- 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.

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- 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

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