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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Eighth Semester, B.E. - Electronics and Communication Engineering
Semester End Examination; May/ June - 2019
Wireless Communication Technologies

Time: 3 hrs   Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

1 a. Briefly explain the following terms: 6
   i) Subscriber identity Module   ii) Mobile equipment   iii) Half Duplex

   b. With the help of a diagram, explain wire line (PSTN) to mobile (cellular) call procedures. 8

   c. With block diagram, explain paging system. 6

2 a. Compare the following 2G technologies :   8
   i) CDMA one (IS-95)   ii) GSM DCS-1900   iii) IS-54 / IS-136

   b. Write short notes on the following :   12
   i) Wireless local loop ii) UMTS (W-CDMA) iii) Wireless Local Area Networks(WLANs)

UNIT - II

3 a. Derive an equation for signal to interface noise ratio in terms of i_s and N. 8

   b. If a total 50 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 20 kHz simplex channels to provide full duplex voice and control channels, calculate the number of channels available per cell if a system uses,

   i) Three-cell reuse   ii) Six-cell reuse

   If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each of the two systems. 6

   c. Explain Lee's Microcell Zone concept with the neat figure. 6

4 a. What are the types of channel assignment strategies? Explain. 6

   b. List the different steps involved in handoff. Also discuss two types of handoff. 8

   c. If a signal to interference ratio of 15 dB is required for satisfactory forward channel performance of cellular system, what is the frequency reuse factor and cluster size that should be used for maximum capacity, if the path loss exponent is (i) $n = 4$ and (ii) $n = 3$? Assume that there are six co-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximation. 6

UNIT - III

5 a. Write any three features of FDMA and Non-linear effects in FDMA . 6

   b. Explain the following spread spectrum multiple access techniques :   6
   i) Frequency Hopped Multiple Access (FHMA)
   ii) Code Division Multiple Access (CDMA)

c. The GSM system uses a frame structure where each frame consists of eight times slots, and each time slot contains 156.25 bits and the data is transmitted at 270.833 kbps in the channel, compute;

    i) The time duration of a bit

    ii) The time duration of a slot   8

    iii) The time duration of a frame

    iv) How long must a user occupying a single time slot wait between two successive transmissions

6 a. Explain the concepts of pure ALOHA and slotted ALOHA protocol.   8

   b. Discuss the concept of capacity of Space Division Multiple Access.   6

   c. If W = 1.25 MHz, R = 9600 bps and minimum acceptable E_b/N_0 is found to be 10 dB, determine the maximum number of user that can be supported in single cell CDMA system using;

       i) Omni-directional base station antenna and no voice activity detection   6

       ii) Three sector at the base station and activity detection with $\alpha = 3/8$.

       Assume the system is interference limited.

UNIT - IV

7 a. With the help of block diagram, explain AMPS voice modulation process.   8

   b. Describe the USDC (IS-54) and (IS-136) slot and frame structure for cellular system with diagrams.   12

8 a. Explain GSM system architecture with block diagram.   10

   b. Illustrate various GSM operations from transmitter to receiver.   5

   c. Illustrate GSM frame structure.   5

UNIT - V

9 a. What is a VoIP challenge?   10

   b. Exaplin H.323 protocol layer with help of diagram .   10

10 a. Illustrate H.323 call establishment and release process.   6

   b. Write Session Initiation Protocol (SIP) proxy server architecture and explain.   8

   c. List and describe VoIP quality of service.   6

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