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

B.Tech

SEM: VI - THEORY EXAMINATION (2025 - 2026)

Subject: Wireless Communication Networks

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) Application layer offers _____ service. (CO1, K1) 1
- (a) End to end
 - (b) Process to process
 - (c) Both End to end and Process to process
 - (d) None of the mentioned
- (1.2) Which protocol is a signaling communication protocol used for controlling multimedia communication sessions? (CO1, K2) 1
- (a) session initiation protocol
 - (b) session modelling protocol
 - (c) session maintenance protocol
 - (d) resource reservation protocol
- (1.3) The principle ofstates that the routing table is stored from the longest mask to the shortest mask. (CO2,K2) 1
- (a) first mask matching
 - (b) shortest mask matching
 - (c) longest mask matching
 - (d) very shortest mask matching
- (1.4) Which of the following describes the function of ARP? (CO2,K2) 1
- (a) It is used to map a 32-bit IP address to a 48-bit ethernet address
 - (b) It is used to map a 48-bit ethernet address to a 32-bit IP address
 - (c) It is used to map a 32-bit ethernet address to a 48-bit IP address
 - (d) It is used to map a 48-bit IP address to a 32-bit ethernet address

- (1.5) Which cellular system introduced the use of frequency hopping to improve security? (CO3, K2) 1
- (a) GSM
 - (b) CDMA
 - (c) AMPS
 - (d) TACS
- (1.6) Which generation of cellular systems introduced analog voice communication? (CO3,K1) 1
- (a) 1G
 - (b) 2G
 - (c) 3G
 - (d) 4G
- (1.7) Which of the following is a challenge in implementing multicarrier modulation? (CO4, K2) 1
- (a) Interference between subcarriers
 - (b) High power consumption
 - (c) Limited range
 - (d) All of the these
- (1.8) Which of the following is NOT a use case for OFDM? (CO4,K2) 1
- (a) Wi-Fi
 - (b) Cellular networks
 - (c) AM radio broadcasting
 - (d) All of the these
- (1.9) Nodes must be scheduled in a distributed fashion for gaining access to the channel because (CO5,K2) 1
- (a) There is no centralized coordinators
 - (b) Nodes are not communicating with each other
 - (c) Exposed terminal problem
 - (d) Power level of the receiving data is very weak
- (1.10) Identify the network with the following characteristics ." Fixed infrastructure based, single hop wireless links, guaranteed bandwidth for voice based traffic, circuit switched ,seamless connectivity" (CO5,K2) 1
- (a) adhoc wireless network
 - (b) Cellular network
 - (c) Fixed land line network
 - (d) Bluetooth network

2. Attempt all parts:-

- (2.1) What is the OSI model, and why was it developed? (CO1,K2) 2
- (2.2) What is the difference between the network layer and the transport layer? (CO2,K3) 2
- (2.3) What were the limitations of 2G networks? (CO3,K2) 2
- (2.4) How do small cells differ from traditional cell towers? (CO4,K3) 2

(2.5)	What is soft handoff? (CO5,K2)	2
SECTION-B		30
Answer any <u>one</u> of the following:-		
(3.1)	What is the relationship between the physical layer and the medium used for transmission? (CO1, K3)	6
(3.2)	What is framing, and how does it work in the data link layer? (CO1, K3)	6
Answer any one of the following:-		
(3.3)	What are the problems encountered during releasing a connection in transport layer? Give some solution applicable to it. (CO2, K3)	6
(3.4)	Explain the role of the Dynamic Host Configuration Protocol (DHCP) in the network layer with some suitable examples. (CO2, K3)	6
Answer any one of the following:-		
(3.5)	What is the difference between 4G and 2G networks? (CO3, K3)	6
(3.6)	What are the requirements for LTE network reliability? (CO3, K3)	6
Answer any one of the following:-		
(3.7)	What is interference management in the context of IoT spectrum sharing using D2D communication? (CO4,K3)	6
(3.8)	How does OFDM differ from other modulation techniques?(CO4, K2)	6
Answer any one of the following:-		
(3.9)	What is CDMA? Also explain the orthogonal codes for CDMA. (CO5, K2)	6
(3.10)	Consider Global System for Mobile, which is TDMA/FDD system that uses 25 MHz for the forward link, which is broken in to radio channels of 200 KHz. If 8 speech channels are supported on a single radio channel and if no guard band is assumed, find the no of simultaneous users that can be accommodated in GSM. (CO4,K4)	6
SECTION-C		50
4. Answer any <u>one</u> of the following:-		
(4.1)	What is the function of the session layer? Also, explain the difference between the OSI model and the TCP/IP model. (CO1, K3)	10
(4.2)	What are some common examples of protocols used at each layer of the OSI model? Explain. (CO1, K2)	10
5. Answer any <u>one</u> of the following:-		
(5.1)	Give the brief introduction of IPv6 and IPv4 addressing with example and draw the format figure of IPv6 diagram. (CO2, K2)	10
(5.2)	What is the importance of flow control and congestion control in the transport layer? Explain the relationship between the transport layer and the application layer. (CO2, K3)	10
6. Answer any <u>one</u> of the following:-		
(6.1)	How did the mobile phone evolve from 1G to 5G? (CO3, K2)	10
(6.2)	What role have advancements in antenna technology played in the evolution of cellular systems? (CO3, K2)	10

7. Answer any one of the following:-

- (7.1) What is the difference between licensed and unlicensed spectrum in Cognitive Radio? Explain. (CO4,K3) 10
- (7.2) What is the impact of SDR on the evolution of wireless communication systems? (CO4,K4) 10

8. Answer any one of the following:-

- (8.1) A group of N stations share a 56-kbps pure ALOHA channel. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent. What is the maximum value of N? How does carrier sense multiple access with collision avoidance (CSMA/CA) work. (CO5, K4) 10
- (8.2) How does spatial multiple access (SMA) enable multiple users to simultaneously communicate over the same frequency band using multiple antennas, and what are the benefits and limitations of this approach? (CO5, K3) 10

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