Q2 a. Draw the systematic diagram of a cellular system and explain the function of each section in the system.

Ans: Page No. 18-19, Fig. 1.19 of Textbook

b. Differentiate between a discrete random variable and a continuous random variable.

Ans: Page No. 30, Fig. 2.21 of Textbook

c. If a total of 33 MHz bandwidth is used for a particular cellular system which uses two 30 KHz simplex channels to provide full duplex voice channels, compute the number of simultaneous calls that can be supported per cell if the system uses:

(i) TDMA with 8 way time multiplexing
(ii) FDMA

Ans (i) TDMA

Each simplex channel is 30 KHz wide and has 8 time slots, one for each user.

No. of simultaneous calls that can be supported = $\frac{33 \times 10^6}{(2 \times 30 \times 10^3)} \times 8 = 4400$

(ii) $\frac{33 \times 10^6}{(30 \times 10^3)} = 550$

FDMA

(30 x 2) KHz is needed to provide full duplex voice channels.

550 simultaneous calls can be supported with FDMA schema.

Q3 a. What are the differences between intersymbol interference and co-channel interference? Explain with suitable diagrams.

Ans: Refer to Sec 3.13, Sec 7.23; Page No. 73, 75, 154, Fig. 7.18 of Textbook

b. A transmitter produces 50 W of power and is applied to a unity gain antenna. With 900 MHz Carrier frequency find the received power in milliwatts at a free space distance of 100 meters from the antenna. Assume unity gain for the receiver antenna and no loss in the system hardware.

Ans: Received power, $P_r = \frac{P_t G_t G_r \lambda^2}{(4\pi)^2 d^2}$

$= \frac{50 \times 1 \times (c/f)^2}{(4\pi)^2 (100)^2}$

$c = 3 \times 10^8$

f= 500 MHz

$P_r = 5{,}5 \times 10^{-3}$ mw.

c. Bring out the concept of an interleaver.

Ans: Sec 4.6, Page No. 90, 91 of Textbook

Q4 b. Explain the concept of CSMA/CA with ACK and CSMA/CA with RTS and CTS.

Ans: Section 6.3.5, Figure 6.14, 6.15, Pages 137-139 of Textbook

Q5 a. Explain the concept of TDMA with the help of the basic structure of a TDMA system.

Ans: **Section 7.2.2, Figure 7.5, 7.6, Page No. 146,147 of Textbook**

b. How many bits can be transmitted in one second using 16 QAM to transmit a binary sequence if the baud rate is 2400 Hz?

Ans: 16 QAM has 16 different values each encoding 4 bits

$2^4 = 16$

Bit rate = Baud rate x 4= 2400 x 4 = 9600bps

c. Discuss the concept of channel allocation for overlapped cells with suitable diagrams.

Ans: Section 8.6.3, Figure 8.5, 8.6; Page No. 179, 180 of Textbook

Q6 a. What are the parameters influencing handoff? Explain hard and soft handoff with schematic diagrams.

Ans: Section 9.4.1, 9.4.2 Figure 9.5, 9.6, Page No. - 195-197 of Textbook

b. Draw the figure of generic satellite system architecture and explain the function of each section.

Ans: **Section 11.5, Figure 11.13, Page No. - 271,272 of Textbook**

Q7 a. With the help of a block schematic explain the operation of AMPS system.

Ans: Section 10.22, Figure 10.1, Pages 223-224 of Textbook

b. How is authentication done in GSM? Explain with a diagram.

Ans: Section 10.44, Figure 10.17, Pages 236, 237 of Textbook

c. List the key features of IMT- 2000 system.

Ans: Section 10.7, Pages 249 of Textbook

Q8 a. Explain features of wireless sensor network? Explain hierarchical routing in sensor networks with an example.

Ans: Wireless sensor network is a collection of unknown and untested environment.

Section 13.8, Pg No. 334, Section-13.93, Figure 13.12, Page No. 343,344 of Textbook

b. On what factors routing in a MANET is dependent? Explain table-driven routing.

Ans: Section 13.4, 13.6.2, Figure 13.4, Page No. 311-323 of Textbook

c. Compare the characteristic features of source-initiated and on-demand routing

Ans: Page No. - 311-322 of Textbook

Q9 a. Discuss Bluetooth system architecture with a schematic diagram.

Ans: Section 14.4.2, Figure 14.14, Page No. 378,384 of Textbook

b. What is SDMA? Explain the basic functions of smart antenna with a diagram.

Ans: Section 15.8.3, Figure 15.6, Page No. 425-427 of Textbook

c. Give the advantages and disadvantages of UWB technology.

Ans: Page No. - 401-402 of Textbook

TEXTBOOK

Introduction to Wireless and Mobile Systems, Second Edition (2007), Dharma Prakash Agrawal and Qing-An Zeng, Thomson India Edition