BITS, PILANI – DUBAI
Academic City, Dubai

Semester II   2007 – 2008
IV Year (EEE/EIE)-Elective

Comprehensive Examination (Closed Book)

Course No.: EA UC452   Course Title: Mobile Telecommunication Networks

Date: 28.05.2008   Time: 03 Hours   M.M. = 40 (40 %)

- *Attempt all question in serial order, marks will be deducted in case of violation.*
- *Assume suitable data/assumptions, if needed. Also write the formula used, if any.*

Q1   Write the full form of the following with respect to wireless communications:
a. AC   b. BIU   c. CW   d. dBi   e. HAAT
f. HSCSD   g. LCR   h. MAC   [8]

Q2   What is application of ERLANG B? What are the basic assumptions on which ERLANG B model is based?   [4]

Q3   If a wireless link provides an SNR of 20dB to the receiver antenna input terminals, and the receiver is specified to have a noise figure of 6db, what is the SNR at the detector output stage of the receiver?   [4]

Q4   Illustrate with the help of figure and discuss a complete handoff scenario at cell boundary.
                                                                                [4]

Q5. Write a technical Note on Radar Cross section Model for Scattering in Mobile Systems giving all mathematical details.   [4]

If a transmitter produces 50W of power, express the transmit power in units of dBm and dBW. If 50W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the receive power in dBm at a free space distance of 1 Km from the antenna. Assume suitable assumption, if needed.   [4]

Q7   Discuss fading effects due to Multipath Time delay spread experienced by a signal propagating through a mobile radio channel.   [4]

[A] Discuss frame structure of GSM.   [4]

[B] Define the following:
       TDMA, FDMA & CDMA   [4]

Course No.: EA UC 452   Course Title: Mobile Telecommunication Networks

Date: 11.05.2008   Time: 50Minutes   **M.M. = 20** (20 %)

- *Attempt all Questions, maintain the serial order.*
- *Assume missing data, if any.*
- *Illustrate with the help of figures wherever necessary.*
- *Only Text Book and Class notes are allowed in original.*

Q1 Consider a binary data stream m(t) in the form of a square wave with amplitudes +1 and -1, centered on the origin. Determine the spectrum of the BPSK signal obtained by multiplying m(t) by a sinusoidal carrier whose frequency is ten times that of the fundamental frequency of the square wave.   [5]

Design an RLC network that implements an IF quadrature FM detector with fc = 10.7MHz and a 500 kHz symmetrical band pass spectrum. [5]

Q3 What do you mean by Receiver Sensitivity? On what factors it depends?
A commercial mobile receiver for data transmission may be specified with a sensitivity of -90dBm. Assuming a 100 mW transmitter and free space path loss between the transmitting and receiving isotropic antennas, what is the radius of the service area of this transmitter at a transmission frequency of 800 MHz? What is the conclusion drawn from the result?

[5]

Write a technical note on the signal processing in GSM.   [5]

Course No.: EA UC 452   Course Title: Mobile telecommunication Networks

Date: 30.03.2008   Time: 50Minutes   ·   **M.M. = 25** (25 %)

- *Attempt all Questions, maintain the serial order.*
  Assume missing data, if any.

Q1   Write a technical note on OKUMURA Model for signal prediction in urban areas.

Q2   Find the median path loss using Okumura's model for d=50km, h_{te} = 100 m, h_{re} = 10 m in a suburban area environment. If the base station transmitter radiates an EIRP of 1 kW at a carrier frequency of 1000 MHz, find the power at the receiver, assuming unity gain antenna. Take Amu at 1000 MHz as 40 dB and Garea = 10 dB.   [06]

Q3.   Show that if medium 1 is free space and medium 2 is a dielectric, both reflection coefficients (parallel and perpendicular cases) approaches unity, as angle of incidence approaches zero regardless of relative permittivity.   [06]

Q4.   Write the full form wrt Mobile Communications: [4]

1. AAL   2. CSD   3. LAR   4. JTC   5. MAHO

6. PABX   7. GOS   8. GPRS

Q5.   Draw the timing diagram illustrating how a call to a mobile user initiated by a landline subscriber is established and vice versa.   [4]