BITS Pilani, Dubai Campus
B.E. Fourth Year, First Semester, 2012-2013
Comprehensive Examination
EA C452 MOBILE TELECOMMUNICATION NETWORKS

Duration: 3 hours Max. Marks: 40 Weightage: 40%

Answer all questions. Appropriate assumptions may be made, where necessary.

1. Name and define the basic propagation mechanisms which impact mobile communication. (2)

2. What is a SIM and what does it store? (1)

3. Assuming low grazing angles and a conductive Earth, derive a model for unobstructed terrestrial propagation. (6)

4. Define small-scale fading. With reference to small-scale fading, define the terms *Doppler spread* and *coherence time*. Distinguish between fast fading and slow fading based on the above parameters. (3)

5. What is meant by channel equalization? Explain the principle of operation of a transversal filter equalizer with the help of a block diagram. (5)

6. If a normal GSM time slot consists of 6 trailing bits, 8.25 guard bits, 26 training bits, and two traffic bursts of 58 bits of data, find the frame efficiency. (4)

7. Prove, quantitatively, that TDMA is inherently superior to FDMA from a message-delay point of view. (5)

8. Discuss PACS architecture and its different features. (5)

9. Write brief notes on the following: (a) Wireless LAN standards; (b) Frequency reuse in cellular communication; (c) Third generation wireless communication networks. (9)

--- Paper ends ---

BITS Pilani, Dubai Campus
B.E. Fourth Year, First Semester, 2012-2013
Test 2 (Open Book)
EA C452 MOBILE TELECOMMUNICATION NETWORKS

Duration: 50 min Max. Marks: 20 Weightage: 20%

Answer all questions. Appropriate assumptions may be made, where necessary.

1. What are the disadvantages of cellular systems with small cells? (1)
2. Why is 800 MHz frequency selected for mobile communication? (2)
3. Name the different analog systems that were available in 1G. (1)
4. What is companding and why and where is it used for speech signals? (2)
5. Name the different digital cellular systems available in 2G. (1)
6. Explain the nature of the equalizer used to combat ISI. (2)
7. What are the main subsystems of GSM architecture? (1)
8. Suppose that the probability of a bit error is 10^{-3}. What is the probability of a single error in any of the positions for an eight-bit word? Repeat for double error. (2)
9. How was adjacent-channel interference avoided in FDMA? What was the resulting "overhead"? (2)
10. Discuss the ability of a Bluetooth link to contend with interference from a microwave oven. (3)
11. Explain briefly, with neat diagrams, how routing in a mobile ad-hoc network is different from traditional routing in a fixed network. (3)

--- Paper ends ---

BITS Pilani, Dubai Campus

BE (Hons.) Fourth Year, First Semester, 2012-2013

Test 1

EA C452 Mobile Telecommunication Networks (Elective)

Duration: 50 min Max. Marks: 25 Weightage: 25%

Answer all questions. All questions carry equal marks.

1. A transmitter radiates 50 W through an antenna with a gain of 12 dB. Find the EIRP in watts. (2 marks)
2. Define the term cluster as applied to cellular communication. Expand the acronym MSC and list the functions of an MSC. (3 marks)
3. Sketch, in a single plot, the typical BER versus SNR curves for: (a) Gaussian channel (no fading); (b)Flat-fading channel; (c) Frequency-selective channel (with equalization); and (d) Frequency-selective channel (no equalization). (4 marks)
4. In the reception of multipath signals, the normalized delay spread D is indicative of the nature of the channel. Discuss the nature of the channel for which (a) $D << 1$; (b) D approaches or exceeds unity. (4 marks)
5. Discuss, with appropriate diagrams, the Lee model for path loss prediction including the effect of non-flat terrain. (5 marks)
6. Consider a simple model for a multipath communication channel described by $y(t) = x(t) + \alpha x(t - \tau)$, where $x(t)$ and $y(t)$ are the input and output of the channel and τ is the path delay. The channel-induced distortion is compensated for by an N-tap tapped delay-line equalization filter at the receiver. Find the values for the filter taps assuming that $\tau = T$ (the clock cycle period) and $\alpha << 1$. (6 marks)

*** *Paper ends* ***

GOOD LUCK!

BITS Pilani, Dubai Campus
Dubai International Academic City

First Semester, 2012-2013
B.E. (Microelectronics) Second Year
Quiz 1 (Closed Book)
EA C452 MOBILE TELECOMMUNICATION NETWORKS

Duration: 20 min Max. Marks: 8 Weightage: 8%

Name: _____ **ID No.:** _____

Answer all questions in the space provided against each question.

1. Draw the waveforms representing the bit pattern 10110010 in each of the following line-code formats: (a) Unipolar RZ (25% duty cycle), and (b) Alternate mark inversion. For each format, indicate the relative advantages and disadvantages, if any, of the code.(2 marks)

2. Expand and define EIRP. (1 mark)

3. What are the standard conditions for the transmitting (base station) and receiving (mobile unit) antenna heights for the Lee model for the mobile propagation environment? (1 mark)

4. If the carrier frequency is 850 MHz, the receiver velocity is 70 mph, and the angle of the received wave is 10°, find the Doppler shift. (2 marks)

5. If we require a frequency reuse ratio of at least $Q = 4.0$, find the minimum cluster size. (2 marks)