by a movement of distance between the mobile and base station.

Question9

Consider an speech block that consists of 480 bits with 4 time slots. If the training bits time equal o.o5 ms and data time slot= 0.4 ms, then the number of bits in training sequence is:

a- 30 bits.
b- 15 bits.
c- 15.25 bits.
d- 20 bits.

Question10

In GSM network architecture, the network subsystem:

a- Stores the information about each subscriber that belongs to it.
b- Provides the link between the cellular network and the public switched telecommunication network.
c- Allows synchronization of transmissions from mobile units located at different distances form the base station.
d- Used to avoid overlapping with other bursts due to different path delays.

Objectives:

- First 5 questions are about FDMA and TDMA in satellite communications.
- The remained questions are about the cellular wireless networks and the GSM design considerations.

Choose the correct answer:

1- Synchronous Connection Oriented (SCO) is:

a- a physical link that allocates a fixed bandwidth between a point-to-point connection involving the master and single slave.
b- a logical link that allocates a variable bandwidth between the master and all slaves in the piconet.
c- a logical link that allocates a variable bandwidth between a point-to-point connection involving he master and single slave.
d- a physical link that allocates a fixed bandwidth between the master and all slaves in the piconet.

2- Ad Hoc Networking is:

a- a wireless link between a LAN hub and a mobile data terminal equipped with an antenna, such as a laptop computer.
b- a point-to point wireless link between buildings.
c- a peer-to-peer network set up temporarily to meet some immediate need.
d- a line between users and the main server.

3- In wireless Application protocol, the WML

a- designed to describe content and format for presenting data on computers with limited bandwidth.

b- designed to describe content and format for presenting data on devices with limited bandwidth, limited screen size and limited user input capability.
c- designed to work with laptop as a main language.
d- designed to provide security for TCP/IP.

4- GSM and many other cellular schemes use a technique known as a slow frequency hopping (SFH) to

a- reduce the effect of channel interference and enhance the system security.
b- reduce the bandwidth.
c- compensate the loss in data rate.
d- increase the number of logical channels.

5- One of the main differences between First and Second Generation Cellular systems is:

a- they use different analog modulation techniques.
b- second generation systems are purely analog.
c- first generation uses TDMA.
d- second generation systems are digital.

6- In satellite communications, the term "Frequency Reuse" means "each frequency assignment is used by:

a- two carriers with horizontal polarization".
b- one carrier with orthogonal polarization".
c- two carriers with vertical polarization".
d- two carriers with orthogonal polarization".

7- In coding and error control. Parity check is:

a- the simplest error detection scheme is to append a parity bit to the end of a block of data.
b- the simplest error detection and correction scheme is to append a parity bit to the end of a block of data.
c- the simplest error correction scheme is to append a parity bit to the end of a block of data.
d- the simplest error detection scheme is to append a parity bits to the end of a Hamming code block.

8- The physical layer is one of TCP/IP layers that

a- is concerned with the exchange of data between an end systems.
b- cover the physical interface between a data transmission device and a transmission medium or network.
c- is concerned with access to and routing data across a network for two end systems attached to the same network.
d- contains the logic needed to support the various user applications.

9- In ATM services categories, the non-real-time services

a- are intended for applications that have burst traffic characteristics and do not have tight constraints on delay and delay variation.
b- are intended for time-sensitive applications.
c- are the simplest services that require a fixed data rate.
d- are intended for applications that have tight constraints on delay variation.

10- Communication via circuit switching involves three operations. The first operation is

a- circuit disconnect
b- information transfer.
c- circuit establishment.
d- information receive.

Question 2: ***(12 Mark)***

a- Write three advantages for Infrared LANs over Microwave LANs.
b- Write and explain three Wireless LAN Requirements.

Question 3: ***(8 Marks)***

a- Sketch the block diagram of continuously variable slope delta (CVSD) Encoder that is used in Bluetooth Audio modulation.

b- Write three examples of Bluetooth uses.