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**Question Paper Code: 71747**

B.E./B.Tech. DEGREE EXAMINATION, APRIL / MAY 2017

Eighth Semester

Electronics and Communication Engineering

EC 6801 – WIRELESS COMMUNICATION

(Regulations 2013)

Time: Three Hours

Maximum: 100 Marks

Answer All Questions

PART – A (10 X 2 = 20 Marks)

1. What are the major advantages of Wireless Communication?
2. Define Coherence time. In what way does this parameter decide the Behavior of wireless channels?
3. Why is cellular concept used for mobile telephony?
4. In a cellular network among a handoff call and a new call, which one is given Priority? Why?
5. What are the basic advantages of using multicarrier schemes such as OFDM?
6. State any two advantages of MSK?
7. Why is an adaptive equalizer required?
8. What is diversity? Why is it employed?
9. Define spatial multiplexing?
10. What is channel state information? What are its benefits?

PART – B (5 X 16 = 80 Marks)

11. a) i) If a transmitter produces 50W of power, which is applied to a unity gain antenna With a 900MHz carrier frequency, find the received power in dBm at a free space Distance of 100m from the antenna. What is received power at a distance of 10km? Assume unity gain for the Receiver antenna. (5)
- ii) Derive the path loss considering a Two Ray model for the propagation mechanism in a Wireless channel. Is considering just two rays alone sufficient? Why? (11)

(or)

b) i) Determine the proper spatial sampling interval required to make small-scale propagation Measurements which assume that consecutive samples are highly correlated in time. How Many samples will be required over 10m travel distance if  $f_c = 1900\text{Hz}$  and  $v = 50 \text{ m/s}$ . how Long would it take to make this measurement, assuming they could be made in real time from a moving vehicle? What is the Doppler spread  $B_D$  for the channel? (5)

ii) Describe in details, the parameter of mobile multipath channels with their Significance? (6)

iii) Compare fast fading and slow fading in practice fast fading only occurs for Very low data rate? Why? (5)

12. a) i) Describe channel assignment strategies and Handoff strategies? (10)

ii) If a total of 33MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 KHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cells if a system uses (1) four cell reuse (2) seven cell reuse and (3) twelve cell reuse. If 1 MHz of the allocated spectrums are dedicated to control channels, determine the equitable distribution of control channels and voice channels in each cell of and each of the three systems. (6)

(or)

b) i) Derive the expression for Cellular CDMA schemes for both noise limited and Interference limited scenarios? (10)

ii. Consider global system for mobile, which is a TDMA/FDD system that uses 25 MHz for the forward link which is broken into radio channels of 200 MHz if 8 speech signals are supported on a single radio channel and if no guard band is assumed find the number of simultaneous users that can be accommodated in GSM. (2)

iii. If GSM uses a frame structure where each frame consists of eight time slot, and each time slot contains 156.25 bits, and data is transmitted at 270.833 kbps in the channel, find (1) the time duration of a bit (2) the time duration of a slot (3) the time duration of a frame (4) how long must be a user occupying a single time slot wait between two successive transmission?

13. a) i) Why are constant envelope modulation scheme such as MSK and GMSK is used in Wireless Communication system? Compare and contrast between these two Modulations Techniques. (8)

ii) Describe OFDM scheme and state the reason behind cyclic prefix in OFDM scheme. What is PAPR? Why is it normally larger in a OFDM technique? (8)

(or)

- b) i) Discuss the error performance of different modulation schemes fading channels. (10)  
ii). what is offset QPSK? What is its advantages? Describe the offset QPSK scheme. (6)

14. a) i) Describe the role played by equalization and diversity as multipath mitigation Technique. Compare and contrast between these two techniques. (10)  
ii. Consider the design of the US digital cellular equalizer, where  $f = 900$  MHz and the mobile velocity  $v = 80$  km/hr, determine the maximum Doppler shift, the coherence time of the channel and the maximum number of channels that could be transmitted without updating the equalizer assuming that the symbol rate is 24.3 K symbols/rate. (6)

(or)

- b) i. Describe RAKE receiver. (6)  
ii. Derive the expression for performance improvement due to maximal ratio Combining. (10)

15. a) Discuss in details, the capacity in fading and non-fading channels. (16)

(or)

- b) i. Describe MIMO systems with emphasis on their requirement in a wireless communication Environment. (8)  
ii. Describe the concept of Pre-coding and beam forming technique. (8)