



JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), Nov-Dec 2016
B. Tech. in Electronics & Comm. Engineering, Semester - VII

ECE702: WIRELESS COMMUNICATION

Roll No.....
Time: 3 hours Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	Larger cells are more useful in -----. (a) Densely populated urban area (c) rural areas (b) lightly populated urban areas (d) mountainous area	
ii.	A large value of handoff margin leads to (a) Unnecessary handoff (c) insufficient times to complete the handoff (b) lightly loaded BSCs (d) None of the above	
iii.	An antenna with unity gain & 1 m largest dimension is operating at 900MHz. Then the Fraunhofer distance will be -----. (a) 12 m (b) 18m (c) 6 m (d) 4m	
iv.	In a flat fading channel (a) BW of signal > BW of channel (c) Delay spread > Symbol Period (b) BW of signal < BW of channel (d) Delay spread = Symbol period	
v.	It is customary to define GMSK by its BT product. As the BT product is decreased the side lobe levels (a) falls off (b) increases (c) initially decreases but then it increases (d) remains unaffected	
vi.	Rake Receiver is an application of ----- diversity technique. (a) Frequency diversity (b) Time diversity (c) Space diversity (d) polarization diversity	
vii.	In a typical mobile communication system, 416 channels are allocated to various cellular operators. The channels are of 30 KHz with guard band of 10 KHz. Then the spectrum allocated to each operator will be -----. (a) 24 MHz (b) 12.5 MHz (c) 22.5 MHz (d) 8.5 MHz	

viii.	The multiple access techniques used in Wireless LAN are (a) Contention based (b) Contention Free (c) both a & b (d) none of the above	
ix.	A GSM super frame consists of (a) 51 multi frame (b) 26 multi frames (c) 25 (d) 8 multi frames	
x.	For a 0.3 GMSK with RF data rate of 270.833 kbps the maximum rms delay spread for which no equalizer is required will be _____. (a) 4.5 μ s (b) 1.23 μ s (c) 0.6 μ s (d) 1.65 μ s	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	State the differences between FCA & DCA with respect to at least four different attributes.	
ii.	Theoretically cell shape is considered to be hexagonal. Why?	
iii.	A mobile receiver is tuned to a transmission of 800 MHz and receives signal with Doppler Frequencies ranging from 10 Hz to 50 Hz when moving at a speed of 80 km/h. Calculate the beam width of the mobile antenna?	
iv.	What is indoor propagation model? How it is different from large propagation model? Specify the path-loss equation for any indoor model.	

Q.3A	An Indoor Wireless LAN is operating at 5 GHz in a cell radius of 10m using omni-directional antenna. In order to ensure a received power of 10 μ w by all terminals within the cell, calculate the required transmit power under free space path loss model. Determine the path loss of such environment in dBm. (Assume unity gain antennas).	05
Q.3B	The minimum S/I requirement of a cellular system is 18 dB. Calculate the worst case signal to co-channel interference ratio for cluster size of 7 and path loss exponent of 4. As a service provider, will you prefer the existing architecture or modify it. Make comment with full justification.	05

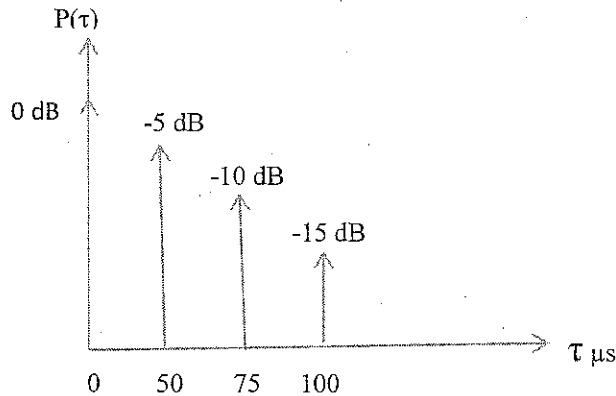
Q.4A	Describe in brief the different multiple Access techniques and suitably compare them.	05
Q.4B	How the access mechanism is implemented in Wireless LAN. Through a timing diagram briefly explain it.	05

Q.5A	What is an adaptive equalizer? Show that the equalizer acts as an inverse filter.	05
Q.5B	What is RAKE Receiver? Briefly explain its principle through a suitable block diagram.	05

Q.6A	State the fundamental difference between large and small scale fading. Mention the different factors that influence the small scale fading.	05
Q.6B	Approximately how large can the rms delay spread be in order for a binary modulated signal with a bit rate of 25 kbps to operate without an equalizer? What about an 8-PSK system with a bit rate of 75 kbps?	05

OR

- Q.6B For the following power delay profile, determine the mean access delay, rms delay spread. Now if a particular modulation provides suitable BER performance whenever, $\frac{\sigma_\tau}{T_s} \leq \frac{1}{10}$, determine the smallest symbol period T_s that may be sent through RF channel without using equalizer. (Refer Fig. X)



(Fig. X- Power delay profile - for Q.No.6B)

- Q.7A State the advantages of $\pi/4$ QPSK modulation. Draw the block diagram of a typical $\pi/4$ -QPSK receiver and explain in brief. 05
- Q.7B State the advantage of GMSK modulation over MSK. Draw the typical block diagram of a MSK transmitter and explain in brief. 05

OR

- Q.7B Outline the essential components of GSM system. Draw the frame structure and label it properly. 05

- Q.8A Define all channel parameters which are used to characterize the small scale fading channel. How they are related to each other? Explain how these parameters are used to classify the fading channels. 10

- Q.9A State the purpose of any diversity techniques. Explain in brief the various diversity techniques used in wireless communication systems. Explain and compare the various combining techniques in detail. 10

- Q.9B A cellular system operates at a carrier frequency of 1800 MHz. It uses the Base Station & Mobile Station transmitters with a height of 120 m & 8 m respectively. Find the median path loss using Okumura's model for a distance of 20 km in a suburban environment. If the base station transmitter radiates an EIRP of 1 kW, find the power at the receiver. If environment is changed to quasi-open area, find the distance at which same power will be received. (Assume a unity gain receiving antenna). (Refer the following Okumura Curves given as Fig. Y) 10

OR

- Q.9B What is spread spectrum modulation techniques? Classify all the spread spectrum modulation techniques and briefly explain the principle of each 10

technique. Draw the block diagrams of the transmitters and receivers of any one of the spread spectrum modulation techniques and explain them in detail. .

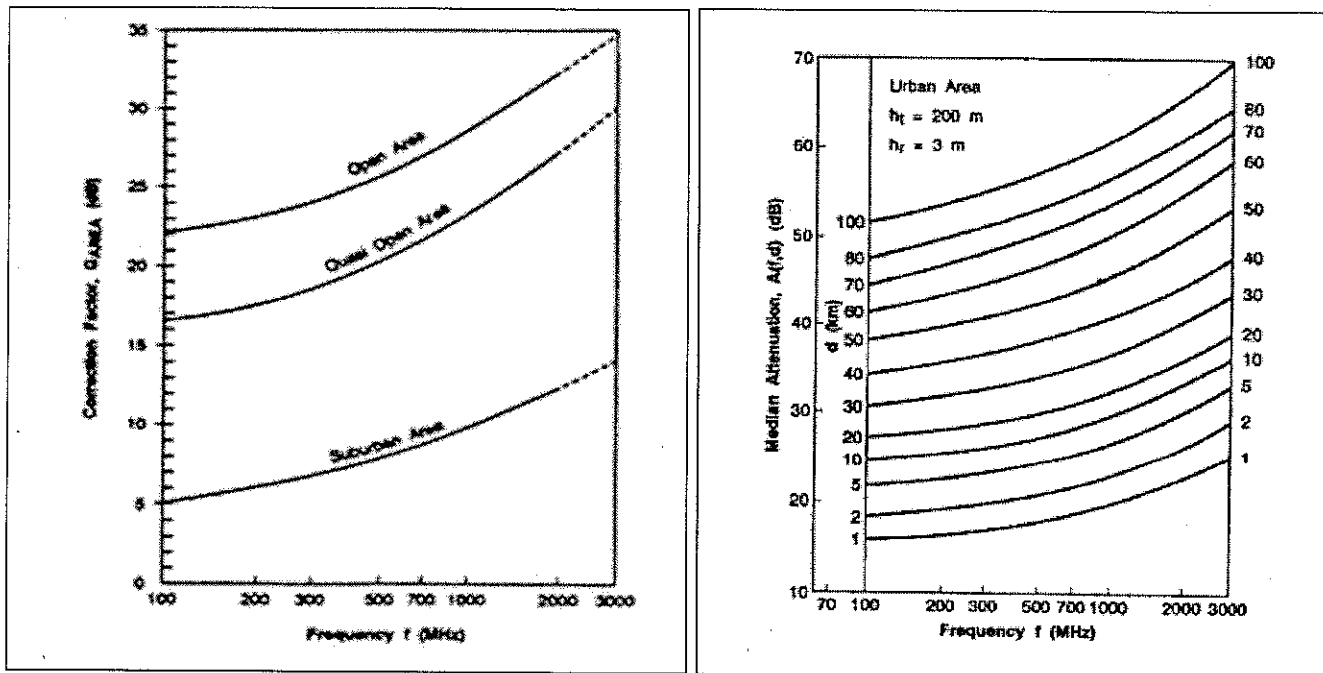


Fig.Y- Okumura Curves (for Q. No. 9(B))

-----Best of Luck-----