

IV B.Tech II Semester Regular Examinations, Apr/May 2008
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 limitations of conventional mobile system? How are they overcome by cellular system?
(b) Briefly explain the cell shape and handoff? [8+8]
2. (a) Derive the C/I in an omni directional antenna system?
(b) What is cell splitting and explain the two kinds of cell splitting techniques? [10+6]
3. (a) A base station receiver capable of providing 80db of isolation between channels is receiving a signal from a mobile unit 2 Km away. What is the minimum distance that a second mobile unit can transmit the signal from the near end mobile unit.
(b) Write a brief note on designing directional antenna system considering the effect of interference. [8+8]
4. (a) Briefly explain the factors considered for prediction of path loss for a particular mobile radio environment.
(b) Explain how antenna spacing and height are done at base station. [8+8]
5. (a) Explain in detail importance of consideration of cell site antennas?
(b) Assume a receiver is located 10Km from a 50W transmitter. The carrier frequency is 6GHz and free space propagation is assumed $G_t = 1$ and $G_r = 1W$.
 - 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. [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?
- (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. Propose a channel assignment strategy for a uniform distribution of user throughout 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) How do you find the values of δ and μ related to the cell?
- (b) How do you reduce the dropped call rate and explain? [8+8]
8. (a) Explain how by increasing the transmitted power, the coverage is increased.
- (b) Discuss the methods for reducing the interference in cellular system. [8+8]

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1. (a) Differentiate the generations in the cordless phones and cellular phones?
(b) Explain about the dynamic channel assignment? [10+6]
2. (a) Draw the general view of telecommunication and explain the function of the each unit?
(b) Distinguish between the permanent splitting and dynamic splitting? [8+8]
3. (a) Define co channel interference How is it measured at the mobile unit?
(b) Describe the effect of antenna parameters on the cell interferes? [8+8]
4. (a) Discuss about the multi path propagation present the associated losses and place the problem?
(b) Discuss about the point to point and area to area prediction model for cell coverage? [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) How do you find the values of δ and μ related to the cell?
(b) How do you reduce the dropped call rate and explain? [8+8]
8. What do you mean by operational techniques? Why are these needed in cellular systems? Explain briefly different operational techniques. [16]

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1. (a) Explain about the NMT and NTT systems?
(b) Explain the necessity of cellular concept? [8+8]
2. (a) Design the C/I formula from a normal case in omni directional antenna system?
(b) Explain two kinds of cell splitting techniques with neat sketches? [8+8]
3. Explain the designing of the directional antenna under the practical case conditions for $K = 4$, $K = 12$ and $K = 7$ with all the suitable values and explaining each of them? [16]
4. (a) Write short notes on mobile to mobile propagation?
(b) State the merit of point to point model and give general formula of Lee point to point model? [8+8]
5. (a) Obtain the free space path loss formula from the transmitting antenna end?
(b) Obtain the free space path loss formula from the receiving antenna end?[8+8]
6. Present the frequency management of cellular systems for efficient spectrum utilization and increases the number of channels? [16]
7. (a) What are the advantages and disadvantages of CDMA for cellular network in system?
(b) Explain the difference between the soft handoff and hard handoff? [8+8]
8. Compare the capacity improvement in 120 degree and 60 degree sectoring. [16]

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1. (a) Explain about the Japanese mobile telephone service network configuration?
(b) Explain the Handoff mechanisms in mobile systems? [8+8]
2. (a) Differentiate the analytical situation and simulation?
(b) During a busy hour the number of calls per hour Q_i for each of 10 cells is 2000,1500,3000,500,1000,1200,1800,2500,2800 and 900 Assume that 60% of the car phones will be used during the busy period and that one call is made per phone Find out the total number of customers in the system? [10+6]
3. (a) Prove that for hexagonal geometry the co channel reuse ratio is given by $Q = \sqrt{3N}$ Where $N = i^2 + ij + j^2$.
(b) Explain the co channel interference are from the mobile receivers based on test? [8+8]
4. (a) From the signal coverage point of you explain ground incident angle, elevation angle, ground reflection and reflection point?
(b) If $h_1 = 50\text{m}$, $h_2 = 3\text{m}$, $d = 5\text{Km}$, $H = 100\text{m}$ use approximate method find incident angle, elevation angle, ground reflection and reflection point? [8+8]
5. (a) Describe the effects of the cell site antenna heights and signal coverage cells?
(b) Define the following concern to the antennas
 - i. ERP
 - ii. Equivalent aperture
 - iii. Null free pattern
 - iv. 120° Sector cell.[6+10]
6. (a) What are the different techniques to utilize the frequency spectrum with brief explanation?
(b) Write the concept of the self location scheme at the mobile unit and the autonomous registration? [8+8]
7. (a) Explain intersystem handoff?
(b) Classify different handoff mechanisms and define each techniques? [6+10]

8. What do you mean by operational techniques? Why are these needed in cellular systems? Explain briefly different operational techniques. [16]

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