Name : ……………………………………………………

Roll No. : ……………………………………………………

Invigilator's Signature : …………………………………

CS/M.Tech(MCNT)/SEM-3/MC-302/2009-10

2009

3G MOBILE NETWORKS

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions.   5 × 14 = 70

1. a) Enumerate the different value added services supported in UMTS network. Draw the SMS network architecture and explain how SMS is supported in the network.

    b) Draw the MMS reference architecture and explain how multimedia messaging service is carried out in mobile networks.   7 + 7

2. a) What is 3GPP ? What are its objectives ? Explain briefly the evolution path towards 3GPP network.

    b) Explain with diagram the theory and principle of operation of rake receiver.   7 + 7
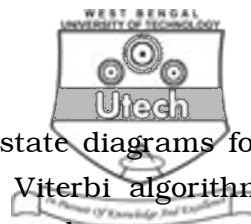
3. a) What are code tree, code trellis and state diagrams for convolution encoders ? Explain the Viterbi algorithm and sequential decoding of convolution codes.

   b) Derive the expression of the capacity of cellular radio mobile communication system in terms of carrier-to-interference ratio of the system. Explain how to achieve maximum capacity.

4. a) If RF bandwidth W = 1·25 MHz, base band information bit rate R = 9600 bps, and a minimum acceptable Eb/No = 10 dB, determine the maximum number of users that can be supported in a single cell CDMA system using

   i) omnidirectional base station antennas and no voice activity detection

   ii) three sectors at the base station and activity detection with α = 3/8.

   Assume the system is interference limited.

   b) Explain the principle of Wideband CDMA (WCDMA) used in 3G mobile system.   8 + 6

5. a) How is an ATM virtual connection identified ? What is the relationship between TPs, VPs and VCs ? Name the ATM layers and their functions.

   b) If an application uses AAL5 and there are 41,000 bytes of data coming into the CS sublayer, how many data units are passed from the SAR to the ATM layer ? How many padding bytes are necessary ?

   c) What is the total efficiency of ATM using AAL1 ?

                                                                 8 + 4 + 2

6. a) Explain with diagram the principle of operation of an ATM based wireless LAN architecture.

   b) Explain with diagram the principle of LAN emulation (LANE) using client-server model for mixed architecture using ATM switch.

7. a) Explain with diagram the principles of LMDS and MMDS broadband wireless access systems.

   b) Explain with diagram the principle of operation of direct sequence spread spectrum (DS-SS) transmitter and receiver with binary phase modulation.

8. Write short notes on any *two* of the following :   7 + 7

   a) Orthogonal codes in CDMA

   b) Turbo encoder

   c) Wireless Application Protocol

   d) Wireless Local Loop.

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