Second Semester Examination 2013
WIRELESS COMMUNICATION
Time: 3 Hours
Max Marks: 70

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions: (2 x 10)
a) What are the limitations of conventional mobile telephone system?
b) Define Dwell time and Brewster angle.
c) Mention the basic propagation mechanisms, which impact propagation in mobile communication.
d) What are main subsystems of GSM architecture?
e) If a cellular operator is allocated 12.5 MHz for each simple's band and if bandwidth is 12.5 MHz, guardband is 10 KHz and B_c = 10kHz find the number of channel available in an FDMA system.
f) What is bluetooth?
g) Explain why a hexagon has been chosen to represent a cell in cellular layouts, even though most of the cells are not hexagonal in shape?
h) Why zero forcing equalizer is not used for wireless link?
i) Define and explain the importance of the frequency reuse distance.
j) What are the causes of fast and slow fading?

Q2   a) The transmitter and receiver are at a height of 15 m and are separated from   (5)
each other by 500 m. If λ = 0.25 m at 900 MHz, then (i) calculate radius of first Fresnel zone, (ii) calculate the effective height of the transmitter and receiver in order to have the approximate equivalence of free space propagation.

     b) What are the causes of co-channel interference in cellular mobile   (5)
communication? Why is this effect the most predominant in cellular communication? What are the limitations caused by this interference in cellular communications?

Q3   a) If a signal to interference ratio of 15 dB is required for satisfactory forward   (5)
channel performance of a cellular system, what is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is (i) 3 , (ii) 4. Assume that there are six co-channel cells in the first tier and all of them are there at the same distance from the mobile.

     b) Give the comparison between fixed channel allocation and dynamic   (5)
channel allocation.

Q4   A receiver in an urban cellular radio system detects a 1 mW signal at d =   (10)
d_0 = 1 meter from the transmitter. In order to mitigate co-channel interference effects, it is required that the signal received at any base station receiver from another base station transmitter which operates with the same channel must be below −100 dBm. A measurement team has determined that the average path loss exponent in the system is n = 3.

Determine the major radius of each cell if a seven-cell reuse pattern is used. What is the major radius if a four cell reuse pattern is used?

Q5 a) How is subscriber authentication and data encryption done in GSM? (5)
Briefly describe the physical factors in the radio propagation channel influence small scale fading.

   b) Compare the complexity of DECT with GSM. (5)

Q6 a) What are the factors to be considered while splitting a cell? What are its (4) disadvantages?

   b) Determine the proper spatial sampling interval required to make small scale (6) propagation measurements which assume that consecutive samples are highly correlated in time. How many samples will be required over 10 m travel distance if f_c = 1900 MHz and v = 50 m/s. How long would it take to make these measurements, assuming they could be made in real time from a moving vehicle? What is the Doppler spread B_D for the channel?

Q7 a) Explain what is meant by diversity reception? What are the different types? (7) What are its advantages in cellular communication?

   b) What role does "SECTORIZATION" of a cell area have on the performance (3) of a cellular system? Explain what is sectorization?

Q8   Write short notes on any two of the followings. (5 x 2)
   a) LPC vocoder
   b) PRMA
   c) PACS
   d) RAKE receiver