Code: AE76   Subject: WIRELESS AND MOBILE COMMUNICATIONS

AMIETE – ET

Time: 3 Hours | **JUNE 2013** | **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 cellular concept is a major breakthrough in solving the problems of _____.

   (A) space and time concept
   (B) simplifying equipments
   (C) spectral congestion and user capacity
   (D) it covers very large area and high capacity

b. Bluetooth provides approach for enabling various _____ in 10 meters range.

   (A) Devices to communicate with one another
   (B) Equipments to communicate wire wives
   (C) Places to communicate within 10 meters range
   (D) It does not support various equipments to communicate

c. Bluetooth operates in _____ ISM band and uses _____ scheme for each radio channel.

   (A) 8.4 GHz band & FDD   **(B)** 2.4 GHz band & TDD
   (C) 10 GHz band & FDD   **(D)** 9 GHz band & TDD

d. In conventional telephone system it is possible to talk and listen simultanelously. This effect is called _____

   (A) multiplexing   **(B)** duplexing
   (C) demultiplexing   **(D)** switching

e. When considering geometric shapes which cover an entire region without overlap and with equal area there are 3 sensible choices, namely _____.

   (A) A triangle, straight line and square
   (B) A square, circle and rectangle
   (C) An equilateral triangle, a square and a hexagon
   (D) A triangle, hexagon and rectangle

f. Consider a cellular system which has a total of S duplex channels available for use. If each cell is allocated a group of K channels (K < S) and if the S channels are divided among N cells then the total number of available radio channels can be expressed as _____.

(A) $S = \dfrac{K}{N}$

(B) $S = KN$

(C) $\dfrac{N}{K} = S$

(D) None of these

g. If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 15 KHz simplex channels, then total number of channels available per cell is _____.

(A) 660 channels   (B) 550 channels
(C) 720 channels   (D) 440 channels

h. In a mobile radio channel the average received signal strength at any point decays as a power law of the distance of separation between a transmitter and receiver. The average received power P_r at a distance d from the transmitting antenna is _____.

(A) $P_r = P_o \left(\dfrac{d}{d_o} \right)^{1/n}$

(B) $P_r = P_o \left(\dfrac{d}{d_o} \right)^{-n}$

(C) $P_r = P_o (d \times d_o)^{\frac{1}{n}}$

(D) $P_r = P_o \left(\dfrac{d_o}{d} \right)^{n}$

i. The mechanism behind electromagnetic wave propagation are _____.

(A) Reflection, diffraction and scattering
(B) Interference, co-channel interference and scattering
(C) None of these
(D) Only diffraction

j. Digital modulation offers many advantages over analog. They are _____.

(A) Greater noise immunity and robustness and easier multiplexing of various forms of information
(B) Only interference, fading and noise immunity
(C) Complex signal conditioning, fading and interference
(D) None of these like greater noise immunity, robustness etc

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

Q.2 a. Explain with neat figure a cellular system. Explain how a cellular telephone call is made.   **(6)**

b. Compare Ad Hoc and Sensor Networks characteristics.   **(6)**

c. Explain the terms:
(i)   Control channel
(ii)   Forward channel
(iii) Mobile switching center   **(4)**

Q.3 a. Derive an expression for path loss in dB for the space propagation in an ideal medium.   **(8)**

b. Discuss the effects of fast fading technique.   **(8)**

Q.4 a. Derive the equation for co-channel interference ratio.   **(5)**

b. Under what condition cell splitting and cell sectoring is done.   **(8)**

c. Explain the various features of CSMA contention based protocols.   **(3)**

Q.5 a. Compare TDMA, CDMA and FDMA.   **(8)**

b. Write a note on channel allocation, hence bring out the difference between static allocation verses dynamic allocation.   **(8)**

Q.6 a. Explain the advantages and limitation of GPS.   **(5)**

b. Explain the sequence of call setup from mobile station to base through satellites.   **(5)**

c. Explain hard and soft hand off and give its parameters for roaming.   **(6)**

Q.7 a. Explain IEEE 802.15 standard for WPANS.   **(5)**

b. List the different security threats to wireless networks.   **(11)**

Q.8 a. With diagram explain the Frame Structure of GSM.   **(8)**

b. Explain 3G cellular systems and UMTS in IMT-2000.   **(4)**

c. Compare PCS and IS-95 wireless systems.   **(4)**

Q.9   Explain the following with neat figures:

(i)   Need for MANET routing
(ii)   Routing classification in MANETS
(iii) Routing in Sensor networks
(iv) Wireless Sensor networks   **(4×4)**