



**STRATHMORE UNIVERSITY**  
**FACULTY OF INFORMATION TECHNOLOGY**  
**MASTER OF SCIENCE IN INFORMATION SYSTEMS SECURITY**  
**END OF SEMESTER EXAMINATION**  
**MST 8208 - ADVANCED DATABASES AND ENTERPRISE SYSTEMS**

**DATE: 16 April, 2018**

**Time: 2 Hours**

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**Instructions**

1. This examination consists of **SEVEN** questions.
2. Answer **all** the question.
3. For each question, provide the answers according to the **instructions in brackets** (the instructions describe a style of the answers and how long each should be).

**Questions**

1. What are keys in the relational model? What is a super-key, candidate key, primary and alternate key? How many of them can exist in one relation (answer one of “none”, “one”, “many” for each)?
2. Describe “projection” and “selection” relational algebra operations (their parameters, functionality, and outputs). Demonstrate these operations on a simple example (an input relation or relations, relational algebra expressions, and their results).
3. What is a serial schedule and a serializable schedule? Why is the serializable schedule (or serializability) important for the concurrency control?
4. Explain the type (is-a) hierarchy between entities. What are super-classes, sub-classes, generalization and specialization relationships between entities? Demonstrate on a simple example (about four entities in the hierarchy).
5. Explain when is a relation in the third normal form (2NF; one sentence)? Provide a simple example of two relation (or two entities of an entity-relationship model) – the first which is not in 2NF (it is just in 1NF), and the second which is in 2NF (it is the first relation after its normalization to 2NF).
6. Provide an example of two different relational algebra trees of the same query. Which of these trees is better in terms of performance and resource utilization (i.e., more optimal than the other tree) and why?
7. Compare online transaction processing systems (OLTP systems) to data warehouse systems? In the comparison, provide at least four aspect where the systems differ.