1. What is a fundamental requirement for transmission over 5G networks?

a) High latency
b) Low bandwidth
c) High spectral efficiency
d) Low reliability

Answer: c) High spectral efficiency
Explanation: 5G networks demand high spectral efficiency to accommodate the increasing data rates and support a large number of devices.

2. Which modulation technique is commonly used in 5G systems?

a) Amplitude Modulation (AM)
b) Frequency Shift Keying (FSK)
c) Orthogonal Frequency Division Multiplexing (OFDM)
d) Phase Shift Keying (PSK)

Answer: c) Orthogonal Frequency Division Multiplexing (OFDM)
Explanation: OFDM is widely adopted in 5G due to its ability to mitigate multipath fading and provide high spectral efficiency.

3. What does OFDM stand for?

a) Orthogonal Frequency Division Modulation
b) Orthogonal Frequency Division Multiplexing
c) Orthogonal Frequency Division Mapping
d) Orthogonal Frequency Division Method

Answer: b) Orthogonal Frequency Division Multiplexing
Explanation: OFDM is a modulation technique that divides the available spectrum into multiple orthogonal subcarriers for data transmission.

4. Which of the following is not a modulation technique used in 5G?

a) Generalized Frequency Division Multiplexing (GFDM)
b) Filter Bank Multi-Carriers (FBMC)
c) Pulse Amplitude Modulation (PAM)
d) Universal Filtered Multi-Carrier (UFMC)

Answer: c) Pulse Amplitude Modulation (PAM)
Explanation: While PAM is a modulation technique, it is not commonly used in 5G systems.

5. What is the advantage of using OFDM in 5G?

a) Low complexity
b) Low spectral efficiency
c) Susceptible to multipath fading
d) High spectral efficiency

Answer: d) High spectral efficiency
Explanation: OFDM offers high spectral efficiency, allowing for efficient data transmission in 5G networks.

6. Which multiple access technique is commonly associated with OFDM in 5G?

a) Code Division Multiple Access (CDMA)

b) Frequency Division Multiple Access (FDMA)
c) Orthogonal Frequency Division Multiple Access (OFDMA)
d) Time Division Multiple Access (TDMA)

Answer: c) Orthogonal Frequency Division Multiple Access (OFDMA)
Explanation: OFDMA is used in 5G networks to enable multiple users to access the same frequency resources simultaneously.

7. What does OFDMA stand for?

a) Orthogonal Frequency Division Multiple Access
b) Orthogonal Frequency Division Modulation Access
c) Orthogonal Frequency Division Mapping Access
d) Orthogonal Frequency Division Method Access

Answer: a) Orthogonal Frequency Division Multiple Access
Explanation: OFDMA is a multiple access technique that combines OFDM modulation with multiple access.

8. Which multiple access technique allows multiple users to share the same frequency and time resources non-orthogonally?

a) Orthogonal Frequency Division Multiple Access (OFDMA)
b) Generalized Frequency Division Multiple Access (GFDMA)
c) Non-Orthogonal Multiple Access (NOMA)
d) Time Division Multiple Access (TDMA)

Answer: c) Non-Orthogonal Multiple Access (NOMA)

Explanation: NOMA allows multiple users to share the same frequency and time resources non-orthogonally, improving spectral efficiency.

9. What is the primary benefit of NOMA in 5G networks?

a) Increased spectral efficiency
b) Reduced complexity
c) Higher reliability
d) Lower latency

Answer: a) Increased spectral efficiency
Explanation: NOMA increases spectral efficiency by allowing multiple users to share the same resources non-orthogonally.

10. Which modulation technique is characterized by a bank of overlapping subcarriers with different frequency responses?

a) Orthogonal Frequency Division Multiplexing (OFDM)
b) Generalized Frequency Division Multiplexing (GFDM)
c) Filter Bank Multi-Carriers (FBMC)
d) Universal Filtered Multi-Carrier (UFMC)

Answer: c) Filter Bank Multi-Carriers (FBMC)
Explanation: FBMC uses a bank of overlapping subcarriers with different frequency responses, providing flexibility in signal design.

11. What is the key feature of Generalized Frequency Division Multiplexing (GFDM)?

a) Orthogonal subcarriers
b) Non-orthogonal subcarriers
c) Frequency-flat channel
d) Time-domain spreading

Answer: b) Non-orthogonal subcarriers
Explanation: GFDM utilizes non-orthogonal subcarriers, which can improve spectral efficiency and robustness to frequency-selective fading.

12. Which modulation technique offers better resistance to frequency-selective fading?

a) Orthogonal Frequency Division Multiplexing (OFDM)
b) Generalized Frequency Division Multiplexing (GFDM)
c) Filter Bank Multi-Carriers (FBMC)
d) Universal Filtered Multi-Carrier (UFMC)

Answer: b) Generalized Frequency Division Multiplexing (GFDM)
Explanation: GFDM’s use of non-orthogonal subcarriers can provide better resistance to frequency-selective fading compared to OFDM.

13. What distinguishes Universal Filtered Multi-Carrier (UFMC) from other modulation techniques?

a) Utilization of frequency-domain filters
b) Employment of time-domain filters
c) Orthogonal subcarrier arrangement
d) Non-orthogonal subcarrier arrangement

Answer: a) Utilization of frequency-domain filters
Explanation: UFMC employs frequency-domain filtering to achieve better spectral containment and interference mitigation.

14. Which multiple access technique allows simultaneous transmission from multiple users using orthogonal subcarriers?

a) Orthogonal Frequency Division Multiple Access (OFDMA)
b) Generalized Frequency Division Multiple Access (GFDMA)
c) Non-Orthogonal Multiple Access (NOMA)
d) Time Division Multiple Access (TDMA)

Answer: a) Orthogonal Frequency Division Multiple Access (OFDMA)
Explanation: OFDMA enables simultaneous transmission from multiple users using orthogonal subcarriers, enhancing spectral efficiency.

15. What is a key advantage of using FBMC in 5G networks?

a) Increased spectral efficiency
b) Enhanced resistance to frequency-selective fading
c) Lower power consumption
d) Simplified receiver design

Answer: b) Enhanced resistance to frequency-selective fading
Explanation: FBMC can provide enhanced resistance to frequency-selective fading, improving the reliability of communication in 5G networks.

16. Which modulation technique allows for the simultaneous transmission of multiple users

with different power levels?

a) Orthogonal Frequency Division Multiplexing (OFDM)
b) Generalized Frequency Division Multiplexing (GFDM)
c) Filter Bank Multi-Carriers (FBMC)
d) Non-Orthogonal Multiple Access (NOMA)

Answer: d) Non-Orthogonal Multiple Access (NOMA)
Explanation: NOMA enables the simultaneous transmission of multiple users with different power levels, maximizing spectral efficiency.

17. What is the primary advantage of TDMA over OFDMA in multiple access scenarios?

a) Higher spectral efficiency
b) Simpler receiver design
c) Reduced interference
d) Increased flexibility

Answer: b) Simpler receiver design
Explanation: TDMA typically requires simpler receiver designs compared to OFDMA due to the absence of complex frequency domain processing.

18. Which modulation technique provides better support for low-latency applications in 5G networks?

a) Orthogonal Frequency Division Multiplexing (OFDM)
b) Generalized Frequency Division Multiplexing (GFDM)
c) Filter Bank Multi-Carriers (FBMC)

d) Universal Filtered Multi-Carrier (UFMC)

Answer: c) Filter Bank Multi-Carriers (FBMC)
Explanation: FBMC can support low-latency applications in 5G networks due to its ability to reduce symbol duration and inter-symbol interference.

19. Which multiple access technique is associated with a reduced likelihood of collision and interference?

a) Orthogonal Frequency Division Multiple Access (OFDMA)
b) Generalized Frequency Division Multiple Access (GFDMA)
c) Non-Orthogonal Multiple Access (NOMA)
d) Time Division Multiple Access (TDMA)

Answer: d) Time Division Multiple Access (TDMA)
Explanation: TDMA reduces the likelihood of collision and interference by allocating different time slots to different users.

20. What is a key challenge associated with Non-Orthogonal Multiple Access (NOMA) implementation in 5G networks?

a) Limited spectral efficiency
b) Complexity in resource allocation
c) Reduced coverage area
d) Incompatibility with existing devices

Answer: b) Complexity in resource allocation
Explanation: NOMA implementation in 5G networks involves complex resource allocation

algorithms to manage non-orthogonal resource sharing among users effectively.

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