- This is a closed book exam. You are not allowed to use any of the papers/videos of the self-study and the slides of the lectures.

- The exam has two parts: Theme 1 and Theme 2. You need to answer questions of both themes.

- Laptops, tablets, graphical calculators, mobile phones, etc., are not allowed.

- This exam is in 5 pages.

- Some questions have part (a), (b), and (c). Don't forget to answer all parts.

- Although the questions are stated in English, you may answer in English or Dutch, whichever you are more comfortable with.

- You should always explain or motivate your answers, with so much detail that the examiner can judge whether you understand the material; so just saying "yes" or giving a formula without explanation is not enough.

- Visiting the toilet without explicit permission of the supervisor is not allowed. During the last 30 minutes of the exam, no toilet visits are allowed.

Student name:

Student number:

Theme 1: Smart objects and (distributed) sensing (10 points)

- Describe four fundamental differences between mesh networks and opportunistic networks? *(2.5 points)*

- (a) What mechanisms are used in dissemination-based routing to reduce network congestion? (b) how can network congestion be further reduced using context-based routing? (c) what are the negative consequences of the context-based routing? *(2.5 points)*

- Mention four stages of a general purpose people-centric sensing system *(2.5 points)*

- Mention two main bottlenecks of participatory sensing systems *(2.5 points)*

Theme 2: Mobile and indoor localization (10 points)

- What is the difference between localization accuracy and precision? *(2.5 points)*

- What are four different ranging techniques used for localization? (Mention their name and explain the technique in 1-2 sentences) *(2.5 points)*

- Inertial positioning systems often use detection of the gait. What is the difference between stance detection and step cycle detection? *(2.5 points)*

- (a) When is a localization graph rigid? (b) Give an example when it is not. *(2.5 points)*