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Printed Page:-4 **Subject Code:- AOE0772**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: VII - 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-a. What is the primary advantage of a satellite communication system in providing wireless coverage?(CO1,K1) 1

(a) Low latency
(b) Wide coverage area, including remote and rural locations
(c) High data transfer rates
(d) Low deployment cost

1-b. What technological improvement is expected to be a hallmark of future wireless systems in enhancing data transmission speeds?(CO1,K1) 1

(a) Increased interference
(b) Reduced spectrum utilization
(c) Lower frequency bands
(d) Advanced modulation techniques

1-c. What is the shape of the cell present in the cellular system?(CO2,K1) 1

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

1-d. Full form of PCS.(CO2,K1) 1

(a) Personal Communications Source
(b) Personal Communications Service
(c) Present Communications Service
(d) None of the above

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1-e. What is the main limitation of the free-space path loss model?(CO3,K1) 1

(a) It does not account for obstacles
(b) It is complex to implement
(c) It does not model fading
(d) It requires line-of-sight communication

1-f. What is the primary impact of fading on the coverage area of a wireless communication system?(CO3,K1) 1

(a) Increases coverage area
(b) Decreases coverage area
(c) Has no effect on coverage area
(d) Stabilizes coverage area

1-g. Multiplexing allows multiple signals to share a common channel by:(CO4,K1) 1

(a) Sending all signals simultaneously
(b) Assigning unique frequencies or time slots
(c) Using advanced modulation techniques
(d) Increasing the signal power

1-h. OFDMA stands for:(CO4,K1) 1

(a) Orthogonal Frequency Division Media Allocation
(b) On-Demand Frequency Data Multiplexing Algorithm
(c) Open Frequency Digital Modulation Access
(d) Orthogonal Frequency Division Multiple Access

1-i. UMTS is a 3G mobile communication standard and stands for:(CO5,K1) 1

(a) Universal Mobile Telephone System
(b) Unified Mobile Telephony System
(c) Universal Mobile Telecommunications System
(d) Uniform Mobile Telephone Service

1-j. What is the defining characteristic of a Mobile Adhoc Network (MANET)?(CO5,K1) 1

(a) Fixed infrastructure and central control
(b) Dynamic and self-configuring network topology
(c) High-speed data transmission
(d) Large geographic coverage

2. Attempt all parts:-

2.a. What role does the Public Switched Telephone Network (PSTN) plays?(CO1,K1) 2

2.b. How do Mobile Termination Points (MTPs) contribute to call setup.(CO2,K2) 2

2.c. Define channel noise briefly.(CO3,K2) 2

2.d. How does a Rake receiver exploit multipath propagation?(CO4,K3) 2

2.e. Describe the evolution from 4G to 5G in terms of network architecture and capabilities.(CO5,K2) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Explain History and evolution of mobile radio systems in detail?(CO1,K2)	6
3.a.(ii)	How do satellite systems provide global coverage for mobile communication?(CO1,K2)	6

3.b. Answer any one of the following:-

3.b.(i)	What is the role of a Handoff Decision Algorithm (HDA) in the handoff process?(CO2,K2)	6
3.b.(ii)	Define the concept of a Mobile Subscriber in cellular communication.(CO2,K1)	6

3.c. Answer any one of the following:-

3.c.(i)	How does fading impact the quality of wireless signals?(CO3,K2)	6
3.c.(ii)	How is Rayleigh fading different from AWGN in channel modeling?(CO3,K2)	6

3.d. Answer any one of the following:-

3.d.(i)	What is the role of MIMO in spatial diversity?(CO4,K1)	6
3.d.(ii)	Compare LPC with other speech coding techniques, such as CELP and ADPCM. Highlight the advantages and limitations of each.(CO4,K3)	6

3.e. Answer any one of the following:-

3.e.(i)	Analyze the key features and services provided by UMTS (Universal Mobile Telecommunications System) and its significance in the mobile industry.(CO5,K2)	6
3.e.(ii)	Describe the concept of Next-Generation Networks (NGN) in the telecommunications industry and how it shapes the future of network infrastructure.(CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Discuss the potential applications of blockchain in ensuring security and privacy in wireless communication.(CO1,K2)	10
4-b.	Explain in detail(CO1,K2) 1- WLL 2- Paging	10

5. Answer any one of the following:-

5-a.	What are the essential components of a cell site besides the BTS?(CO2,K1)	10
5-b.	Discuss the challenges and solutions of antenna placement in urban areas.(CO2,K2)	10

6. Answer any one of the following:-

6-a.	Discuss the role of obstructions and obstacles in radio wave propagation issues for personal wireless systems.(CO3,K2)	10
6-b.	What are the key sources of channel noise in wireless communication, and how do they affect signal quality?(CO3,K2)	10

7. Answer any one of the following:-

7-a.	How does a Rake receiver help in improving signal reception in a multipath environment?(CO4,K2)	10
7-b.	Describe the process of finger assignment in a Rake receiver.(CO4,K2)	10

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8. Answer any <u>one</u> of the following:-

8-a.	Explain the architecture and operation of General Packet Radio Service (GPRS), including its role in providing mobile data services and internet access.(CO5,K2)	10
8-b.	Analyze the technological advancements and the differences between 4G and 5G mobile networks, highlighting the transformative potential of 5G.(CO5,K3)	10