UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

MODULE	**IFM2A10/IFM02A2** Database Design
CAMPUS	APK
SSA EXAM	JULY 2016

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DURATION: 120 MINUTES **MARKS:** 100

NUMBER OF PAGES: 5

PLEASE TAKE CAREFUL NOTE OF THE FOLLOWING:

1. Answer **ALL** questions **ONLY** in the supplied **ANSWER SHEET**.
2. **Do NOT write/draw in pencil**. **Anything in pencil <u>WILL NOT BE MARKED</u>**.
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. Make sure to read and follow all instructions written in the exam answer sheet.

QUESTION 1

1.1 Why is Database Design important? **(4)**

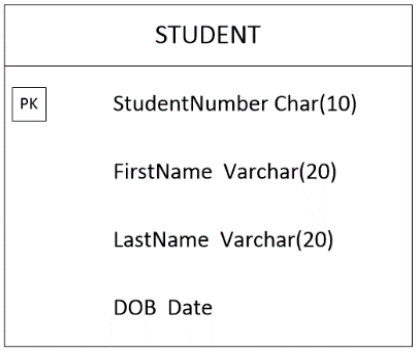
1.2 Briefly discuss Database Management Systems. **(4)**

[8]

QUESTION 2

2.1 What is a Primary key? **(2)**

2.2 Provide a relational schema for the entity below: **(3)**



2.3 Briefly discuss the concept of "Controlled Redundancy". **(3)**

[8]

QUESTION 3

3.1 The System Development Life Cycle (SDLC) traces the history (life cycle) of an information system. It provides a "big picture" within which database design and application development can be mapped out and evaluated. By means of a diagram, illustrate the SDLC. **(9)**

3.2 Briefly discuss the Database Initial Study phase of the Database Life Cycle. **(6)**

[15]

QUESTION 4

4.1 Name and briefly describe the transaction processing error that occurs in the transaction log below. **(4)**

Time	Transaction	Step	Stored Value
1	T1	Read PROD_QOH	35
2	T1	PROD_QOH = 35 + 100	
3	T1	Write PROD_QOH	135
4	T2	Read PROD_QOH	135
5	T2	PROD_QOH = 135 - 30	
6	T1	****ROLLBACK****	35
7	T2	Write PROD_QOH	105

4.2 Name and briefly describe five locking mechanisms that can be used to ensure transaction serializability done by a DBMS's Scheduler. **(10)**

[14]

QUESTION 5

The University of Johannesburg's Fashion Society hosts various fashion shows where they showcase some of the work done by the University's fashion design students. The society outsource modelling services from model agencies who each have a fixed agency rate for each of their models.

As things currently stand, the society reports on their events by making use of a spreadsheet that tracks the event, the models hired and the cost of each model. An extract of this spreadsheet is illustrated in Table 5.1 below.

The University of Johannesburg's Fashion Society would like you to assist them develop a database system that will help them keep track of the cost of their events in a much more structured manner.

Show Number	Show Name	Model Number	Model Name	Model Agency	Agency Rate	Hours Worked	Total Charge
25	APB Fashion Week	B25	Sindiswa Khubeka	IOU	R50.00	16	R 800.00
25	APB Fashion Week	B28	Lebohang Mathe	ICU	R75.00	6	R 450.00
25	APB Fashion Week	B30	Salmon Gnat	IOU	R50.00	7	R 350.00
25	APB Fashion Week	B85	Ringo Blue	OB1	R25.00	18	R 450.00
26	APK Fashion Week	B121	Shalinee Sing	OB1	R25.00	13	R 325.00
26	APK Fashion Week	B100	Jodie Pienaar	ONE	R95.00	5	R 475.00
26	APK Fashion Week	B4	Scarlet Seal	OB1	R25.00	25	R 625.00
26	APK Fashion Week	B85	Ringo Blue	OB1	R25.00	6	R 150.00
26	APK Fashion Week	B1	Tumi Mphore	IOU	R50.00	13	R 650.00
27	SWC Fashion Week	B2	Sicil Daw	MIL	R10.00	20	R 200.00
27	SWC Fashion Week	B28	Lebohang Mathe	ICU	R75.00	24	R 1 800.00
27	SWC Fashion Week	B30	Salmon Gnat	IOU	R50.00	21	R 1 050.00
27	SWC Fashion Week	B121	Shalinee Sing	OB1	R25.00	15	R 375.00
27	SWC Fashion Week	B100	Jodie Pienaar	ONE	R95.00	1	R 95.00

Table 5.1: Extract of The University of Johannesburg's Fashion Society's Event Spreadsheet

5.1 Use dependency diagrams to depict how the spreadsheet illustrated in Table 5.1 would look in Third Normal Form (3NF). **(8)**

[8]

QUESTION 6

6.1 Name and describe two basic business intelligence architectural components. **(4)**

6.2 What is the difference between a Data Warehouse and a Data Mart? **(4)**

[8]

QUESTION 7

7.1 Distributed Database Management Systems (DDBMSs) govern storage and processing of logically related data over interconnected computer systems in which both data and processing functions are distributed among several sites. Briefly discuss the advantages of using DDBMSs. **(5)**

7.2 List three of CJ Date's Twelve Commandments for Distributed Databases. **(3)**

[8]

QUESTION 8

8.1 Name and briefly discuss the three main components of Client/Server Architecture. **(6)**

[6]

QUESTION 9

The MS Access database diagram in Figure 9.1 shows the tables created for Westbury High School's rugby department. The database currently allows the rugby department to keep track of their different ruby teams, rugby players and each team's coach.

Each Player belongs to one Team, while a Team can have multiple Players. A Coach can coach several Teams, while a Team can only be coached by one Coach.

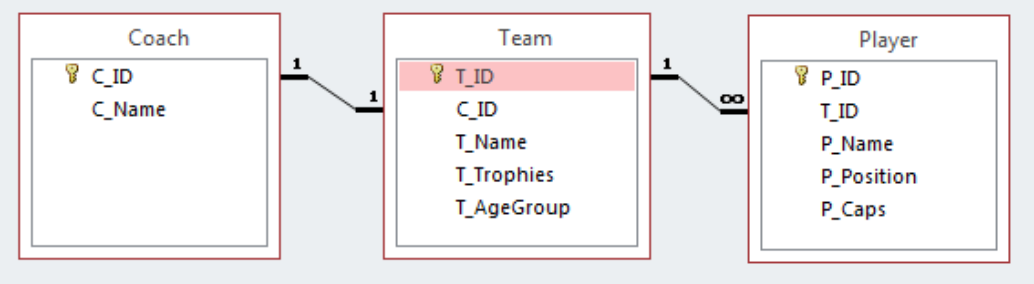


Figure 9.1: Westbury High School's Rugby Database

***NB:** Use this information to answer the questions below by providing SQL statements.*

Use the aforementioned information to answer the questions below by providing SQL statements:

9.1 How many Teams does Westbury High School have for each age group? **(3)**

9.2 List each Team and the sum of all Caps acquired by all Players on the Team. **(4)**

9.3 List the name of each Team and its Coach. Use an INNER JOIN in your SQL statement. **(3)**

[10]

QUESTION 10

Maluti Computers is a computer part store that has been operating in Johannesburg for the past four years. The company sells various types of computer parts at their store and have reached out to you to help them develop an information system to aid in their sales operations. **(15)**

Maluti Computers currently keeps a wide variety of computer parts at their store. The usual information stored for each computer part includes the name, manufacturer, model type, price and quantity on hand. They would like all of this information to be maintained by the new information system. Alongside this, Maluti Computers would like you to keep track of the various computer part catagories (such as I/O parts and processing parts etc.).

Apart from keeping track of these computer parts, Maluti Computers would like the new information system to also keep track of the purchases made by their clients. Purchases made by clients are shown in invoices which list all the computer parts bought by the client, as well as the quantities of each computer part. The price at which a computer part was bought should also be recorded at the time of purchase of the computer parts.

Maluti Computers would like to develop a rewards programme for their clients. Therefore the company would like the new information system to keep track of customers and their contact details in order for this to be used for getting in touch with clients in the future.

Maluti Computers has sales agents whoes performance contracts are evaluated based on the number of invoices they process per month. Therefore Maluti Computers would like the new information system to provide a way for keeping track of which sales agent was responsible for generating an invoice for each client's purchase.

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

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

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

[15]

TOTAL: 100 MARKS