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**Second Semester M.Tech. Degree Examination, June/July 2013**  
**Wireless and Mobile Networks**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. With respect to wireless communication system define the following: i) Base station  
ii) Forward channel iii) Reverse channel iv) Page v) Handoff. (10 Marks)
- b. Write the timing diagram and explain how a call initiated by a mobile is established. (10 Marks)
- 2 a. Explain in detail second generation (2G) cellular networks. (12 Marks)
- b. With a block diagram explain overview and evolution of IEEE 802.11 wireless LAN standard. (08 Marks)
- 3 a. Prove that for a hexagonal geometry the co-channel re use ratio is given by,  $Q = \sqrt{3N}$  where cluster size  $N = i^2 + ij + j^2$ . (10 Marks)
- b. For cluster size of  $N = 7$ , considering only first tier of co-channel cells derive an expression for signal to interference ratio  $(S/I)$  for the worst case using approximate geometry and hence show that  $S/I$  ratio is approximately 17 dB for the worst case assuming a value of path loss exponent  $n = 4$ . (10 Marks)
- 4 a. If a transmitter produces 50 W of power, express the transmit power in units of i) dBm and ii) dBW. If 50 W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from the antenna. What is  $P_r$  (10 km)? Assume unity gain for the receiver antenna. (10 Marks)
- b. What is Brewster angle? Explain. Calculate the Brewster angle for a wave impinging on ground having a permittivity of  $\epsilon_r = 4$ . (10 Marks)
- 5 a. Distinguish between frequency modulation and amplitude modulation. (08 Marks)
- b. What is angle modulation? Explain. (06 Marks)
- c. If the SNR of a wireless communication link is 20 dB and the RF bandwidth is 30 kHz, determine the maximum theoretical datarate that can be transmitted using Shannon's channel capacity. (06 Marks)
- 6 a. Write the block diagrams of DPSK transmitter and receiver. (08 Marks)
- b. What FDMA? Explain the features of FDMA. (08 Marks)
- c. If a US AMPS cellular operator is allocated 12.5 MHz for each simplex band and if  $B_t$  is 12.5 MHz,  $B_{guard}$  is 10 KHz, and  $B_c$  is 30 KHz, find the number of channels available in an FDMA system. (04 Marks)
- 7 a. Explain the features of CDMA. (06 Marks)
- b. Distinguish between pure ALOHA and slotted ALOHA. (08 Marks)
- c. Discuss the development of wireless networks (first, second and third generation). (06 Marks)
- 8 Write short note on:
  - a. Differences between wireless and fixed telephone networks.
  - b. Capacity of space division multiple access.
  - c. QPSK.
  - d. MSK. (20 Marks)

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