Code No: 07A70404 | R07 | | Set No. 2 |

IV B.Tech I Semester Examinations,May 2011
CELLULAR AND MOBILE COMMUNICATIONS
Common to Electronics And Computer Engineering, Electronics And
Telematics, Electronics And Communication Engineering

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the functional architecture and principal interfaces of a GSM and explain it.

   (b) Explain the following with respect of GSM channels:
       i. SACCH
       ii. FACCH
       iii. SDCCH
       iv. CBCH.   [8+8]

2. (a) Describe the performance criteria of a mobile communication systems.

   (b) Discuss the propagation attenuation and severe fading in a mobile radio transmission medium.   [8+8]

3. (a) Define sum and difference patterns of an N element array equi-spaced by a separation 'd'.

   (b) Compare High gain antennas with the directional antenna.

   (c) What are the different types of umbrella pattern antennas used at cell site?
                                                    [4+6+6]

4. (a) Explain the co-channel interference areas from mobile receivers based on test1.

   (b) Explain about the nonlinear amplification in Noncochannel interference.[8+8]

5. (a) Explain how to calculate the number of handoffs per call?

   (b) What are the circumstances where handoffs are necessary but cannot be made?

   (c) Explain how a handoff is initiated?   [6+6+4]

6. Discuss in detail the consideration of components of cellular systems.   [16]

7. (a) Derive the relation for the maximum coverage distance in mobile environment.

   (b) Derive the relation for path loss in land to mobile over water.   [8+8]

8. (a) What are the different techniques for increasing frequency spectrum?

   (b) Compare the average blocking in spatially uniform and nonuniform traffic distribution for FCA, BCA and FBCA.   [8+8]

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Time: 3 hours   Max Marks: 80

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1. Explain the significance of the following channels of CDMA Digital Cellular Systems:

   (a) Sync Channel
   (b) Primary paging channel
   (c) Pilot channel
   (d) Reverse traffic channel.   [4×4=16]

2. (a) What are the factors that have to be consider in calculations of dropped call rate?
   (b) Explain how the traffic is handled by splitting the cells?   [8+8]

3. (a) Give the differences between next channel interference and neighboring channel interference.
   (b) Explain the occurrence of near-end-far-end interference in one cell and two cell system.   [8+8]

4. (a) Differentiate the analog & digital cellular systems with their operating capacities.
   (b) Explain the relation between the received power & the range of subsystem in detail.   [8+8]

5. (a) Explain the components of cellular systems.
   (b) Explain the frequency reuse distance in cellular radio system.   [8+8]

6. (a) Explain how omni directional antenna is used for coverage.
   (b) What is effective radiated power? Derive the expression for Gain-and-pattern relationship.   [8+8]

7. (a) Differentiate between the Access channel and Paging channel.
   (b) Explain how to avoid interference between two system while assigning setup channels?
   (c) Why the cochannel interference is avoided easily in sectorization than in cell splitting?   [6+4+6]

8. Explain the path loss prediction over hilly terrain with suitable diagrams.   [16]

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Code No: 07A70404 | R07 | Set No. 1

IV B.Tech I Semester Examinations,May 2011
CELLULAR AND MOBILE COMMUNICATIONS
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Time: 3 hours | Max Marks: 80

Answer any FIVE Questions
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1. Explain the following terms used in wireless communications:

   (a) Base Station

   (b) Control Channel

   (c) Forward Control Channel

   (d) Full Duplex Channel System

   (e) Half Duplex Channel System

   (f) Hand off

   (g) Mobile Station

   (h) Mobile Switching Center. [16]

2. (a) Compare the co-channel interference performance of a directional antenna system for k=7 and k=4 cell patterns.

   (b) What is tilting of an antenna? How can these antenna patterns reduce the co-channel interference? [8+8]

3. (a) Derive the general formula of dropped call rate and explain the significant of each term.

   (b) Write notes on coverage hole fillers. [8+8]

4. (a) Distinguish between permanent splitting and dynamic splitting.

   (b) From a Normal case, Derive the desired C/I in an omni directional antenna system. [8+8]

5. (a) Explain how a paging channels are used for the land originating calls?

   (b) How a Reuse-partition scheme reduces the number of cell sites? Explain it with suitable examples. [8+8]

6. (a) Compare the symmetrical and asymmetrical patterns.

   (b) Draw the Null-free pattern and how it represented? What is the application of it?

   (c) How a high gain broadband umbrella pattern antenna can be constructed for cell site? [4+6+6]

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7. (a) Prove that in two ray ground model $\Delta = d_1 - d_2 \cong 2h_t h_r/d$ and state the condition for above expression to present a good approximation.

   (b) Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz, For a vehicle moving at 90kmph. Compute the received carrier frequency if the mobile is moving in a

      i. Direction towards the transmitter.

      ii. Direction away from the transmitter

      iii. Direction, which is perpendicular to the direction of the arrival of the transmitting signal. [10+6]

8. (a) How many power levels are present in TDMA and What is the output power from transmitting antenna of mobile station?

   (b) Draw the VSELP speech decoder and explain how it is used in TDMA Digital Cellular system. [8+8]

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1. (a) Explain the major elements of cellular mobile radio system.

   (b) Explain the frequency reuse schemes.

   (c) Describe the blocking probability of cellular system.   [6+6+4]

2. (a) What are the different types channels present in GSM? Explain them in detail and discuss their function in GSM.

   (b) What type of modulation is used in TDMA Digital Cellular system? What are the advantages of it?   [10+6]

3. (a) Draw the omni directional receiving antenna configuration for 45 channels and explain its coverage.

   (b) Draw the directional antenna configuration for 60^0 sector and explain how interference is reduced?   [8+8]

4. (a) A base station receiver capable of providing 90 dB of isolation between channels is receiving a signal from a mobile unit 3KM away. What is the minimum distance that a second mobile unit can transmit the signal from near end mobile unit.

   (b) Distinguish between co-channel and Noncochannel interference.   [8+8]

5. (a) Explain how a two level handoff scheme is used to eliminate the interference in the system?

   (b) Determine the transmitted power for a new cell after cell splitting.   [8+8]

6. (a) Explain the general formula of received power from real model based on shadow case, direct path & over the water condition in detail.

   (b) Briefly explain the effect of foliage loss in mobile signal propagation.   [8+8]

7. (a) Distinguish between landline telephone networks and cellular telephone network.

   (b) What are the advantages of mobile radio over the heavily saturated cell based radio channels? What are the factors that effect mobile radio channels? [8+8]

8. (a) A system has 100 cell sites and a call paging has to reach all 100 cell sites. If every page takes 100ms and there are 2000 land originating calles per hour during a busy hour then calculate the airtime spent for paging during the busy hour?

(b) Explain how to calculate the new additional spectrum utilization factor at any given period of time?

(c) How the frequency is assigned to reduce the interference between adjacent channels in the cell?   [4+6+6]

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