UNIVERSITI TENAGA NASIONAL

The Energy University

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College of Computing and Informatics

BACHELOR OF INFORMATION TECHNOLOGY (HONS.)
BACHELOR OF COMPUTER SCIENCE (HONS.)

FINAL EXAMINATION
SEMESTER I 2019/2020

DATABASE 2
(CISB314)

September 2019

Time allowed: 3 hours + 10 minutes for reading

INSTRUCTIONS TO CANDIDATES

1. The total marks for this exam is 100 marks.
2. There are **THREE (3) SECTIONS** to this paper: Section A, Section B and Section C.
3. Answer **ALL** questions in the answer booklet provided.

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE INSTRUCTED TO DO SO

THIS QUESTION PAPER CONSISTS OF **10** PRINTED PAGES INCLUDING THIS PAGE

SECTION A: MULTIPLE CHOICE (15 QUESTIONS, 15 MARKS)

Instruction: Choose the best answer.

1. A(n) _____ is a database stored on multiple computers in multiple locations that are connected by a data communications link.
   (A) decentralized database
   (B) distributed database
   (C) centralized database
   (D) data repository

2. Which of the following characterizes homogeneous environments?
   (A) Different DBMS used at each location
   (B) Same DBMS used at all locations
   (C) Some users require only local access
   (D) Cross-linked systems easily communicate

3. Which of the following is true of distributed databases?
   (A) Less expensive than centralized database
   (B) Slower response time
   (C) Better local control
   (D) Centralized process

4. With _____, users can act as if all the data were located at a single node.
   (A) local autonomy
   (B) client-based control
   (C) location consistency
   (D) location transparency

5. A set of SQL statements and business logics with an assigned name that is stored in the database in compiled form is called a(n) _____.

(A) function.

(B) stored procedure.

(C) trigger.

(D) application logic.

6. _____ is a technical function responsible for database design, security, and disaster recovery.

(A) Database administration

(B) Data administration

(C) Tech support

(D) Operations

7. Which of the following is **NOT TRUE** of poor data and/or database administration?

(A) Data timing problems

(B) Maintaining a secure server

(C) Multiple entity definitions

(D) Unknown meanings of stored data

8. The actions that must be taken to ensure data integrity is maintained during multiple simultaneous transactions are called _____ actions.

(A) ACID

(B) transaction authorization

(C) concurrency control

(D) multiple management

9. A(n) _____ prevents another transaction from reading and therefore updating a record until it is unlocked.

(A) record controller

(B) authorization rule

(C) shared lock

(D) exclusive lock

10. Which of the following threats involve outside parties using information to embarrass a company?
    (A) Accidental loss
    (B) Theft and fraud
    (C) Loss of data integrity
    (D) Loss of confidentiality

11. Security measures for dynamic Web pages are different from static HTML pages because _____.
    (A) dynamic Web pages are built "on the fly."
    (B) static Web pages contain more sensitive data.
    (C) the connection requires full access to the database for dynamic pages.
    (D) HTML is more complex than dynamic Web pages.

12. A trigger can be used as a security measure in which of the following ways?
    (A) To check for viruses
    (B) To design a database
    (C) To cause special handling procedures to be executed
    (D) To conduct a DFD analysis

13. In a distributed database, a transaction that requires reference to data at one or more nonlocal sites is called a _____ transaction.
    (A) local
    (B) link
    (C) global
    (D) ACID

14. A DBMS periodically suspends all processing and synchronizes its files and journals through the use of a _____.
    (A) backup facility.
    (B) recovery manager.
    (C) checkpoint facility.
    (D) database change log.

15. An audit trail of database changes is kept by a _____.

(A) change control device.

(B) journalizing facility.

(C) subschema.

(D) before image.

SECTION B: SHORT ANSWER QUESTIONS (6 QUESTIONS, 65 MARKS)

Instruction: Answer ALL questions from this section.

Question 1

Data is an important asset of an organization that need to be managed properly. New technologies and trends have made data administration and database administration roles important.

(a) List **FOUR (4)** roles of a Data Administrator (DA)

[4 marks]

(b) List **FOUR (4)** roles of a Database Administrator (DBA)

[4 marks]

Question 2

The concept of transparency is very important in Distributed Database environment. It involves the process of hiding the fragmentation and distribution of the fragments to different sites.

(a) Choose **TWO (2)** types of transparency and briefly explain what each transparency does. Give **ONE (1)** example for each type.

[6 marks]

(b) In your opinion, what will happen if the transparency feature does not exists in Distributed Database environment.

[2 marks]

Question 3

Concurrency control is the activity of coordinating the simultaneous execution of transactions in a multiprocessing or multi-user Database Management System. The objective of concurrency control is to ensure the serializability of transactions in a multi-user Database Management System. Two approaches could be used to achieve serializability which are pessimistic approach and optimistic approach.

(a) Explain the concept of serializability.

[2 marks]

(b) Distinguish between pessimistic approach and optimistic approach. What is the mechanism used in each approach?

[6 marks]

(c) Deadlock is a problem that can occur in a pessimistic approach. Describe the **TWO (2)** algorithms used in deadlock prevention technique. Use a diagram to illustrate your answer for each algorithm.

[8 marks]

Question 4

Big data is a collection of large scale of structured, semi-structured and unstructured data. Relational databases which have ruled the storage technology for such a long time seems not suitable for these mixed types of data.

(a) Differentiate between structured data, semi-structured data and unstructured data.

[6 marks]

(b) In your opinion, why relational database is not suitable for big data?

[2 marks]

(c) What is the most appropriate database for big data? Explain your answer.

[2 marks]

Question 5

Differentiate the following terms:

(a) Cold backup and Hot backup

[4 marks]

(b) Rollback recovery and Roll forward recovery

[4 marks]

(c) Two-tier architecture and Three-tier architecture

[4 marks]

Question 6

Authentication is one of the important security features in DBMS.

(a) Describe authentication scheme

[2 marks]

(b) Explain the **THREE (3)** types of authentication scheme depending on the number of factors used. Give example for each type.

[9 marks]

SECTION C: APPLICATION QUESTIONS (2 QUESTIONS, 20 MARKS)

Instruction: Answer ALL questions from this section.

Question 1

Table 1 below is retrieved from the Ministry of Health which is located in Putrajaya. The hospital in Melaka, Kangar and Ipoh would like to have data of their own nurses.

Table 1: Nurse Location

NurseID	NurseName	Current_Loc	Date_Joined
111	Salmah	Johor	12/1/2003
112	Mary	Kangar	11/3/2003
113	Jenny	Kangar	15/5/2003
114	Millie	Seremban	12/6/2003
115	Sofia	Melaka	14/7/2003
116	Kiran	Ipoh	15/8/2003
117	Mei Mei	Melaka	18/9/2003
118	Su Ling	Kangar	29/9/2003
119	Aminah	Melaka	30/10/2003
120	Dhia	Ipoh	2/12/2003
121	Zainon	Melaka	12/12/2003

(a) What is the most suitable distributed database partitioning strategy to suit the hospitals' requirement?

[1 mark]

(b) Show the results of the chosen strategy. (*You should draw the new tables)*

[8 marks]

Question 2

Faizal and Fauziah have a joint saving account, and both want to withdraw some cash at the same time, each using an ATM terminal at a different location. The balance in the account is $1000. Faizal withdraws $500 from the account and a few second later, Fauziah withdraw $400. The end balance in the account shows $600.

Based on this situation, answer the following questions:

(a) Identify the problem that occur during the transactions.

[1 mark]

(b) Using a diagram, show how locking mechanism may solve this problem.

[10 marks]

---End of Questions---