

BITS, PILANI – DUBAI CAMPUS
Knowledge Village, Dubai

Semester II 2006 – 2007
IV Year (EEE/EIE)-Elective

Comprehensive Examination (Closed Book)

Course No.: EA UC452

Course Title: Mobile Telecommunication Networks

Date: 23.05.2007

Time: 03 Hours

M.M. = 40 (40 %)

- *Attempt all question in serial order.*
- *Assume suitable data/assumptions, if needed.*

- Q.1 Write the full form of the following with reference to Mobile Communications:
1. 3GPP 2. ACA 3. CDVCC 4. IMTS 5. VAD
[5]
- Q.2 Write in tabular form the Key specifications of leading 2G technologies.
[5]
- Q.3 Illustrate with the help of figure only, a complete handoff scenario at cell boundary.
[5]
- Q.4 Consider the figure 1. Assume each base station uses 60 channels, regardless of cell size. If each original cell has a radius of 1 km and each micro cell has a radius of 0.5 km, find the number of channels contained in a 3 km by 3 km square centered around 'A' under the following conditions:
1. without the use of micro cells
2. When the lettered micro cells as shown in fig are used
Assume cells on the edge of the square to be contained within the square.
[5]
- Q.5 Draw the frame structure of GSM. Figure only with proper markings.
[5]
- Q.6 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]
- Q.7 Design an RLC network that implements an IF quadrature FM detector with $f_c = 10.7\text{MHz}$ and a 500 kHz symmetrical band pass spectrum.
[5]
- Q.8 Write technical note on any two of the following:
1. Bluetooth Technology
2. CDMA
3. Channel Equalization
4. Channel Coding
[5]

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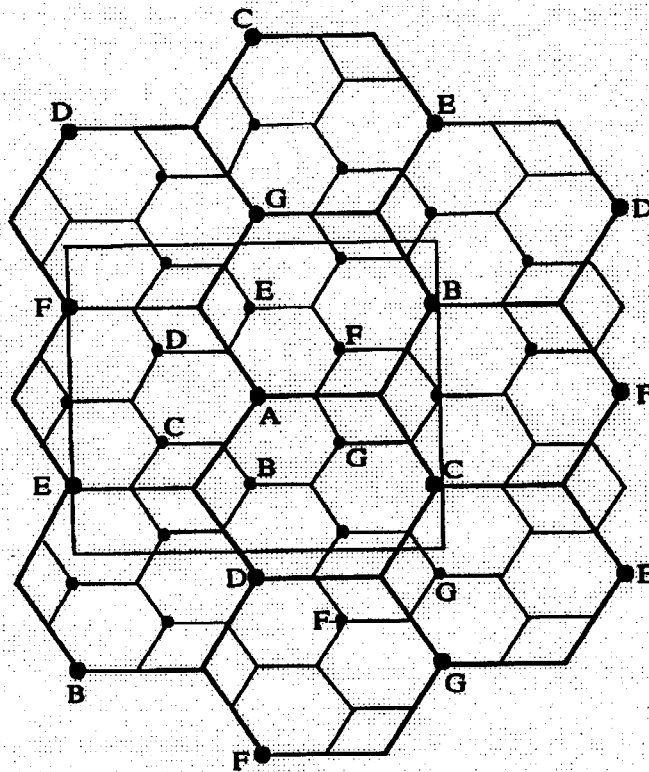


Figure 1

BITS, PILANI – DUBAI CAMPUS
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Test -2(Closed Book)

Course No.: EA UC 452

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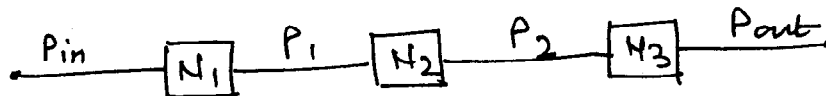
Date: 03.05.2007

Time: 50Minutes

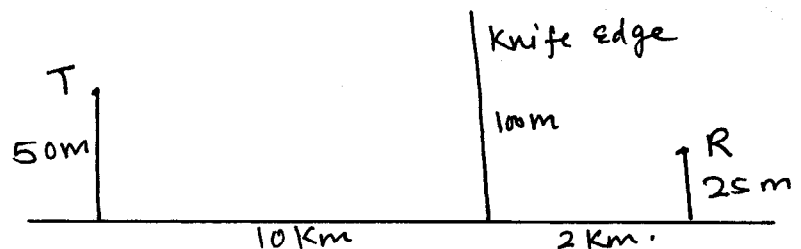
M.M. = 20 (20 %)

Attempt all questions, maintain the Serial Order.

- Q1. Determine a formula for the overall gain of the three cascaded networks shown below as a ratio and in dB. [3]



- Q2. Determine the modulation index for an amplitude modulator when a carrier frequency having peak amplitude of 2V is modulated with a modulating frequency having peak amplitude of 1.5 V. [4]
- Q3. How much bandwidth is required for an analog signal (frequency modulated) that has an audio BW of 5 kHz and a modulation index of 3. How much output SNR improvement would be obtained if the modulation index is increased to 5? What is the tradeoff bandwidth for this improvement? [5]
- Q4. Given the following geometry, determine the loss due to knife edge diffraction and the height of the obstacle required to include 6 dB diffraction losses. Assume $f = 900$ MHz. [3]



- Q5. If a normal GSM time slot consists of six trailing bits, 8.25 guard bits, 26 training bits and two traffic bursts of 58 bits of data, find the frame efficiency. [2]
- Q6. Write a technical note on HATA Model for outdoor propagation. [3]

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Semester II 2006 – 2007
IV Year (EEE)-Elective

Test -1 (Closed Book)

Course No.: EA UC 452

Course Title: Mobile telecommunication Networks

Date: 18.03.2007

Time: 50Minutes

M.M. = 20 (20 %)

Attempt all questions, maintain the Serial Order.

Q.1. Write the full form of the following abbreviation related to Wireless/Mobile communication:

a) POCSAG (b) ESN (c) PCN/PCS (d) ITU-R (e) CDMA/FDD

[5]

Q.2. Define the following:

[5]

- Simulcasting with reference to paging systems
- Frequency Planning
- Handoff & handoff Strategies
- Co Channel Interference
- Trunking & Grade of Service

Q.3. A hexagonal cell within a 40cell system has a radius of 1.387 km. A total of 60 channels re used within the entire system. If the load per user is 0.029 Erlangs and $\lambda = 1$ call/hour, compute the following for an Erlang C system that has a 5% probability of a delayed call:

a) How many users / km² will this system support? (Take traffic intensity as given data as 9 Erlangs)

(b) What is the probability that a delayed call will have will have to wait for more than 10 Sec?

(c) What is the probability that a call will be delayed for more than 10 Sec?

[6]

Q.4. If a transmitter produces 50 W of power, express the transmit power in units of dBm and dBW. If 50 W is applied to a unity gain antenna with a 900MHz carrier frequency, find the received power in dBm at free space distance of 1000 m from the antenna. What is Pr (10,000m)?

[4]