

**IV B.Tech. II Semester Supplementary Examinations, July -2005**  
**CELLULAR & MOBILE COMMUNICATIONS**  
( Common to Electronics & Communication Engineering, Information  
Technology and Electronics & Computer Engineering)  
**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Distinguish between the landline telephone network and cellular telephone network?  
(b) Explain the phenomena of severe fading?
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?
3. Briefly explain the interference of cellular mobile transmitter by UHF TV receiver.
4. (a) From the free space propagation model derive the equation for received power?  
(b) If a transmitter produces 50W of power express the transmitter power in units of
  - i. dBm
  - ii. dBW . If 50W is applied to a unity gain antenna with a 900MHz carrier frequency . Find the received in dBm at a free space distance of 100m from the antenna . What is  $P_r$  (10Km) ? Assume unity for the receiver antenna?
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. Explain the following in detail concern to the mobile system
  - (a) Setup channel
  - (b) Accesses channel
  - (c) Paging channel
  - (d) Voice channel.

7. (a) How do you find the values of  $\delta$  and  $\mu$  related to the cell?  
(b) How do you reduce the dropped call rate and explain?
8. Explain the following terms under operational techniques:
  - (a) Small cells
  - (b) Narrow beam concept.

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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?
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?
3. Explain in detail about the real time co-channel interference measurement at mobile radio receiver.
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.
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?
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?
7. (a) Discuss the methods of queuing of hand offs.  
(b) Derive the blocking probability for hand off calls and the blocking probability of originating calls.
8. (a) What is coverage hole? How is it filled?  
(b) Explain the sectorised cells under operational conditions?

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1. (a) How spectrum is utilized efficiently in mobile system explain each in detail with the suitable example?  
(b) What do you mean by in efficient spectrum utilization?
2. (a) Explain about the general description of the system?  
(b) Explain about the maximum number of calls per hour per cell?
3. Explain the design aspects of omni-directional antenna system in co-channel interference reduction.
4. (a) Explain the mobile radio propagation effects based on signal strength and fading?  
(b) If  $f_c = 900\text{MHz}$ ,  $h_t = 40\text{m}$ ,  $h_r = 5\text{m}$  and  $d = 10\text{Km}$  Estimate the path loss medium size city?
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  $G_r = 1\text{W}$ .
  - 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. (a) Explain the concept the dynamic channel assignment in detail?  
(b) Describe the non fixed channel assignment algorithms?
7. Explain how  $\delta$  and  $\mu$ . are improved due to the natural two-site diversity in the hand off region.
8. (a) Discuss the various vehicle locating methods at the cell site.  
(b) Discuss how antenna mountings used on the mobile units affect system performance.

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1. (a) Explain the digital cellular system with TACS  
(b) Compare and explain the advantages of cellular phones over cordless phones.
2. (a) Explain the general description of the in mobile environment?  
(b) If the maximum calls per hour  $Q_i$  in one cell be 3000 and an average calling time  $T$  be 1.76min. The blocking probability is 2% Find out the offered load  $A$ . For the above  $Q_i$  is 28000 what is the offered load and find the required channels to the above . Finally compare the two systems (use Erlang B model).
3. (a) Explain the effect of umbrella pattern antennas?  
(b) Write and explain the benefit of the umbrella pattern antennas in mobile systems?
4. (a) Explain about the point to point prediction model?  
(b) Describe the point to point transmission between two fixed stations?
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?
6. (a) Describe the grouping of the voice, setup and paging channels?  
(b) Present the reuse partition scheme in overlaid cell system Mention the advantages associated with it?
7. (a) Discuss the parameters for handling hand offs.  
(b) How hand offs are initiated? Explain with examples.
8. Explain the micro cell concept in cellular system.

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