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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech Integrated

SEM: VIII - THEORY EXAMINATION (2025 - 2026)

Subject: Wireless communication

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- (1.1) Header specifies the _____ of a new packet. (CO1,K1) 1
- (a) Ending
 - (b) Middle part
 - (c) Beginning
 - (d) Data information
- (1.2) Space diversity is also known as _____(CO1,K2) 1
- (a) Frequency diversity
 - (b) Antenna diversity
 - (c) Polarization diversity
 - (d) Time diversity
- (1.3) What is the main reason to adopt hexagon shape in comparison to square and triangle? (CO2,K2) 1
- (a) Largest area
 - (b) Simple design
 - (c) Small area
 - (d) Single directional
- (1.4) In a micro cell zone concept, when a mobile travels from one zone to another within the cell, it retains the same _____ (CO2,K2) 1
- (a) Power level
 - (b) Base station
 - (c) Channel
 - (d) Receiver

- (1.5) In wireless communication, what does the term "coherence time" refer to? (CO3,K2) 1
- (a) The time over which a fading channel remains constant
 - (b) The time taken for signal propagation from transmitter to receiver
 - (c) The time delay introduced by channel noise
 - (d) The time required for frequency interference to stabilize
- (1.6) What is the term for the additional attenuation experienced by a signal as it passes through buildings or other obstacles?(CO3,K2) 1
- (a) Path loss
 - (b) Free-space loss
 - (c) Shadowing
 - (d) Fading loss
- (1.7) Which technique allows multiple users to share the same frequency band using different spreading codes? (CO4,K1) 1
- (a) TDMA
 - (b) CDMA
 - (c) FDMA
 - (d) OFDMA
- (1.8) In channel coding, what does the term "parity bit" refer to? (CO4,K2) 1
- (a) A bit used for encryption
 - (b) A bit for synchronization
 - (c) An error-detection bit
 - (d) A bit for modulation
- (1.9) Which network is not typically associated with mobile data communication? (CO5,K1) 1
- (a) 4G
 - (b) Wi-Fi
 - (c) Bluetooth
 - (d) DSL
- (1.10) NGN is designed to support various services, including voice, data, and multimedia, using: (CO5,K2) 1
- (a) Traditional circuit-switched technology
 - (b) Packet-switched technology
 - (c) Visible light
 - (d) Time-division multiplexing

2. Attempt all parts:-

- (2.1) Describe the role of beamforming in improving wireless communication. (CO1,K3) 2
- (2.2) How do mobile backhaul networks support cellular system? (CO2,K3) 2
- (2.3) What is fading in wireless communication system ? explain (CO3,K2) 2
- (2.4) How does selection diversity improve signal quality? (CO4,K3) 2
- (2.5) What are some challenges and advantages of implementing Mobile Adhoc 2

SECTION-B

30

Answer any one of the following:-

(3.1) How do satellite systems provide global coverage for mobile communication?(CO1,K3) 6

(3.2) Explain the concept of signal-to-noise ratio (SNR) and its importance in wireless communication.(CO1,K2) 6

Answer any one of the following:-

(3.3) Define the concept of a Mobile Subscriber in cellular communication.(CO2,K2) 6

(3.4) How do cells in a cellular network prevent interference between neighboring cells? (CO2,K3) 6

Answer any one of the following:-

(3.5) Differentiate between small-scale and large-scale fading effects. (CO3,K4) 6

(3.6) How does the frequency of a wireless signal affect its propagation in different environments? (CO3,K4) 6

Answer any one of the following:-

(3.7) Discuss the concept of redundancy in error-correcting codes and its role in error detection and correction. (CO4,K3) 6

(3.8) Compare and contrast the performance of spatial diversity and frequency diversity in combating fading in wireless channels. (CO4,K4) 6

Answer any one of the following:-

(3.9) Analyze the technological advancements and key differences between 4G and 5G mobile networks, emphasizing the capabilities of 5G. (CO5,K4) 6

(3.10) Explain the architecture and key components of the GSM system for mobile telecommunications, highlighting its significance in the evolution of mobile networks. (CO5,K3) 6

SECTION-C

50

4. Answer any one of the following:-

(4.1) What were the key technological innovations that enabled the transition from analog to digital mobile systems? (CO1,K3) 10

(4.2) Discuss the trade-offs between power efficiency and data rate in wireless communication link design. (CO1,K4) 10

5. Answer any one of the following:-

(5.1) How does sectorization of antennas enhance the capacity of cellular networks? (CO2,K3) 10

(5.2) Discuss the various handoff strategies used in cellular networks, including hard handoff and soft handoff. (CO2,K3) 10

6. Answer any one of the following:-

(6.1) What is the role of equalization techniques in mitigating the effects of frequency-selective fading in wireless systems? (CO3,K3) 10

(6.2) What are the challenges of mitigating interference and noise in dense urban wireless networks? (CO3,K3) 10

7. Answer any one of the following:-

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| (7.1) | Describe the selection diversity technique and its advantages. (CO4,K3) | 10 |
| (7.2) | How does a Rake receiver contribute to interference rejection in a CDMA system?(CO4,K3) | 10 |

8. Answer any one of the following:-

- | | | |
|-------|--|----|
| (8.1) | Analyze the technical and operational advancements that distinguish 5G technology from its predecessors and how it paves the way for new applications and services. (CO5,K4) | 10 |
| (8.2) | Provide a detailed comparison of data transfer speeds between EDGE technology and the original GSM standard, and elaborate on the factors that contribute to these speeds.(CO5,K4) | 10 |

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