

UNIVERSITY
OF
JOHANNESBURG**FACULTY OF SCIENCE**

ACADEMY OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING	
MODULE	IFM2A10/IFM02A2 Database Design
CAMPUS	APK
EXAM	JUNE 2014

DATE: 18/06/2014**SESSION: 12H30 – 14H30****ASSESSOR:****MR SMA MAVEE**
MR TD MPHUTHI**INTERNAL MODERATOR:****DR WS LEUNG****DURATION: 120 MINUTES****MARKS: 100**

NUMBER OF PAGES: 5**PLEASE TAKE CAREFUL NOTE OF THE FOLLOWING:**

1. Answer ALL questions in the ASSESSMENT SCRIPT supplied.
 2. Do NOT write in pencil. Anything in pencil WILL NOT BE MARKED.
 3. Write neatly and legibly.
 4. Answers must pertain to the material covered during the course of the module.
 5. NO calculators may be used.
 6. This question paper consists of 5 (including this cover page) pages.
 7. This question paper consists of 10 question sections.
 8. **DON'T PANIC.**
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QUESTION 1

- 1.1 What is the **difference** between **data** and **information**? (2)
- 1.2 What is a **Database Management System (DBMS)**? (2)
- 1.3 Name **two drawbacks** to explain why **data redundancy** is a **problem**. (2)
- 1.4 Name and **briefly discuss three functions** the **DBMS** performs. (6)
- 1.5 Apart from the Relational Model, name **two other models** that can be used to design a database. (2)

[14]

QUESTION 2

- 2.1 Dr EF Codd published a list of 13 rules to define a relational database. Name **three** of these rules. (3)
- 2.2 When is a database said to have **entity integrity**? (2)
- 2.3 In a **relational database**, what is the only purpose of a **Secondary key**? (1)

[6]

QUESTION 3

- 3.1 By means of a **diagram**, illustrate the **Database Lifecycle (DBLC)**. (8)
- 3.2 Confidentiality and Integrity are two aspects of information security that must always be taken into account when dealing with database systems. **Briefly discuss how the loss of confidentiality and integrity** in a database system can occur. (2)

[10]

QUESTION 4

- 4.1 List and **briefly** describe the **properties** of a **database transaction**. (10)

[10]

QUESTION 5

- 5.1 Briefly **discuss two advantages** and **two disadvantages** of using a **Distributed Database Management System**. (4)
- 5.2 Briefly describe **Distribution Transparency** and **Transaction Transparency**. (4)
- 5.3 Name **two characteristics** of a **Distributed Management System**. (2)

[10]

QUESTION 6

Express Waiters is a local business that sources Waiters from various Agencies for local Events. Their business has been booming so much that they have decided to build a database system to manage their billing of Events.

Essentially every Event can hire as many Waiters as they need from Express Waiters and every Waiter sourced by Express Waiters can be assigned to work on different Events. Each of the Waiters bill an Event based on the hours they spend working at the Event and the hourly rating that their Agency charges. Each Agency that Express Waiters sources Waiters from is able to provide multiple Waiters, each of which can only belong to one Agency. Express Waiters currently report on their books using spread sheets such as the one shown below.

The spread sheet below shows the total bill that Express Waiters charged each event that was worked on in March 2014.

EVENT NUMBER	EVENT NAME	EVENT DATE	WAITER NAME	AGENCY NAME	AGENCY RATING	HOURS WORKED	BILL
12	Project Closure Party	01-Mar-14	Tom Ford	TCM	R85,00	6	R510,00
			Noluntu Mbeki	TCM	R85,00	5	R425,00
			Keygen Smith	One Nation	R80,00	7	R560,00
							R1 495,00
13	SOA Conference	12-Mar-14	Noluntu Mbeki	TCM	R85,00	5	R425,00
			Mandy Wolden	TCM	R85,00	4	R340,00
							R765,00
14	Earnings Release Party	24-Mar-14	Johnny Duncan	One Nation	R80,00	8	R640,00
			Sinah Sonke	One Nation	R80,00	6	R480,00
			Tom Ford	TCM	R85,00	8	R680,00
			Tholwana Thuto	TCM	R85,00	8	R680,00
			Tumelo Dineka	Bright Light	R90,00	7	R630,00
							R3 110,00
15	Retirement Party	30-Mar-14	Juan Rodrigues	TCM	R85,00	8	R680,00
			Andy Thapedi	Bright Light	R90,00	8	R720,00
							R1 400,00
Total							R6 770,00

- 6.1 Use dependency diagrams to depict how the spreadsheet that Express Waiters uses (7) for reporting would look in **Third Normal Form (3NF)**.

[7]

QUESTION 7

- 7.1 Define the term **Business Intelligence (BI)**. (3)
- 7.2 Name and briefly describe three basic BI architectural components. (6)
- 7.3 List three rules that define a **Data Warehouse**. (3)

[12]

QUESTION 8

8.1 In cloud-based systems, **name four advantages** offered by the use of **SQL Data Services**, when compared with in-house systems. **(4)**

8.2 Name the **seven Open Systems Interconnection (OSI) layers**. **(7)**

[11]

QUESTION 9

9.1 The South African Department of Sport and Recreation (SRSA) has just started digitizing all of their information, in order to make it more accessible to the public. In order to test their new project, they have decided to first focus only on all soccer teams in the country. **(10)**

In order to help the SRSA keep track of all the soccer teams in the county, they have asked you to draw an Entity Relationship Diagram to show the structure of the database.

They have provided you with the following extra information:

- They would like you to keep track of every soccer team in the country (name of the team, province of the team, name of the team's founder, and date of the founding of the team),
- They would like to keep track of all the soccer players in the country (their name, and date of birth), and which soccer team they belong to.
- One soccer team can have many soccer players, and one soccer player can only play for one soccer team.
- They would like to keep track of all the soccer competitions happening in the country (name of the competition, date of the start of the competition, and name of the main sponsor of the competition),
- They would like to know which soccer teams are participating in each of the soccer competitions, and the number of goals the team has scored in those competitions, and
- One soccer team can participate in many soccer competitions, and one soccer competition can have multiple teams participating in it.

Given the information above, draw an ER Diagram showing the following:

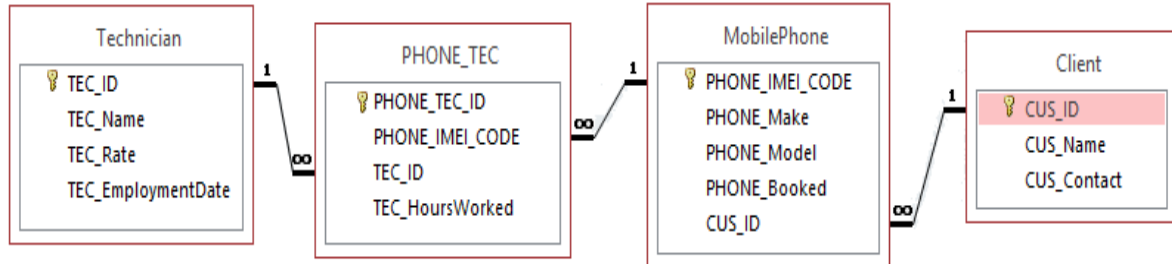
- Entities,
- Attributes,
- Show all key attributes,
- Data types for each attribute, and
- All relationships between the entities

NB: You may use one of the standardised ERD notations.

[10]

QUESTION 10

The MS Access database diagram below shows the tables created for a Mobile Phone Repair Shop, where Technicians are assigned to fix client's mobile phones. One Technician can be assigned multiple mobile phone, and one mobile phone can be assigned to multiple technicians. Answer the questions below by providing SQL statements.



- 10.1** Write the SQL statement used to CREATE the PHONE_TEC table. (4)
- 10.2** List all unique makes of the mobile phone makes currently booked in the repair shop. (2)
- 10.3** List all clients' names and the make and model of their mobile phone(s). Use an INNER JOIN in your SQL statement. (4)

[10]**TOTAL: 100 MARKS**