

IV B.Tech II Semester Regular Examinations, Apr/May 2006
CELLULAR AND MOBILE COMMUNICATION
(Common to Electronics & Communication Engineering, Computer Science
& Engineering, Information Technology, Computer Science & Systems
Engineering and Electronics & Computer Engineering)
Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the trunking efficiency?
(b) Explain about the mobile fading characteristics? [8+8]
2. (a) With help of neat diagrams, explain the N cell reuse pattern for four and seven cell reuse?
(b) Derive the co channel interference factor for 7 cell reuse pattern? [9+7]
3. (a) What are the causes of co-channel and adjacent channel interference in a mobile communication system,
(b) Discuss the effect of Near-end and far-end interference of mobile unit. [8+8]
4. (a) Explain about the concept of mobile to mobile propagation?
(b) For the given figure antenna height 300m, transmitting power is 5W antenna gain is 2dB per dipole under suburban condition find the path loss? (Use necessary assumptions where ever required) [6+10]
5. (a) Explain about the mobile unit antennas?
(b) Derive the received power in dBm How is the measure d field strength converted into the received power? [8+8]
6. Explain the following in detail concern to the mobile system
 - (a) Setup channel
 - (b) Accesses channel
 - (c) Paging channel
 - (d) Voice channel. [16]
7. (a) Explain clearly how to calculate δ and μ for single cell?
(b) Why hand off is necessary for cellular systems Determine the two types of handoffs based on signal strength and C/I ratio? [8+8]
8. Explain the following under operational techniques:
 - (a) Separation between highway cell sites
 - (b) Low density small market design [16]

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1. (a) Explain about the importance of the amplifier noise in cellular system?
(b) Explain the operation of the cellular system? [8+8]
2. (a) Derive the maximum number calls per hour per cell and the maximum number frequency channels per cell . How are they related?
(b) Find the desire co channel interference phenomena in a reuse cellular system that employs omni directional antenna system? [8+8]
3. (a) Explain briefly about reduction of co-channel interference in mobile radio system.
(b) Write detailed notes on the different diversity schemes and combining techniques used in mobile communication. [8+8]
4. (a) Explain about the ground reflection (two ray) method? Find the path loss?
(b) A mobile is located 5Km away from a base station and uses a vertical $\lambda/4$ monopole antenna with a gain of 2.55dB to receive the cellular radio signals. The E field at 1Km from the transmitter is measured to be 10^{-3} V/m The carrier frequency used for this system is 900MHz
 - i. Find the length and effective aperture of the receiving antenna
 - ii. Find the received power at the mobile using the two ray ground reflection model assuming the height of the transmitting antenna is 50m and the receiving antenna is 1.5m above the ground? [8+8]
5. (a) Derive the relation between the received power and electrical field of the antenna?
(b) Assume a receiver is located 10km from a 50W transmitter. The carrier frequency is 900MHz , assume free space propagation $G_t = 1$ and $G_r = 2W$
 - i. Find the power at the receiver
 - ii. The magnitude of the electric field at the receiving antenna
 - iii. The rms voltage applied to the receiver input assuming that the receiving antenna has purely real importance of 50 ohms and is matched to the receiver. [6+10]
6. (a) Write the procedure to allot the channels for the traveling mobile units?

- (b) Explain the channel assignment to the cell sites based on the adjacent channels? [8+8]
- 7. (a) Discuss the advantages of delayed hand offs.
- (b) Distinguish between forced hand off and soft hand offs. [8+8]
- 8. (a) Explain the phenomena of the wave guide.
- (b) Explain the importance of leaky feeder in wave guides. [8+8]

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1. (a) Discuss analog cellular system (AMPS) in detail?
(b) Discuss the mobile radio transmission medium? [8+8]
2. (a) With help of neat diagrams, explain the N cell reuse pattern for four and seven cell reuse?
(b) Derive the co channel interference factor for 7 cell reuse pattern? [9+7]
3. (a) Explain about the co channel and adjacent channel interference?
(b) How many users can be supported for 0.3% blocking probability for the following number of trunked channels in a blocked calls clear system?
 - i. 2
 - ii. 5
 - iii. 25. Assume each user generates a 0.2% E of traffic [8+8]
4. (a) Derive the relation for the maximum coverage distance in mobile environment?
(b) Write the equation for the system gain? Write the importance of each parameter? [10+6]
5. Describe the directional antenna patterns and the respective antenna arrangement.
 - (a) At the cell site
 - (b) Explain the diversity receiver. [16]
6. The U.S AMPS system is allocated 50MHz of spectrum in the 800 Mhz range and provides 832 channels. 42 of those channels are control channels. The forward channel frequency is exactly 45MHz greater then the reverse channel frequency.
 - (a) If the AMPS system is simplex, half duplex or full duplex? What is the band width for each channel and how is it distributed between the base station and subscriber?
 - (b) Assume a base station transmits control information on channel 352, operating at 880.560MHz What is the transmission frequency of the subscriber unit on transmitting on channel 352?

- (c) The A- side and B - Side cellular carriers evenly split the AMPS channels. Find the number of voice channels and the number of control channels for each carrier?
 - (d) let suppose you are chief engineer of a cellular system using seven cell reuse purpose a channel assignment strategy for a uniform distribution of user through out your cellular system specifically , assume that each cell has three control channels (1200 sector is employed)and specify the number of voice channels you would assign to each control in your system?
 - (e) For an ideal hexagonal cellular layout which has an identical cell coverage, what is the distance between the centers of two nearest co channel cells for seven cell reuse? For four cell reuse? [16]
7. (a) Give the illustration of a hand off scenario at cell boundary.
- (b) What is meant by (MAHO) mobile assisted hand off ? Explain. [8+8]
8. Explain the following special features in detail.
- (a) SMS
 - (b) MMS
 - (c) EMS
 - (d) Call waiting
 - (e) Call forwarding
 - (f) Call diverting
 - (g) Voice storage box
 - (h) Call re routing. [16]

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1. (a) What is the difference between selective Fading and flat fading.
(b) What are the major problems in AMPS system? How these are overcome in GSM system? [6+10]
2. (a) Explain about the general description of the system?
(b) Explain about the maximum number of calls per hour per cell? [8+8]
3. (a) Explain how co channel interference is measured in real time mobile radio transceivers?
(b) Prove that $K = 7$ cell pattern does not provide a sufficient frequency reuse distance even when an ideal conditions of flat terrain is assumed? [6+10]
4. (a) What are the requirements of cell site antennas?
(b) Describe the different types of mobile high gain antennas with diagram. [8+8]
5. (a) Discuss the characteristics of cell site antennas?
(b) If the antenna heights are varying what are the effects you are getting at the time of operation of mobile system? [8+8]
6. The U.S AMPS system is allocated 50MHz of spectrum in the 800 Mhz range and provides 832 channels. 42 of those channels are control channels. The forward channel frequency is exactly 45MHz greater then the reverse channel frequency.
 - (a) If the AMPS system is simplex, half duplex or full duplex? What is the band width for each channel and how is it distributed between the base station and subscriber?
 - (b) Assume a base station transmits control information on channel 352, operating at 880.560MHz What is the transmission frequency of the subscriber unit on transmitting on channel 352?
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channels (1200 sector is employed) and specify the number of voice channels you would assign to each control in your system?

- (e) For an ideal hexagonal cellular layout which has an identical cell coverage, what is the distance between the centers of two nearest co channel cells for seven cell reuse? For four cell reuse? [16]
7. (a) Explain intersystem handoff?
- (b) Classify different handoff mechanisms and define each techniques? [6+10]
8. (a) Briefly explain the diversity in operational techniques.
- (b) Explain the different co phase techniques. [9+7]
