مواد إمتحان تأهيلى دكتوراه ٢٠٢٣

Data Engineering PhD Qualifications Exam Content

Part I (25% Dr. Ayman El Kilany):

- **Book Name: Next Generation Databases: NoSQL, NewSQL and Big Data**
    1. **Chapter** 2: Google, Big Data and Hadoop: 21-37
    2. **Chapter** 3: Shading, Amazon, and Birth of NOSQL 39-51
    3. **Chapter** 4: Document Databases 53-63
    4. **Chapter** 5: Tables are Not Your Friends: Graph Databases 65- 74

Topics included:

- Map-Reduce
- Big-Table (HBase)
- Key-Value Stores
- CAP Theorem and Tunable Consistency
- Document Database
- Graph Database

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Part II (75% Dr. Ali Zidane):

- **Book Name: FUNDAMENTALS OF Database Systems/ SEVENTH EDITION**
    1. **Chapter 3:** Data Modeling Using the Entity–Relationship (ER) Model
    2. **Chapter 4:** The Enhanced Entity–Relationship (EER) Model.
    3. **Chapter 5:** The Relational Data Model and Relational Database Constraints
    4. **Chapter 7:** More SQL: Complex Queries, Triggers, Views, and Schema Modification
    5. **Chapter 8:** The Relational Algebra and Relational Calculus
    6. **Chapter 9:** Relational Database Design by ER- and EER-to-Relational Mapping
    7. **Chapter** 14 Basics of Functional Dependencies and Normalization for Relational Databases
    8. **Chapter** 15 Relational Database Design Algorithms and Further Dependencies
    9. **Chapter** 16: Disk Storage, Basic File Structures, Hashing, and Modern Storage Architectures
    10. **Chapter** 17 Indexing Structures for Files and Physical Database Design
    11. **Chapter** 19 Query Optimization
    12. **Chapter** 20 Introduction to Transaction Processing Concepts and Theory
    13. **Chapter** 21 Concurrency Control Techniques
    14. **Chapter** 22 Database Recovery Techniques
    15. **Chapter** 26 Enhanced Data Models: Introduction to Active, Temporal, Spatial, Multimedia, and Deductive Databases
    16. **Chapter** 28 Data Mining Concepts
    17. **Chapter** 29 Overview of Data Warehousing and OLAP
    18. **Chapter** 30 Database Security

Topics included:

- Database Design Modelling (ERD && EERD)
- SQL and Relational Algebra and Calculus.
- Normalization and Functional Dependencies.
- Query Optimizations.
- Transaction Management and Concurrency Control.
- Database Recovery.
- Hashing
- Data Mining Concepts.
- Data warehousing and OLAP
- Database Security

Information Systems

1. Analysis and Design of Information Systems, a previous mandatory course (Prof Dr Sherif Mazen)

2. Fundamentals of Business Process Management, part of a previous optional course (Dr Iman Helal)

The current syllabus references are as follows:

1. Systems Analysis and Design: in a changing world, 7th edition (2015). John W. Satzinger, Robert B. Jackson, Stephen D. Burd. (All Chapters)

2. Fundamentals of Business Process Management, 2nd edition (2018). Marlon Dumas, Marcello La Rosa, Jan Mendling, Hajo A. Reijers. (Chapters 1-5)

 A soft copy of the book is available upon request Contact point is Dr Iman Helal,

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