



## Exam in TSKS03 Wireless Systems

- Exam code:** TEN1
- Date:** 2014-06-03      **Time:** 8:00–12:00
- Place:** U15
- Teacher:** Mikael Olofsson, tel: 281343
- Visiting exam:** 9 and 11
- Administrator:** Carina Lindström, 013-284423, carina.e.lindstrom@liu.se
- Department:** ISY
- Allowed aids:** None
- Number of tasks:** 9
- Solutions:** Will be published within three days after the exam at <http://www.commsys.isy.liu.se/TSKS03>
- Result:** You get a message about your result via an automatic email from Ladok. Note that we cannot file your result if you are not registered on the course. That also means that you will not get an automated email about your result if you are not registered on the course.
- Exam return:** 2014-06-16, 12.15–13.00, Mikael Olofssons office, Building B, top floor, corridor A between entrances 27–29. After that in the student office of Dept. of EE. (ISY), Building B, Corridor D, between Entrances 27–29, right next to Café Java.
- Important:** **Solutions and answers must be given in English.**

**Grading:** This exam consists of nine questions. Each question can give you 2, 4 or 6 points. Totally, you can get 36 points. Grade limits:

- Grade three: 16 points,
- Grade four: 22 points,
- Grade five: 28 points.

Sloppy solutions and solutions that are hard to read are subject to hard judgement, as are unreasonable answers.

- 1 Infrared communication is often using simple modulation methods, based on intensity modulation. Name and briefly describe three such modulation methods intended for infrared communication. (2 p)
- 2 UMTS uses CRC codes to protect transport blocks. What is a CRC code and what is the purpose of using such codes in UMTS? (2 p)
- 3 There are four types of bursts that can be found in a GSM time slot. Name those and explain the purpose of them. (2 p)
- 4 In mobile cellular communication, the users are allowed to move. Name and describe three impacts on communication due to mobility. (4 p)
- 5 MIMO is a technique that is rapidly becoming popular among new wireless communication systems. Explain the basic concept of MIMO, and give three ways to utilize the possibilities of MIMO. (4 p)
- 6 In DS-CDMA, all users use the same frequency band at the same time. Still it is possible to separate the signal of each user from the others. How is that possible? Explain how this is done and why it works. (4 p)
- 7 Describe the generation of (6 p)
  - a. M-sequences,
  - b. Gold sequences,
  - c. small set of Kasami sequences.

- 8 The following three techniques are common in mobile systems. Describe them briefly and explain what problems they are supposed to solve. (2p each) (6 p)
- a. Power control
  - b. Handover
  - c. Multiple Access
- 9 Are the following claims true or false? You do not need to explain your answer. (6 p)
- a. Source coding are methods to pack data.
  - b. “Means of Opinion” is a way to measure quality in speech coded systems.
  - c. Kasami sequencies are error control codes.
  - d. To generate a Gold sequence, you need one primitive polynomial.
  - e. In hard handover, a mobile may communicate through more than one base station at the same time.
  - f. MSK is a narrow-band modulation technique.

For each of the claims above, a correct answer gives you +1 point, while an incorrect answer gives you -1 point. No answer give you 0 points for that claim. You cannot get less than 0 points totally from this task.