AMIETE – ET (NEW SCHEME) – Code: AE76

Subject: WIRELESS AND MOBILE COMMUNICATIONS

Time: 3 Hours

DECEMBER 2010

Max. Marks: 100

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 half an hour 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. _____ is a first generation cellular phone system.

    (A) AMPS   **(B)** D-AMPS
    (C) GSM   **(D)** IS-95

b. _____ connects the base stations with the wired telephone network (PSTN).

    (A) Transmitter   **(B)** Cell phones
    (C) MSC   **(D)** CDMA

c. _____ occurs when a user begins moving towards another cell and the phone automatically associates with the base station of that cell.

    (A) Roaming   **(B)** handoff
    (C) Hunting   **(D)** Multiplexing

d. Frequency reuse factor in CDMA is

    (A) 1   **(B)** Less than 1
    (C) Greater than 1   **(D)** zero

e. GSM uses _____ for multiplexing.

    (A) CDMA   **(B)** TDMA and FDMA
    (C) FDMA   **(D)** CSMA

f. Convolutional encoder as shown in the Fig.1 has code rate

    (A) $\dfrac{1}{3}$ **(B)** $\dfrac{1}{2}$

    (C) $\dfrac{2}{3}$ **(D)** 1
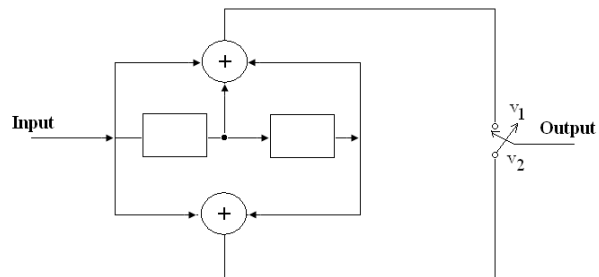

Fig.1

g. In the_____random access method, stations do not sense the medium.

(A) ALOHA   **(B)** CSMA/CD
(C) CSMA/CA   **(D)** CSMA

h. The signal from a satellite is aimed at a specific area called the _____.

(A) period   **(B)** footprint
(C) orbit   **(D)** uplink

i. IEEE 802.15 standard correspond to _____.

(A) Wi-Fi   **(B)** Blue tooth
(C) WMAN   **(D)** Ethernet

j. A _____ is a computerised centre that is responsible for connecting calls, recording call information and billing.

(A) base station   **(B)** cell
(C) MSC   **(D)** mobile station

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

Q.2 a. With a simplified system infrastructure diagram for a cellular system, bring out the salient features of a cellular system. **(6)**

b. If a total of 33 MHz bandwidth is allocated to a particular cellular telephone system that uses two 25 KHz simplex channels to provide full duplex voice channels, compute the number of simultaneous calls that can be supported per cell if a system uses
(i) FDMA (ii) TDMA with 8 way time multiplexing
Assume that additional bandwidth is reserved for the control channels. **(6)**

c. Define discrete random variables and its expected value. **(4)**

Q.3 a. How is free space propagation different from land propagation? Explain with the help of path loss schematics. **(8)**

b. What causes intersymbol interference and how can you reduce intersymbol interference in the wireless communication system? **(4)**

c. Bring out the concept of an interleaver. **(4)**

Q.4 a. Explain the following terms:

(i) Frequency reuse.
(ii) Cell splitting and sectoring. **(3+6)**

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

Q.5 a. What do you mean by spread spectrum? Discuss the concept of DSSS with diagram. **(4+4)**

b. 16 QAM is used to transmit a binary sequence, if the baud rate is 1200 Hz, how many bits can be transmitted in one second? **(4)**

c. Describe the specific advantages and disadvantages of static channel over dynamic allocation strategies? **(4)**

Q.6 a. What is handoff and how it can be initiated? Explain hard and soft handoffs with schematic illustrations. **(2+3+3)**

b. How the call setup in a satellite system differs from a cellular system? Explain with a diagram. **(8)**

Q.7 a. Explain GSM architecture with a block schematic. **(8)**

b. Discuss the function of various logical channels in IS-95. **(8)**

Q.8 a. What are the differences between cellular and adhoc networks? **(4)**

b. On what factors routing in a MANET is dependent? Explain dynamic source routing. **(1+6)**

c. Draw and explain the general architecture of a fixed sensor node. **(5)**

Q.9 a. Discuss bluetooth system architecture with a schematic diagram. **(8)**

b. Explain the basic functions of smart antenna with a diagram. **(8)**