

Unit 10 - Week 9 - Capacity and Introduction to CDMA

Course outline

How to access the portal

Overview of Cellular Evolution and Wireless Technologies

Wireless Propagation and Cellular Concepts

Cellular System Design, Capacity, Handoff, and Outage

Week 4 - Multipath Fading Environment

Week 5 - BER Performance in Fading Channels

Week 6 - Wide Sense Stationary Uncorrelated Scattering (WSSUS) Channel Model

Week 7 - Computer simulation of Rayleigh fading, Antenna Diversity

Week 8 - Fading Channels - Diversity and Capacity

Week 9 - Capacity and Introduction to CDMA

● Review of lecture 19 to lecture 36

○ Optimum Power Allocation – Water filling

○ Optimum Power Allocation – Water filling – Part II

○ Intro to Direct Sequence Spread Spectrum Communications

○ lec39_notes

○ lec40_notes

○ lec41_notes

○ lec42_notes

○ Feedback for week 9

● Assignment 9 Solutions

○ Quiz : Assignment 9

Week 10 - Introduction to CDMA

Week 11 - CDMA Receivers

Week 12

Text Transcription

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Assignment 9

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-02, 23:59 IST.

1) Which of the following power allocation schemes does not need CSIT? 1 point

- Water filling
 Channel inversion
 Capacity with outage
 Both (b) and (c)

No, the answer is incorrect.
Score: 0

Accepted Answers:
Capacity with outage

2) Consider a single tap channel of 30 kHz bandwidth with the following SNR characteristics. 1 point

$p(\gamma_1) = 0.2$ and $\gamma_1 = 0.414$
 $p(\gamma_2) = 0.4$ and $\gamma_2 = 7$
 $p(\gamma_3) = 0.4$ and $\gamma_3 = 15$
 Find the ergodic capacity of the channel.

- 25.29 kbps
 26.19 kbps
 84 kbps
 87 kbps

No, the answer is incorrect.
Score: 0

Accepted Answers:
87 kbps

3) For the channel distribution given in question (2), find the maximum capacity when CSIT is available. 1 point

- 61.65 kbps
 86.08 kbps
 91.08 kbps
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
91.08 kbps

4) Find the optimal power allocation $P(\gamma_i) / \bar{P}$ for each SNR state of the channel distribution given in the question (2). 1 point

- 0, 1.212, 1.288
 1.061, 1.212, 1.288
 0, 1.424, 1.5
 2.41, 0.143, 0.067

No, the answer is incorrect.
Score: 0

Accepted Answers:
0, 1.212, 1.288

5) For the channel distribution given in question (2), find the capacity with outage when CSIT is not available. 1 point

- 84 kbps
 36 kbps
 48 kbps
 72 kbps

No, the answer is incorrect.
Score: 0

Accepted Answers:
72 kbps

6) For the channel distribution given in question (2), find the capacity when channel inversion is performed. 1 point

- 44 kbps
 54 kbps
 64.77 kbps
 84.77 kbps

No, the answer is incorrect.
Score: 0

Accepted Answers:
44 kbps

7) For the channel distribution given in question (2), find the truncated channel inversion capacity 1 point

- 60.46 kbps
 88.63 kbps
 65.46 kbps
 70.89 kbps

No, the answer is incorrect.
Score: 0

Accepted Answers:
88.63 kbps

8) What are the benefits of having multiple transmitter and multiple receivers in a wireless system? 1 point

- Diversity benefit
 Capacity increases
 Receiver complexity reduces
 Both (a) and (b)

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both (a) and (b)

9) In the lecture it was shown that using DS-SS increases the bandwidth of the signal. What is the consequence of this increase in bandwidth? 1 point

- Time resolution becomes smaller and as a result many multipath components can be received which can be combined using MRC diversity combining
 Time resolution becomes larger and as a result many multipath components can be received which can be combined using MRC diversity combining
 Time resolution becomes smaller and as a result very few multipath components can be received which can be combined using MRC diversity combining
 Time resolution becomes larger and as a result very few multipath components can be received which can be combined using MRC diversity combining

No, the answer is incorrect.
Score: 0

Accepted Answers:
Time resolution becomes smaller and as a result many multipath components can be received which can be combined using MRC diversity combining

10) Statement 1: DS-SS increases the bandwidth of the signal
Statement 2: DS-SS doesn't alter the magnitude of the frequency response. 1 point

Choose the correct option.

- Statement 1 is true, Statement 2 is true
 Statement 1 is false, Statement 2 is true
 Statement 1 is true, Statement 2 is false
 Statement 1 is false, Statement 2 is false

No, the answer is incorrect.
Score: 0

Accepted Answers:
Statement 1 is true, Statement 2 is false

11) If the channel is $h(t) = \delta(t)$, SNR at the Rx is 10dB. What would be the effective SNR for the channel $h(t) = \frac{1}{\sqrt{2}}\delta(t) + \frac{1}{\sqrt{2}}\delta(t - \tau)$ if MRC (maximal ratio combining) is performed? 1 point

- 0 dB
 10 dB
 13 dB
 20 dB

No, the answer is incorrect.
Score: 0

Accepted Answers:
10 dB

12) If EGC (equal gain combining) is performed at the Rx what would be the effective SNR? 1 point

- 0 dB
 10 dB
 13 dB
 20 dB

No, the answer is incorrect.
Score: 0

Accepted Answers:
10 dB