ROLL NO. _____

Code: AE76/AE127/AC127
Subject: WIRELESS AND MOBILE COMMUNICATIONS

AMIETE – ET/CS (Current & New Scheme)

Time: 3 Hours **December 2016** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. The mobile-to-base frequency assignment for GSM system is
(A) 890-915 MHz **(B)** 935-960 MHz
(C) 870-890 MHz **(D)** 825-845 MHz

b. Which digital modulation technique is used in GSM?
(A) QAM **(B)** GFSK
(C) BPSK **(D)** GMSK

c. The MTSO is responsible for _____.
(A) Connecting the cell with the telephone central office
(B) Assigning channels for retransmission
(C) Billing function
(D) All of these

d. Golay code and Reed-Solomon codes are examples of _____ that are commonly used in communication system.
(A) convolution error-correcting codes
(B) tree error-correcting codes
(C) parity error-correcting codes
(D) block error-correcting codes

e. The output of a cellular radio is controlled by the
(A) User or caller **(B)** Cell site
(C) AMPS **(D)** MTSO

f. Determine the total number of channel capacity of a cellular telephone area comprised of 10 clusters with seven cells in each cluster and 10 channels in each cell.
(A) 7 channels **(B)** 70 channels
(C) 700 channels **(D)** 7000 channels

g. Decreasing co-channel interference while increasing capacity by using directional antenna is called _____.
(A) clustering **(B)** splitting
(C) partitioning **(D)** sectoring

h. For satellite communication, standard Earth stations have antenna diameters in the range of _____ metre.
(A) 27.5 to 30 **(B)** 10 to 15
(C) 30 to 50 **(D)** 5 to 10

i. Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?
(A) CDMA **(B)** CSMA/CA
(C) ALOHA **(D)** None of these

j. Which one of the following event is not possible in wireless LAN?
(A) collision detection **(B)** Acknowledgement of data frames
(C) multi-mode data transmission **(D)** None of these

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Describe two technical advantages and disadvantages of wireless systems that use bursty data transmission rather than continuous data transmission. **(4)**

b. Cellular systems are migrating to smaller cells to increase system capacity. Name at least three design issues which are complicated by this trend. Why does minimizing reuse distance maximize spectral efficiency of a cellular system? **(6)**

c. Explain the following basic multiplexing technique **(2×3)**
(i) FDMA (ii) TDMA (iii) CDMA

Q.3 a. This problem demonstrates the capacity increase as cell size decreases. Consider a square city that is 100 square kilometers. Suppose you design a cellular system for this city with square cells, where every cell (regardless of cell size) has 100 channels so can support 100 active users (in practice the number of users that can be supported per cell is mostly independent of cell size as long as the propagation model and power scale appropriately).
(i) What is the total number of active users that your system can support for a cell size of 1 square kilometer?
(ii) What cell size would you use if you require that your system support 250,000 active users? **(4)**

b. Explain reflection, diffraction and scattering in radio wave propagation. **(6)**

c. Compare and explain fast fading and slow fading. **(6)**

Q.4 a. What are the advantages of Cell Sectoring? Explain with suitable example. **(8)**

b. How does slotted ALOHA improve the throughput as compared to pure ALOHA? **(8)**

Q.5 a. What are the advantages and disadvantages of FDMA with respect to TDMA or CDMA? **(8)**

b. In a first-generation AMP system where there are 395 channels of 30 kHz each in a bandwidth of 12.5 MHz, what is the multiple access spectral efficiency for FDMA? **(4)**

c. What are the specific advantages of static channel allocation over dynamic channel allocation strategies? **(4)**

Q.6 a. Describe the Handoff techniques classified as mobile-controlled handoff (MCHO), network-controlled handoff (NCHO), and mobile-assisted handoff (MAHO). **(8)**

b. Explain in brief the Wireless Personal Area Network. **(8)**

Q.7 a. Discuss the primary areas of applications of Wireless Sensor Networks. **(8)**

b. Which techniques are required for adapting to the Inherent Dynamic Nature of Wireless Sensor Networks? **(8)**

Q.8 a. Draw and explain the block diagram of GSM Architecture in detail. **(8)**

b. Explain the operation of IEEE 802.11 Medium Access Control protocol. **(8)**

Q.9 a. What are the issues that should be considered in deploying the Wireless LAN? **(8)**

b. What is a Smart Antenna System? How many types of Smart Antenna Systems are there? **(8)**