(2170710)

Mobile Computing and Wireless Communication SUMMER 2019

[Q.1]

(a) Define Reflection, Refraction and diffraction.

➔ **Reflection:**

➔Reflection is when waves, whether physical or electromagnetic, bounce from a surface back toward the source. A mirror reflects the image of the observer.

➔**Refraction:**

➔Refraction is when waves, whether physical or electromagnetic, are deflected when the waves go through a substance. The wave generally changes the angle of its general direction.

➔**Diffraction:**

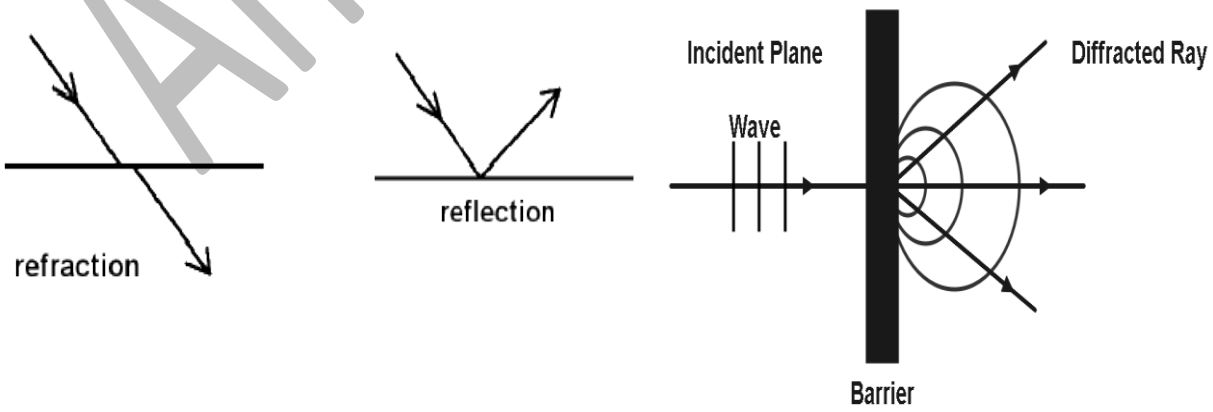
➔Diffraction is when a wave goes through a small hole and has a flared out geometric shadow of the slit.

➔ Diffraction is a characteristic of waves of all types.

➔We can hear around a corner because of the diffraction of sound waves.

➔For instance, if a wall is next to you when you yell, the sound will parallel the wall.

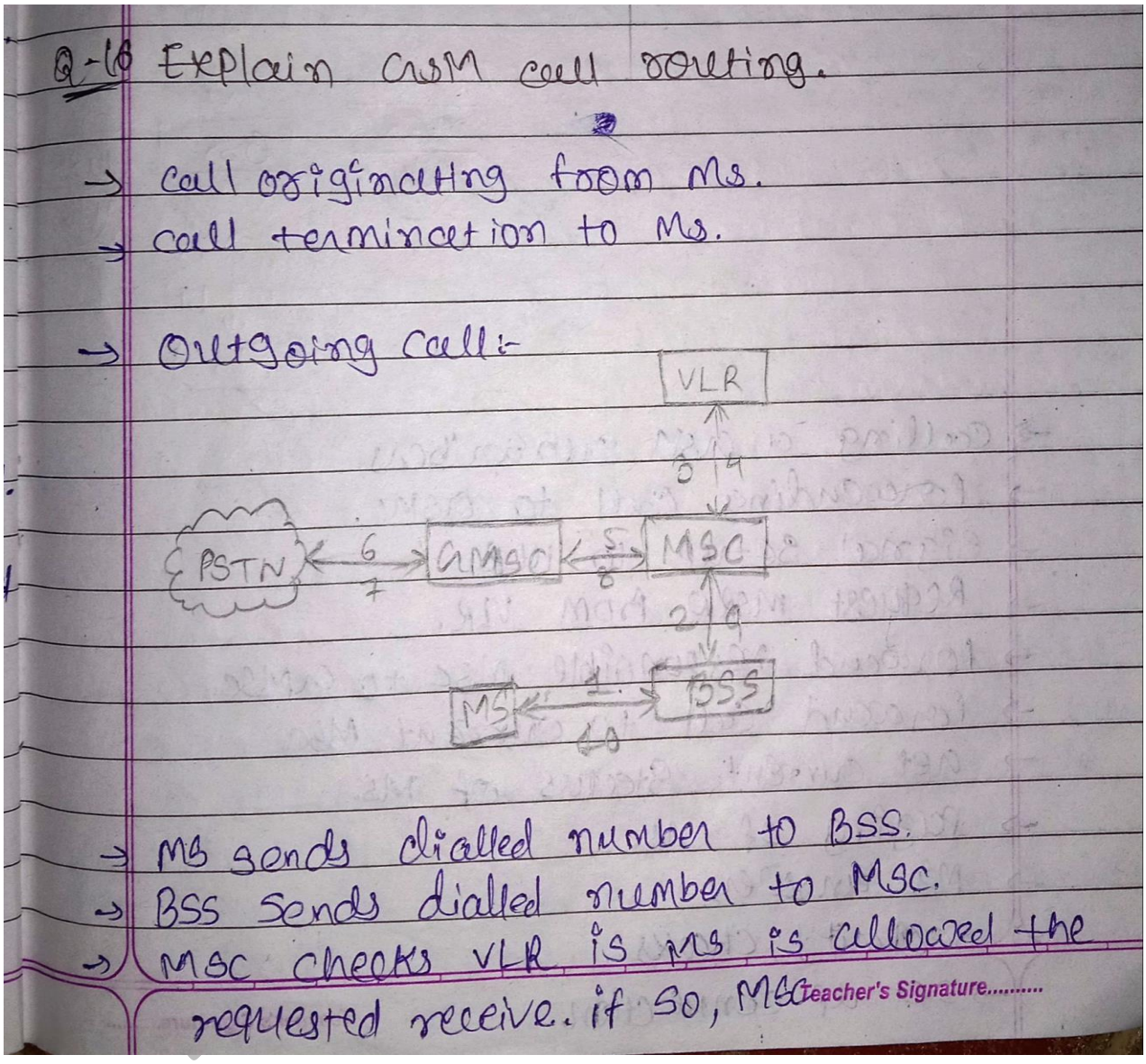
➔ The wall may stop, but the voice doesn't; sound will almost turn the corner of the wall. This is diffraction.



(b) Explain packet switching and circuit switching.

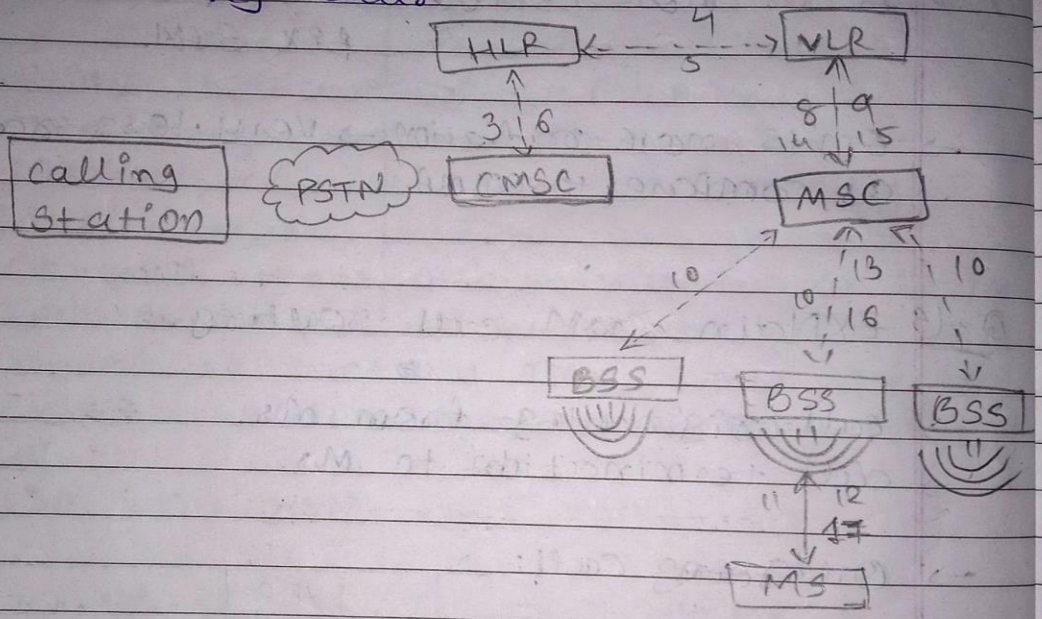
➔ refer Q-1-b WINTER 2021

(c) Explain GSM call routing.



asks BSS to allocate resources for call.
→ MSC routes the call to GMSC.
→ GMSC routes the call to local exchange of called user.
→ Answer back (ring back) tone is routed from called user to MS via GMSC, MSC, BSS.

⇒ Incoming Calls-



⇒ Calling a GSM subscribers
→ Forwarding call to GSMC.
→ Signal setup to HLR.
→ Request MSRN from VLR.
→ Forward responsible MSC to GMSC.
→ Forward call to current MSC.
→ Get current status of MS.
→ Paging of MS.
→ MS answers
→ Security checks
→ Set up connection.

Teacher's Signature.....

[Q.2]

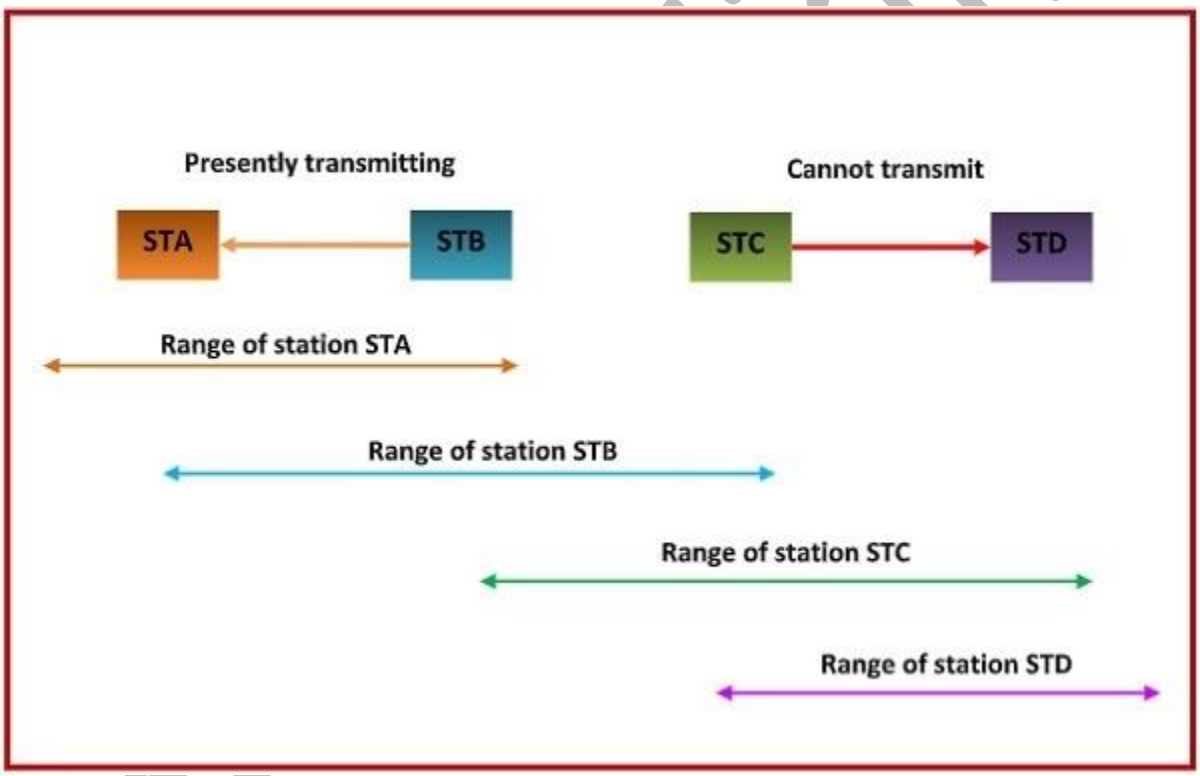
(a) Discuss hidden and exposed terminals.

➔ **Exposed terminal problem:**

➔Suppose that there are four stations labelled STA, STB, STC, and STD, where STB and STC are transmitters while STA and STD are receivers at some slot of time.

➔ The stations are in a configuration such that the two receivers STA and STD are out of radio range of each other, but the two transmitters STB and STC are in radio range of each other.

➔This is shown in the following figure:



➔The above diagram shows that a transmission is going on from STB to STA. STC falsely concludes that the above transmission will cause interference and so stops its transmission attempts to STD.

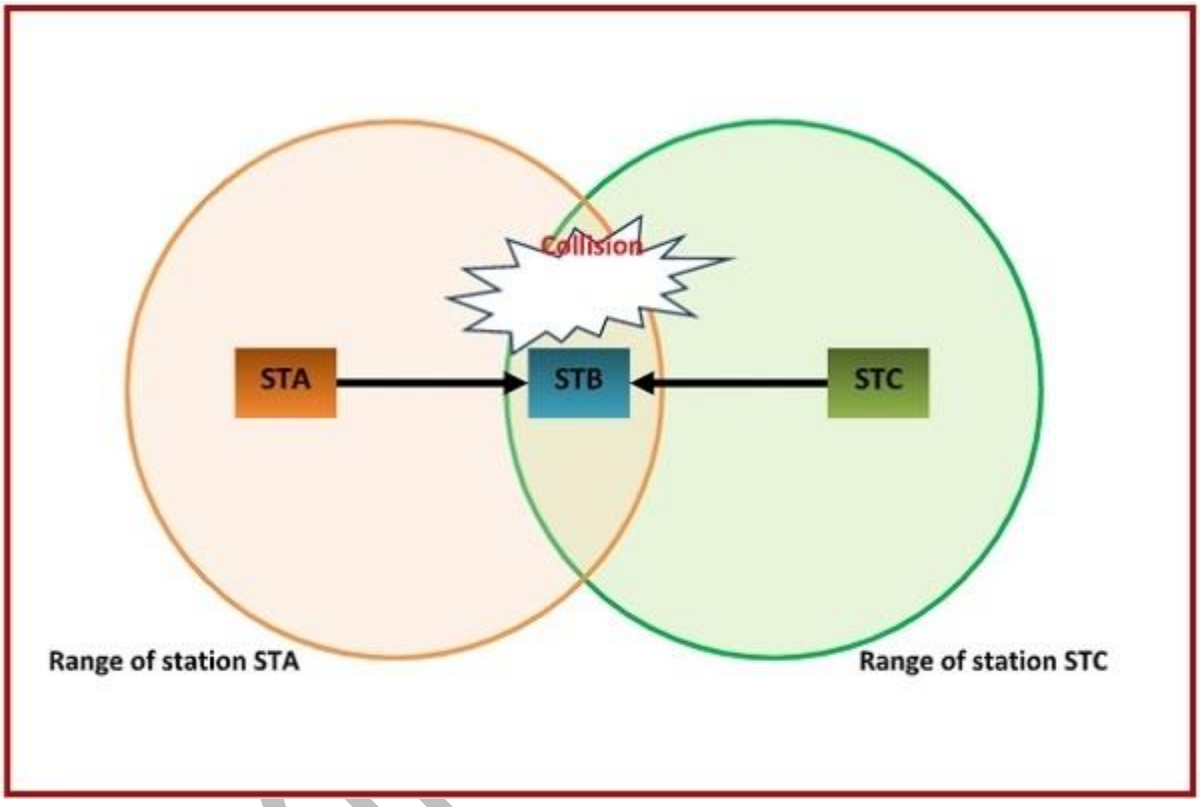
➔However, the interference would not have occurred since the transmission from STC to STD is out of range of STB.

➔This prevention of transmission is called exposed terminal problem.

➔ **Hidden Terminal Problem:**

➔Suppose that there are three stations labelled STA, STB, and STC, where STA and STC are transmitting while STB is receiving.

➔The stations are in a configuration such that the two transmitters STA and STC are not in the radio range of each other. This is shown in the following figure :



➔The above diagram shows that station STA starts transmitting to station STB.

➔Since station STC is out of radio range of STA, it perceives that the channel is free and starts transmitting to STB.

➔The frames received by STC are garbled and collision occurs.

➔ This situation is known as the hidden terminal problem.

(b) Write a short note on selective repeat ARQ.

➔ refer Q-2-b WINTER 2021

(c) Explain various signal multiplexing techniques.

➔ Multiplexing is the sharing of a medium or bandwidth. It is the process in which multiple signals coming from multiple sources are combined and transmitted over a single communication/physical line.

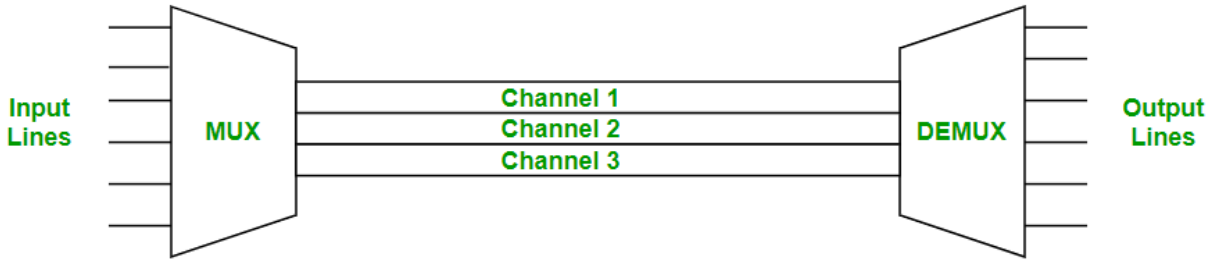
Types of Multiplexing

There are three types of Multiplexing:

1. Frequency Division Multiplexing (FDM)
2. Time-Division Multiplexing (TDM)
3. Wavelength Division Multiplexing (WDM)

1. Frequency Division Multiplexing :

➔Frequency division multiplexing is defined as a type of multiplexing where the bandwidth of a single physical medium is divided into a number of smaller, independent frequency channels.

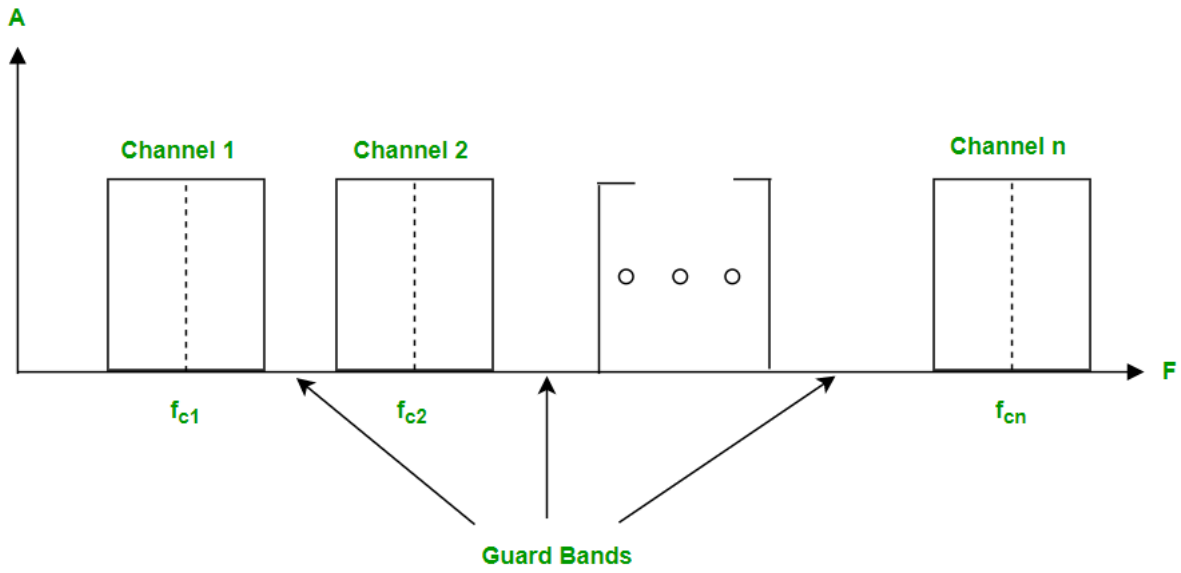


➔Frequency Division Multiplexing is used in radio and television transmission.

➔In FDM, we can observe a lot of inter-channel cross-talk, due to the fact that in this type of multiplexing the bandwidth is divided into frequency channels.

➔In order to prevent the inter-channel cross talk, unused strips of bandwidth must be placed between each channel.

➔These unused strips between each channel are known as guard bands.

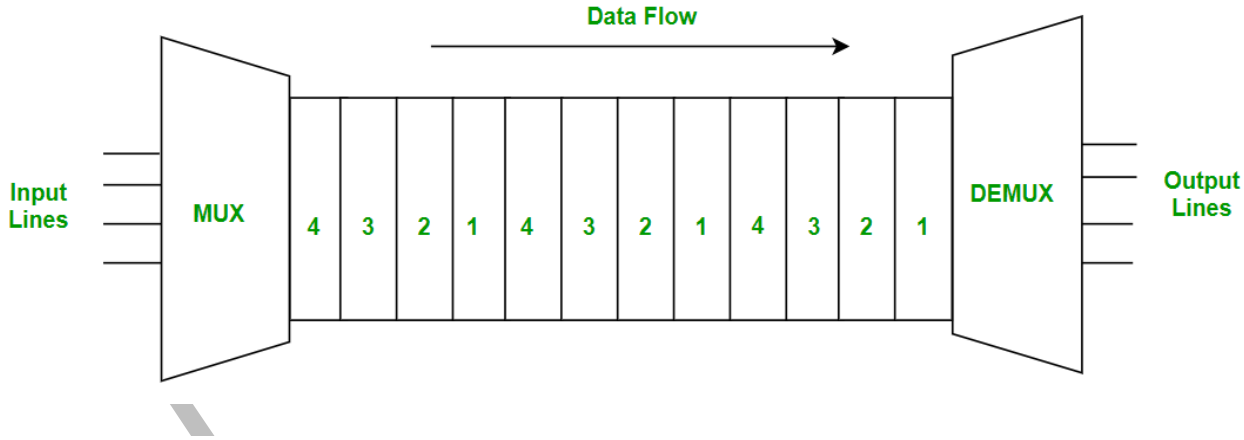


2. Time Division Multiplexing :

➔Time-division multiplexing is defined as a type of multiplexing wherein FDM, instead of sharing a portion of the bandwidth in the form of channels, in TDM, time is shared.

➔Each connection occupies a portion of time in the link.

➔In Time Division Multiplexing, all signals operate with the same frequency (bandwidth) at different times.



➔There are two types of Time Division Multiplexing :

1. Synchronous Time Division Multiplexing
2. Statistical (or Asynchronous) Time Division Multiplexing

➔**Synchronous TDM :**

Synchronous TDM is a type of Time Division Multiplexing where the input frame already has a slot in the output frame. Time slots are grouped into frames.

➔One frame consists of one cycle of time slots.

➔Synchronous TDM is not efficient because if the input frame has no data to send, a slot remains empty in the output frame.

I➔n synchronous TDM, we need to mention the synchronous bit at the beginning of each frame.

➔**Statistical TDM :**
➔Statistical TDM is a type of Time Division Multiplexing where the output frame collects data from the input frame till it is full, not leaving an empty slot like in Synchronous TDM.

➔In statistical TDM, we need to include the address of each particular data in the slot that is being sent to the output frame.

➔Statistical TDM is a more efficient type of time-division multiplexing as the channel capacity is fully utilized and improves the bandwidth efficiency.

3. Wavelength Division Multiplexing :
➔Wavelength Division Multiplexing is used on fiber optics to increase the capacity of a single fiber.

➔It is an analog multiplexing technique. Optical signals from the different sources are combined to form a wider band of light with the help of multiplexers.

➔At the receiving end, the demultiplexer separates the signals to transmit them to their respective destinations.

OR

(c) Discuss Mobile IP.

➔The Mobile IP is Internet protocol that allows mobile device users to move from one network to another while maintaining the same permanent IP address.

➔The concept and role of Mobile IP are very important in the field of mobile computing technology.

➔The mobile IP makes the communication flawless and ensures that the communication will occur without the user's sessions or connections being dropped.

➔Mobile IP is based on IP, so it is scalable for the Internet. Any media that supports IP can also support Mobile IP.

➔Components of Mobile IP:

The mobile IP has following three components as follows:

1. Mobile Node (MN)

➔The Mobile Node is a device or a user or a router that can frequently change their network positions without changing its original IP address.

➔Examples of mobile nodes are cell phone, personal digital assistant (PDA), laptop, etc. whose software enables network roaming capabilities.

2. Home Agent (HA)

➔The Home Agent is a router on the home network. It serves as the anchor point for communication with the Mobile Node.

3. Foreign Agent (FA)

➔The Foreign Agent is a router that provides several services such as tunneling data-grams whenever a mobile node visits a foreign network.

➔It is responsible for delivering packets from the Home Agent to the Mobile Node.

4. Care of Address (COA)

➔The Care of Address or COA is used to define the mobile node's current position or user.

➔ It is used to deliver data packets through the process of tunneling.

5. Correspondent Node (CN)

➔The partner nodes which are used for communication with mobile nodes are called corresponding nodes.

6. Home Network

➔The home network is the base station network to which the mobile node originally belongs to.

7. Foreign network

➔The Foreign Agent is a router that provides several services such as tunneling data-grams whenever a mobile node visits a foreign network.

➔ It is responsible for delivering packets from the Home Agent to the Mobile Node.

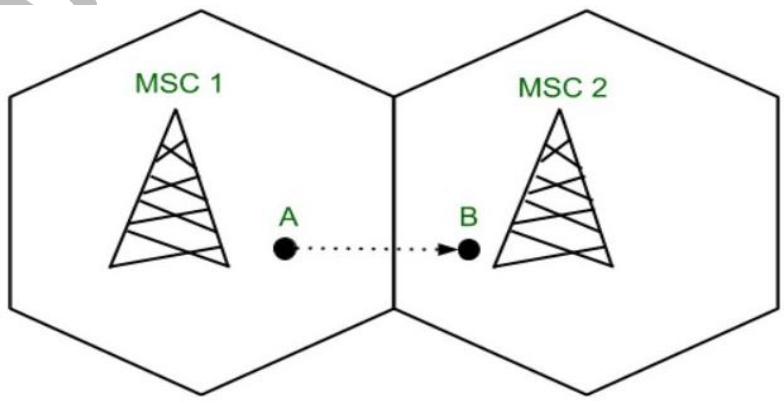
[Q.3]

(a) Differentiate infrastructure and ad-hoc network.

Infrastructure networks	Ad-hoc wireless networks
Fixed infrastructure	No infrastructure
Single-hop wireless links	Multi-hop wireless links
High cost and time of deployment	Very quick and cost-effective
Reuse of frequency via channel reuse	Dynamic frequency sharing
Nowadays applications: civilian, commercial	Nowadays applications: military, rescue
High cost of network maintenance	Maintenance operations are built-in
Low complexity of mobile devices	Intelligent mobile devices are required
Widely deployed, evolves	Still under development in commercial sector

(b) Explain handover process in cellular system.

➔ In cellular telecommunications, the terms **handover** or **handoff** refers to the process of transferring ongoing call or data connectivity from one Base Station to other Base Station. When a mobile moves into the different cell while the conversation is in progress then the MSC (Mobile Switching Center) transfer the call to a new channel belonging to the new Base Station.



➔When a mobile user A moves from one cell to another cell then BSC 1 signal strength loses for the mobile User A and the signal strength of BSC 2 increases and thus ongoing calls or data connectivity for mobile user goes on without interrupting.

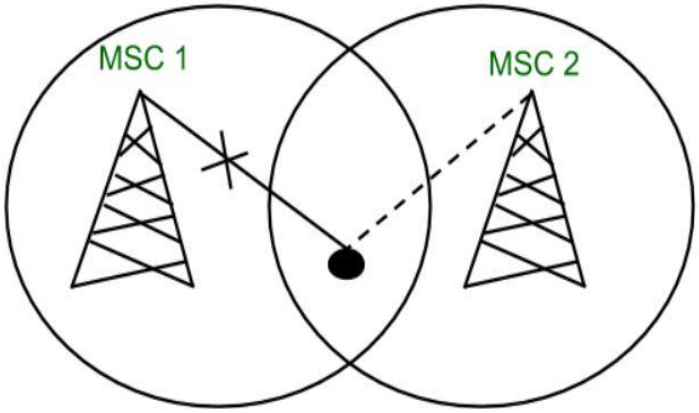
➔**Types of Handoff:**

➔**Hard Handoff:**

➔When there is an actual break in the connectivity while switching from one Base Station to another Base Station.

➔There is no burden on the Base Station and MSC because the switching takes place so quickly that it can hardly be noticed by the users.

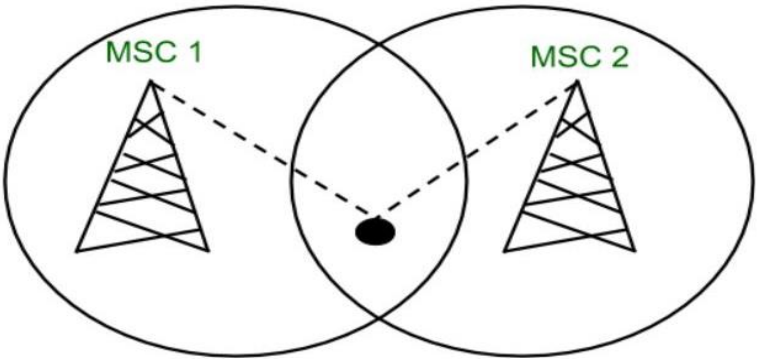
➔The connection quality is not that good. Hard Handoff adopted the 'break before make' policy.



➔**Soft Handoff:**

➔In Soft Handoff, at least one of the links is kept when radio signals are added or removed to the Base Station.

➔ Soft Handoff adopted the 'make before break' policy. Soft Handoff is more costly than Hard Handoff.



(c) Explain frequency hopping spread spectrum.

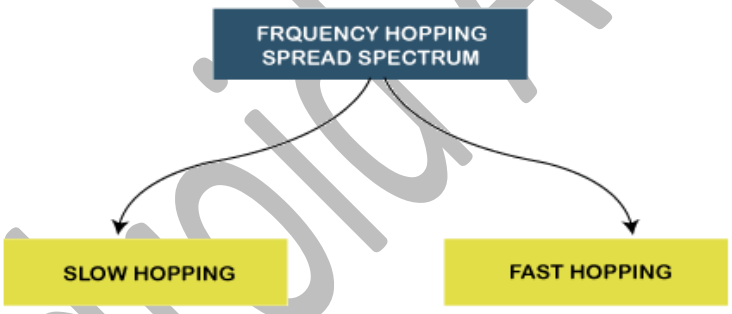
➔ The Frequency Hopping Spread Spectrum or FHSS allows us to utilize bandwidth properly and maximum. In this technique, the whole available bandwidth is divided into many channels and spread between channels, arranged continuously.

➔The frequency slots are selected randomly, and frequency signals are transmitted according to their occupancy.

➔The transmitters and receivers keep on hopping on channels available for a particular amount of time in milliseconds.

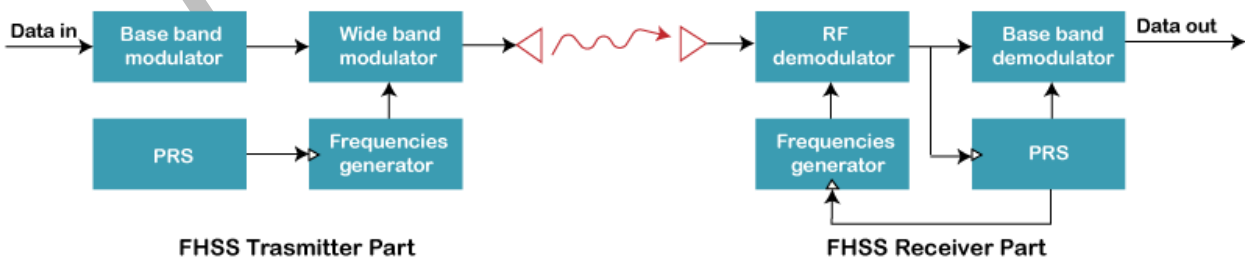
➔So, you can see that it implements the frequency division multiplexing and time-division multiplexing simultaneously in FHSS.

➔**The Frequency Hopping Spread Spectrum or FHSS can also be classified into two types:**



➔**Slow Hopping:** In slow hopping, multiple bits are transmitted on a specific frequency or same frequency.

➔**Fast Hopping:** In fast hopping, individual bits are split and then transmitted on different frequencies.



➔**Advantages:**

➔The biggest advantage of Frequency Hopping Spread Spectrum or FHSS is its high efficiency.

➔It requires a shorter time for acquisition.

➔We can easily program it to avoid some portions of the spectrum.

➔It provides a very large bandwidth.

➔It can be simply implemented as compared to DsSS.

➔**Disadvantages:**

➔FHSS is less Robust, so sometimes it requires error correction.

➔FHSS needs complex frequency synthesizers.

➔It is not very useful for range and range rate measurements.

➔It supports the lower coverage range due to the high SNR requirement at the receiver.

➔Nowadays, it is not very popular due to the emerging of new wireless technologies in wireless products.

➔FHSS supports a lower data rate of 3 Mbps as compared to the 11 Mbps data rate supported by DSSS.

OR [Q.3]

(a) What are the advantages of WLAN.

➔ Advantages of wireless local area network (WLAN)

➔It is a reliable type of communication

➔As WLAN reduces physical wires so it is a flexible way of communication

➔WLAN also reduces the cost of ownership

➔It is easier to add or remove workstation

➔It provides high data rate due to small area coverage

➔You can also move workstation while maintaining the connectivity

➔For propagation, the light of sight is not required

➔The direction of connectivity can be anywhere i.e. you can connect devices in any direction unless it is in the range of access point

➔Easy installation and you need don't need extra cables for installation

➔WLAN can be useful in disasters situation e.g. earthquake and fire. People can still communicate through the wireless network during a disaster

➔It is economical because of the small area access

➔If there are any building or trees then still wireless connection works

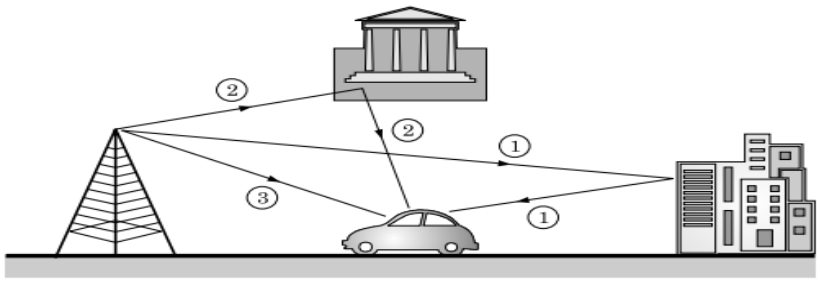
(b) What is Multi-path propagation and fading?

➔ **Multi-path propagation:** In multipath propagation, multiple signal paths are established between the base station and the user terminal (mobile phone).

➔The fading due to multipath propagation is known as 'Multipath fading' or 'Rayleigh fading'. One signal path arrives at an antenna (either mobile or base station) as a direct signal, while other signals are multipath or indirect signals.

➔ Indirect signal generated due to reflection; refraction or diffraction of signals from any or all objects lie in the path of transmitting antenna and receiving antenna.

➔These indirect signals can add to or subtract from the direct signal arriving at the antenna This depends on whether or not the indirect signals are in-phase or out-of-phase with the direct signal.



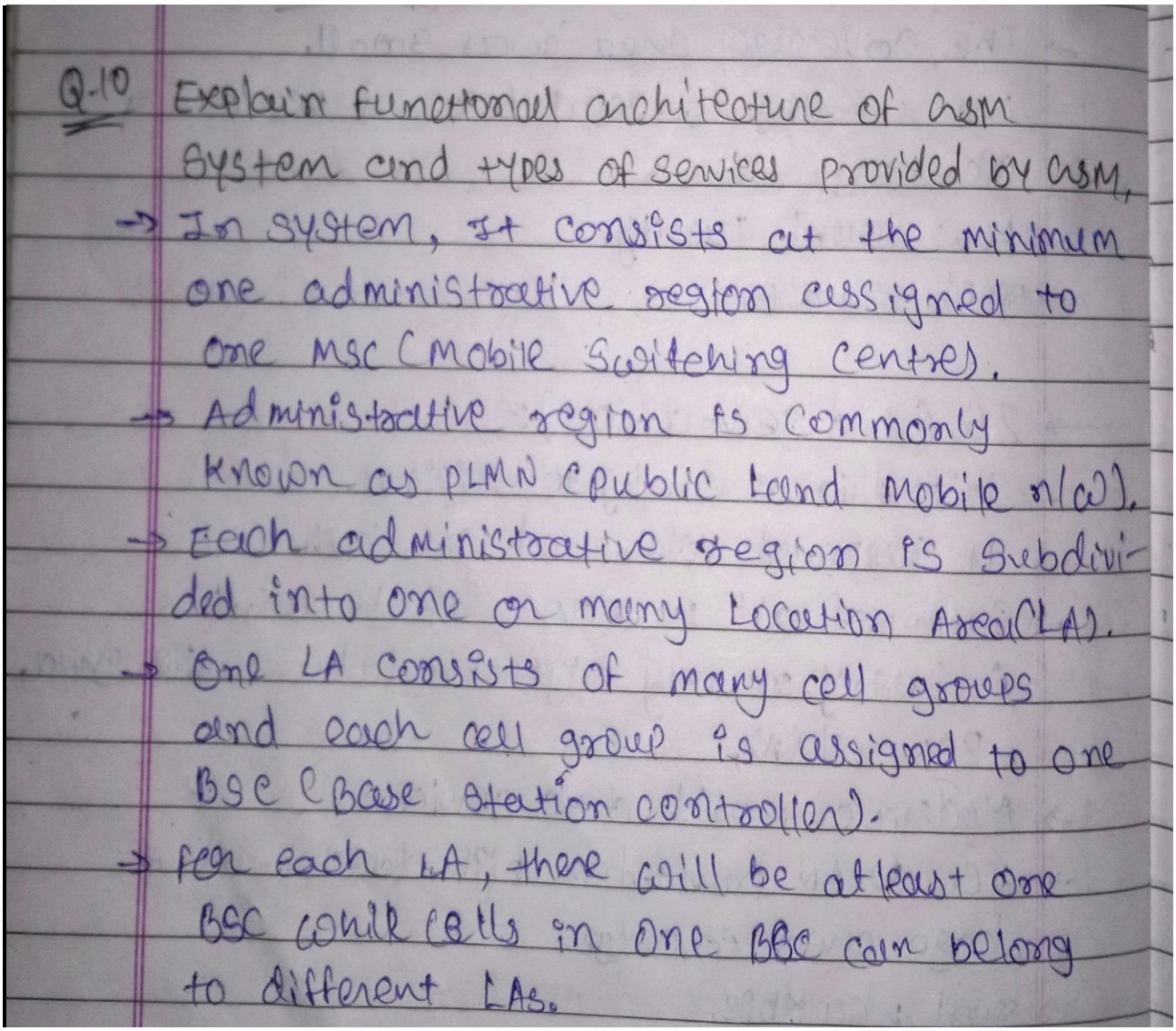
Multipath Propagation.

➔If the signals are in-phase then overall signal strength increases and if the signals are out-of-phase then over all signal strength decreases.

➔ **fading:**

➔Fading refers to the distortion that a carrier-modulated telecommunication signal experiences over certain propagation media. In wireless systems, fading is due tomultipath propagation and is sometimes referred to as multipath induced fading.

(c) Discuss GSM architecture in detail.


Q.10 Explain functional architecture of GSM system and types of services provided by GSM.

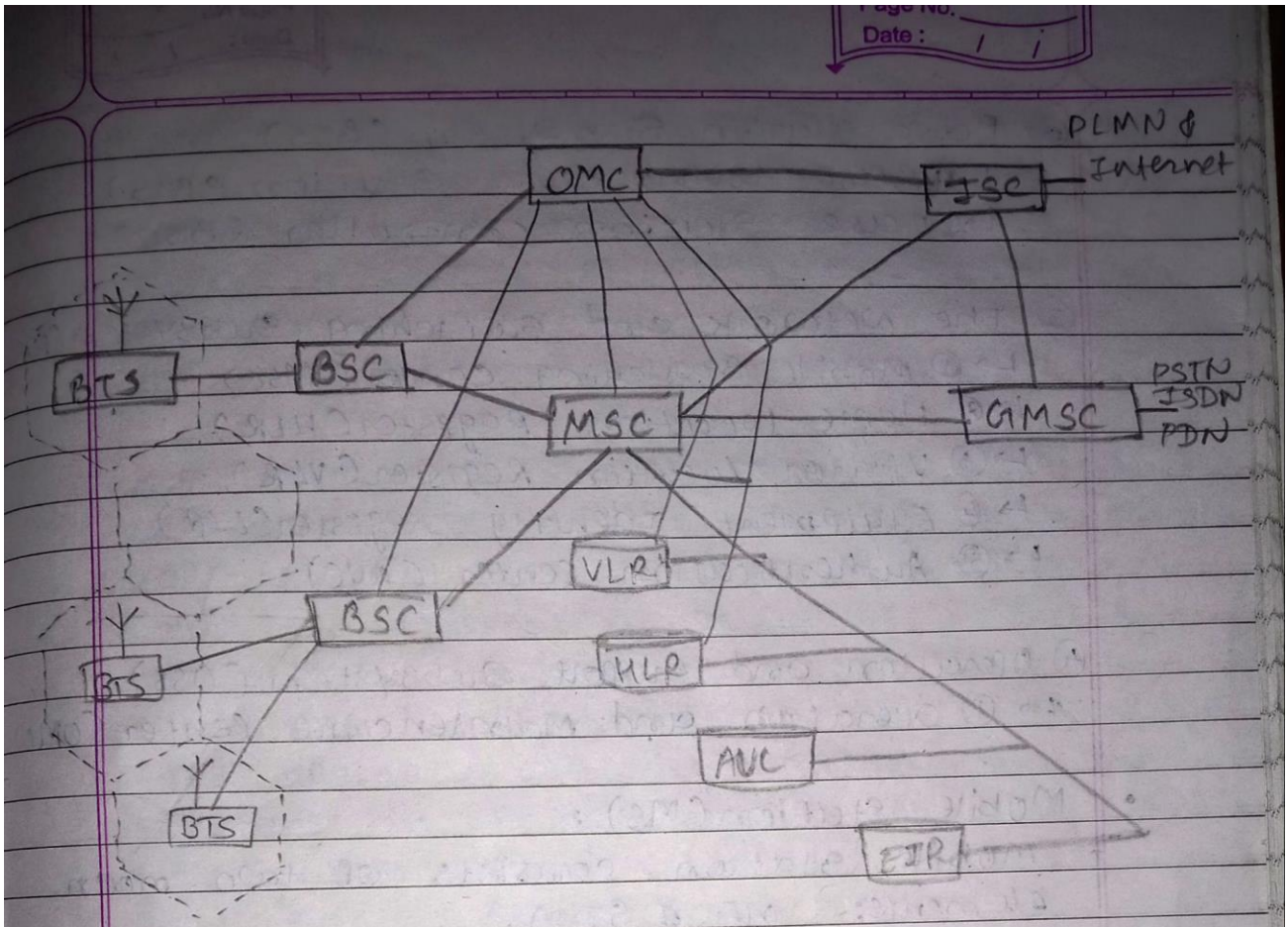
→ In system, it consists at the minimum one administrative region assigned to one MSC (Mobile Switching Centre).

→ Administrative region is commonly known as PLMN (Public Land Mobile n/w).

→ Each administrative region is subdivided into one or many Location Area(LA).

→ One LA consists of many cell groups and each cell group is assigned to one BSC (Base station controller).

→ For each LA, there will be atleast one BSC while cells in one BSC can belong to different LAs.



→ cells are formed by the radio areas covered by BTS (Base transceiver station).
→ Several BTS are controlled by one BSC.
→ Traffic from the MS (Mobile Station) is routed through MSC.
→ Calls originating from or terminating in a fixed network or other mobile n/w is handled by the GMSC (Gateway MSC).
→ The GSM network can be divided into 5 main groups:
① The Mobile Station (MS)
② ↳① Mobile equipment (ME)
↳② Subscriber Identity Module (SIM)

Teacher's Signature.....

② Base Station SubSystem (BSS)
↳① Base transceiver Station (BTS)
↳② Base Station controller (BSC)

③ The Network and switching SubSystem (NSS)
↳① Mobile Switching center (MSC)
↳② Home location Register (HLR)
↳③ Visitor location Register (VLR)
↳④ Equipment Identity Register (EIR)
↳⑤ Authentication center (AUC)

④ Operation and Support Subsystem (OSS)
↳① operation and maintenance center (OMC)

- Mobile Station (MS) :-

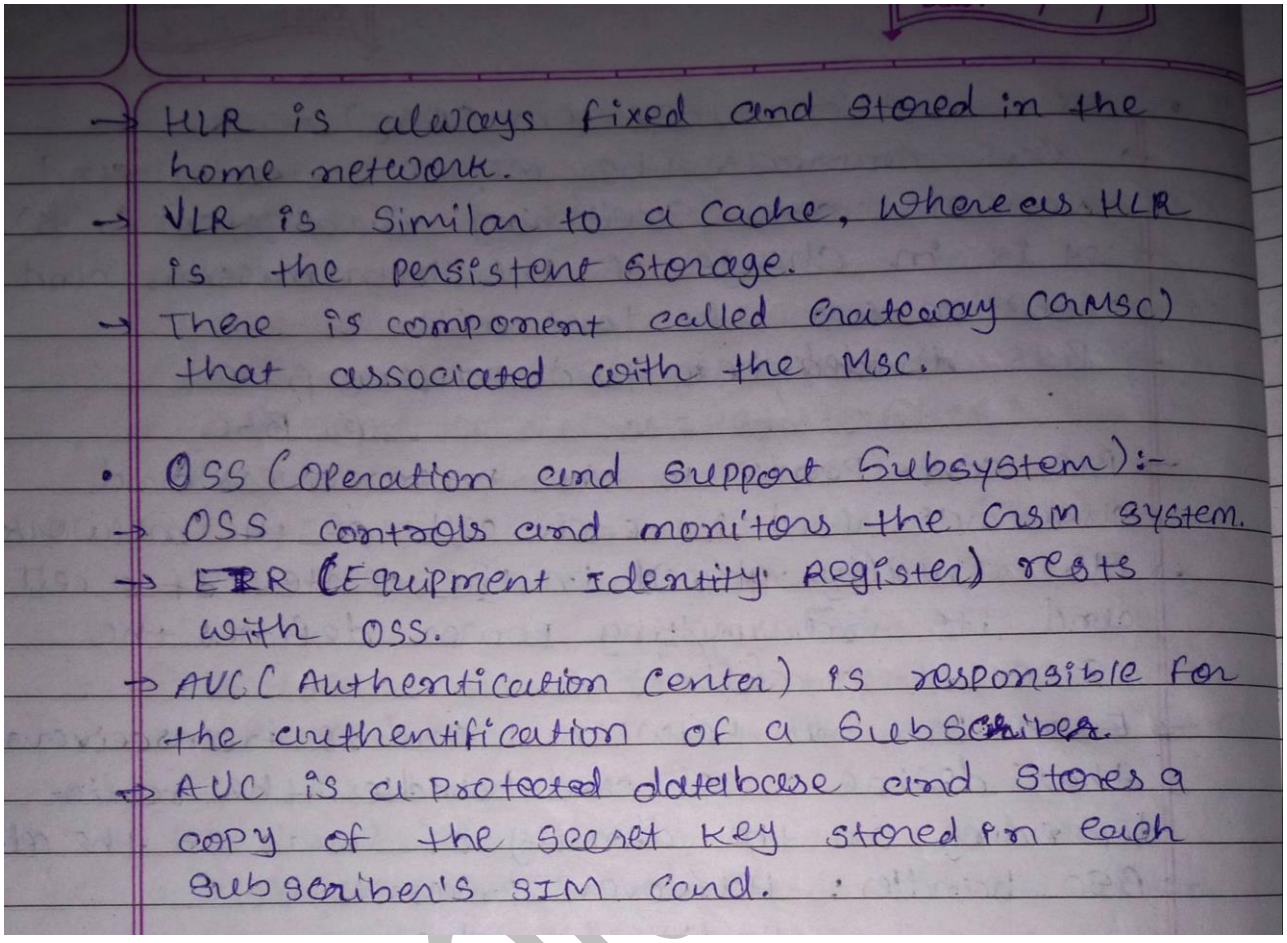
→ Mobile station consists of two main elements:- ME & SIM.
→ Terminals distinguished principally by their power and application.
→ SIM is installed in every GSM phone and identifies the terminal.
→ SIM cards used in GSM phones are smart processor cards process a processor and a small memory.
→ SIM card contains the International Mobile Subscriber Identity (IMSI) used to identify the subscriber to the system, a secret key for authentification, and other security information.

Date : / /

- Base Station Subsystem (BSS) :-
  - BSS connects the mobile station and network and switching subsystem (NSS).
  - It is in charge of the transmission and reception for the last mile.
  - BSS divided into two parts: ① BTS ② BSC
  - BTS corresponds to the transceivers and antennas used in each cell of the network.
  - BTS usually placed in the center of a cell and its transmitting power defines the size of a cell.
  - Each BTS has between 1 and 16 transceivers that define a cell and handles the radio- depending on the density of users in the cell.
  - BSC handles: Hardovers process
    - Radio-channel setup
    - control of radio frequency power levels of the BTS.
    - Exchang function, & freqⁿ hopping.

- Network and switching Subsystem (NSS)
  - A central component of the Network Subsystem is the Mobile switching Center (MSC).
  - Signaling between functional entities in the Network Subsystem uses Signaling System Number 7 (SS7).
  - MSC together with HLR and VLR databases, Provide the call-Routing and roaming capabilities of GSM.
  - HLR contains all the administrative information of each Subscriber registered in the corresponding GSM network.

Teacher's Signature.....



[Q.4]

(a) Discuss Piconet and Scatternet.

Q-23 Explain Scatternet and Piconet in Bluetooth with diagram.

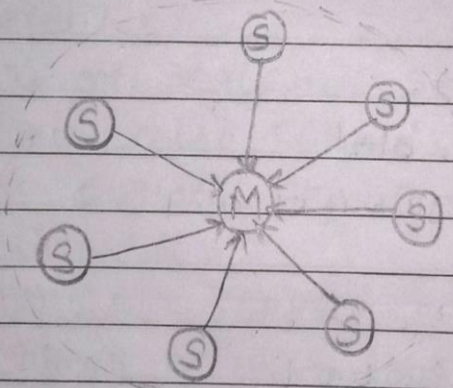
→ Piconet and Scatternet

→ Bluetooth Protocol uses the concept of master and slave relation.

→ In a master-slave Protocol a device cannot talk as when they desire.

→ They need to wait till the time a master allows them to talk.

→ The master and slaves together Form a Piconet. UP to seven "slave" devices can be set to communicate with a "master". (M: Master, S: Slave).

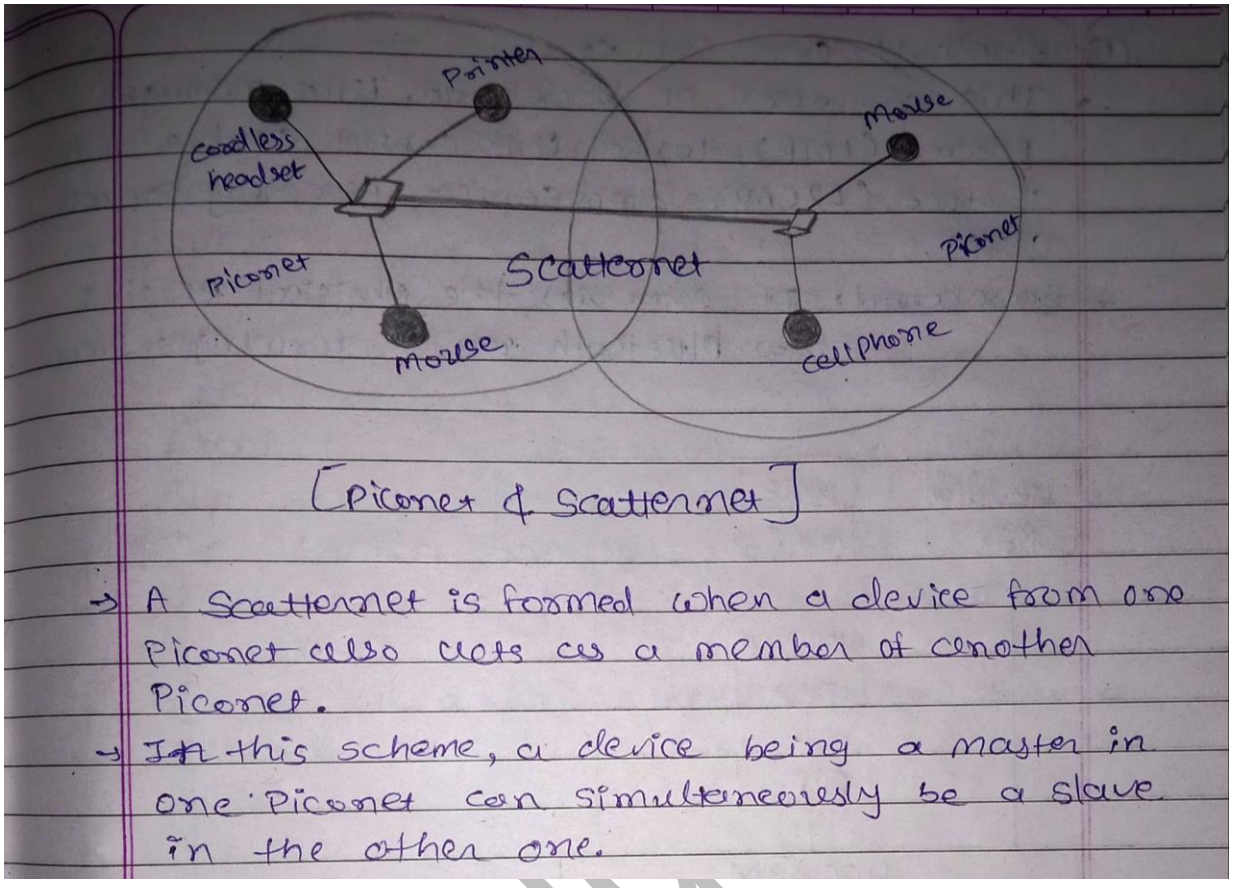


[master-slave connection in Piconet.]

→ Several of these Piconets can be linked together to form a larger network in an ad-hoc manner.

→ The topology can be thought as a flexible, multiple Piconet structure.

→ The network of Piconet is called Scatternet.



(b) Describe any one error detection technique with suitable example.

➔ There are Some popular techniques for error detection are:

1. Simple Parity check
2. Two-dimensional Parity check
3. Checksum
4. Cyclic redundancy check

1. Simple Parity check

➔Blocks of data from the source are subjected to a check bit or parity bit generator form, where a parity of :

- ⇨ 1 is added to the block if it contains odd number of 1's, and
- ⇨ 0 is added if it contains even number of 1's

➔This scheme makes the total number of 1's even, that is why it is called even parity checking.

2. Two-dimensional Parity check

➔Parity check bits are calculated for each row, which is equivalent to a simple parity check bit.

➔Parity check bits are also calculated for all columns, then both are sent along with the data.
➔At the receiving end these are compared with the parity bits calculated on the received data.

3. Checksum
➔In checksum error detection scheme, the data is divided into k segments each of m bits.
➔In the sender's end the segments are added using 1's complement arithmetic to get the sum. The sum is complemented to get the checksum.
➔The checksum segment is sent along with the data segments.
➔At the receiver's end, all received segments are added using 1's complement arithmetic to get the sum. The sum is complemented.
➔If the result is zero, the received data is accepted; otherwise discarded.

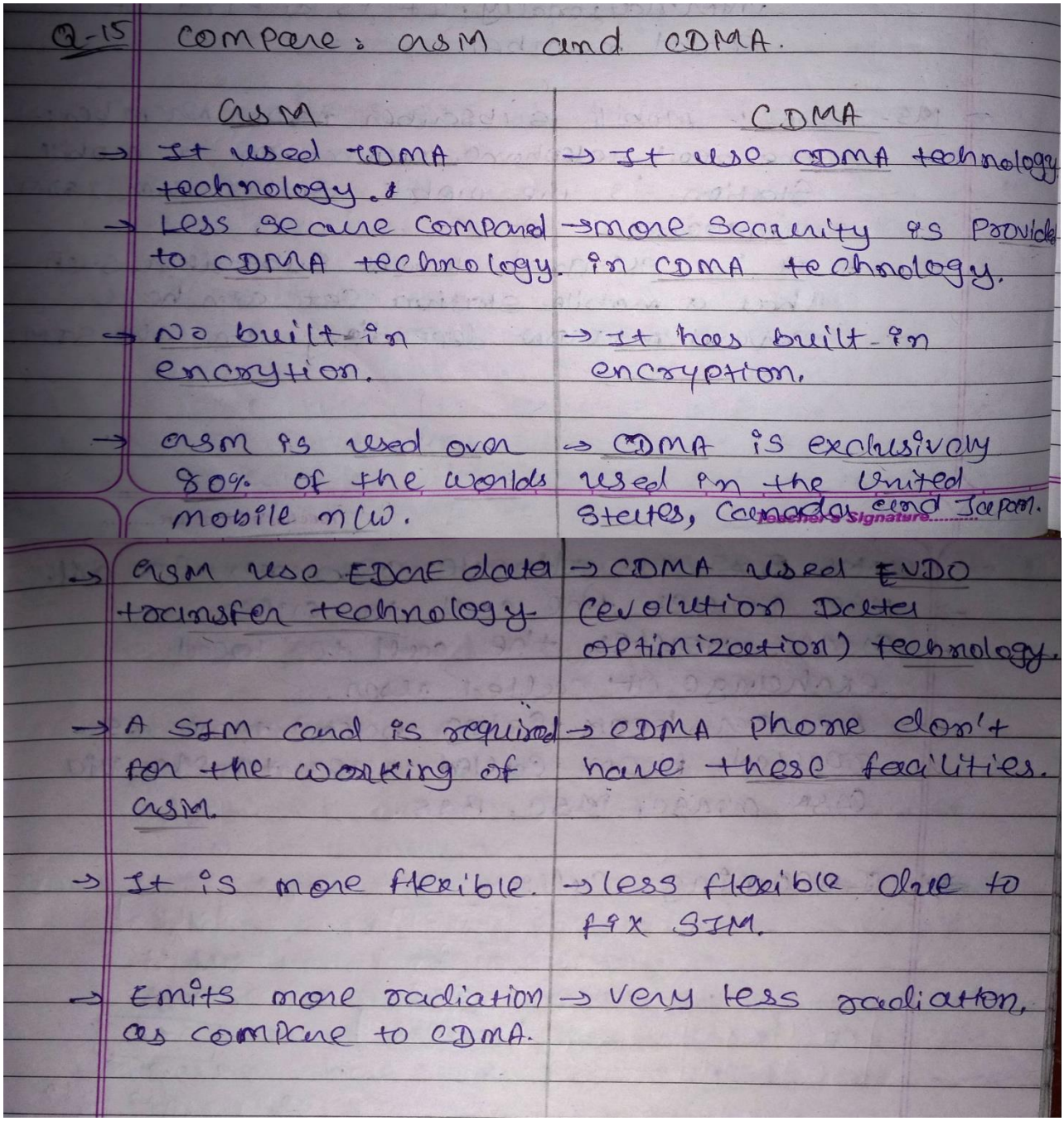
4. Cyclic redundancy check (CRC)
➔Unlike checksum scheme, which is based on addition, CRC is based on binary division.
➔In CRC, a sequence of redundant bits, called cyclic redundancy check bits, are appended to the end of data unit so that the resulting data unit becomes exactly divisible by a second, predetermined binary number.
➔At the destination, the incoming data unit is divided by the same number. If at this step there is no remainder, the data unit is assumed to be correct and is therefore accepted.
➔A remainder indicates that the data unit has been damaged in transit and therefore must be rejected.

(c) Explain DFWMAC-DCF using CSMA/CA.

➔

OR [Q.4]

(a) Differentiate GSM and CDMA.



Q-15 Compare: GSM and CDMA.

GSM	CDMA
→ It used TDMA technology.	→ It use CDMA technology
→ Less secure compared to CDMA technology.	→ more security is Provide in CDMA technology.
→ No built-in encryption.	→ It has built-in encryption.
→ GSM is used over 80% of the worlds mobile m/w.	→ CDMA is exclusively used in the United States, Canada, and Japan.
→ GSM use EDGE data transfer technology	→ CDMA used EVDO (Evolution Data optimization) technology.
→ A SIM card is required for the working of GSM.	→ CDMA phone don't have these facilities.
→ It is more flexible.	→ less flexible due to fix SIM.
→ Emits more radiation as compare to CDMA.	→ very less radiation.

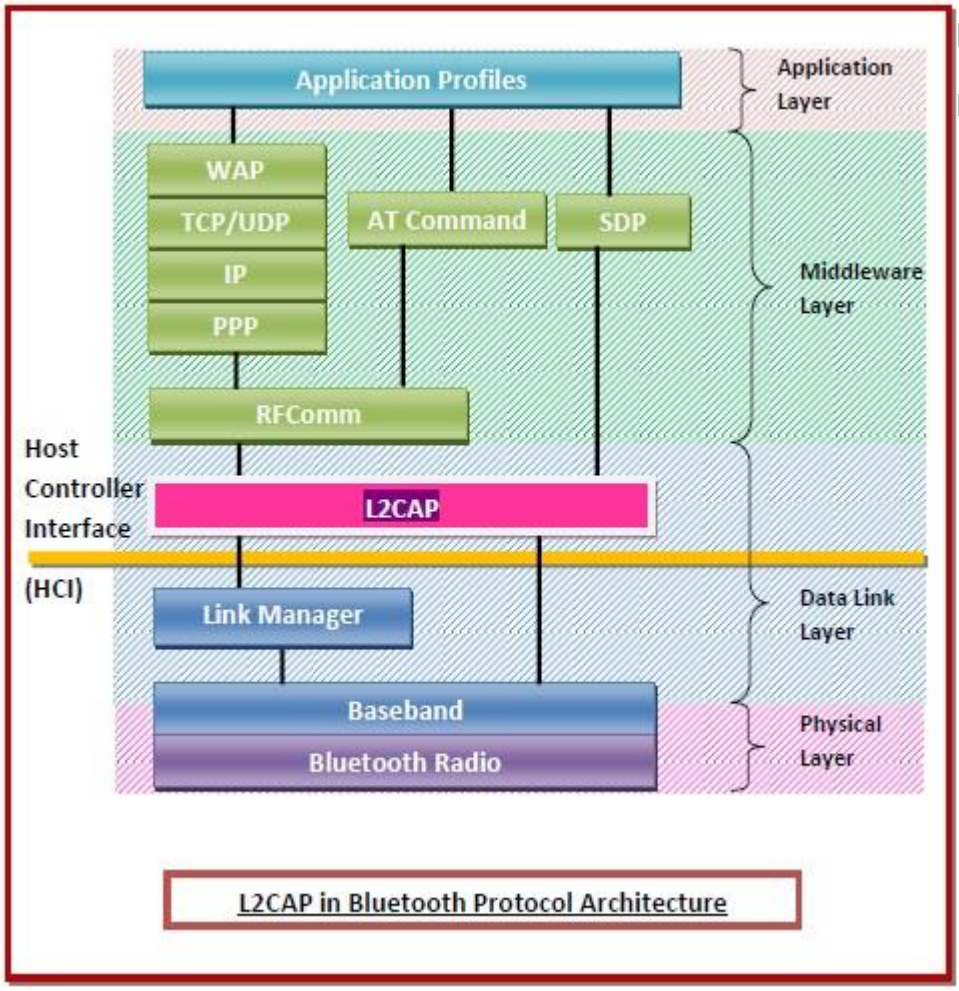
Teacher's Signature.....

(b) Explain L2CAP protocol of Bluetooth.

➔ Logical Link Control and Adaptation Protocol (L2CAP) is a protocol used in the Bluetooth standard that provides adaption between higher layers and the baseband layer of the Bluetooth stack.

➔It operates just above the host-controller interface (HCI) passing data frames from the higher layers to either HCI or Link Manager.

➔The following diagram shows the position of L2CAP in Bluetooth protocol architecture −



L2CAP in Bluetooth Protocol Architecture

➔Functions of L2CAP

- ⇨ Adaptation between higher-layer frames and lower layer frames of the Bluetooth protocol stack.
- ⇨ Support for both connection-oriented as well as connectionless services.
- ⇨ Supporting two links for the Baseband layer −
- ⇨ Synchronous Connection-Oriented (SCO) links for real-time voice traffic using reserved bandwidth.

- ⇨ Asynchronous Connection-Less (ACL) links for best-effort traffic.
- ⇨ Multiplexing of higher layer protocols, which allows them to use the links provided by the lower layers.
- ⇨ Segmentation and reassembly of data packets of the upper layer that are larger than the capacity of the radio layer underneath.
- ⇨ Group management.
- ⇨ Quality of Service (QoS) for upper-layer protocols.

(c) Draw and explain the GPRS transmission plane protocol model.

➔

[Q.5]

(a) Explain the power saving states of Bluetooth device.

➔ Modes of Operation SNIFF, HOLD and PARK modes are the three power saving modes of operation for Bluetooth devices which are connected to a piconet.

➔These modes are used when no data is to be transmitted.

➔**SNIFF mode:**

➔The slave device listens to the piconet in this mode, but at a reduced rate. Thus reducing its duty.

➔The SNIFF interval is programmable and depends on application.

➔**HOLD mode:**

➔ The master unit can put a slave unit into HOLD mode or a slave unit can demand to ne put into HOLD mode.

➔ Data transfer restarts instantly when units transition out of HOLD mode.

➔The HOLD is used when connecting several piconets or managing a low power device such as temperature sensor.

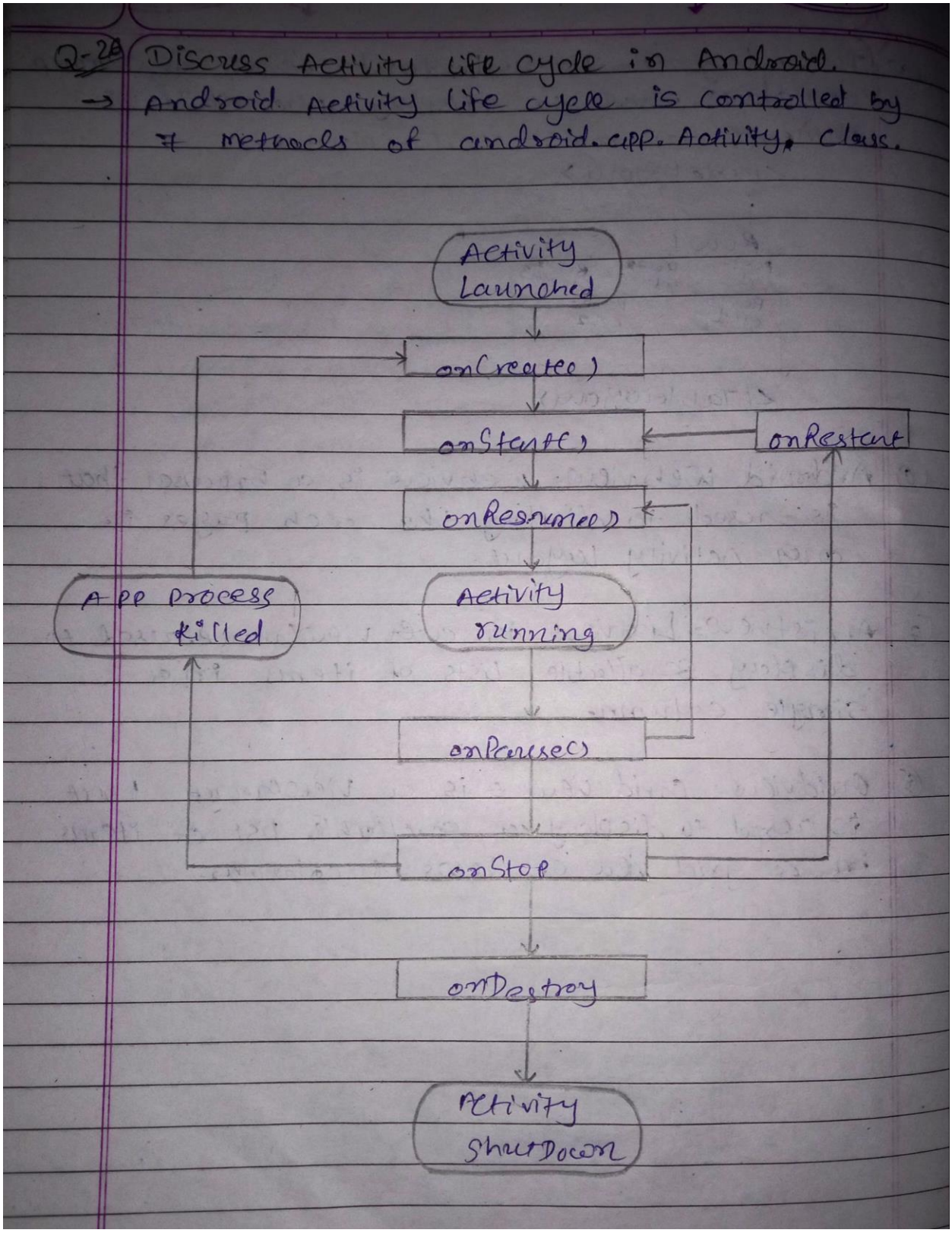
➔**PARK mode:**

➔The device is still synchronized to the piconet but does not participate in traffic.

➔ PARKED devices have given up their MAC address and occasionally listen to the traffic of the master to resynchronize and check on broadcast messages.

➔ In the increasing order of power efficiency, the SNIFF mode has higher duty cycle, followed by HOLD mode with a lower duty cycle, and PARK mode, with lowest duty cycle.

(b) Discuss Activity life cycle in Android.



→ onCreate() → This method is called when activity is first created.

→ onStart() → This method is called when activity becoming visible to the user.

→ onResume() → This method is called when activity will start interacting with the user.

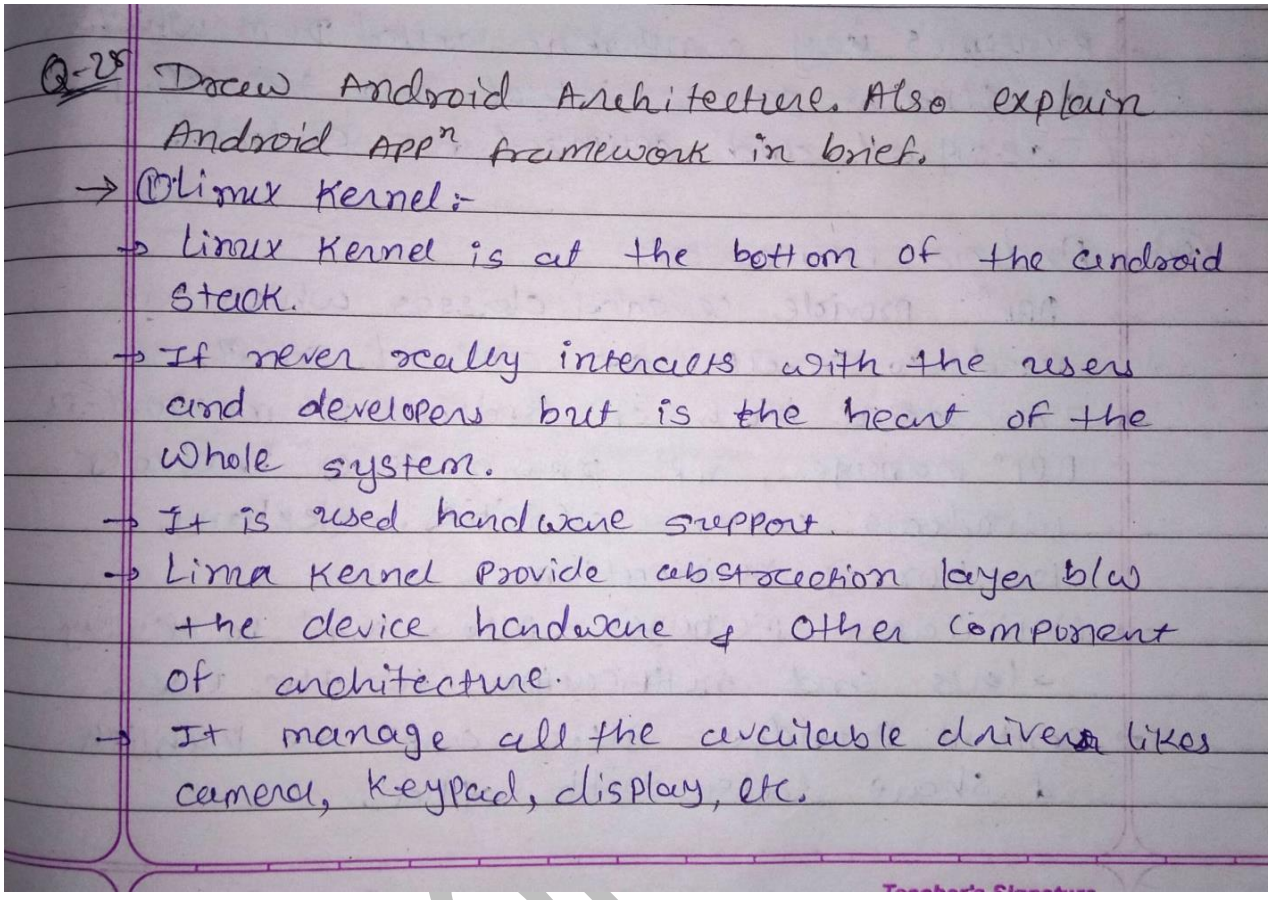
→ onPause() → This method is called when activity not visible to the user.

→ onStop() → This method is called when activity is no longer visible to the user.

→ onRestart() → This method is called after your activity stopped, prior to start.

→ onDestroy() → This method is called before the activity is destroyed.

(c) Explain Android platform architecture.



Q-2ᵉ Draw Android Architecture. Also explain Android App^{n} framework in brief.

→ ① Linux Kernel :-

→ Linux Kernel is at the bottom of the android stack.

→ It never really interacts with the users and developers but is the heart of the whole system.

→ It is used hardware support.

→ Linux Kernel Provide abstraction layer b/w the device hardware & other component of architecture.

→ It manage all the available drivers likes camera, keypad, display, etc.

Date : / /

→ It is responsible for managment of m/m, Power devices, etc.

(ii) Libraries:

→ Libraries carry a set of instruction to guide the device in handling diff^n type of data.
→ In the next layer Android Architecture is Android's native libraries such as SQLite, OpenGL, webkit, freetype, media etc.
→ The webkit library is responsible for browser support, SQLite for database, freetype for font support media for playing & recording audio & video format.

(iii) Runtime:

→ It is written in Java & executing in DVM.
→ Runtime's key component called DVM which is a kind of Java virtual m/c specially designed and optimized for android.

(iv) Android Framework:

→ App^n provide several classes which are nesed to create an android app^n.
→ Important block of android framework is App^n manager, App^n ~~mnag~~ manager includes windows, contents, activities, telephony, location & notifications.
→ Notification Manager - Allow app^n to display alerts and notifications to the user.
→ Content Providers - Allow app^n to publish & share data with others.

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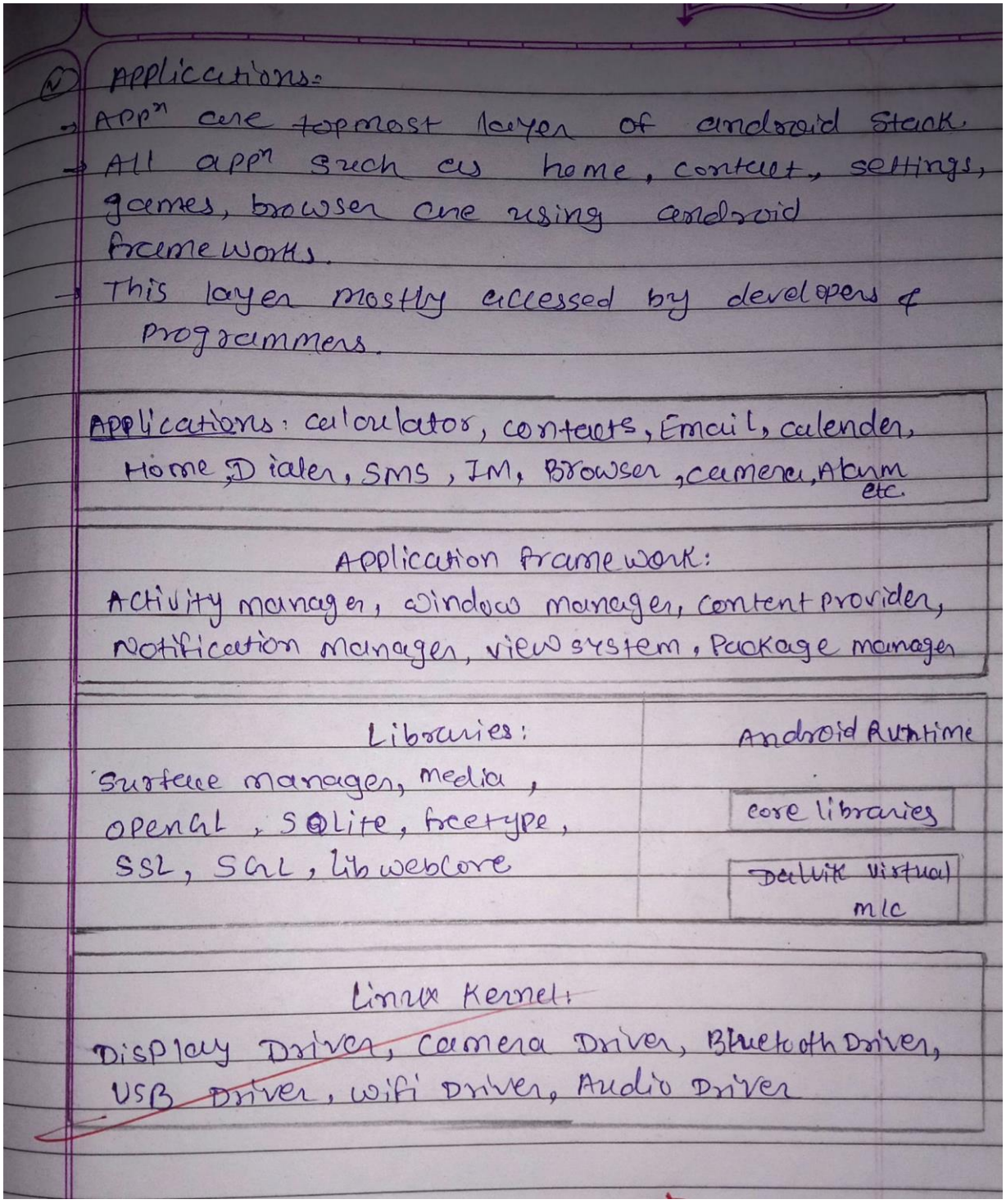

Applications:
→ APPn are topmost layer of android stack.
→ All appn such as home, contact, settings, games, browser are using android frameworks.
→ This layer mostly accessed by developers & programmers.
Applications: calculator, contacts, Email, calender, Home, Dialer, SMS, IM, Browser, camera, Alarm etc.
Application framework:
Activity manager, window manager, content provider, Notification manager, view system, Package manager
Libraries:
Surface manager, media, OpenGL, SQLite, freetype, SSL, SGL, libwebcore
Android Runtime
core libraries
Dalvik virtual m/c
Linux Kernel:
Display Driver, Camera Driver, Bluetooth Driver, USB Driver, wifi Driver, Audio Driver

OR [Q.5]

(a) Explain types of Intents.

➔ Android Intent is the *message* that is passed between components such as activities, content providers, broadcast receivers, services etc.

➔It is generally used with startActivity() method to invoke activity, broadcast receivers etc.

➔The dictionary meaning of intent is *intention or purpose*. So, it can be described as the intention to do action.

➔The LabeledIntent is the subclass of android.content.Intent class.

⇨ *There are two types of intents in android*

1. Implicit
2. Explicit

1) Implicit Intent :

➔Implicit Intent doesn't specifiy the component. In such case, intent provides information of available components provided by the system that is to be invoked.

2) Explicit Intent :

➔Explicit Intent specifies the component. In such case, intent provides the external class to be invoked.

(b) Discuss the manifest file with example.

➔ The **AndroidManifest.xml file** *contains information of your package*, including components of the application such as activities, services, broadcast receivers, content providers etc.

⇨ **AndroidManifest.xml file** :

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.javatpoint.hello"
    android:versionCode="1"
    android:versionName="1.0" >
```

```
<uses-sdk
    android:minSdkVersion="8"
    android:targetSdkVersion="15" />

<application
    android:icon="@drawable/ic_launcher"
    android:label="@string/app_name"
    android:theme="@style/AppTheme" >
    <activity
        android:name=".MainActivity"
        android:label="@string/title_activity_main" >
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />

            <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
    </activity>
</application>

</manifest>
```

➔The elements used in the above xml file are described below.

➔**<manifest>**

- ⇨ manifest is the root element of the AndroidManifest.xml file. It has package attribute that describes the package name of the activity class.

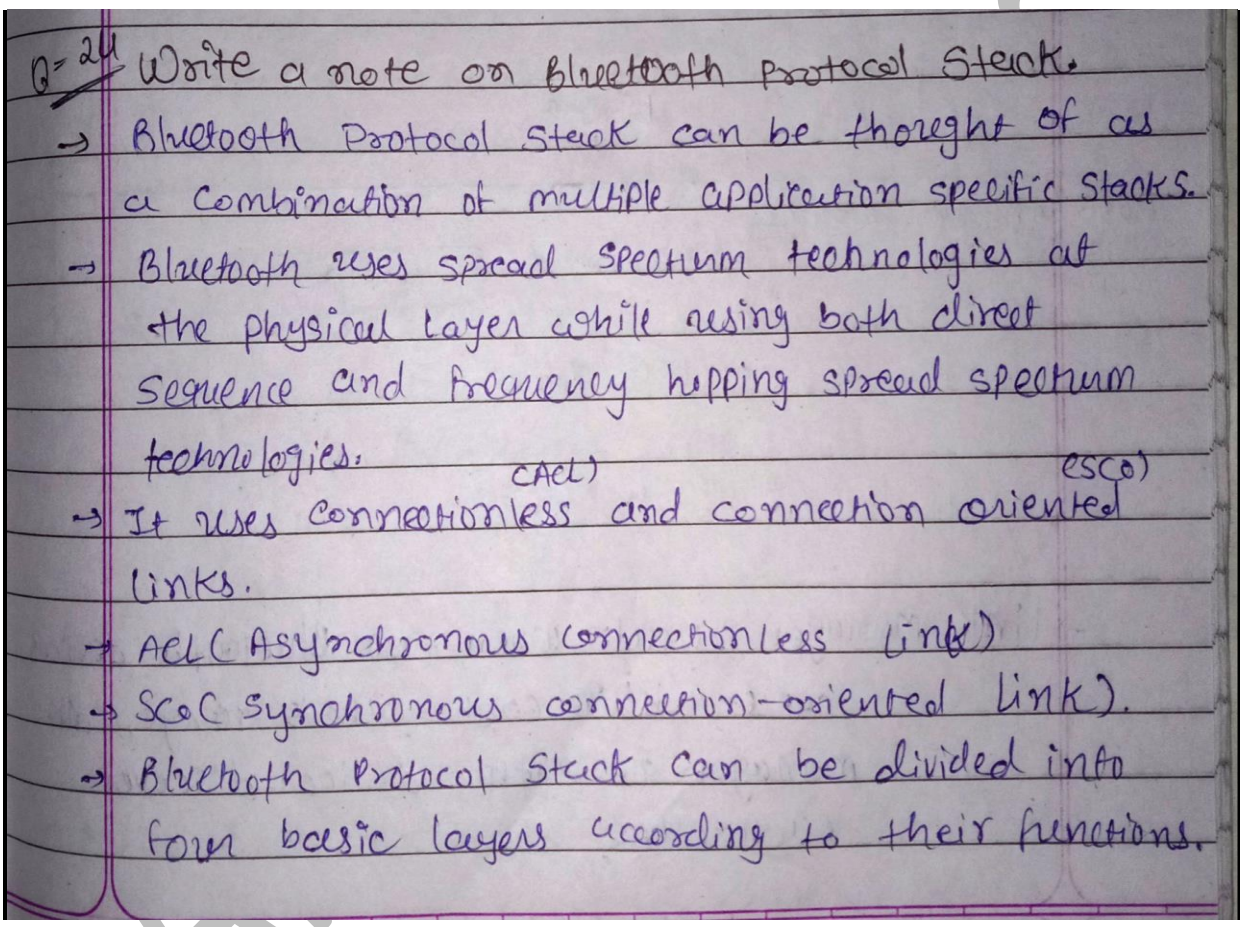
➔**<application>**

- ⇨ application is the subelement of the manifest. It includes the namespace declaration. This element contains several subelements that declares the application component such as activity etc.
- ⇨ The commonly used attributes are of this element are icon, label, theme etc.
- ⇨ android:icon represents the icon for all the android application components.
- ⇨ android:label works as the default label for all the application components.
- ⇨ android:theme represents a common theme for all the android activities.

➔**<activity>**

- ⇨ activity is the subelement of application and represents an activity that must be defined in the AndroidManifest.xml file. It has many attributes such as label, name, theme, launchMode etc.

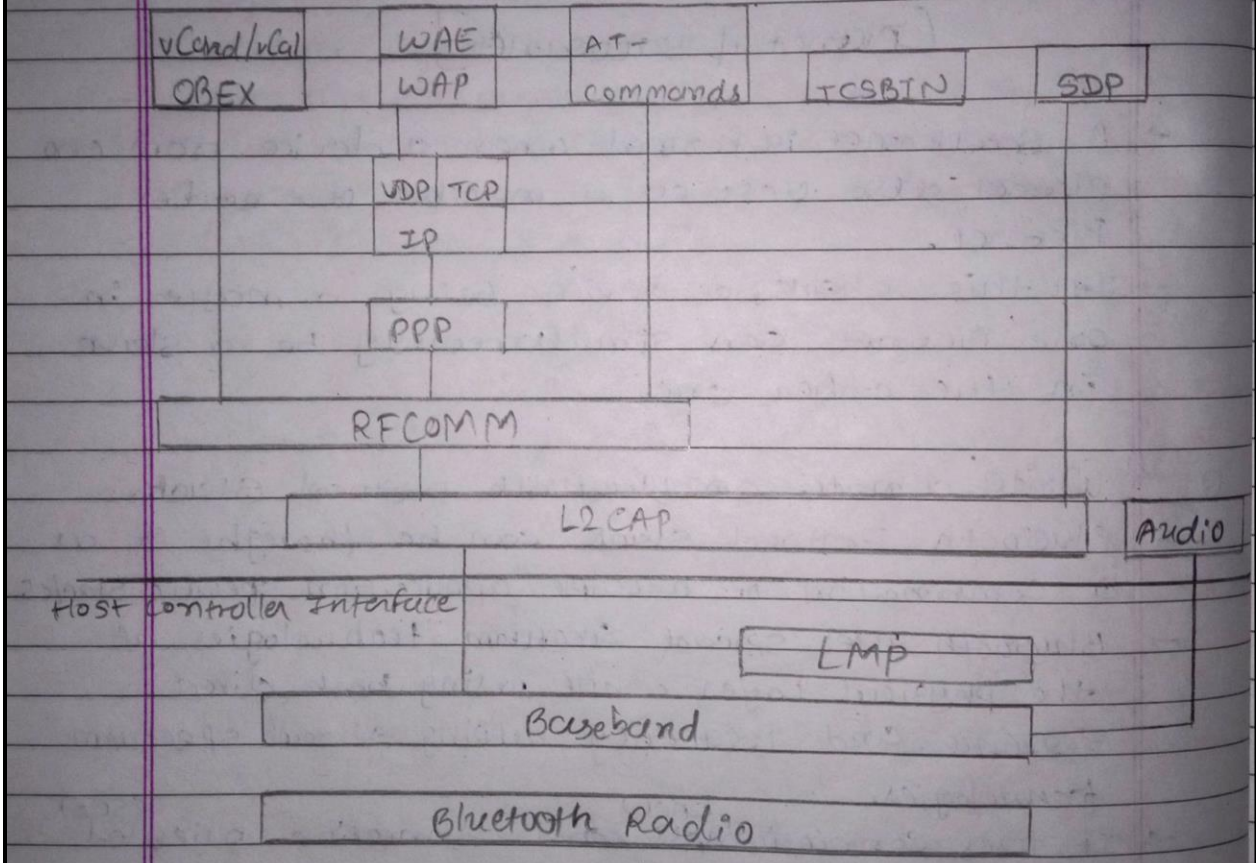
(c) Write a note on Bluetooth protocol stack.



(1) Bluetooth Core Protocols:

→ This comprises of baseband, Link Manager Protocol (LMP), Logical Link control and Adaption Protocol (L2CAP), and Service Discovery Protocol (SDP).

→ Baseband: It enables the physical RF link b/w Bluetooth units forming a Piconet.



→ Link manager Protocol:- When two Bluetooth devices come within each other's range, Link managers of either device discover each other.

→ LMP then engages itself in Peer-to-Peer message exchange.
→ This message perform various security functions starting from authentication to encryption.
→ Logical Link control & Adaption Protocol (L2CAP):-
→ This layer is responsible for segmentation of large Packets and reassembly of fragmented Packets.
→ L2CAP is also responsible for multiplexing of Bluetooth Packets from different applications.
→ SDP (Service Discovery protocol):-
→ It enables a Bluetooth device to join a Piconet.
→ Using SDP a device inquires what services are available in a Piconet & how to access them.

② Cable Replacement Protocol:
→ This Protocol has only one member which is Radio frequency communication (RFCOMM).
→ RFCOMM: It is a Serial line communication Protocol and is based on ETSI 07.10 specification.
→ The cable replacement Protocol emulates RS-232 control and data signals over Bluetooth Baseband Protocol.

③ Telephony Control Protocol:-
→ It comprises of 2 Protocol Stacks, viz., Telephony control Specification Binary (TCSBIN), and AT-commands.
→ TCS BIN: It is a bit-oriented Protocol.

→ It defines all the call control signaling Protocol for set up of speech and data calls between Bluetooth devices.

→ AT-Commands :- It defines a set of AT-commands by which a mobile phone can be used and controlled as a modem for fax and data transfer.

(4) Adopted protocols :-

→ This has many protocols stacks like Point-to-Point Protocol (PPP), TCP/IP Protocol, OBEX (Object Exchange Protocol), Wireless Application Protocol (WAP), vCard, vCalender, Infrared mobile communication (IrMC), etc.

→ PPP Bluetooth :- This offers PPP over RFComm to accomplish Point-to-Point connections.

→ PPP is the means of taking IP Packets to/from the PPP layer and placing them onto the LAN.

→ TCP/IP :- This Protocol is used for communication across the Internet.

→ TCP/IP stacks are used in numerous devices including printers, handheld computers, and mobile handsets.

→ TCP/IP/PPP is used for the all Internet bridge usage scenarios.

→ OBEX Protocol :- OBEX is a session protocol developed by the Infrared Data Association (IrDA) to exchange objects.

→ Content formats : vCard and vCalender specifications define the format of an

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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2170710 **Date:16/05/2019**

Subject Name:Mobile Computing and Wireless Communication

Time:02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	(a)	Define Reflection, Refraction and diffraction.	03
	(b)	Explain packet switching and circuit switching.	04
	(c)	Explain GSM call routing.	07
Q.2	(a)	Discuss hidden and exposed terminals.	03
	(b)	Write a short note on selective repeat ARQ.	04
	(c)	Explain various signal multiplexing techniques.	07
		OR	
	(c)	Discuss Mobile IP.	07
Q.3	(a)	Differentiate infrastructure and ad-hoc network.	03
	(b)	Explain handover process in cellular system.	04
	(c)	Explain frequency hopping spread spectrum.	07
		OR	
Q.3	(a)	What are the advantages of WLAN.	03
	(b)	What is Multi-path propagation and fading?	04
	(c)	Discuss GSM architecture in detail.	07
Q.4	(a)	Discuss Piconet and Scatternet.	03
	(b)	Describe any one error detection technique with suitable example.	04
	(c)	Explain DFWMAC-DCF using CSMA/CA.	07
		OR	
Q.4	(a)	Differentiate GSM and CDMA.	03
	(b)	Explain L2CAP protocol of Bluetooth.	04
	(c)	Draw and explain the GPRS transmission plane protocol model.	07
Q.5	(a)	Explain the power saving states of Bluetooth device.	03
	(b)	Discuss Activity life cycle in Android.	04
	(c)	Explain Android platform architecture.	07
		OR	
Q.5	(a)	Explain types of Intents.	03
	(b)	Discuss the manifest file with example.	04
	(c)	Write a note on Bluetooth protocol stack.	07

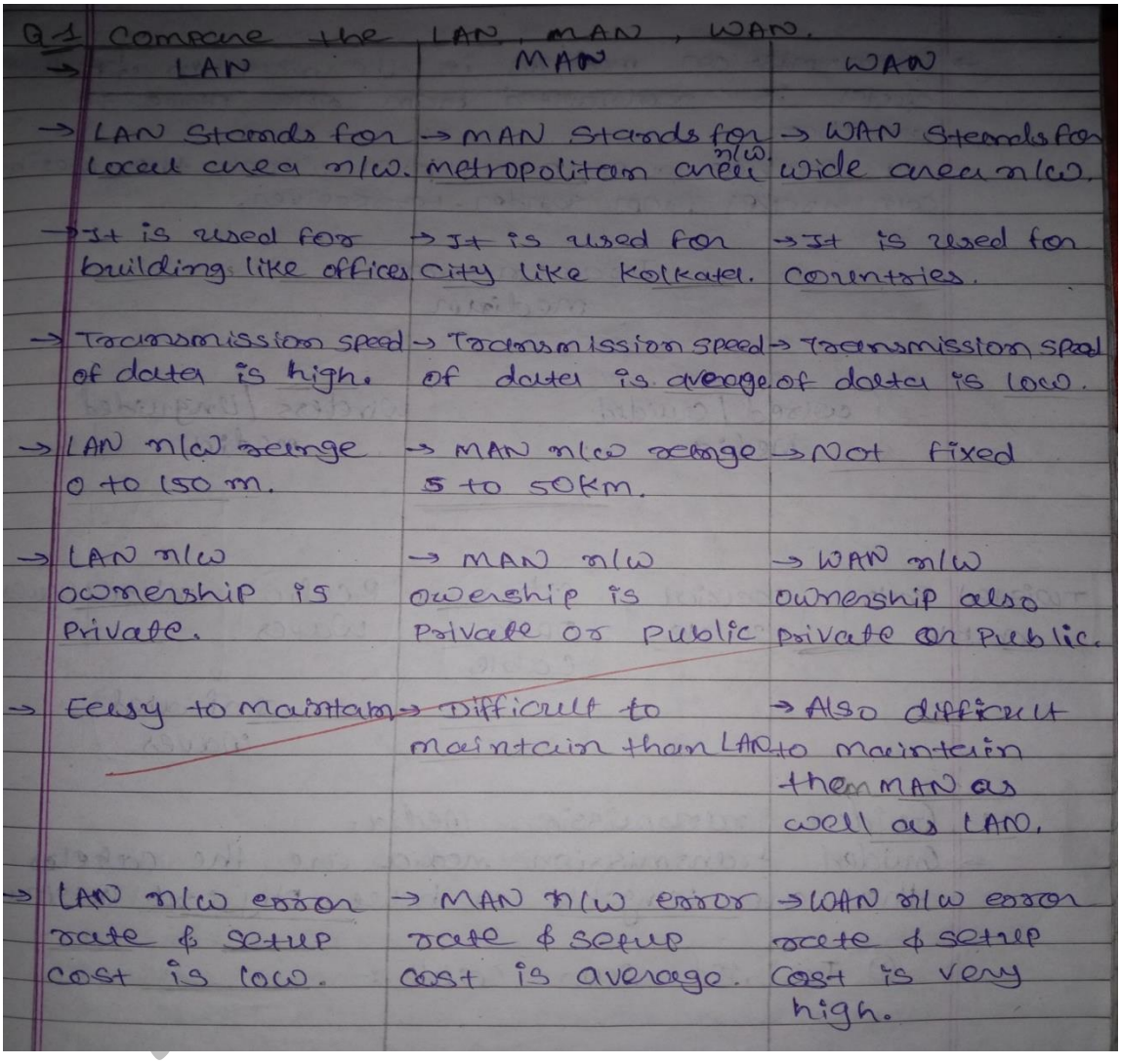
****

2170710

Mobile Computing and Wireless Communication SUMMER 2018

[Q.1]

(a) Compare the LAN and WAN.



Q-1 Compare the LAN, MAN, WAN.

→	LAN	MAN	WAN
→	LAN Stands for Local area n/w.	→ MAN Stands for metropolitan area n/w.	→ WAN Stands for wide area n/w.
→	It is used for building like offices.	→ It is used for city like Kolkata.	→ It is used for countries.
→	Transmission speed of data is high.	→ Transmission speed of data is average.	→ Transmission speed of data is low.
→	LAN n/w range 0 to 150 m.	→ MAN n/w range 5 to 50Km.	→ Not fixed
→	LAN n/w ownership is Private.	→ MAN n/w Owership is Private or Public	→ WAN n/w ownership also Private or Public.
→	Easy to maintain	→ Difficult to maintain than LAN	→ Also difficult to maintain then MAN as well as LAN.
→	LAN n/w error rate & setup cost is low.	→ MAN n/w error rate & setup cost is average.	→ WAN n/w error rate & setup cost is very high.

(b) Define the term Multiplexing. Explain the FDM and TDM with one example each.

➔Refer Q-2-C (SUMMER 2019)

(c) Explain the Nyquist Theorem. Find the relationship among the 07 following terms: Channel Capacity(C), Bandwidth(B) and Signal-to-Noise Ratio(SNR). Ratio (SNR)

A theorem, developed by H. Nyquist, which states that an analog signal waveform may be uniquely reconstructed, without error, from samples taken at equal time intervals. The sampling rate must be equal to, or greater than, twice the highest frequency component in the analog signal.

Nyquist's work states that an analog signal waveform can be converted into digital by sampling the analog signal at equal time intervals.

The Nyquist Theorem, also known as the sampling theorem, is a principle that engineers follow in the digitization of analog signals.

Channel Capacity (C)

The maximum rate at which data can be transmitted over a given communication path, or channel, under given conditions, is referred to as the channel capacity.

Bandwidth (B)

The bandwidth of the transmitted signal as constrained by the transmitter and the nature of the transmission medium, expressed in cycles per second, or hertz

Signal-to-Noise Ratio (SNR)

In analog and digital communications, signal-to-noise ratio, often written S/N or SNR, is a measure of signal strength relative to background noise. The ratio is usually measured in decibels (dB) using a signal-to-noise ratio formula.

Signal to noise ratio formula

The signal to noise ratio is the ratio between the wanted signal and the unwanted background noise.

$$SNR = \frac{P_{signal}}{P_{noise}}$$

It is more usual to see a signal to noise ratio expressed in a logarithmic basis using decibels:

$$SNR_{dB} = 10 \log_{10}\left(\frac{P_{signal}}{P_{noise}}\right)$$

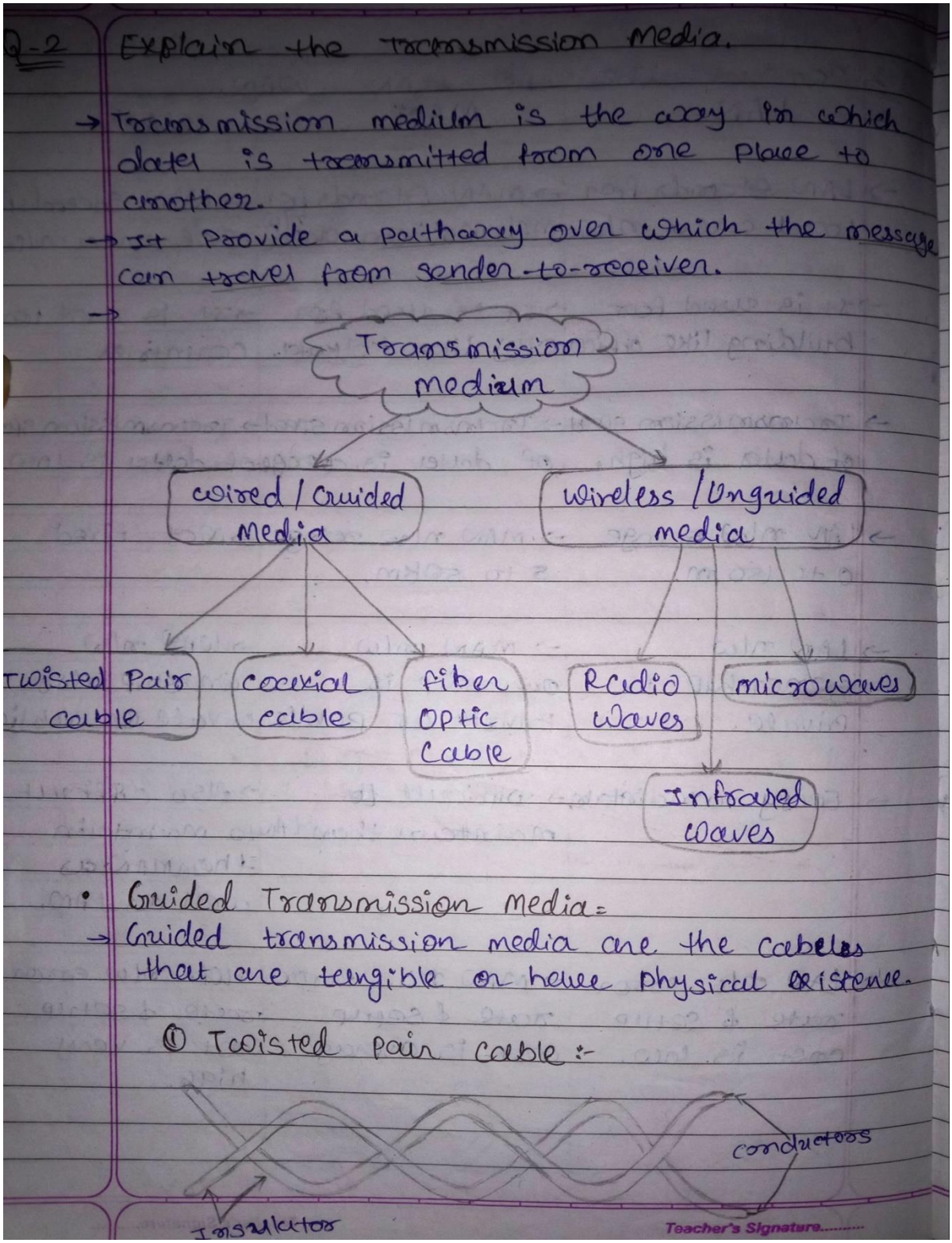
If all levels are expressed in decibels, then the formula can be simplified to:

$$SNR_{dB} = P_{signal_{dB}} - P_{noise_{dB}}$$

The power levels may be expressed in levels such as dBm (decibels relative to a milliwatt, or to some other standard by which the levels can be compared.

[Q.2]

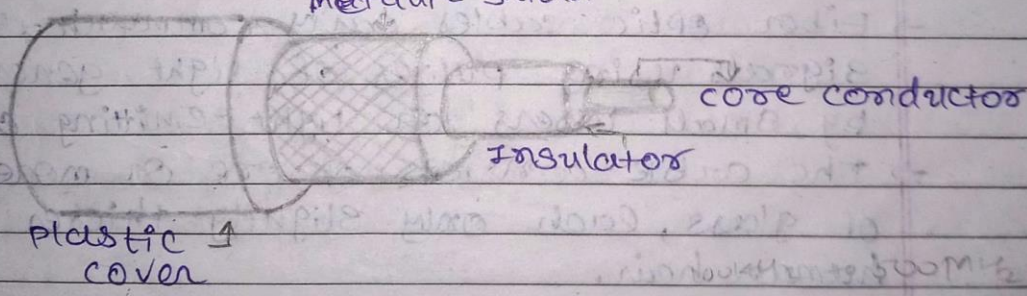
(a) Explain the Transmission Media.



YouTube: https://www.youtube.com/channel/UClk43_DjgTzodjJjumyRlwA

→ A twisted pair cable is a pair of copper wires.
→ Copper wires are the most common wires used for transmitting signals because of good performance at low costs.
→ A twisted pair consist of two conductors (normally copper), each with its own plastic insulation, twisted together to form a single medid.
→ Out of these two wires, only one carries actual signal and another is used for ground reference.
→ The twists b/w wires are helpful in Reducing noise (electro-magnetic interference) and cross talk.
→ These type of cable is used in telephone lines to provide voice and data channels.
→ There are two types of twisted pairs are :-
1. Unshielded twisted pair (UTP)
2. Shielded twisted pair (STP)

② Coaxial Cable :-

→ 

→ Coaxial cabels are copper cables with better shielding than twisted pair cables, so that transmitted signals may travel longer distance at higher speeds.
→ The shield minimize electrical and radio freq" interference
→ Coaxial cabling is the primary type of cabling used by the cable television industry and is also widely used for computer networks, such as Ethernet.

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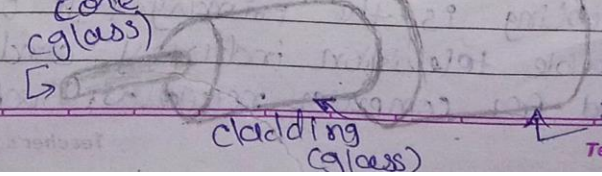
→ Coaxial cable has two wires of copper.
→ The core copper wire in centre and is made of solid conductor. It is enclosed in an insulating sheath.
→ The second copper wire is wrapped around, and is used to protect from external electromagnetic interference (Noise).
→ This all is covered by plastic cover.

③ fiber optic cable :-
→ A fiber optic cable is made of high quality of thin glass or plastic.
→ It is used to transfer digital data signals in the form of light up to distance of thousand of miles.
→ Fiber optic cables are not affected by electromagnetic interference, so noise and distortion is very less.
→ Fiber optic cables carry communication signals using pulses of light generated by small lasers or light-emitting diodes (LEDs).
→ The cable consists of one or more strands of glass, each only slightly thicker than a human hair.
→ The centre of each strand is called the core, which provides the pathway for light to travel.
→ The core is surrounded by a layer of glass called cladding.



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- Unguided Media:-

① Radio waves :-

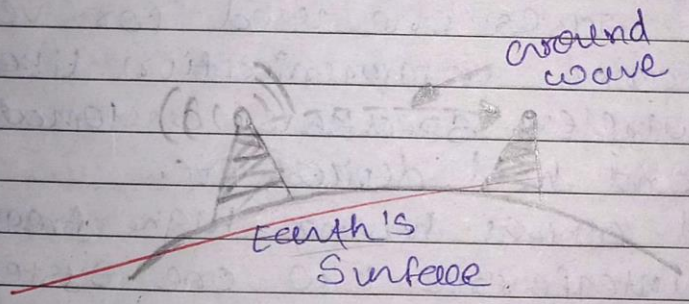
→ Radio waves are EM (Electromagnetic) waves that have wavelengths between 1 millimetre and 100 kilometres. (300 GHz & 3 KHz in freqⁿ).

→ Radio frequency is easy to generate because it has large wavelength and can travel long distance.

→ Radio waves are generated by radio transmitters and received by radio receivers.

→ Radio stations transmit radio waves using transmitters, which are received by the receiver installed in our devices.

→ Both transmitters and receivers use antennas to radiate or capture radio signals.



② Microwave ~~from~~ :-

→ microwaves are a type of radio waves with high frequencies.

→ It can be classified as a subclass of radio waves.

→ The frequency of microwaves lies in the 300MHz to 300GHz.

→ Unlike radio waves, microwaves are unidirectional, in which the sending and receiving antennas need to be aligned.
→ Microwaves are widely used for point-to-point communications because their small wavelength, which means that the signal is focused into a narrow beam.
→ Additionally, each antenna must be within line of sight of the next antenna.

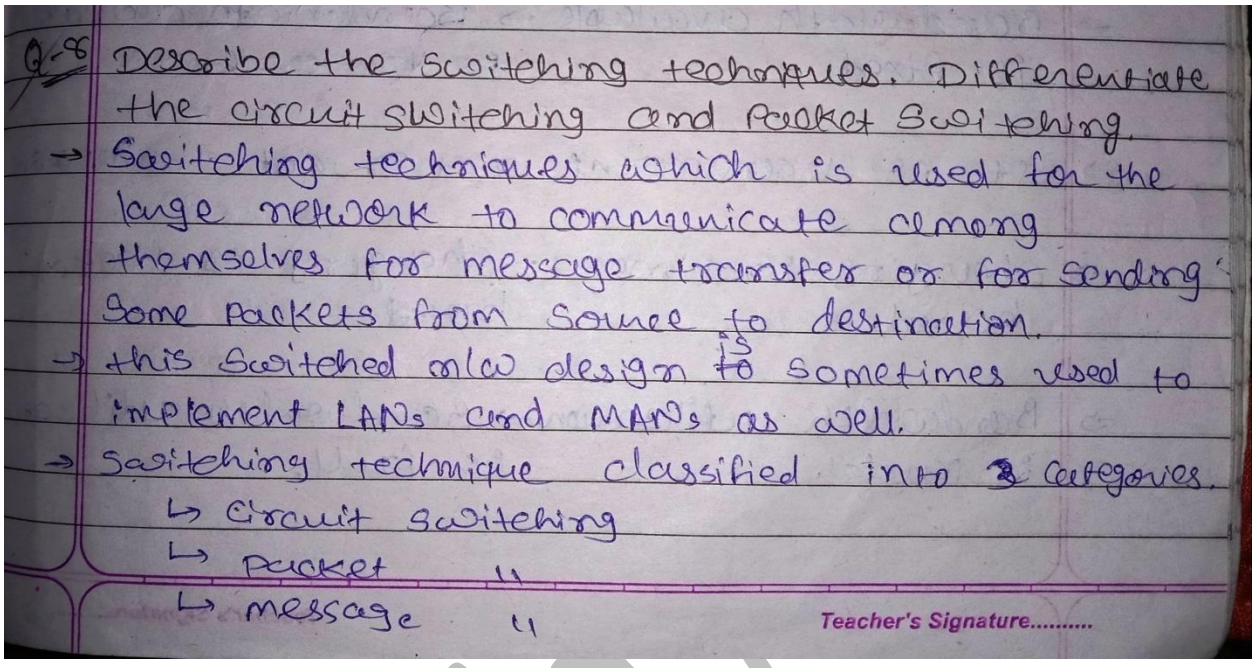
③ Infrared Waves Transmission
→ Infrared waves or signals have frequencies between 300 GHz to 400 THz.
→ They are used for short-range communication.
→ Infrared waves are used for very short distance communication like tv remote, wireless speakers, automatic doors, hand held devices etc.
→ Infrared waves having high frequencies prevents interference b/w one system to another.
→ Infrared signals have high frequencies and cannot penetrate walls.

(b) Differentiate the GSM and GPRS.

GSM	GPRS
Circuit Switched Architecture	Packet Switched Architecture
Point to point service	Multipoint service
Inefficient use of resources	Efficient use of resources
Lower bit rate(14.4KB/S)	Higher bit rate(170KB/S)
Reserved bandwidth	Shared bandwidth
Fixed access time	Variable access time
Time based billing	Traffic based billing

PARAMETERS	GSM	GPRS
Abbreviation	Global System for Mobile Communication.	General Packet Radio Service.
Data rates	14.4 Kbps	57.6 Kbps
Carrier Size	200 KHz TDMA	200 KHz
System generation	2G	2.5G
Based System	TDMA	GSM
Users per channel	8	8
Type of connection	Circuit-Switched Technology.	Packet-Switched Technology.
Frame Duration	4.615 ms.	4.615 ms.
Features	SMS	MMS

(c) Describe the Switching Techniques. Differentiate the Circuit Switching and Packet Switching.


Q-8 Describe the switching techniques. Differentiate the circuit switching and Packet Switching.
→ Switching techniques which is used for the large network to communicate among themselves for message transfer or for sending some packets from source to destination.
→ this switched n/w design is sometimes used to implement LANs and MANs as well.
→ Switching technique classified into 3 categories.
↳ Circuit switching
↳ Packet "
↳ message "
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➔ **Differentiate the Circuit Switching and Packet Switching.**

➔Refer Q-1-b WINTER 2021

OR

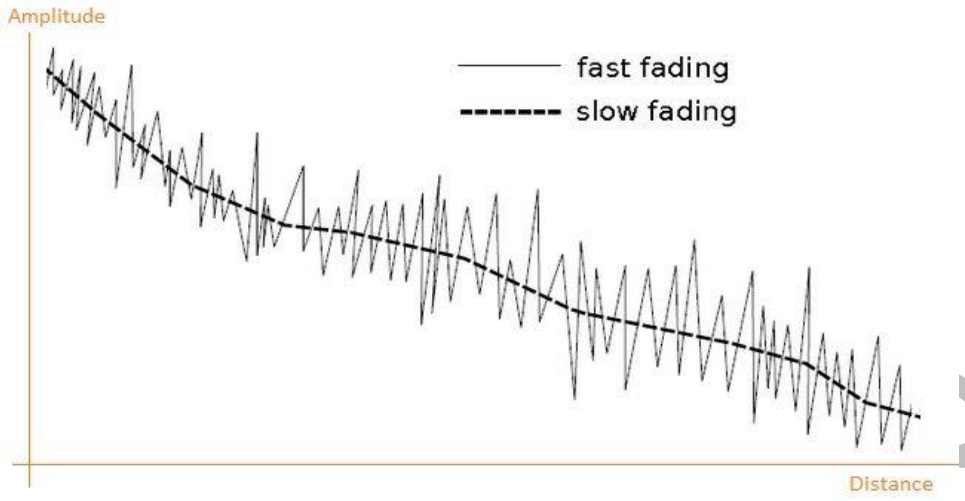
(c) Explain the term Fading and its types in the Mobile Environment in detail.

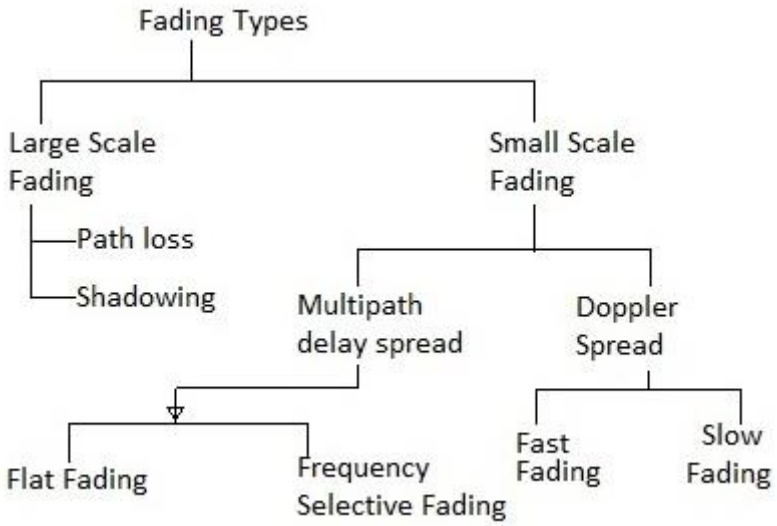
➔ The time variation of received signal power due to changes in transmission medium or paths is known as **fading**.

➔ Fading depends on various factors as mentioned above. In fixed scenario, fading depends on atmospheric conditions such as rainfall, lightening etc.

➔ In mobile scenario, fading depends on obstacles over the path which are varying with respect to time.

➔ These obstacles create complex transmission effects to the transmitted signal.





1.) Large Scale Fading

➔Large scale fading occurs when an obstacle comes in between transmitter and receiver.

➔This interference type causes significant amount of signal strength reduction.

➔This is because EM wave is shadowed or blocked by the obstacle.

➔It is related to large fluctuations of the signal over distance.

1.A) PATH LOSS

The free space path loss can be expressed as follows.

➢ $Pt/Pr = \{(4 * \pi * d)^2 / \lambda^2\} = (4*\pi*f*d)^2/c^2$

Where,

Pt = Transmit power

Pr = Receive power

λ = wavelength

d = distance between transmitting and receiving antenna

c = speed of light i.e. 3×10^8

➔From the equation it implies that transmitted signal attenuates over distance as the signal is being spread over larger and larger area from transmit end towards receive end.

1.B) SHADOWING EFFECT

➔ Shadowing is deviation of received power of EM signal from average value.
➔ It is result of obstacles over the path between transmitter and receiver.
➔It depends on geographical position as well as radio frequency of EM (ElectroMagnetic) waves.

2. Small Scale Fading

➔Small scale fading is concerned with rapid fluctuations of received signal strength over very short distance and short time period.
➔Based on **multipath delay spread** there are two types of small scale fading viz. flat fading and frequency selective fading.
➔ These multipath fading types depend on propagation environment.

2.A) FLAT FADING

➔The wireless channel is said to be flat fading if it has constant gain and linear phase response over a bandwidth which is greater than the bandwidth of the transmitted signal.

➔In this type of fading all the frequency components of the received signal fluctuate in same proportions simultaneously. It is also known as non-selective fading.

- Signal BW << Channel BW
- Symbol period >> Delay Spread

➔The effect of flat fading is seen as decrease in SNR. These flat fading channels are known as amplitude varying channels or narrowband channels.

2.B) FREQUENCY SELECTIVE FADING

➔It affects different spectral components of a radio signal with different amplitudes. Hence the name selective fading.

• Signal BW > Channel BW

• Symbol period < Delay Spread

➔Based on **doppler spread** there are two types of fading viz. fast fading and slow fading. These doppler spread fading types depend on mobile speed i.e. speed of receiver with respect to transmitter.

2.C) FAST FADING

➔The phenomenon of fast fading is represented by rapid fluctuations of signal over small areas (i.e. bandwidth). When the signals arrive from all the directions in the plane, fast fading will be observed for all directions of motion.

➔Fast fading occurs when channel impulse response changes very rapidly within the symbol duration.

➔This parameters result into frequency dispersion or time selective fading due to doppler spreading. Fast fading is result of reflections of local objects and motion of objects relative to those objects.

➔In fast fading, receive signal is sum of numerous signals which are reflected from various surfaces. This signal is sum or difference of multiple signals which can be constructive or destructive based on relative phase shift between them. Phase relationships depend on speed of motion, frequency of transmission and relative path lengths.

➔Fast fading distorts the shape of the baseband pulse. This distortion is linear and creates ISI (Inter Symbol Interference). Adaptive equalization reduces ISI by removing linear distortion induced by channel.

[Q.3]

(a) Describe the TCP/IP Protocol Architecture.

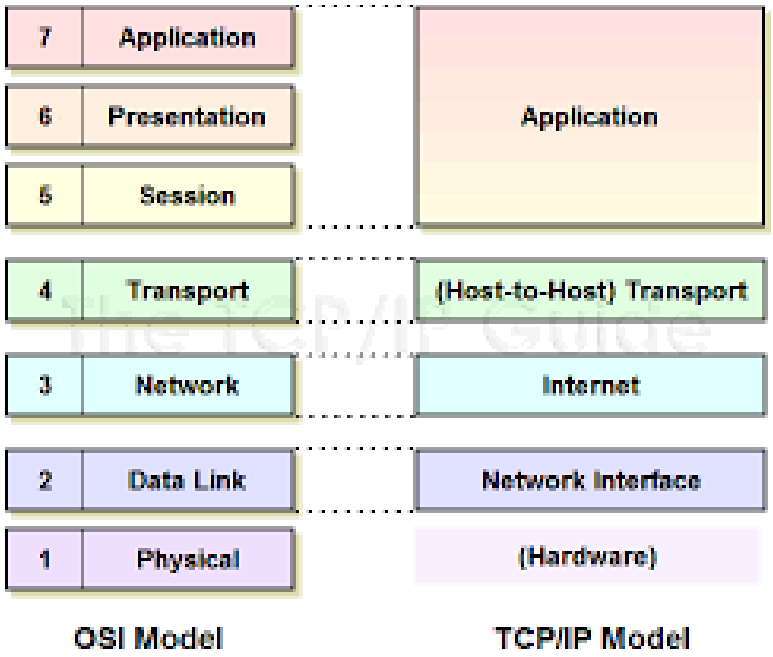
➔ It is a four-layered protocol stack.

➔It helps in the interconnection of network devices over the internet.

➔Each layer contains certain protocols that help in the functioning of the layer.

➔The four layers of TCP/IP protocol are Application Layer, Transport Layer, Networking/Internet Layer and the Data Link/physical layer.

➔ The reliability, flow-control, and correction of data that is sent over the network are taken care of by the transport layer.



➔User Datagram Protocol and the Transmission control protocol are present in the transport layer. After the transport layer, the control is given to the Internet layer.

➔The Internet layer is also known as the network layer. Its function is to move the data packets over the internet to the destination.

➔Data packets can take any of the optimized routes suggested by this layer. The most important protocol -IP Protocol is present in this layer.

➔This protocol is responsible for adding the IP addresses to the data, routing the packets, data encapsulation, formatting.

➔The last layer in the TCP/IP protocol stack is the Network Access Layer. It is the combination of the physical and data link layers of the OSI model.

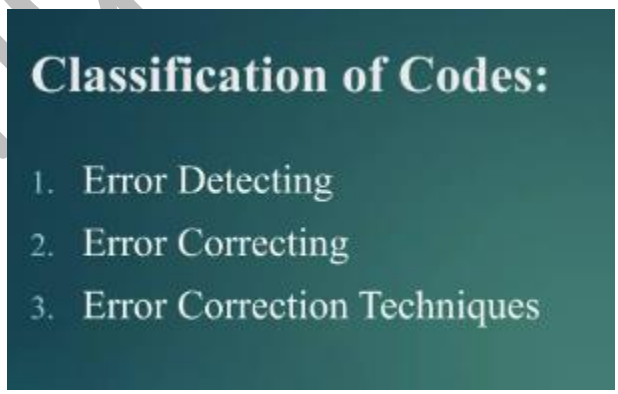
➔The transmission of data physically over a network between two devices is controlled by this layer.

➔The mapping of IP addresses of the devices into physical addresses is also done at this layer.

(b) Describe the Error Control Coding in detail.

➔ **Error control coding** is the coding procedure done to control the occurrences of errors. These techniques help in Error Detection and Error Correction.

➔There are many different error correcting codes depending upon the mathematical principles applied to them.



Error Detection Techniques:

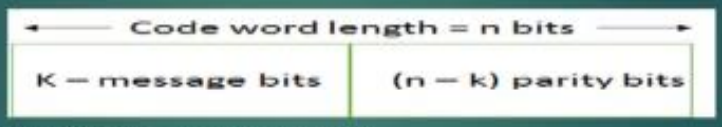
1. Parity Checking
2. Check Sum Error Detecting
3. Cyclic Redundancy Check (CRC)

Error Correcting Techniques:

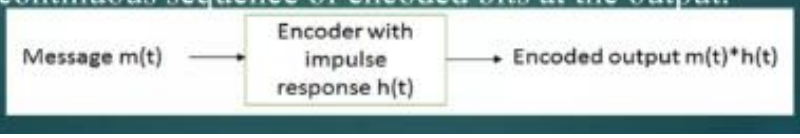
- Based on generation of code words at the transmitter
- Coded words contain the data bits and check bits

Classification of Error – Correcting Codes:

- Block Codes (No memory is required)
- (n, k) block code is generate when the channel encoder accepts information in successive k bit blocks. At the end of each such block, (n - k) parity bit is added, which contains no information and termed as redundant bits.



- Convolutional Codes (Memory is required)
- Here the code words are generated by discrete – time convolution of the input sequence with impulse response of the encoder. Unlike block codes, channel encoder accepts messages as a continuous sequence and generates a continuous sequence of encoded bits at the output.



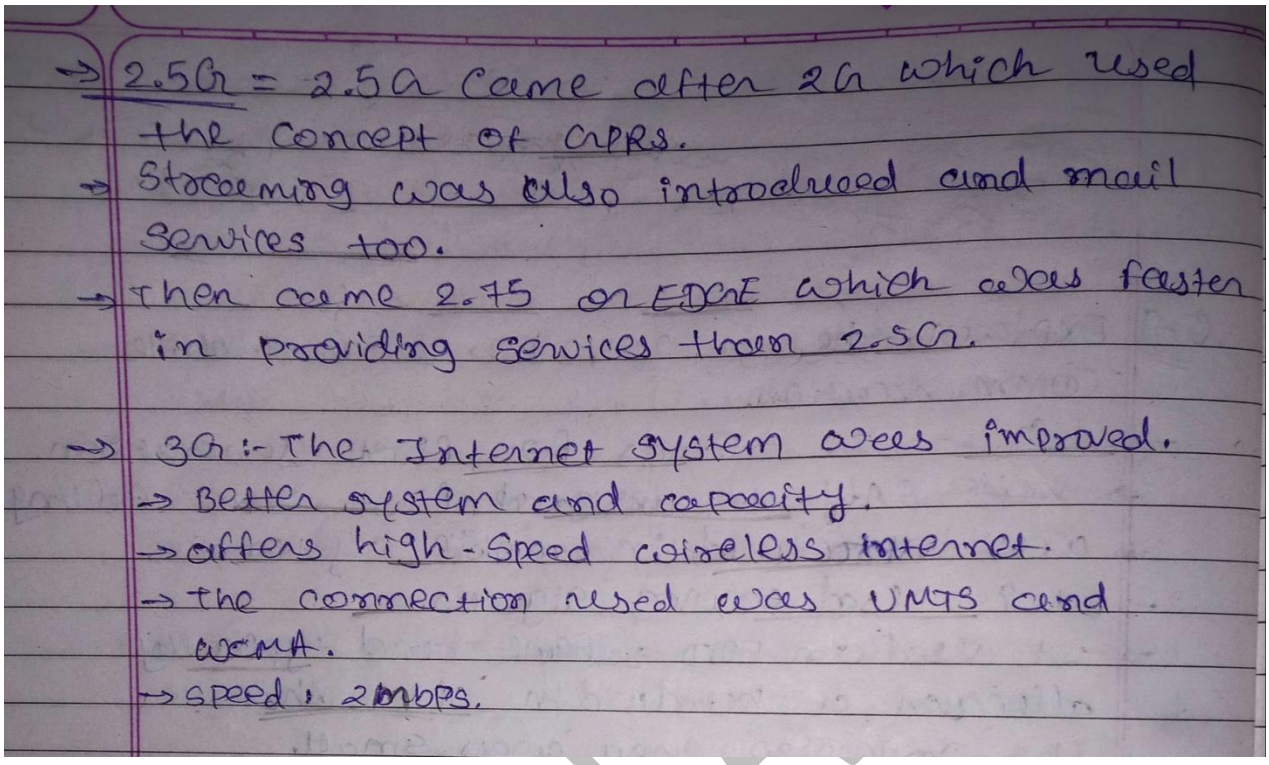
YouTube: https://www.youtube.com/channel/UClk43_DjgTzodjJjumyRlwA

(c) Explain the 1G, 2G, 2.5G and 3G Mobile Communications.

Q-9 Explain the 1G, 2G, 2.5G & 3G Mobile Communication.

→ 1G :- It stands for first generation.
→ Voice only. ~~It designed~~ first-time calling
→ was introduced in mobile systems.
→ It is used analog signals.
→ It used an FDD scheme and typically allocated a bandwidth of 25 Mhz.
→ The coverage area was small.
→ No roaming support between various operators.
→ Low sound quality.
→ speed - 24 Kbps.

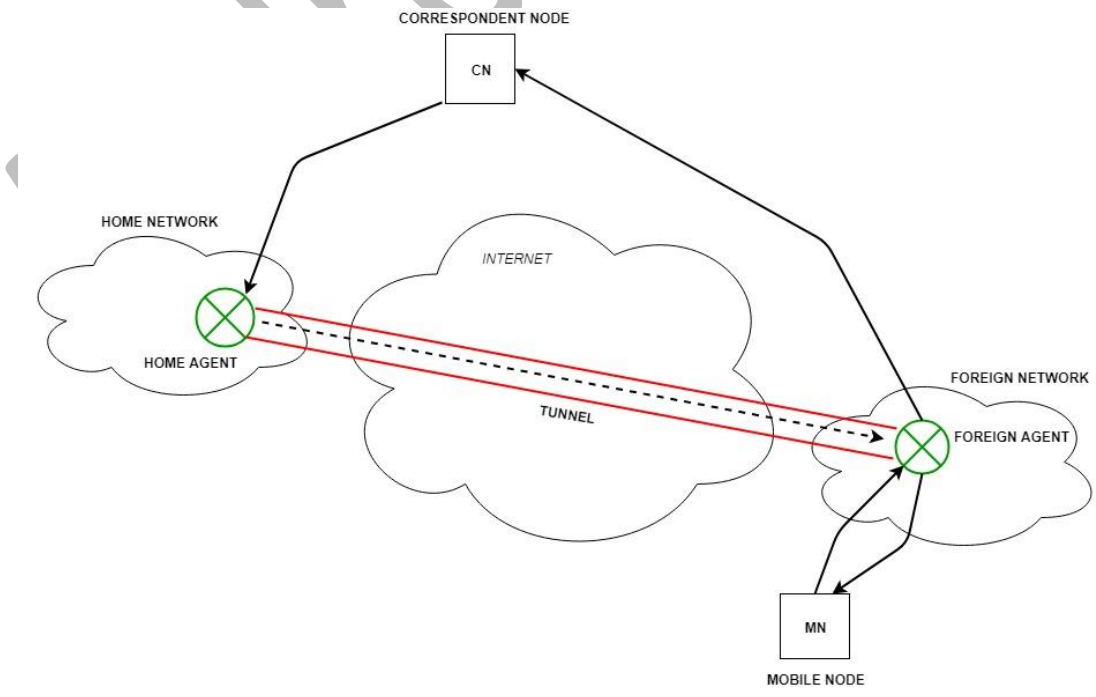
→ 2G (2nd generation) :-
→ Shifted from analog to digital.
→ It supported voice and SMS both.
→ Supported all 4 sectors of the wireless industry namely Digital cellular, Mobile Data, PCs, WLAN,
→ Moderate Mobile data servce.
→ 2G WLAN provided a high data ~~rate~~ & large area coverage.
→ speed : 64 Kbps.



OR

[Q.3]

(a) Explain how the Mobile IP works.



➔The correspondent node sends the data to the mobile node. Data packets contain the correspondent node's address (Source) and home address (Destination).

➔Packets reach the home agent. But now mobile node is not in the home network, it has moved into the foreign network.

➔The foreign agent sends the care-of-address to the home agent to which all the packets should be sent.

➔Now, a tunnel will be established between the home agent and the foreign agent by the process of tunneling.

➔Tunneling establishes a virtual pipe for the packets available between a tunnel entry and an endpoint.

➔It is the process of sending a packet via a tunnel and it is achieved by a mechanism called encapsulation.

➔Now, the home agent encapsulates the data packets into new packets in which the source address is the home address and destination is the care-of-address and sends it through the tunnel to the foreign agent.

➔Foreign agent, on another side of the tunnel, receives the data packets, decapsulates them, and sends them to the mobile node.

➔The mobile node in response to the data packets received sends a reply in response to the foreign agent.

➔The foreign agent directly sends the reply to the correspondent node.

(b) What are HLR and VLR? Describe its functions in Call Routing and Roaming.

➔Refer Q-4-B (WINTER 2021)

(c) Define the Frequency Hopping in Spread Spectrum? Write a note on TDMA, FDMA and CDMA.

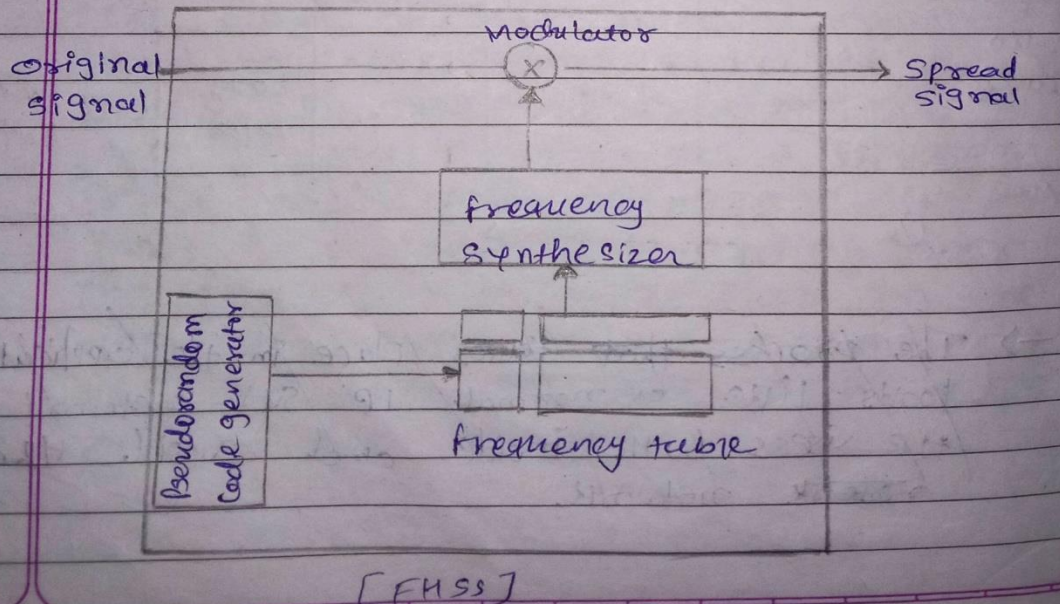
Q-19 Define the frequency Hopping a Spread Spectrum? Write a note on TDMA, FDMA and CDMA.

→ Spread Spectrum is a technique used for wireless communications in telecommunication and radio communication.

/* → In this technique, the frequency of the transmitted signal, i.e. an electrical signal, electromagnetic signal, or accoustic signal, is deliberately ~~varied~~ (intentional) varied and generates a much ~~better~~ greater bandwidth than the signal would have if its frequency were not varied. */

→ "Spectrum is a technique in which the transmitted signals of specific frequencies are varied slightly to obtain greater bandwidth as compared to initial bandwidth".

→ Spread spectrum is designed to be used in wireless applications (LANs and WANs).



Teacher's Signature.....

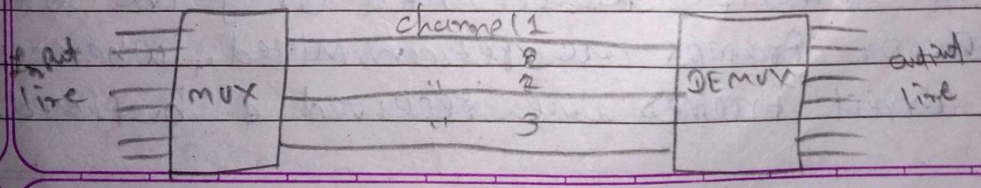
YouTube: https://www.youtube.com/channel/UClk43_DjgTzodjJjumyRlwA

→ FDM:- Frequency Division multiplexing

→ In analog multiplexing, the most used technique is frequency Division multiplexing FDM.

→ This technique uses various frequencies to combine streams of data, for sending them on a communication medium, as a single signal.

Example:- A traditional television transmitter, which sends a number of channels through a single cable, uses FDM.



Teacher's Signature.....

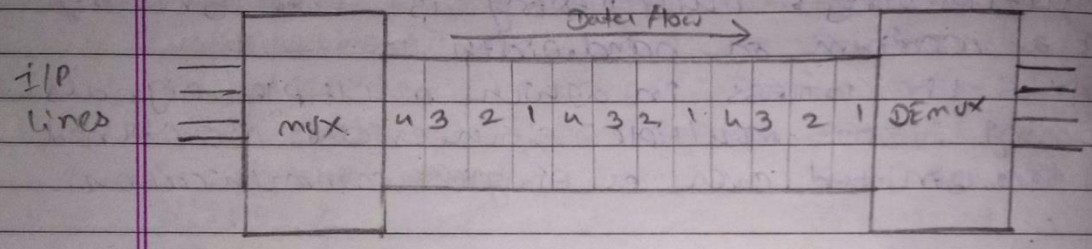
Date : / /

→ TDM:- Time Division multiplexing :-

→ In TDM, the time frame is divided into slots.

→ This technology is used to transmit a signal over a single communication channel, with allotting one slot for each message.

Of all the types of TDM, the main ones are Synchronous and Asynchronous TDM.



→ There are two types of TDM:-

① Synchronous TDM.

② Asynchronous TDM.

→ CDMA -

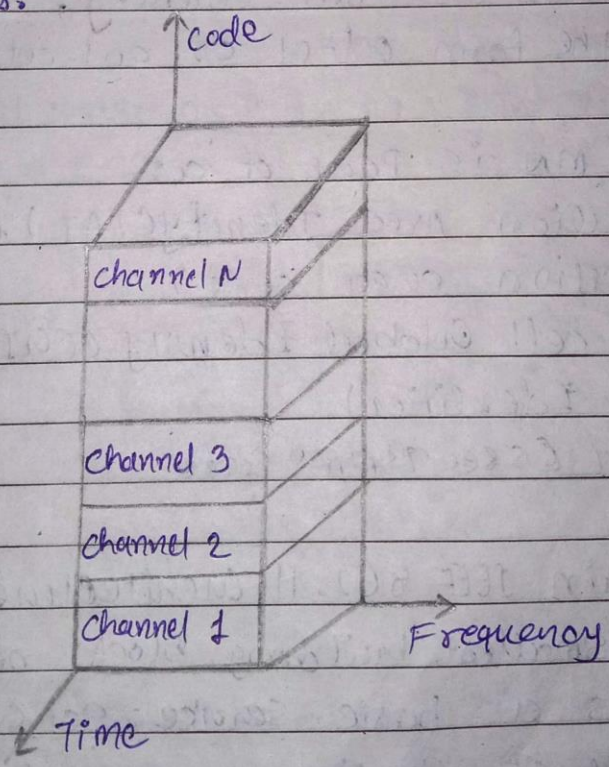
→ Code Division Multiple access is a channel access method used by several radio communication technologies.

→ It is a digital cellular technology and an example of multiple access.

→ It is generally used for mobile communication.

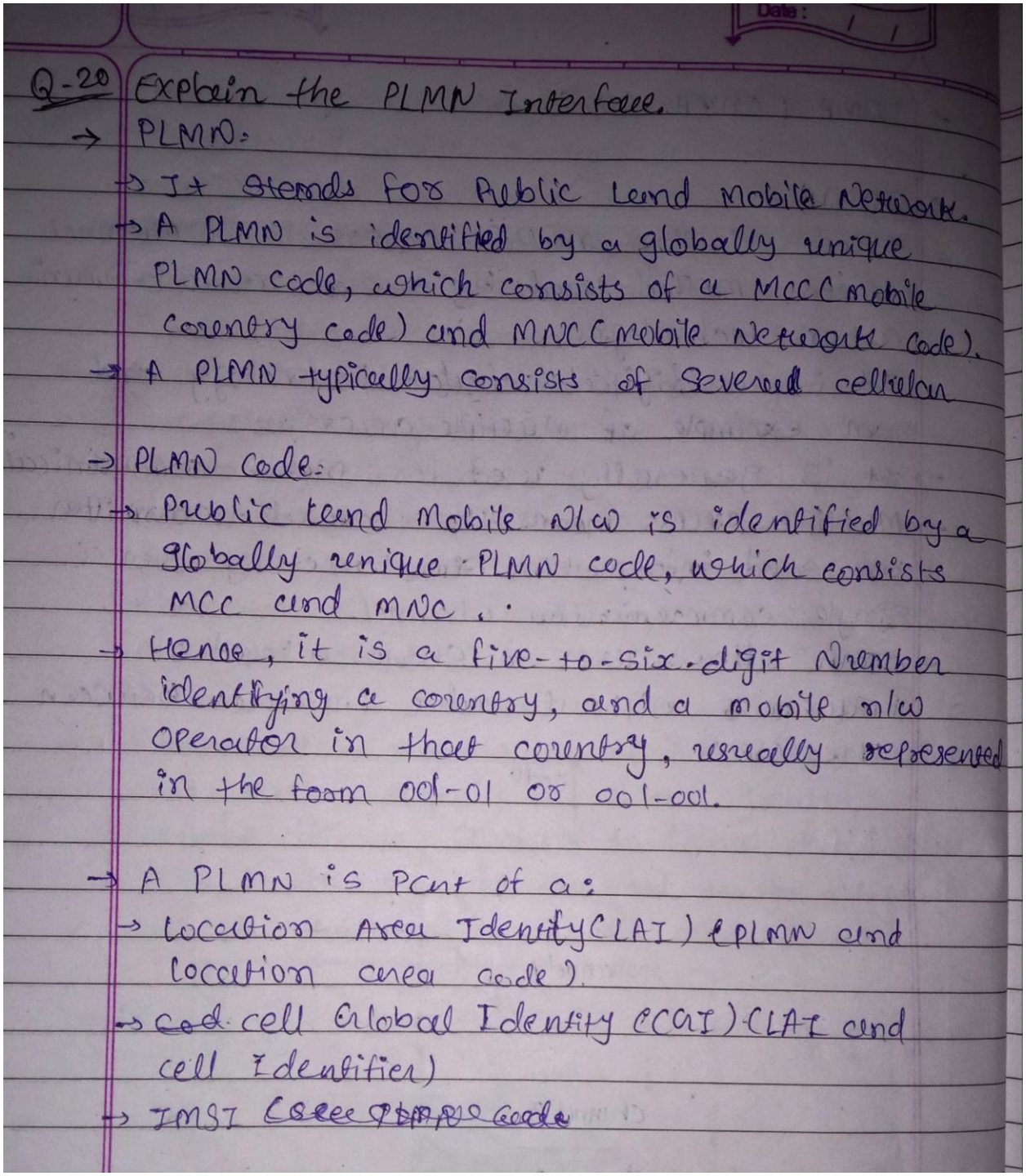
→ Multiple access means that several transmitter can send information simultaneously over a single communication channel.

→ CDMA allows user to share a band of frequencies without undue interface between the users.



[Q.4]

(a) Explain the PLMN Interface.



Q-20 Explain the PLMN Interface.

→ PLMN:

→ It stands for Public Land Mobile Network.

→ A PLMN is identified by a globally unique PLMN code, which consists of a MCC (Mobile Country code) and MNC (Mobile Network code).

→ A PLMN typically consists of several cellular

→ PLMN code:

→ Public Land Mobile N/w is identified by a globally unique PLMN code, which consists MCC and MNC.

→ Hence, it is a five-to-six-digit Number identifying a country, and a mobile n/w operator in that country, usually represented in the form 001-01 or 001-001.

→ A PLMN is Part of a:

→ Location Area Identity (LAI) (PLMN and location area code).

→ Cell Global Identity (CGI) (LAI and cell Identifier)

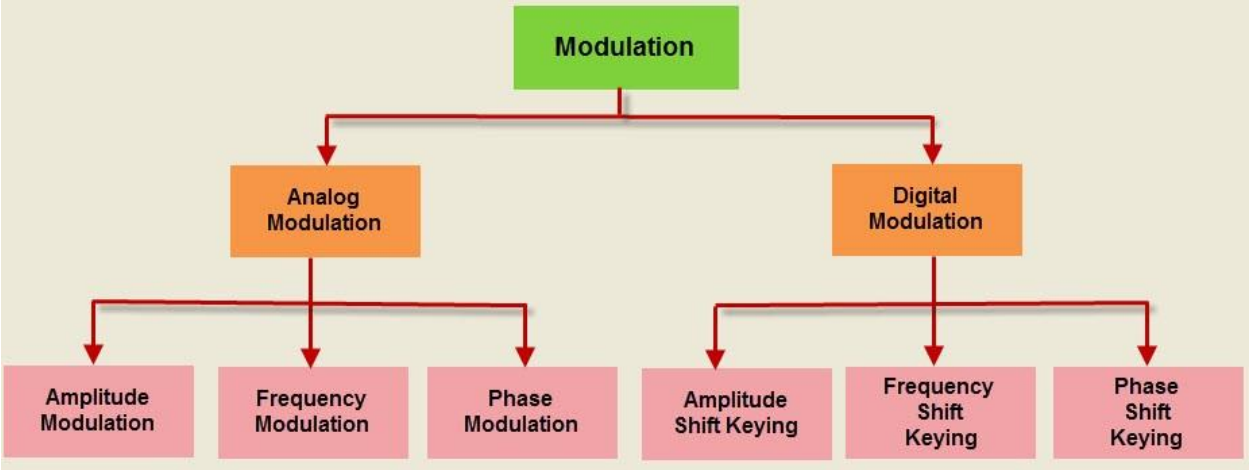
→ IMSI

(b) Enlist and Explain the different Modulation Techniques in the signal theory.

➔ Modulation techniques are roughly divided into four types: Analog modulation, Digital modulation, Pulse modulation , and Spread spectrum method.

➔Analog modulation is typically used for AM, FM radio, and short-wave broadcasting.

➔Digital modulation involves transmission of binary signals (0 and 1).



➔**Amplitude modulation (AM) :**

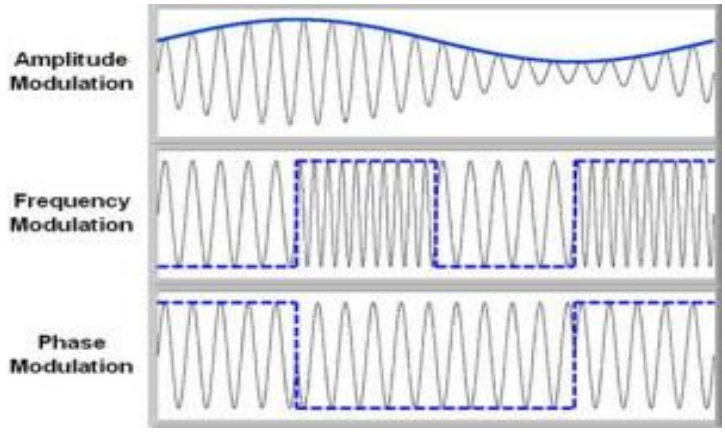
- ⇨ the amplitude of the carrier wave is varied in proportion to the message signal, and the other factors like frequency and phase remain constant.

➔ **Frequency modulation** (FM)

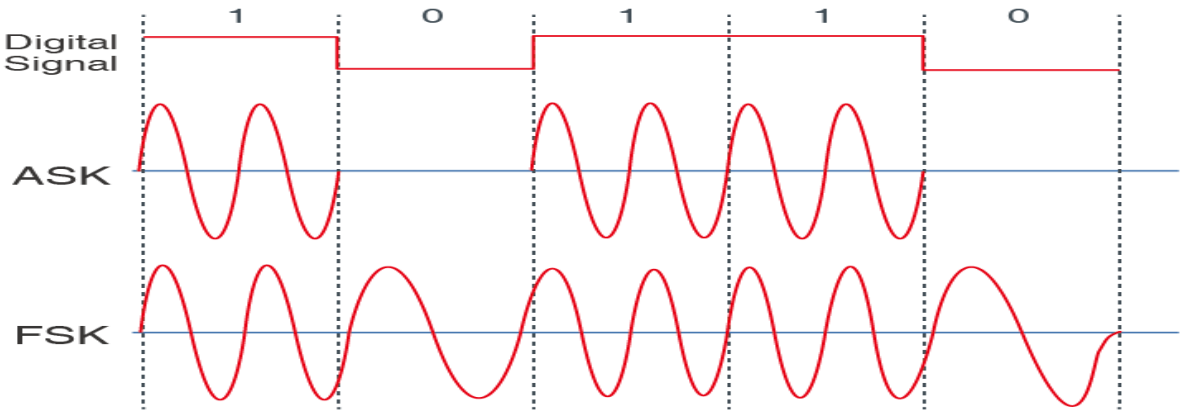
- ⇨ **Frequency modulation** (FM) varies the frequency of the carrier in proportion to the message or data signal while maintaining other parameters constant.

➔**phase modulation (PM):**

- ⇨ the carrier phase is varied in accordance with the data signal. In this type of modulation, when the phase is changed it also affects the frequency, so this modulation also comes under frequency modulation.



➔**Digital Modulation :**



➔**ASK (Amplitude Shift Keying) :**

- ⇨ A digital modulation method that sends transmission data by varying the presence/absence of analog signals.

➔**FSK (Frequency Shift Keying) :**

- ⇨ This technique utilizes the difference in the amplitude of analog signals to modulate digital signals by switching between low frequency and high frequency in order to represent 0 and 1.

➔**PSK – Phase Shift Keying :**

- ⇨ The phase of the output sign al gets shifted depending upon the input. These are mainly of two types, namely Binary Phase Shift Keying BPSKBPSK and Quadrature Phase Shift Keying QPSKQPSK, according to the number of phase shifts. The other one is Differential Phase Shift Keying DPSKDPSK which changes the phase according to the previous value.

(c) Explain in detail the Direct Sequence Spread Spectrum (DSSS).

➔ Refer OR Q-4-C (WINTER 2021)

OR

[Q.4]

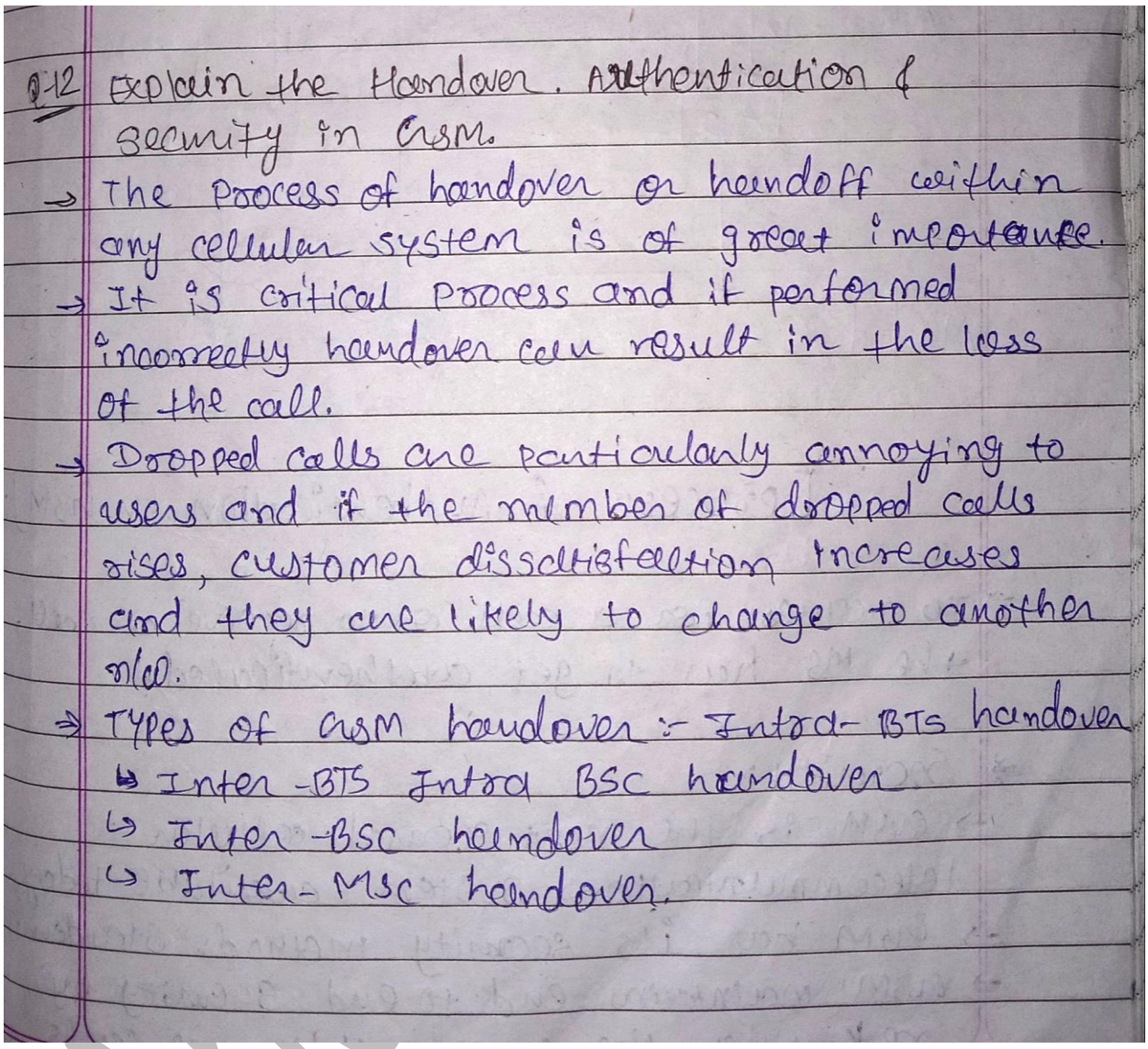
(a) Differentiate the Wimax and WiFi.

WiMAX	Wi-Fi
It is used for deploying Wireless Broadband Networks.	It is used for deploying Wireless LAN networks.
It uses 2-11 GHz frequency.	It uses 2.5 GHz or 5 GHz frequency.
It has an adjustable Channel Bandwidth.	It has a fixed Channel Bandwidth of 25MHz.
It uses Full Duplex Communication Protocol.	It uses Half Duplex Communication Protocol.
It uses 3DES/AES encryption.	It has optional RC4 encryption.
Both of them uses QPSK, BPSK modulation techniques for transmission.	

stands for Worldwide Interoperability for Microwave Access | Wi-Fi stands for Wireless Fidelity

Wi-Fi	WiMAX
Connection Oriented	Connection Less
Limited area	Depends on the Networks establishments
Use the versions 802.11b,802.11a,802.11g,802.11n	Use the versions 802.16
Less bandwidth	Medium Band width
Limited access points	No of access points
Connection must be reliable	Connect is Unreliable

(b) Explain the Handover, Authentication and Security in GSM.



Q.12 Explain the Handover. Authentication & Security in GSM.

→ The process of handover or handoff within any cellular system is of great importance.

→ It is critical process and if performed incorrectly handover can result in the loss of the call.

→ Dropped calls are particularly annoying to users and if the number of dropped calls rises, customer dissatisfaction increases and they are likely to change to another n/w.

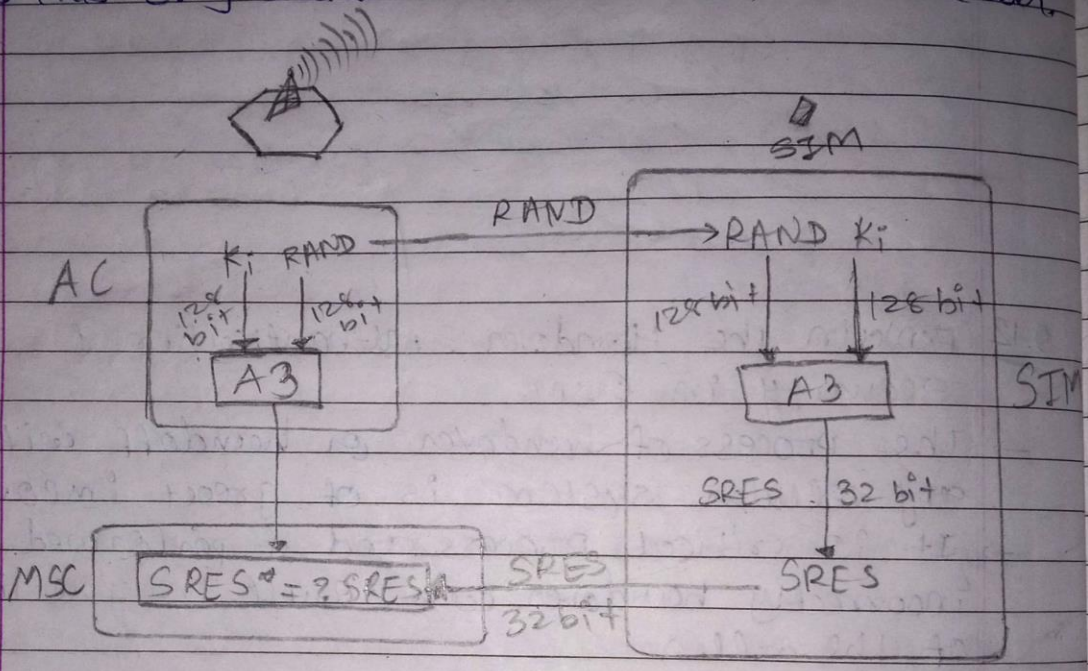
→ Types of GSM handover :- Intra-BTS handover
↳ Inter-BTS Intra BSC handover
↳ Inter-BSC handover
↳ Inter-MSC handover.

→ Authentication of GSM

→ Authentication in the GSM system is achieved by the Base station sending out a challenge to the mobile station.

→ The MS uses a key stored on its SIM to send back a response that is then verified.

→ This only authenticates the MS, not the user.



[Process of Authentication in GSM]

→ To request for a call or to receive a call, the MS has to get authenticated.

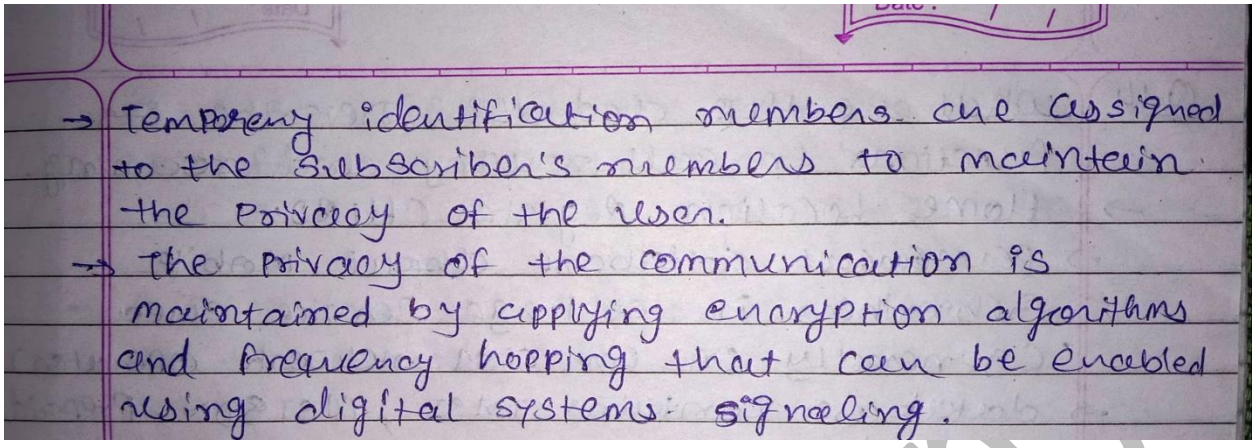
→ Security :-

→ GSM is the most secured cellular telecommunications system available today.

→ GSM has its security methods standardized

→ GSM maintains end to end security by retaining the confidentiality of calls and anonymity of the GSM subscriber.

Teacher's Signature.....

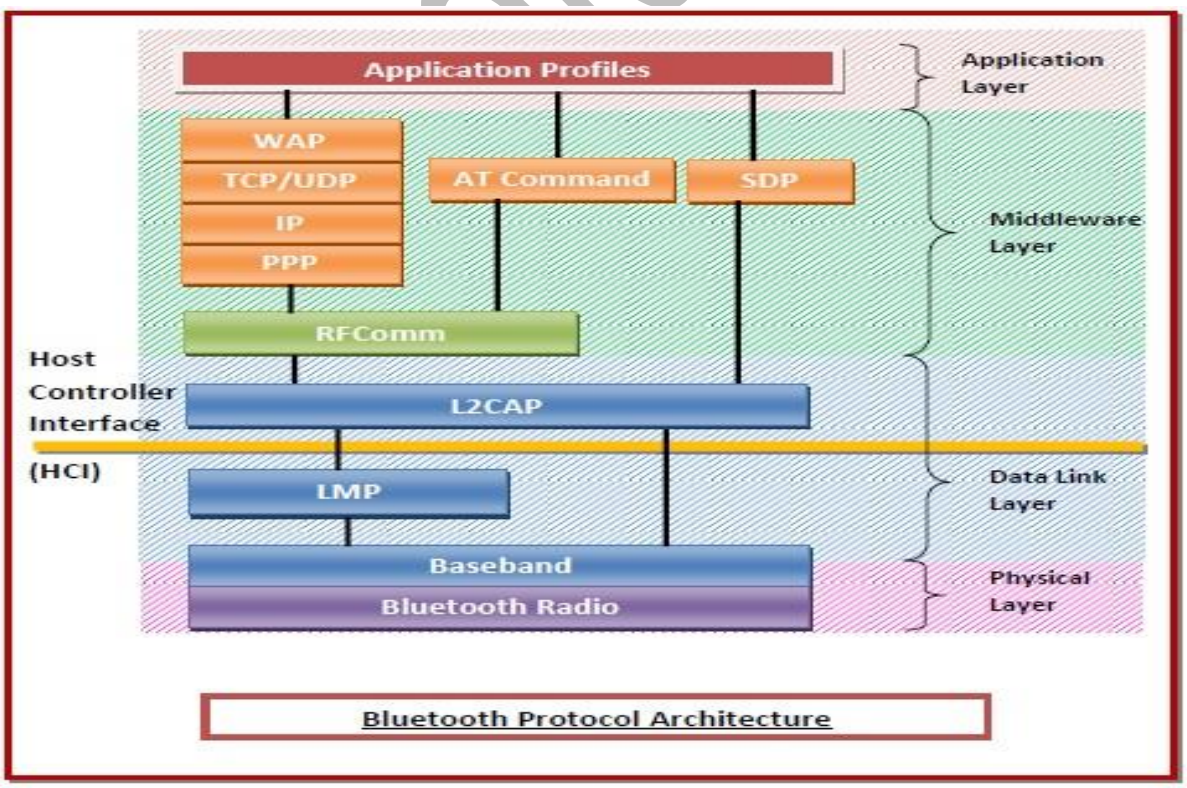


(c) Draw and explain the Bluetooth Protocol Architecture.

➔ Bluetooth network technology connects mobile devices wirelessly over a short-range to form a personal area network (PAN).

➔The Bluetooth architecture has its own independent model with a stack of protocols, instead of following the standard OSI model or TCP/IP model.

➔The protocols in the Bluetooth standard can be loosely grouped into the physical layer, data link layer, middleware layer, and application layer as shown in the following diagram –



➔Protocols in the Bluetooth Protocol Architecture

- ⇨ **Physical Layer** – This includes Bluetooth radio and Baseband (also in the data link layer.
  - **Radio** – This is a physical layer equivalent protocol that lays down the physical structure and specifications for transmission of radio waves. It defines air interface, frequency bands, frequency hopping specifications, and modulation techniques.
  - **Baseband** – This protocol takes the services of radio protocol. It defines the addressing scheme, packet frame format, timing, and power control algorithms.
- ⇨ **Data Link Layer** – This includes Baseband, Link Manager Protocol (LMP), and Logical Link Control and Adaptation Protocol (L2CAP).
  - **Link Manager Protocol (LMP)** – LMP establishes logical links between Bluetooth devices and maintains the links for enabling communications. The other main functions of LMP are device authentication, message encryption, and negotiation of packet sizes.
  - **Logical Link Control and Adaptation Protocol (L2CAP)** – L2CAP provides adaption between upper layer frame and baseband layer frame format. L2CAP provides support for both connection-oriented as well as connectionless services.
- ⇨ **Middleware Layer** – This includes Radio Frequency Communications (RFComm) protocol, adopted protocols, SDP, and AT commands.
  - **RFComm** – It is short for Radio Frontend Component. It provides a serial interface with WAP.
  - **Adopted Protocols** – These are the protocols that are adopted from standard models. The commonly adopted protocols used in Bluetooth are Point-to-Point Protocol (PPP), Internet Protocol (IP), User Datagram Protocol (UDP), Transmission Control Protocol (TCP), and Wireless Application Protocol (WAP).
  - **Service Discovery Protocol (SDP)**– SDP takes care of service-related queries like device information so as to establish a connection between contending Bluetooth devices.
  - **AT Commands** – ATtention command set.
- ⇨ **Applications Layer** – This includes the application profiles that allow the user to interact with the Bluetooth applications.

[Q.5]

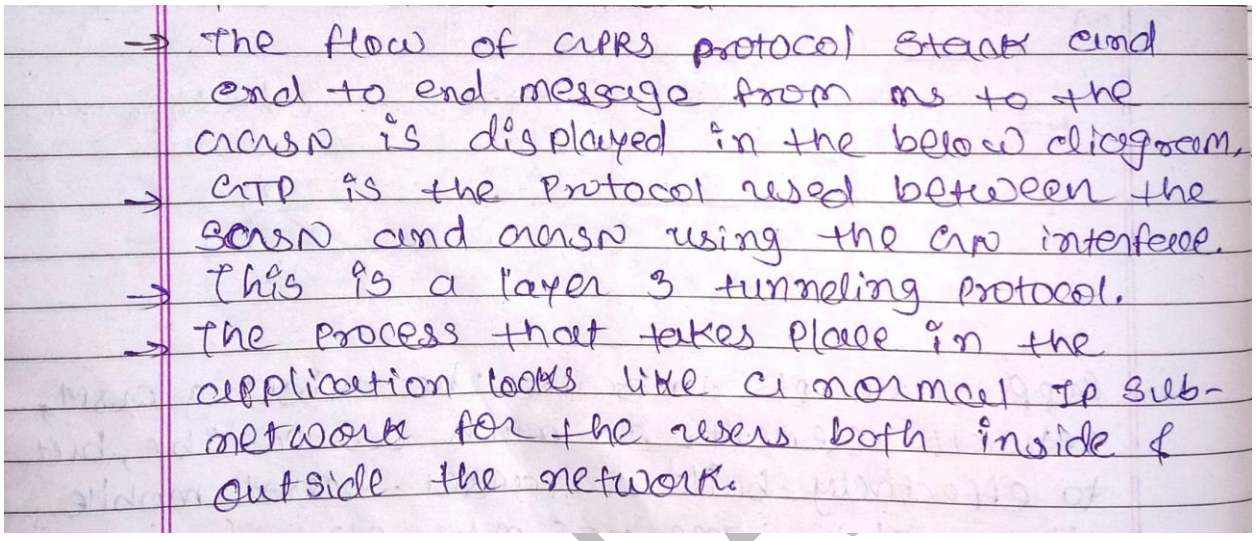
(a) Explain the Wireless Session Protocol Primitives and Parameters.

➔ X

(b) Explain the IEEE 802.11 Architecture with the neat diagram.

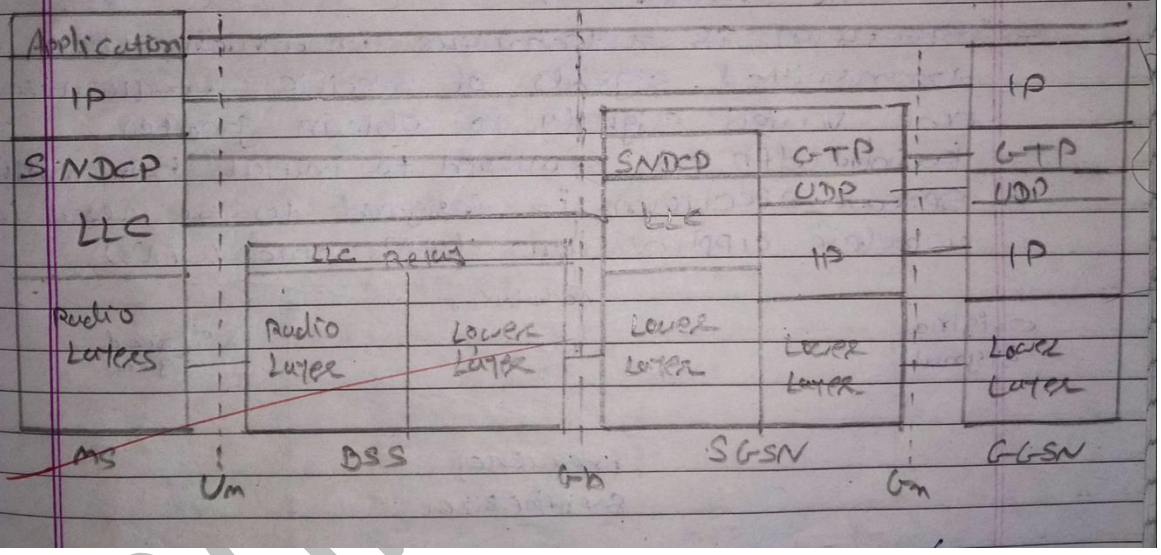
➔Refer OR Q-3-C (WINTER 2021)

(c) Explain the GPRS Transmission Protocol Stack with the neat diagram.


→ The flow of GPRS protocol stack and end to end message from MS to the GGSN is displayed in the below diagram.
→ GTP is the Protocol used between the SGSN and GGSN using the Gn interface.
→ This is a layer 3 tunneling protocol.
→ The process that takes place in the application looks like a normal IP sub-network for the users both inside & outside the network.

→ The vital thing that needs attention is the application communicates via standard IP, that is carried through the GPRS network and out through the gateway GPRS.

→ the Packets that are mobile between the GGSN and the SGSN use the GPRS tunneling protocol this way the IP addresses located on the external side of the GPRS n/w do not have deal with the internal backbone UDP and IP are run by GTP.



OR[Q.5]

(a) Explain the WAP Stack with neat diagram.

Q-27 EXplain the WAP Stack with neat diagram.

→ The WAP Stack consists of the following layers:

① WAE = Wireless Application Environment

→ The WAE defines the following functions:

→ Wireless Markup Language (WML):

→ It is an XML-based markup language for the visual display of WAP-based contents.

→ WML script:- A script language, very similar to JavaScript.

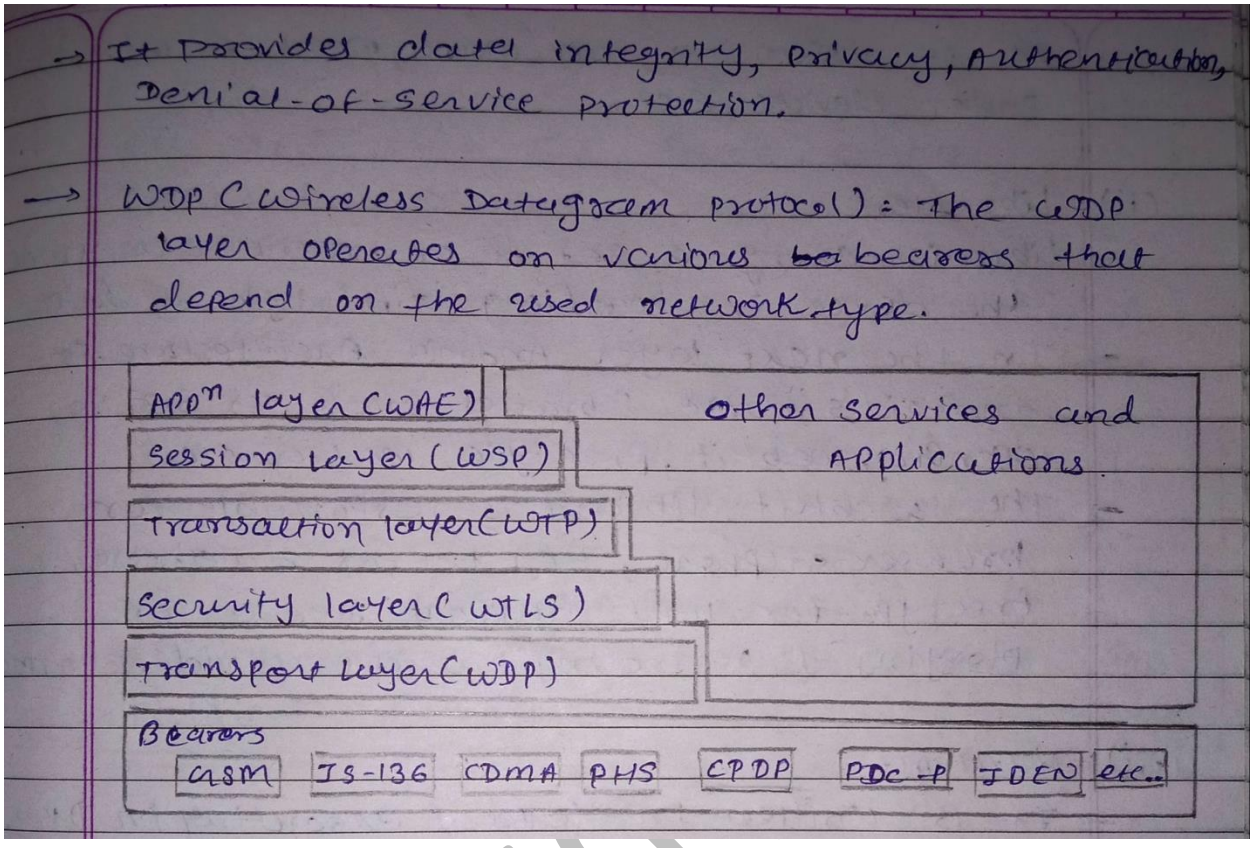
→ WTA (Wireless Telephony App^n)/(WTAI):-
→ Telephony services & programming interfaces.

Content formats:- These are specifications for data formats, including images, telephone directories, calendar information, and so on.

→ WSP (Wireless Session Protocol):-
→ It implements an interface for connection-oriented & connectionless session services.
→ The connection-oriented session service operates using the Protocol of the transaction layer.

→ WTP (Wireless Transaction Protocol):-
→ It runs on top of a datagram service such as user Datagram protocol (UDP) & is part of the standard suite of TCP/IP Protocols used to provide a simplified Protocol suitable for low bandwidth wireless station.
→ WTP supports class of transaction service, optional user-to-user reliability, PDU concatenation and asynchronous transaction.

→ WTLS (Wireless ~~transport~~ transaction layer Security):- The WTLS layer implements a security Protocol based on the TLS (Transport layer security) industry standard.



(b) Explain the Android Architecture with the neat diagram.

➔ Refer Q-5-C (SUMEER 2019)

(c) Define the Android Layout. Explain the various Android Layouts.

➔ Refer OR Q-5-C (WINTER 2021)

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE –SEMESTER-7 (NEW)- EXAMINATION- SUMMER 2018

Subject Code: 2170710 **Date: 03-05-2018**

Subject Name: Mobile Computing and Wireless Communication

Time: 02:30 pm to 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Compare the LAN and WAN.	**03**
	(b)	Define the term Multiplexing. Explain the FDM and TDM with one example each.	**04**
	(c)	Explain the Nyquist Theorem. Find the relationship among the following terms: Channel Capacity(C), Bandwidth(B) and Signal-to-Noise Ratio(SNR).	**07**
Q.2	**(a)**	Explain the Transmission Media.	**03**
	(b)	Differentiate the GSM and GPRS.	**04**
	(c)	Describe the Switching Techniques. Differentiate the Circuit Switching and Packet Switching.	**07**
		OR	
	(c)	Explain the term Fading and its types in the Mobile Environment in detail.	**07**
Q.3	**(a)**	Describe the TCP/IP Protocol Architecture.	**03**
	(b)	Describe the Error Control Coding in detail.	**04**
	(c)	Explain the 1G, 2G, 2.5G and 3G Mobile Communications.	**07**
		OR	
Q.3	**(a)**	Explain how the Mobile IP works.	**03**
	(b)	What are HLR and VLR? Describe its functions in Call Routing and Roaming.	**04**
	(c)	Define the Frequency Hopping in Spread Spectrum? Write a note on TDMA, FDMA and CDMA.	**07**
Q.4	**(a)**	Explain the PLMN Interface.	**03**
	(b)	Enlist and Explain the different Modulation Techniques in the signal theory.	**04**
	(c)	Explain in detail the Direct Sequence Spread Spectrum (DSSS).	**07**
		OR	
Q.4	**(a)**	Differentiate the Wimax and WiFi.	**03**
	(b)	Explain the Handover, Authentication and Security in GSM.	**04**
	(c)	Draw and explain the Bluetooth Protocol Architecture.	**07**
Q.5	**(a)**	Explain the Wireless Session Protocol Primitives and Parameters.	**03**
	(b)	Explain the IEEE 802.11 Architecture with the neat diagram.	**04**
	(c)	Explain the GPRS Transmission Protocol Stack with the neat diagram.	**07**
		OR	
Q.5	**(a)**	Explain the WAP Stack with neat diagram.	**03**
	(b)	Explain the Android Architecture with the neat diagram.	**04**
	(c)	Define the Android Layout. Explain the various Android Layouts.	**07**

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(3170710)

Mobile Computing and Wireless communication WINTER 2021

[Q.1]

(a) Explain any three addresses and identifiers used in GSM with example.

➔ **International Mobile Station Equipment Identity (IMEI) :**

➔The International Mobile Station Equipment Identity (IMEI) looks more like a serial number which distinctively identifies a mobile station internationally.

➔Following are the parts of IMEI:

- **Type Approval Code (TAC)** : 5 decimal places, centrally assigned.
- **Final Assembly Code (FAC)** : 5 decimal places, assigned by the manufacturer.
- **Serial Number (SNR)** : 4 decimal places, assigned by the manufacturer.
- **Spare (SP)** : 1 decimal place.

➔**Mobile Subscriber ISDN Number (MSISDN) :**

The authentic telephone number of a mobile station is the Mobile Subscriber ISDN Number (MSISDN).

➔Following are the parts of MSISDN:

- Country Code (CC) : Up to 3 decimal places.
- National Destination Code (NDC) : Typically 2-3 decimal places.
- Subscriber Number (SN) : Maximum 10 decimal places.

➔**Mobile Station Roaming Number (MSRN) :**

➔Mobile Station Roaming Number (MSRN) is an interim location dependent ISDN number, assigned to a mobile station by a regionally responsible Visitor Location Register (VLA).

➔The MSRN has the same structure as the MSISDN:

- Country Code (CC) : of the visited network.
- National Destination Code (NDC) : of the visited network.
- Subscriber Number (SN) : in the current mobile network.

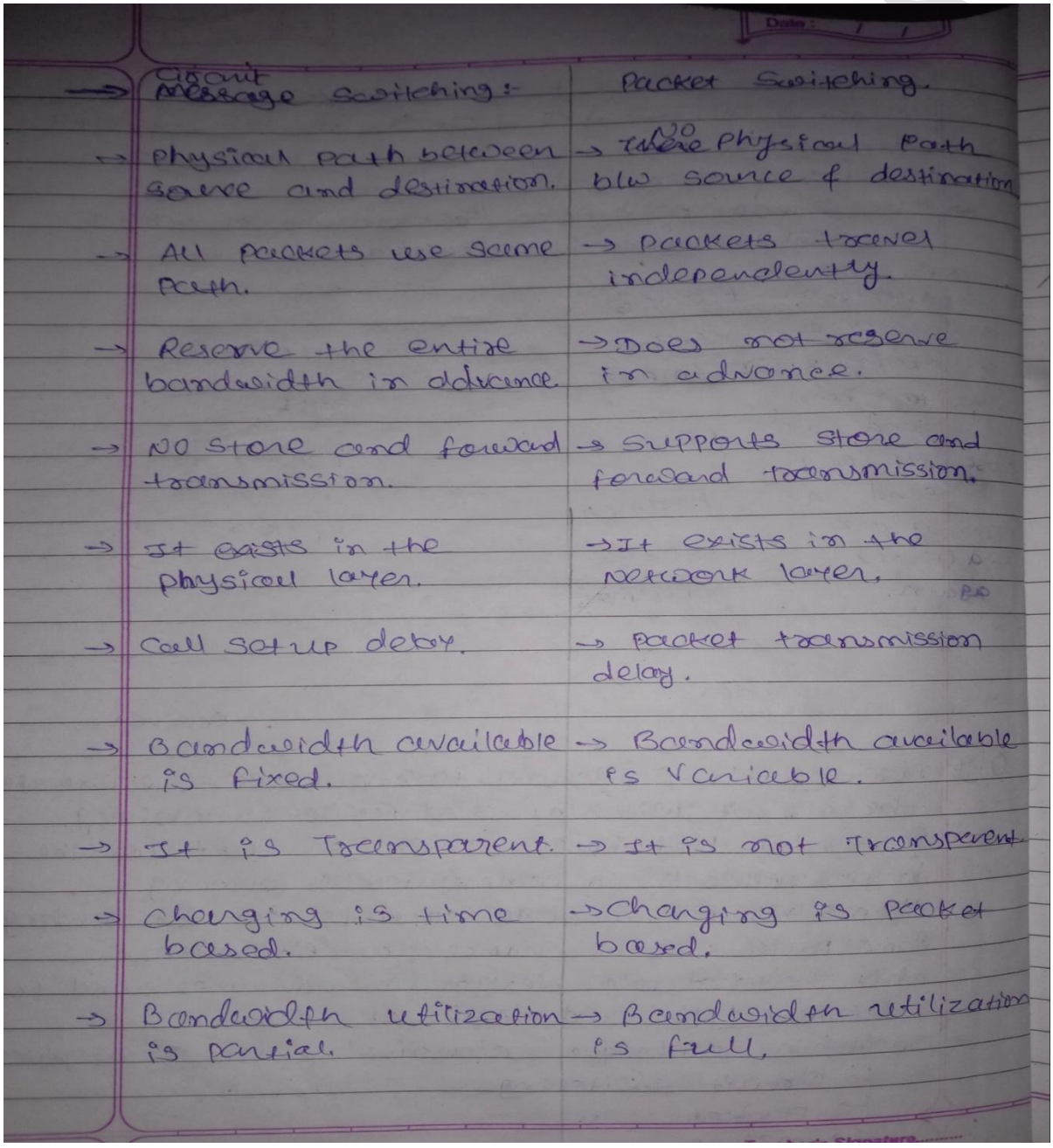
➔**International Mobile Subscriber Identity (IMSI) :**

➔Every registered user has an original International Mobile Subscriber Identity (IMSI) with a valid IMEI stored in their Subscriber Identity Module (SIM).

➔IMSI comprises of the following parts:

- Mobile Country Code (MCC) : 3 decimal places, internationally standardized.
- Mobile Network Code (MNC) : 2 decimal places, for unique identification of mobile network within the country.

(b) Differentiate packet switching and circuit switching.



Circuit Message Switching :	Packet Switching.
→ Physical path between source and destination.	→ There No Physical Path blw source & destination
→ All packets use same path.	→ packets travel independently.
→ Reserve the entire bandwidth in advance.	→ Does not reserve in advance.
→ No store and forward transmission.	→ Supports store and forward transmission.
→ It exists in the physical layer.	→ It exists in the network layer.
→ Call setup delay.	→ Packet transmission delay.
→ Bandwidth available is fixed.	→ Bandwidth available is Variable.
→ It is Transparent.	→ It is not Transparent.
→ Charging is time based.	→ Charging is packet based.
→ Bandwidth utilization is partial.	→ Bandwidth utilization is full.

(c) Explain Mobile IP.

➔Refer OR Q-2-C (SUMEER 2019)

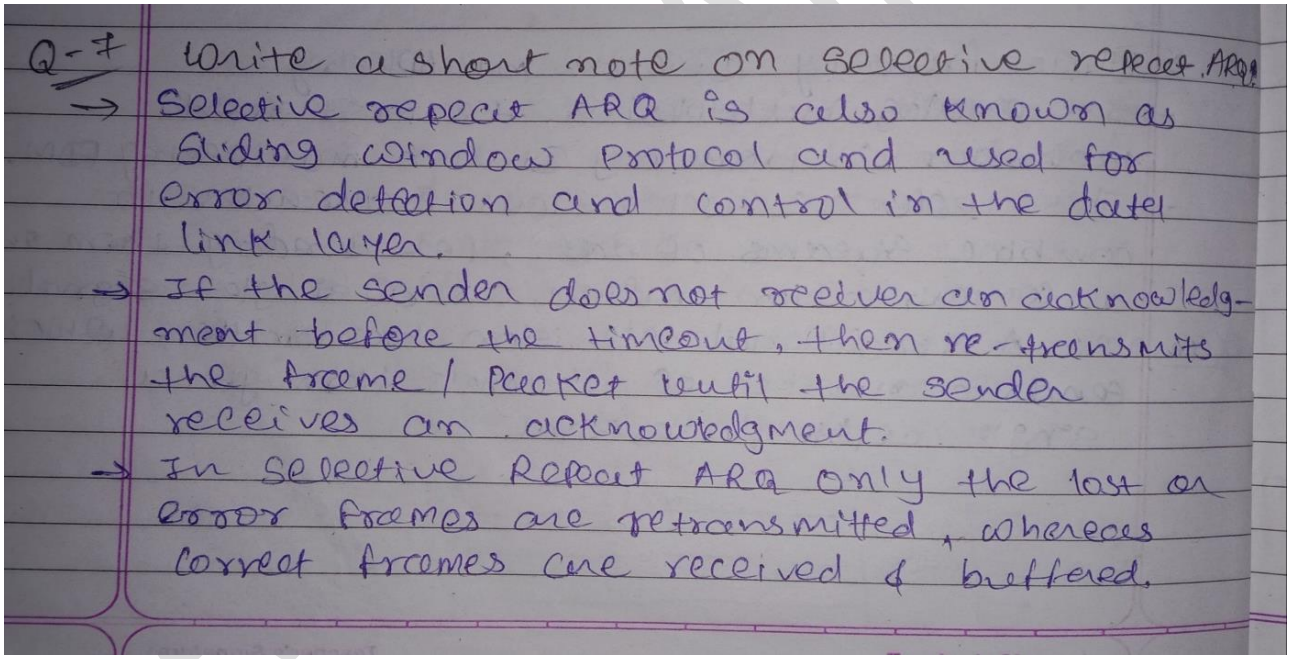
[Q.2]

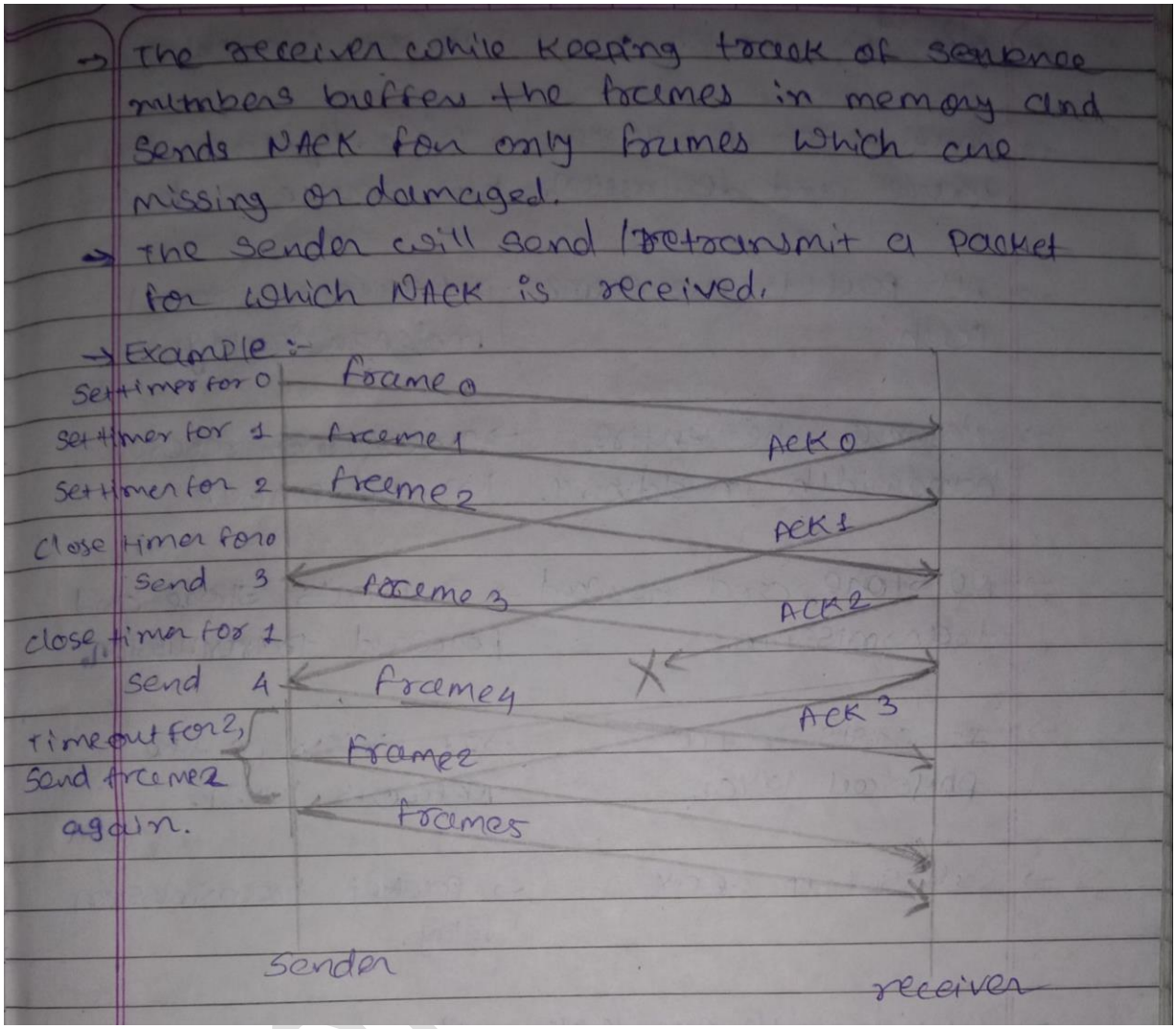
(a) Given a channel with an intended capacity of 50 Mbps, the bandwidth of the channel is 5 MHz What signal-tonoise ratio is required to achieve this capacity?

➔ X

(b) Write a short note on selective repeat ARQ.

➔


Q-7 Write a short note on selective repeat ARQ.
→ Selective repeat ARQ is also known as Sliding window Protocol and used for error detection and control in the datel link layer.
→ If the senden does not receiver can acknowledg- ment before the timeout, then re-transmits the frame / Packet until the sender receives an acknowledgment.
→ In Selective Repeat ARQ only the lost or error frames are retransmitted, whereas correct frames are received & buffered.



(c) Write a note on stop-and-wait and selective repeat ARQ.

➔ It is the simplest flow control method. In this, the sender will transmit one frame at a time to the receiver.

➔The sender will **stop and wait** for the acknowledgement from the receiver.

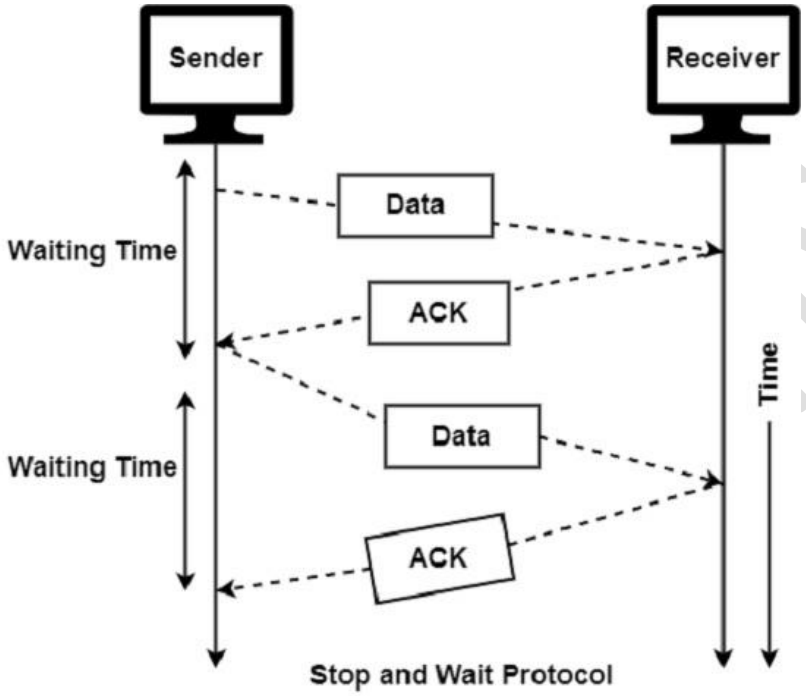
➔This time is the sender's waiting time, and the sender is idle during this time.

➔When the sender gets the acknowledgement (ACK), it will send the next data packet to the receiver and wait for the disclosure again, and this process will continue as long as the sender has the data to send.

➔While sending the data from the sender to the receiver, the data flow needs to be controlled. If the sender is transmitting the data at a rate higher than the receiver can receive and process it, the data will get lost.

➔The Flow-control methods will help in ensuring that the data doesn't get lost. The flow control method will check that the senders send the data only at a rate that the receiver can receive and process.

➔The working of Stop and Wait Protocol is shown in the figure below –



➔ selective repeat ARQ.

Refer Q-2-B (upper)

OR

(c) Explain various signal multiplexing techniques

➔Refer Q-2-C (SUMEER 2019)

[Q.3]

(a) Explain L2CAP protocol of Bluetooth.

➔ Refer OR Q-4-B (SUMEER 2019)

(b) Explain handover process in cellular system.

➔ Refer Q-3-B (SUMEER 2019)

(c) Explain DFWMAC-DCF using CSMA/CA

➔ X

OR

[Q.3]

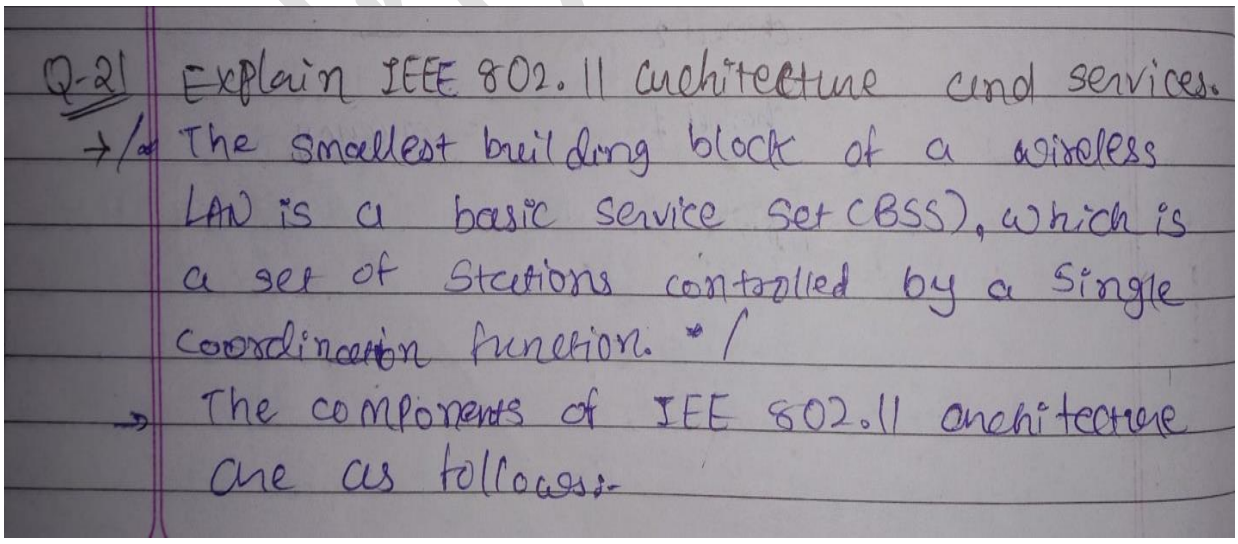
(a) Differentiate infrastructure and ad-hoc network.

➔ Refer Q-3-A (SUMEER 2019)

(b) What is Handover? Explain types of it in brief.

➔ Refer Q-3-B (SUMEER 2019)

(c) Explain IEEE 802.11 architecture and its services.


Q-2) Explain IEEE 802.11 architecture and services.
→/* The smallest building block of a wireless LAN is a basic service set (BSS), which is a set of stations controlled by a single coordination function. */
→ The components of IEE 802.11 architecture are as follows:-

→ Stations (STA) = Stations comprises of all devices and equipment that are connected to the wireless LAN.

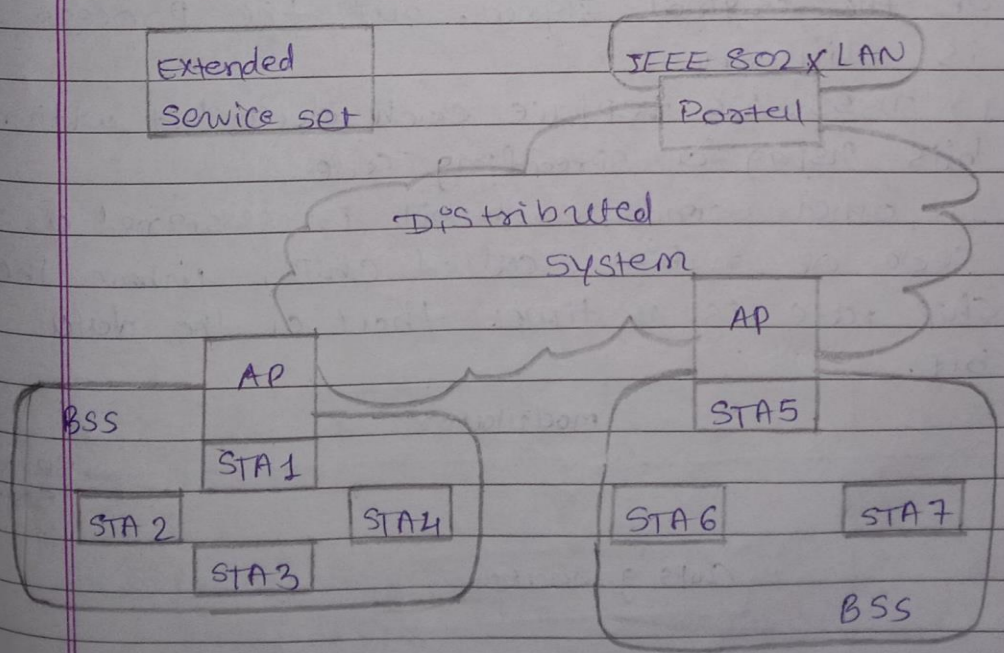
→ Each station has a wireless n/w interface controller.

→ Basic Service Set (BSS) = A basic service set is a group of stations communicating at the physical layer level.

→ There are 2 categories of BSS-
- Infrastructure BSS
- Independent BSS

→ Extended Service Set (ESS) = It is a set of all connected BSS.

→ Distributed System (DS) = It connects access points in ESS.



→ IEEE 802.11 services

Service	Provided	Used to support
Association	Distributed system	MSDU deliver
Authentication	Station	LAN access & security
Deauthentication	Station	LAN access & security
Disassociation	Distributed system	MSDU delivery
Distribution	Ds	MSDU delivery
Integration	Distribution	MSDU delivery
MSDU delivery	Station	MSDU delivery
Privacy station	Station	LAN access & security
Reassociation	DS	MSDU delivery

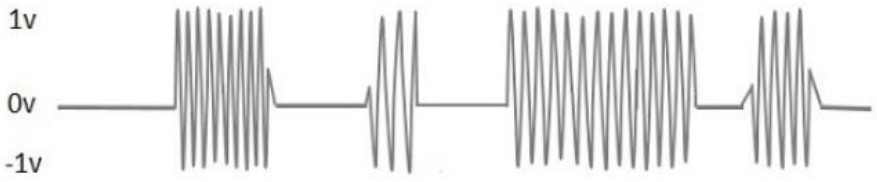
[Q.4]

(a) Define ASK, FSK & PSK.

➔ASK:

- ⇨ Amplitude Shift Keying ASK is a type of Amplitude Modulation which represents the binary data in the form of variations in the amplitude of a signal.
- ⇨ Any modulated signal has a high frequency carrier. The binary signal when ASK modulated, gives a zero value for Low input while it gives the carrier output for High input.

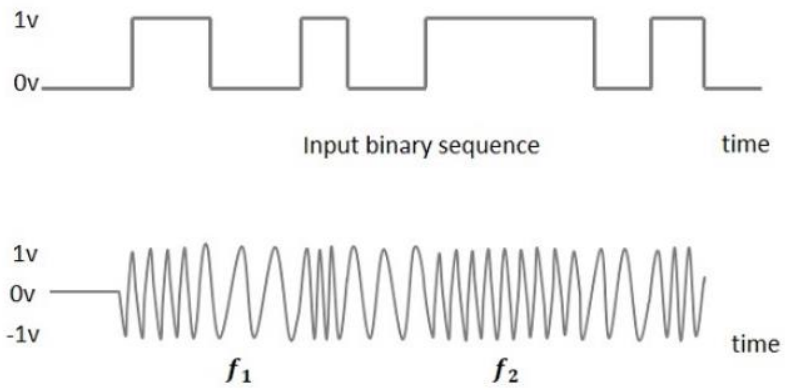
Input binary sequence



ASK Modulated output wave

➔ FSK :

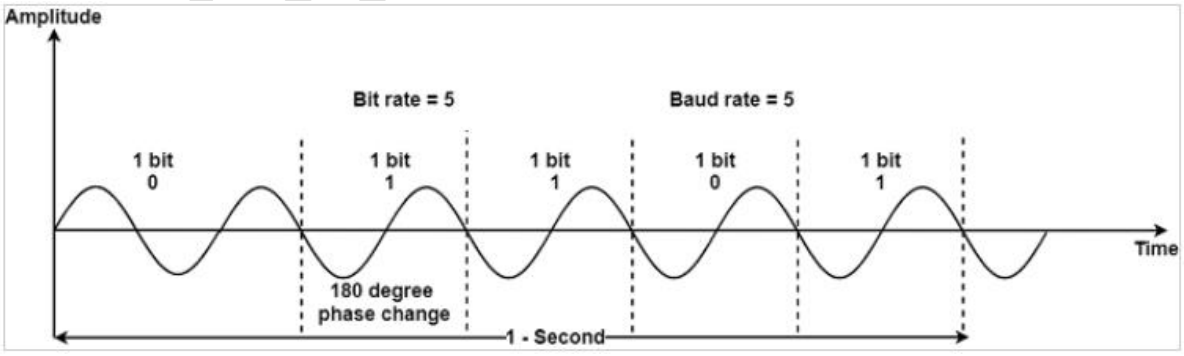
- ⇨ **Frequency Shift Keying** FSKFSK is the digital modulation technique in which the frequency of the carrier signal varies according to the digital signal changes. FSK is a scheme of frequency modulation.
- ⇨ The output of a FSK modulated wave is high in frequency for a binary High input and is low in frequency for a binary Low input. The binary **1s** and **0s** are called Mark and Space frequencies.



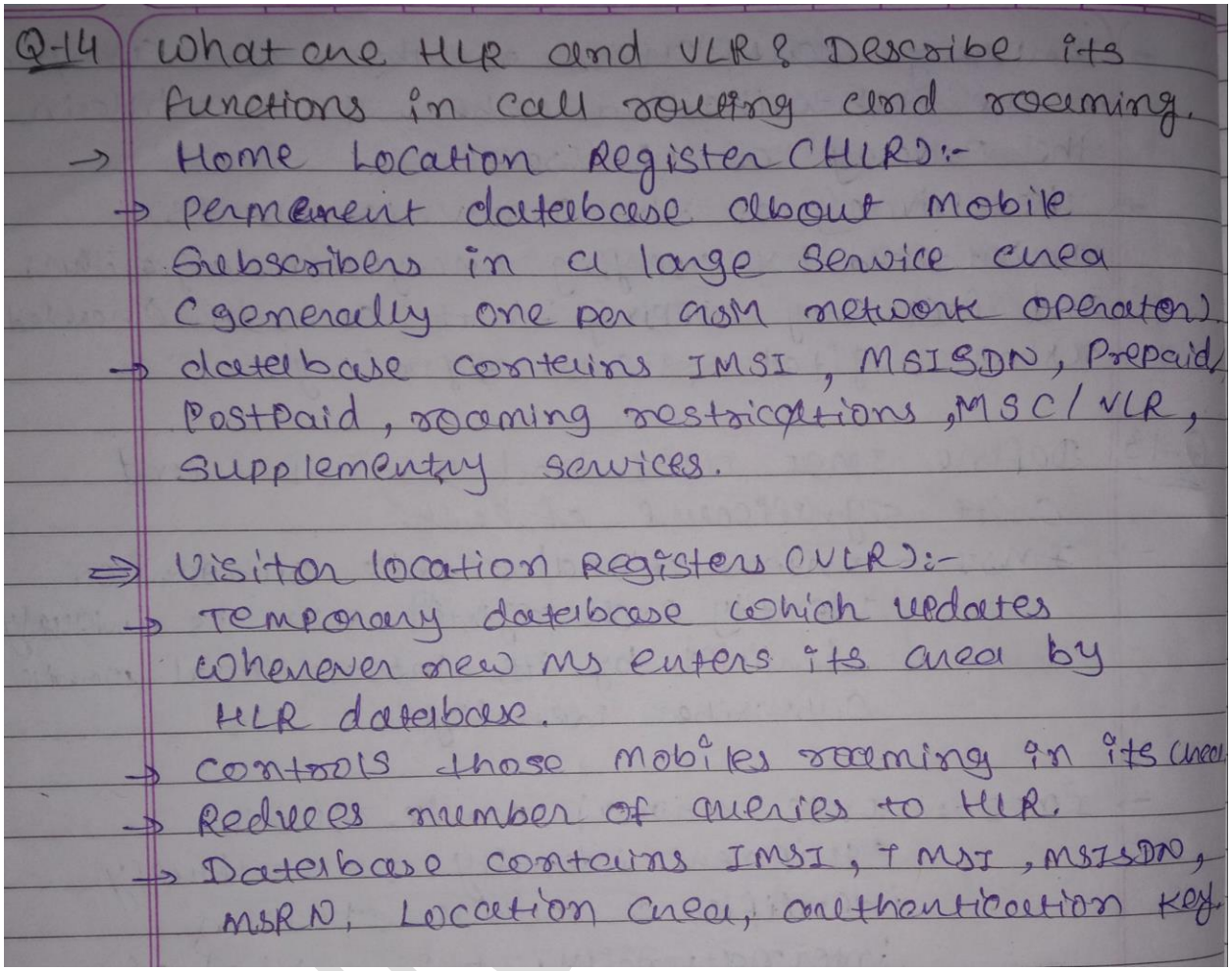
FSK Modulated output wave

➔ PSK:

- ⇨ **Phase Shift Keying** PSKPSK is the digital modulation technique in which the phase of the carrier signal is changed by varying the sine and cosine inputs at a particular time. PSK technique is widely used for wireless LANs, bio-metric, contactless operations, along with RFID and Bluetooth communications.



(b) What are HLR and VLR? Describe its functions in call routing and roaming.


Q-14 What are HLR and VLR? Describe its functions in call routing and roaming.

→ Home Location Register (HLR):-
→ permanent database about mobile subscribers in a large service area (generally one per GSM network operator).
→ database contains IMSI, MSISDN, Prepaid/PostPaid, roaming restrictions, MSC/VLR, supplementry services.

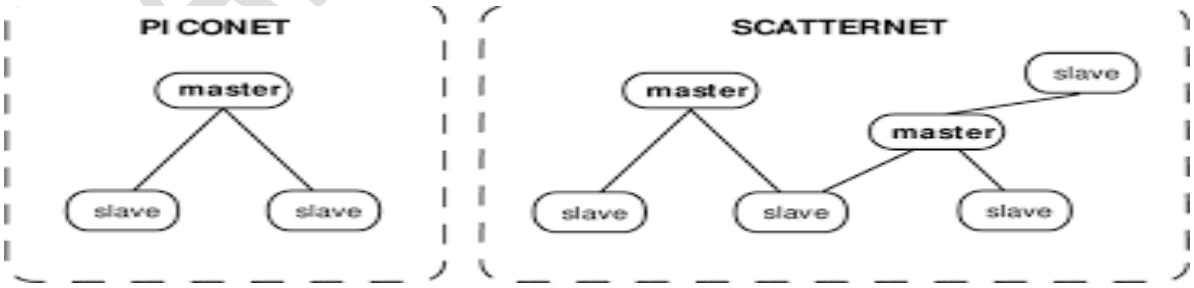
⇒ Visitor location Register (VLR):-
→ Temporary database which updates whenever new MS enters its area by HLR database.
→ controls those mobiles roaming in its area
→ Reduces number of queries to HLR.
→ Database contains IMSI, TMSI, MSISDN, MSRN, Location area, authentication key.

(c) State the applications of Bluetooth and differentiate between Piconet and Scatternet with neat diagram.

➔ Some of the common applications of Bluetooth are −

- In laptops, notebooks and wireless PCs
- In mobile phones and PDAs (personal digital assistant).
- In printers.
- In wireless headsets.
- In wireless PANs (personal area networks) and even LANs (local area networks)
- To transfer data files, videos, and images and MP3 or MP4.
- In wireless peripheral devices like mouse and keyboards.
- In data logging equipment.
- In the short-range transmission of data from sensors devices to sensor nodes like mobile phones.

Piconet	Scatternet
In this bluetooth network, device can function either as master or slave.	In this bluetooth network, device can function as master or slave or (master+slave)
It serves smaller coverage area.	It serves larger coverage area.
It supports maximum 8 nodes.	It supports more than 8 nodes.
It allows less efficient use of available bluetooth channel bandwidth.	It allows more efficient use of available bluetooth channel bandwidth.



OR

[Q.4]

(a) Compare Paging and Location update in GSM.

➔Paging in GSM

- Paging is the one-to-one communication between the mobile and the base station
- Paging is a procedure the network uses to find out a subscriber's location before actual call establishment.
- Paging is used to alert the mobile station of an incoming call.
- Paging is initiated by the NSS (Network Subsystem) and is based on the Location Registration information the Mobile Subscriber has supplied when performing the Location Update.

➔Location update in GSM.

- The mobile station also performs location updating, in order to indicate its current location, when it moves to a new Location Area or a different Public Land Mobile Network (PLMN). This location updating message is sent to the new MSC/VLR, which gives the location information to the subscriber's HLR. If the mobile station is authorized in the new MSC/VLR, the subscriber's HLR cancels the registration of the mobile station with the old MSC/VLR.

(b) Differentiate Amplitude, Frequency and Phase Shift Keying in Digital Modulation with proper diagram.

➔ Refer Q-4-B (SUMMER 2018)

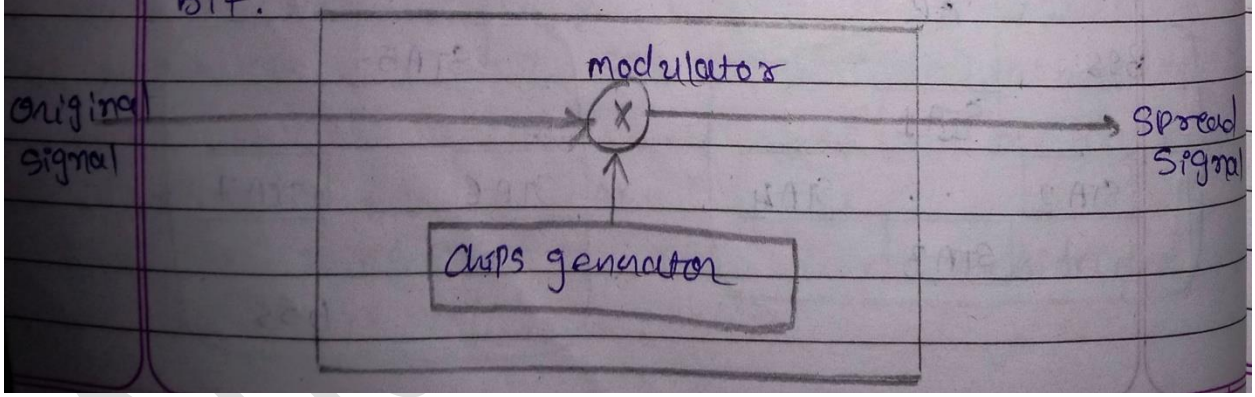
(c) Explain in detail the Direct Sequence Spread Spectrum (DSSS).

Q-22 Explain Direct sequence spread spectrum in detail.

→ The Direct Sequence spread spectrum (DSSS) technique also expands the bandwidth of the original signal, but the process is different.

→ In DSSS, we replace each data bit with n bits using a spreading code.

→ In other words, each bit is assigned a code of n bits, called chips, where the chip rate is n times that of the data bit.



→ The general, spread-spectrum communication is distinguished by 3 key elements:

1) The signal occupies a bandwidth much larger than what is independant of the datel.
2) The bandwidth is spread by means of a code, which is independent of the datel.
3) The receiver synchronizes to the code to recover the datel. The use of an independent code and synchronous reception allows multiple users to access the same frequency band at the same time.

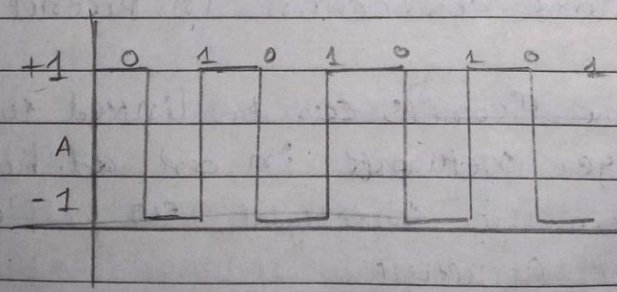
ex: Station A

Datel : 00 (2 bit)

Spreading code : 0101

Spreading message : 0101 0101

```
Datel     0000  0000
+ code    0101  0101
          0101  0101
```



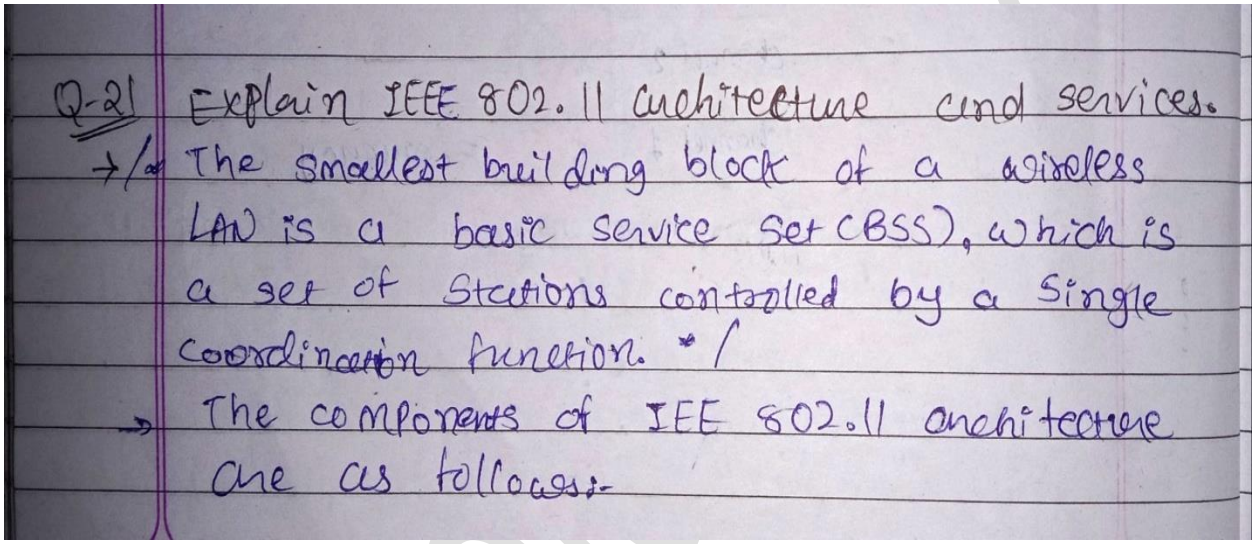
- Bit 0 then +1
- Bit 1 then -1

[Q.5]

(a) Explain the power saving states of Bluetooth device.

➔ Refer Q-5-A (SUMMER 2019)

(b) Explain the IEEE 802.11 Architecture with the neat diagram.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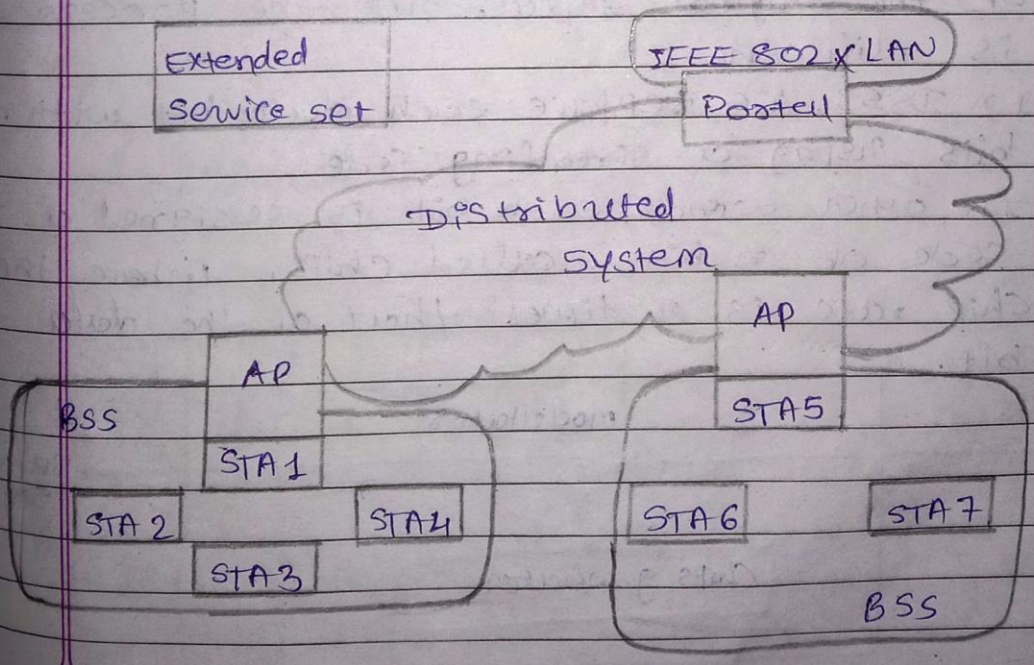

Teacher's Signature.....

→ IEEE 802.11 services

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Distribution	Ds	MSDU delivery
Integration	Distribution	MSDU delivery
MSDU delivery	Station	MSDU delivery
Privacy station	Station	LAN access & security
Reassociation	DS	MSDU delivery

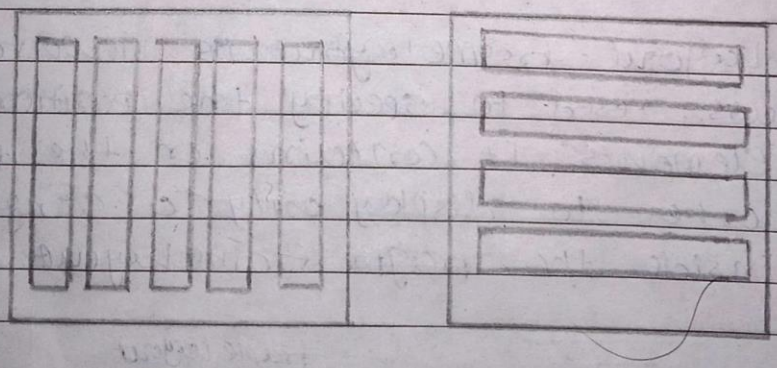
(c) Enlist & explain common layouts available in android.

Q-25 Define Android Layout. Explain various Android Layouts.

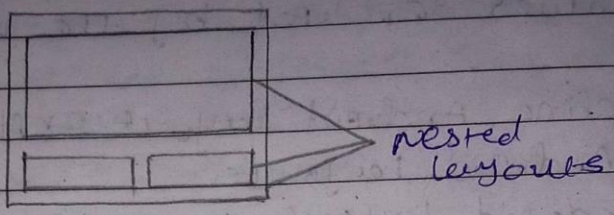
→ Android Layout is used to define user Interface that holds the UI controls or widgets that will appear on the screen of an android application or activity screen.

→ Types of Android Layout.

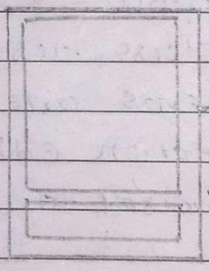
① Android Linear Layout = LinearLayout is a viewGroup subclass, used to provide child view elements one by one either in a particular direction either horizontally or vertically based on the orientation property.



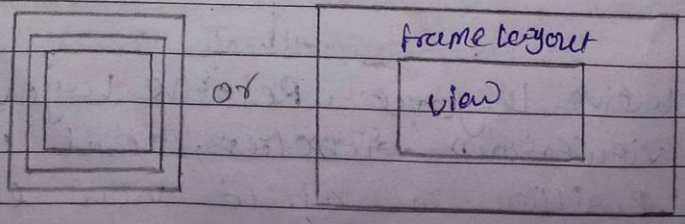
② Relative Layout = RelativeLayout is a viewGroup subclass, used to specify the position of child view elements relative to each other or relative to the parent.



③ constraint Layout = constraint layout is a viewgroup subclass used to specify the position of layout constraints for every child view relative to other views present. A constraintlayout is similar to a Relativelayout, but having more power.

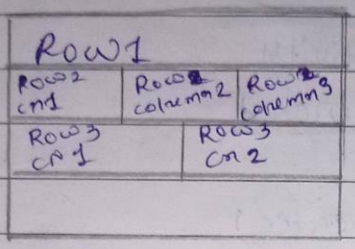


④ Frame Layout = framelayout is viewGroup subclass, used to specify the position of view elements it contains on the top of each other to display only a single view inside the ~~fragme~~ framelayout.



⑥ Table Layout: Table Layout is a ViewGroup subclass, used to display the child view elements in rows and columns.

<TableLayout>

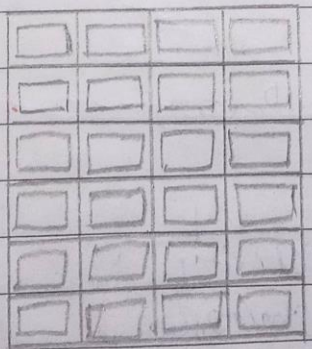


</TableLayout>

⑦ Android Webview: Webview is a browser that is used to display the web pages in our Activity Layout.

⑦ ~~A~~ Listview: Listview is a ViewGroup, used to display scrollable lists of items in a single column.

⑧ Gridview: Grid view is a ViewGroup that is used to display a scrollable list of items in a grid view of rows & columns.



OR

[Q.5]

(a) Explain types of Intents.

➔Refer OR Q-5-a (SUMMER 2019)

(b) Write a note on DECT frame format.

➔ X

(c) Define the Android Layout. Explain the various Android Layouts.

➔ Layout basically refers to the arrangement of elements on a page these elements are likely to be images, texts or styles.

➔They define the structure of android user interface in the app, like in an activity.

➔All elements in the layout are built with the help of Views and ViewGroups.

➔These layouts can have various widgets like buttons, labels, textboxes, and many others.

➔ **Explain the various Android Layouts.**

➔ Refer Q : 5 (c)

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2021

Subject Code:3170710 Date:15/12/2021

Subject Name:Mobile Computing and Wireless communication

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	(a)	Explain any three addresses and identifiers used in GSM with example.	03
	(b)	Differentiate packet switching and circuit switching.	04
	(c)	Explain Mobile IP.	07
Q.2	(a)	Given a channel with an intended capacity of 50 Mbps, the bandwidth of the channel is 5 MHz What signal-tonoise ratio is required to achieve this capacity?	03
	(b)	Write a short note on selective repeat ARQ.	04
	(c)	Write a note on stop-and-wait and selective repeat ARQ.	07
		OR	
	(c)	Explain various signal multiplexing techniques	07
Q.3	(a)	Explain L2CAP protocol of Bluetooth.	03
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		OR	
Q.3	(a)	Differentiate infrastructure and ad-hoc network.	03
	(b)	What is Handover? Explain types of it in brief	04
	(c)	Explain IEEE 802.11 architecture and its services.	07
Q.4	(a)	Define ASK, FSK & PSK.	03
	(b)	What are HLR and VLR? Describe its functions in call routing and roaming.	04
	(c)	State the applications of Bluetooth and differentiate between Piconet and Scatternet with neat diagram.	07
		OR	
Q.4	(a)	Compare Paging and Location update in GSM.	03
	(b)	Differentiate Amplitude, Frequency and Phase Shift Keying in Digital Modulation with proper diagram.	04
	(c)	Explain in detail the Direct Sequence Spread Spectrum (DSSS).	07
Q.5	(a)	Explain the power saving states of Bluetooth device.	03
	(b)	Explain the IEEE 802.11 Architecture with the neat diagram.	04
	(c)	Enlist & explain common layouts available in android.	07
		OR	
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****