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Question Paper Code: 7006

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020

Seventh Semester

**Electronics and Communication Engineering
U15EC729 – WIRELESS COMMUNICATION
(Regulation 2015)**

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. Define Cell splitting.
2. What is meant by co-channel interference?
3. Define Brewster Angle.
4. Where do you use Longley-Rice Model?
5. List the most important effects in small scale multipath propagation.
6. Find the average fade duration for threshold levels $\rho = 0.1$ and $\rho = 1$, when the Doppler frequency is 200 Hz.
7. If GSM uses a frame structure where each frame consists of 8 time slots and each time slot contains 156.25 bits and data is transmitted at 270.833 kbps in the channel, find (a) the time duration of a bit (b) the time duration of a slot.
8. List packet radio protocols.
9. Illustrate the block diagram of AMPS modulation sub system.
10. What are the drawbacks in AMPS architecture?

PART – B

(5 x 13 = 65 Marks)

11. a) If a total of 33 MHz 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 cell if a system uses (a) 4-cell reuse (b) 7-cell reuse (c) 12-cell reuse. If 1 MHz of allocated spectrum is dedicated to control channels then how many voice channels available in each cell for each of the three systems.

(OR)

- b) What are the methods to improving Coverage and Capacity in Cellular systems? Explain.
12. a) A mobile is located 5 km away from a base station and uses a vertical $\lambda/4$ monopole antenna with a gain of 2.55 dB to receive cellular radio signals. The E-field at 1 km from the transmitter is measured to be 10^{-3} V/m. The carrier frequency used for this system is 900 MHz.
- Find the length and the gain of the receiving antenna.
 - Find the received power at the mobile using the 2-ray ground reflection model assuming the height of the transmitting antenna is 50 m and the receiving antenna is 1.5 m above ground.

(OR)

- b) Explain in detail about Outdoor Propagation models in Large scale fading?
13. a) Explain the impulse response model of a multipath channel.
- (OR)
- b) Classify the types of small scale fading and explain in detail.
14. a) i. Extend in detail about Space division multiple Access technique. (7)
- ii. Explain in detail about packet radio access techniques with neat diagram. (6)

(OR)

- b) i. Evaluate four different cellular radio standards and choose the one with the maximum radio capacity. (7)

System A : $B_c = 30$ kHz, $(C/I)_{\min} = 18$ dB

System A : $B_c = 30$ kHz, $(C/I)_{\min} = 14$ dB

System A : $B_c = 30$ kHz, $(C/I)_{\min} = 12$ dB

System A : $B_c = 30$ kHz, $(C/I)_{\min} = 9$ dB

- ii. If $w = 1.25$ MHz, $R = 9600$ bps and a min acceptable E_b / N_0 is found to be 10 dB, determine the maximum number of users that can be supported in a single-cell CDMA system using (a) omni-directional base station antennas and no voice activity detection and (b) 3-sectors at the base station and activity detection with $\alpha = 3 / 8$. Assume the system is interference limited. (6)

15. a) Define GSM Radio system. Also explain the two types of GSM Logical channel.

(OR)

- b) Identify the various components of PACS System Architecture in wireless systems.

PART-C

(1x15=15 marks)

- 16 a) 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 10 m travel distance if $f_c = 1900$ MHz and $v = 50$ m/s. How long would it take to make these measurements, assuming they could be made in real time from a moving vehicle? What is the Doppler spread B_D for the channel?

(OR)

- b) What mechanisms would cause breakdown in the reverse link of an IS-95 CDMA systems as the number of users in a sector approaches the theoretical limit?

