

B.Tech 7th Semester Exam., 2021

(New Course)

WIRELESS COMMUNICATION

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **EIGHT** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following
(any seven) : 2×7=14

- (a) What is wireless communication?
- (i) Sending data from one location to another with the use of physical medium
 - (ii) Sending data from one location to another without the use of physical medium
 - (iii) Sending data from one location to another without the use of virtual medium
 - (iv) None of the mentioned

(b) _____ is a transmission method used in MIMO wireless communications to transmit encoded data signals independently.

- (i) MU-MIMO
- (ii) STTD
- (iii) SM
- (iv) Collaborative uplink MIMO

(c) Which of the following types of transmission technique is employed by paging system?

- (i) Multicasting
- (ii) Unicasting
- (iii) Hybrid
- (iv) Simulcasting

(d) Which of the following is a CDMA standard of second-generation network?

- (i) ETACS
- (ii) EDGE
- (iii) IS-95
- (iv) IS-136

(e) Which of the following leads to the 3G evolution of GSM, IS-136 and PDC systems?

- (i) GPRS
- (ii) HSCSD
- (iii) W-CDMA
- (iv) EDGE

(f) Which of the following modulation schemes is used by Bluetooth?

- (i) GFSK
- (ii) DQPSK
- (iii) BPSK
- (iv) MSK

(g) Which of the following technologies distributes the coverage of the cell and extends the cell boundary to hard-to-reach places?

- (i) Sectoring
- (ii) Cell splitting
- (iii) Micro-cell zone concept
- (iv) Scattering

(h) Which of the following is not a multipath channel parameter that can be determined from power delay profile?

- (i) RMS delay spread
- (ii) Doppler spread
- (iii) Mean excess delay
- (iv) Excess delay spread

(i) Which of the following is not a technique for FM demodulation?

- (i) Phase locked discriminator
- (ii) Slope detection
- (iii) Zero crossing detection
- (iv) Product detector

(j) Which of the following standards had not adopted digital TDMA for high capacity?

- (i) PDC
- (ii) USDC
- (iii) IS-95
- (iv) GSM

2. Discuss the similarities and differences between a conventional cellular radio system and a space-based (satellite) cellular radio system. What are the advantages and disadvantages of each system? Which system could support a larger number of users for a given frequency allocation and why? How would this impact the cost of service for each subscriber? 14
3. Assume that a GSM, an IS-95, and a US digital cellular base station transmit the same power over the same distance. Which system will provide the best SNR at a mobile receiver? What is the SNR improvement over the other two systems? Assume a perfect receiver with only thermal noise present in each of the three systems. 14
4. Compare the number of omni-directional cells required to cover a 1000 sq. km area using GSM at 800 MHz and DCS-1900 at 1900 MHz. Assume the sensitivity of both the GSM and the DCS-1900 receivers equal -104 dBm. Assume equal transmitter power and antenna gains for the two systems frequency of the baseband. Gaussian, pulse-shaping filter used in the GSM system. 14

5. (a) What are different operations of mobile IP? Explain mobile IP-SIP in detail. State the entities and terminologies used in mobile IP along with tunneling and also explain the three types of encapsulation mechanisms used in mobile IP. What is triangular routing? 7
- (b) Consider a different way of looking at the orthogonality property of CDMA chip sequences. Each bit in a pair of sequences can match or not match. Express the orthogonality property in terms of matches and mismatches. 7
6. (a) With a neat diagram, explain the elements of the CDMA2000 packet core networks. 7
- (b) Is there a Data Channel associated with LTE or 4G voice calls? Explain briefly. Write the difference between 3G and 4G. How does 4G work? Explain with the help of a diagram. 7
7. (a) Differentiate between 3G and 4G networks. What is the data rate offered by 4G systems? Mention the challenges faced by 4G networks. What are the applications of 4G technology? 7
- (b) Discuss the design issue of the IEEE 802.11 and explain the working of BSS, DS and ESS networks. 7

8. What are different types of fading? What is the condition of fast fading? Explain the Rayleigh/Rician fading channels. Write the difference between mean and median of Rayleigh fading signal. Envelope of the sum of two quadrature Gaussian noise signals obeys which distribution? List out the necessary condition for optimal power allocation. What is the micro-diversity in wireless communication? 14

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