Printed Page:- 04 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 (2024 - 2025)

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.

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SECTION-A 20

1. Attempt all parts:-

1-a. What is the purpose of a demodulator in wireless communication?(CO1,K1) 1

(a) To amplify the received signal

(b) To decode the signal and recover the original data

(c) To encode voice messages

(d) To modulate the carrier signal

1-b. Which of the following is not an example of wireless communication?(CO1,K2) 1

(a) Wi-Fi

(b) Mobiles

(c) Landline

(d) Wireless Computer Parts

1-c. Soft handoff is also known as _____(CO2,K1) 1

(a) MAHO

(b) Hand over

(c) Break before make

(d) Make before break

1-d. Which one is not an advantage of using frequency reuse?(CO2,K2) 1

(a) Increased capacity

(b) Limited spectrum is required

(c) Same spectrum may be allocated to other network

(d) Number of base stations is reduced

1-e. Which propagation model is commonly used for outdoor wireless communication in urban areas?(CO3,K2) 1

(a) Free-space model
(b) Two-ray ground reflection model
(c) Rayleigh fading model
(d) Okumura-Hata model

1-f. Which type of fading is caused by variations in signal strength over short time scales?(CO3,K2) 1

(a) Slow fading
(b) Fast fading
(c) Rayleigh fading
(d) Shadowing

1-g. Maximal ratio combining (MRC) in Rake receivers aims to:(CO4,K1) 1

(a) Maximize data throughput
(b) Reduce transmission delay
(c) Minimize power consumption
(d) Optimize signal-to-noise ratio

1-h. MIMO (Multiple-Input, Multiple-Output) technology is a form of:(CO4,K1) 1

(a) Spatial diversity
(b) Temporal diversity
(c) Selection diversity
(d) CDMA

1-i. What does EDGE stand for in mobile telecommunications?(CO5,K1) 1

(a) Enhanced Data Rates for GSM Evolution
(b) Extended Digital GSM Enhancement
(c) Enhanced Digital GSM Environment
(d) Enhanced Data GSM Extension

1-j. LTE Advanced (LTE-A) is an enhancement of LTE technology and is often referred to as:(CO5,K1) 1

(a) 3G LTE
(b) 4G LTE
(c) 4.5G LTE
(d) 5G LTE

2. Attempt all parts:-

2.a. Define the term "modulation" in the context of wireless communication.(CO1,K2) 2

2.b. Describe the role of a Mobile Switching Center (MSC) in a cellular network.(CO2,K2) 2

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2.c.	Describe the impact of noise on signal quality.(CO3,K2)	2
2.d.	What is intersymbol interference, and how does equalization help mitigate it?(CO4,K1)	2
2.e.	Explain the key advantages of General Packet Radio Service (GPRS) in mobile communication.(CO5,K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	What is the concept of Massive MIMO, and how can it enhance wireless communication?(CO1,K1)	6
3-b.	How does a Wireless Local Loop (WLL) system facilitate last-mile connectivity?(CO2,K1)	6
3-c.	Describe the difference between omnidirectional and directional antennas in cellular systems.(CO2,K2)	6
3-d.	How does dynamic channel assignment differ from fixed channel assignment in cellular systems?(CO2,K2)	6
3.e.	Explain the concept of Rayleigh fading in land mobile systems.(CO3,K2)	6
3.f.	Discuss the principles of selection diversity. How does it enhance signal reception in a fading channel, and what are its limitations?(CO4,K2)	6
3.g.	Discuss the technological advancements in Edge (Enhanced Data rates for GSM Evolution) technology and how it enhances data transfer rates in GSM networks.(CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Describe the Shannon-Hartley theorem and its significance in wireless communication.(CO1,K2)	10
4-b.	What are the key advantages of Wireless Local Loop (WLL) systems in providing last-mile connectivity?(CO1)	10

5. Answer any one of the following:-

5-a.	What is the role of a Gateway Mobile Switching Center (GMSC) in the cellular infrastructure?(CO2,K1)	10
5-b.	Discuss the role of the Operation and Maintenance Center (OMC) in cellular system components.(CO2,K2)	10

6. Answer any one of the following:-

6-a.	How do weather conditions, such as rain and fog, affect radio wave propagation in wireless systems?(CO3,K2)	10
6-b.	Explain how channel estimation and equalization techniques can be adapted to the Rayleigh channel model.(CO3,K2)	10

7. Answer any one of the following:-

7-a.	What is the importance of the Hamming distance in error correction?(CO4,K1)	10

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7-b.	What is a Rake receiver, and how does it work in a wireless communication system?(CO4,K1)	10

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

8-a.	Provide a detailed comparison of data transfer speeds between EDGE and the original GSM standard, and explain the technological advancements that enable this.(CO5,K2)	10
8-b.	Describe the architecture and services provided by UMTS networks, with a focus on how they enable high-speed data transfer and multimedia services.(CO5,K2)	10

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