

## UNI2 QUESTION BANK

### PART A (MCQ)

Q1. Which of the following is not a characteristic of cellular telephone system?

- a) Accommodate a large number of users
- b) Large geographic area
- c) Limited frequency spectrum
- d) Large frequency spectrum

Answer: d

Explanation: Cellular systems accommodate a large number of users within a limited frequency spectrum over a large geographic area.

Q2. What is the responsibility of MSC in cellular telephone system?

- a) Connection of mobile to base stations
- b) Connection of mobile to PSTN
- c) Connection of base station to PSTN
- d) Connection of base station to MSC

Answer: b

Explanation: Mobile Switching Center (MSC) is responsible for connecting all mobiles to the PSTN (Public Switched Telephone Network) in a cellular system.

Q3. Who has the responsibility of billing and system maintenance function in cellular system?

- a) Base Station
- b) PSTN
- c) MSC
- d) Mobile system

Answer: c

Explanation: Mobile switching center (MSC) accommodates 100,000 subscribers and 5,000 simultaneous conversations at a time and handles all billing and system maintenance functions.

Q4. What is the function of FVC (Forward Voice Channel)?

- a) Voice transmission from base station to mobiles
- b) Voice transmission from mobile to base station
- c) Initiating mobile calls
- d) Broadcast all traffic request for all mobile

Answer: a

Explanation: FVC (Forward Voice Channel) and RVC (Reverse Voice Channel) are responsible for voice transmission. FVC is used for voice transmission from base station to mobile and RVC is used for voice transmission from mobile to base station.

Q5. Which two channels are responsible for initiating mobile calls?

- a) FVC and FCC
- b) FVC and RVC
- c) FCC and RCC
- d) FCC and RVC

Answer: c

Explanation: FCC (Forward Control Channel) and RCC (Reverse Control Channel) are control channels responsible for initiating mobile calls.

Q6. Of the total channels present in the cellular system, what is the percentage of voice and control channels?

- a) 95% voice channels, 5% control channels
- b) 5% voice channels, 95% control channels
- c) 50% voice channels, 50% control channels
- d) 25% voice channels, 75% control channels

Answer: a

Explanation: In each cellular system, control channels are 5% of the total channels available and remaining 95% are dedicated to voice and data traffic.

Q7. What is MIN?

- a) Subscriber's telephone number
- b) Paging message
- c) Traffic request number

d) Mobile Internet

Answer: a

Explanation: MIN (Mobile Identification Number) is a 10 digit unique number which represents the telephone number of subscriber.

Q8. What is transmitted along with the call initiation request during the origin of call by a mobile?

- a) MIN
- b) ESN
- c) ESN and SCM
- d) MIN, ESN and SCM

Q9. What does SCM indicates?

- a) Maximum receiver power level for a particular user
- b) Maximum transmitter power level for a particular user
- c) Minimum receiver power level for a particular user
- d) Minimum transmitter power level for a particular user

Q10. What is the shape of the cell present in the cellular system?

- a) Circular
- b) Square
- c) Hexagonal
- d) Triangular

Q11. Why the size of the cell is kept small in cellular network?

- a) Increase capacity
- b) Decrease capacity
- c) Increased size of base station electronics
- d) Slow process of handoffs

Answer: a

Explanation: The size of the cells in cellular network is kept small because of the need of high capacity in areas with high user density and reduced size and cost of base station electronics.

Q12. What is handoff?

- a) Forward channel
- b) Switching technique
- c) Roamer
- d) Guard channel

Answer: b

Explanation: Handoff is a switching technique which refers to the process of transferring an active call or data session from one cell in a cellular network to another.

Q13. Which one is not an advantage of using frequency reuse?

- a) Increased capacity
- b) Limited spectrum is required
- c) Same spectrum may be allocated to other network
- d) Number of base stations is reduced

Answer: d

Explanation: Frequency reuse is a technique of reusing frequencies and channels within a cellular system to improve capacity and spectral efficiency.

Q14. The process of transferring a mobile station from one base station to another is \_\_\_\_\_

- a) MSC
- b) Roamer
- c) Handoff
- d) Forward channel

Answer: c

Explanation: Handoff is the process of changing the channel associated with current connection while a call is in progress.

Q15. The interference between the neighbouring base stations is avoided by \_\_\_\_\_

- a) Assigning different group of channels
- b) Using transmitters with different power level
- c) Using different antennas
- d) Using different base stations

Answer: a

Explanation: The interference between the neighbouring base stations is avoided by assigning different group of channels and reusing the same channel after a certain amount of distance.

## FDMA

Q16. Frequency division multiple access (FDMA) assigns \_\_\_\_\_ channels to \_\_\_\_\_ users.

- a) Individual, individual
- b) Many, individual
- c) Individual, many
- d) Many, many

View Answer

Answer: a

Explanation: Frequency division multiple access (FDMA) assigns individual channels to individual users. Each user is allocated a unique frequency band or channel. These channels are assigned on demand to users who request service.

Q17. During the period of call, other users can share the same channel in FDMA.

- a) True
- b) False

View Answer

Answer: b

Explanation: In FDMA systems, no other user can share the same channel during the period of call. In FDD systems, the users are assigned a channel as a pair of frequencies; one is used for the forward channel while the other frequency is used for the reverse channel.

Q18. The FDMA channel carries \_\_\_\_\_ phone circuit at a time.

- a) Ten
- b) Two
- c) One
- d) Several

View Answer

Answer: c

Explanation: The FDMA channel carries one phone circuit at a time. Each individual band or channel is wide enough to accommodate the signal spectra of the transmissions to be propagated.

Q19. If the FDMA channel is not in use, it can be used by other users.

- a) True
- b) False

View Answer

Answer: b

Explanation: If an FDMA channel is not in use, it sits idle and cannot be used by other users to increase or share capacity. It is essentially a wasted resource.

Q20. The bandwidth of FDMA channel is \_\_\_\_\_

- a) Wide
- b) Narrow
- c) Large
- d) Zero

View Answer

Answer: b

Explanation: The bandwidth of FDMA channels is relatively narrow as each channel supports only one circuit per carrier. That is, FDMA is usually implemented in narrow band systems.

Q21. The symbol time in FDMA systems is \_\_\_\_\_ thus intersymbol interference is \_\_\_\_\_

- a) Large, high
- b) Small, low
- c) Small, high
- d) Large, low

View Answer

Answer: d

Explanation: The symbol time of a narrowband signal is large as compared to the average delay spread. This implies that the amount of intersymbol interference is low and, thus, little or no equalization is required in FDMA narrowband systems.

Q22. Due to \_\_\_\_\_ transmission scheme \_\_\_\_\_ bits are needed for overhead in FDMA systems.

- a) Continuous, few
- b) Discontinuous, few
- c) Continuous, many

d) Discontinuous, many

View Answer

Answer: a

Explanation: Since FDMA is a continuous transmission scheme, fewer bits are needed for overhead purposes (such as synchronization and framing bits) as compared to TDMA.

Q23. Which of the following is not true for FDMA systems as compared to TDMA systems?

- a) Low complexity
- b) Lower cell site system cost
- c) Tight RF filtering
- d) Narrow bandwidth

View Answer

Answer: b

Explanation: FDMA systems have higher cell site system costs as compared to TDMA systems. It is due to single channel per carrier design, and the need to use costly bandpass filters to eliminate spurious radiation at the base station.

Q24. \_\_\_\_\_ is undesired RF radiation.

- a) Intermodulation frequency
- b) Intermediate frequency
- c) Instantaneous frequency
- d) Instrumental frequency

View Answer

Answer: a

Explanation: Intermodulation (IM) frequency is undesired RF radiation which can interfere with other channels in the FDMA systems. The nonlinearities cause signal spreading in the frequency domain and generate IM frequency.

Q25. \_\_\_\_\_ is based on FDMA/FDD.

- a) GSM
- b) W-CDMA
- c) Cordless telephone
- d) AMPS

View Answer

Answer: d

Explanation: The first US analog cellular system, the Advanced Mobile Phone System (AMPS) is based on FDMA/FDD. A single user occupies a single channel while the call is in progress.

Q26. In US AMPS, 416 channels are allocated to various operators with 10 kHz guard band and channel between them is 30 kHz. What is the spectrum allocation given to each operator?

- a) 12.5 kHz
- b) 30 kHz
- c) 12.5 MHz
- d) 30 MHz

View Answer

Answer: c

Explanation: Spectrum allocated to each cellular operator is 12.5 MHz. As  $B_t = NB_c + 2B_{\text{guard}}$  which is equal to  $416 \times 30 \times 10^3 + 2(10 \times 10^3) = 12.5 \text{ MHz}$ .

## TDMA

Q27. TDMA systems transmit in a continuous way.

- a) True
- b) False

View Answer

Answer: b

Explanation: TDMA systems transmit data in a buffer and burst method. Thus, the transmission for any user is not continuous.

Q28. Preamble contains \_\_\_\_\_

- a) Address
- b) Data
- c) Guard bits
- d) Trail bits

View Answer

Answer: a

Explanation: TDMA frame is made up of a preamble, an information message and the trail bits. In a TDMA frame, the preamble contains the address and synchronization information that both the base station and the subscribers use to identify each other.

Q29. \_\_\_\_\_ are utilized to allow synchronization of the receivers between different slots and frames.

- a) Preamble
- b) Data
- c) Guard bits
- d) Trail bits

[View Answer](#)

Answer: c

Explanation: Guard times are utilized to allow synchronization of the receivers between different slots and frames. TDMA/FDD systems intentionally induce several time slots of delay between the forward and reverse time slots for a particular user.

Q30. Which of the following is not true for TDMA?

- a) Single carrier frequency for single user
- b) Discontinuous data transmission
- c) No requirement of duplexers
- d) High transmission rates

[View Answer](#)

Answer: a

Explanation: TDMA share a single carrier frequency with several users, where each user makes use of non-overlapping time slots. The number of time slots per frame depends on several factors, such as modulation technique, available bandwidth etc.

Q31. Because of \_\_\_\_\_ transmissions in TDMA, the handoff process in \_\_\_\_\_

- a) Continuous, complex
- b) Continuous, simple
- c) Discontinuous, complex
- d) Discontinuous, simple

[View Answer](#)

Answer: d

Explanation: Because of discontinuous transmissions in TDMA, the handoff process is much simpler for a subscriber unit, since it is able to listen for other base stations during idle time slots.

Q32. \_\_\_\_\_ synchronization overhead is required in TDMA due to \_\_\_\_\_ transmission.

- a) High, burst
- b) High, continuous
- c) Low, burst
- d) No, burst

[View Answer](#)

Answer: a

Explanation: High synchronization overhead is required in TDMA systems because of burst transmissions. TDMA transmissions are slotted, and this requires the receivers to be synchronized for each data burst.

Q33. TDMA allocates a single time per frame to different users.

- a) True
- b) False

[View Answer](#)

Answer: b

Explanation: TDMA has an advantage that it can allocate different numbers of time slots per frame to different users. Thus, bandwidth can be supplied on demand to different users by concatenating or reassigning time slots based on priority.

Q34. \_\_\_\_\_ of TDMA system is a measure of the percentage of transmitted data that contains information as opposed to providing overhead for the access scheme.

- a) Efficiency
- b) Figure of merit
- c) Signal to noise ratio
- d) Mean

[View Answer](#)

Answer: a

Explanation: Efficiency of TDMA system is a measure of the percentage of transmitted data that contains information as opposed to providing overhead for the access scheme. The frame efficiency is the percentage of bits per frame which contain transmitted data.

Q35. A TDMA system uses 25 MHz for the forward link, which is broken into radio channels of 200 kHz. If 8 speech channels are supported on a single radio channel, how many simultaneous users can be accommodated?

- a) 25
- b) 200
- c) 1600
- d) 1000

[View Answer](#)

Answer: d

Explanation: For a TDMA system that uses 25 MHz for the forward link, which is broken into radio channels of 200 kHz. If 8

speech channels are supported on a single radio channel, 1000 simultaneous users can be accommodated as  $N = (25 \text{ MHz}) / (200 \text{ kHz} / 8)$ .

Q36. What is the time duration of a bit if data is transmitted at 270.833 kbps in the channel?

- a) 270.833 s
- b) 3  $\mu$ s
- c) 3.692  $\mu$ s
- d) 3.692 s

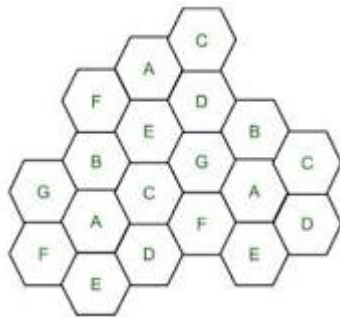
View Answer

Answer: c

Explanation: If data is transmitted at 270.833 kbps in the channel, the time duration of a bit will be 3.692  $\mu$ s, as  $T_b = (1/270.833 \text{ kbps}) = 3.692 \mu\text{s}$ .

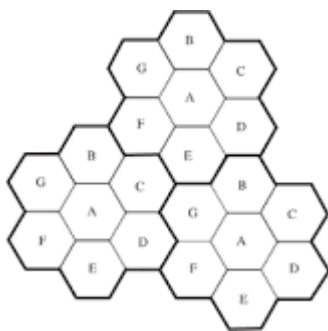
## PART B LONG

Q1 What is frequency reuse formula?



So to avoid the Interference cells that use the same set of channels or frequencies are separated from one another by a larger distance. The distance between any two Co-Channels can be calculated by the following formula:  $D = R * (3 * N)^{1/2}$ .

Q2 What are the advantages of frequency reuse?



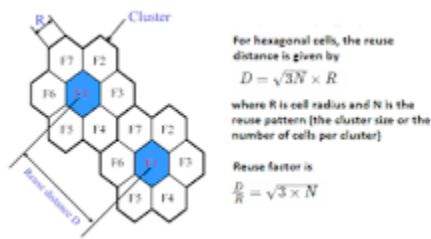
Advantages of frequency reuse:

**Large coverage area.** Efficient spectrum utilization. Enhanced system capacity.

Q3 Why frequency reuse is important in cellular communication?

To ensure that the mutual interference between users remains below a harmful level, adjacent cells use different frequencies. However in cells that are separated further away, frequencies can be reused. Typical frequency reuse plan for 7 different radio frequencies, based on hexagonal cells

Q4 What is frequency reuse ratio?



The number of cells after which a frequency channel can be reused is called as the Frequency reuse factor (R.F). It is given by **R. F=1/N**, Where N is the cluster size.

Q5 What is breathing cell effect?

Cell-breathing is **the expansion or contraction of the effective coverage of a cell in response to the number of active mobiles (MSs) in a network**. If it is not well controlled, communication failure may result.

Q6 How frequency reuse increases capacity of a cellular system?

Cell splitting is the process of subdividing a congested cell into smaller cells, each with its own base station and a corresponding reduction in antenna height and transmitter power. Cell splitting increases the capacity of a cellular system since **it increases the number of times that channels are reused**.

Q7 What do you mean by cell dragging?

Cell dragging **occurs when there is a line-of-sight (LOS) radio path between the subscriber and the base station**. The user enters the neighboring cell without handoff. This creates a potential interference and traffic management problem.

Q8 What is Guard channel disadvantages?

This method has the disadvantage of **reducing the total carried traffic**, as fewer channels are allocated to originating calls.

Q9 How can I increase cellular network capacity?

There are 3 techniques for improving cell capacity in cellular system, namely: **Cell Splitting. Sectoring.**

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**Advantages:**

1. Improvement in Signal capacity.
2. Improvement in signal to interference ratio.
3. Increases frequency reuse.

Q10 What is hard and soft handoff?

The definition of a **hard-hand off is one where an existing connection must be broken when the new one is established**. Soft hand-off is defined as a hand-off where a new connection is established before old one is released.

Q11 What is dwell time in cellular network?

The dwell time, also denoted as cell residence time or mobile sojourn time, is **a random variable that describes the amount of time a mobile spends in a radio cell**. Therefore, the dwell time depends on the following parameters: velocity of the subscriber, cell size, cell shape, and the traversed path.

Q12 What is difference between handoff and handover?

The process by which this occurs is known as handover or handoff. The term **handover is more widely used within Europe, whereas handoff tends to be use more in North America**. Either way, handover and handoff are the same process.

Q13 What is cell dragging and dwell time?

**Cell dragging results from pedestrian users that provide a very strong signal to the base station.** In urban areas when there is line of sight radio path between the subscribers and the base station as the user travel away from the base station at very slow speed, the average signal strength does not decay rapidly.

Q14 What are the types of handover?

There are two types of handover, **vertical and horizontal**. Horizontal handover occurs when a device moves within one type of network technology under one operator. For instance a mobile phone user moving within their provider's network must switch cellular towers as they move in and out of range of different towers.

Q15 What are the 4 types of handovers available in GSM?

A handover can be **intra cell, Inter cell, Inter BSC or intra MSC** depending on the location of old and new cell.

Q16 What is the difference between TDMA and FDMA?

TDMA requires synchronization between different stations. It is type of access method in data link layer. At each station data link layer tells station to use allocated time slot.

...  
Difference between FDMA and TDMA :

<b>Sr. No.</b>	<b>FDMA</b>	<b>TDMA</b>
1.	FDMA stands for Frequency Division Multiple Access.	TDMA stands for Time Division Multiple Access.

Q17 What is difference between CDMA and FDMA?

**In FDMA the mode of data transfer is continuous signal. In CDMA the mode of data transfer is digital signal.** The capacity of the system is low in FDMA. The capacity of the system is large in CDMA.

Q18 Which is better TDMA or CDMA?

**TDMA is the channelization protocol in which bandwidth of channel is divided into various stations on a time basis.**

...  
Difference between TDMA and CDMA :

<b>S. No.</b>	<b>TDMA</b>	<b>CDMA</b>
7.	It is less flexible than CDMA.	Flexibility is high.
8.	In this, there is no Near-far problem.	There is existence of Near-far problem.
9.	Rate of data is average.	Rate of data is high.



Q19 What is FDMA technique?

FDMA (frequency division multiple access) is the division of the frequency band allocated for wireless cellular telephone communication into 30 channels, each of which can carry a voice conversation or, with digital service, carry digital data.

Q20 Where is TDMA used?



Time Division Multiple Access (TDMA) is a digital modulation technique used in **digital cellular telephone and mobile radio communication**.

Q21 What are the advantages of TDMA?

Advantages of TDMA:

TDMA **allows the operator to do services like fax, voice band data, and SMS as well as bandwidth-intensive application such as multimedia and video conferencing**. Since TDMA technology separates users according to time, it ensures that there will be no interference from simultaneous transmissions.

Q22 What is FDMA advantages and disadvantages?

Advantages of FDMA :

**Capacity can be increased** can obtain efficient bit code. Very simple and easy to implement with respect to hardware resources. The complexity of the system is low. Simple algorithmically and from a hardware standpoint.

Q23 What is ALOHA and types of ALOHA?

ALOHA is a medium access control (MAC) protocol for transmission of data via a shared network channel. Using this protocol, several data streams originating from multiple nodes are transferred through a multi-point transmission channel. There are two types of ALOHA protocols – **Pure ALOHA and Slotted ALOHA**.

Q24 What is the difference between ALOHA and Slotted ALOHA?

Difference between Pure Aloha and Slotted Aloha

**In Pure Aloha, time is continuous and is not globally synchronized.** In Slotted Aloha, time is discrete and is globally synchronized. The vulnerable time or susceptible time in Pure Aloha is equal to  $(2 \times T_t)$ . In Slotted Aloha, the vulnerable time is equal to  $(T_t)$ .

Q25 What is the difference between CSMA and CSMA CD?

CSMA/CA stands for Carrier Sense Multiple Access / Collision Avoidance is a network protocol for carrier transmission.

