

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
JUNE EXAMINATIONS 2004

SUBJECT: DATABASE CONCEPTS
CODE: SCP1202

INSTRUCTION TO CANDIDATES

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This examination paper consists of eight (8) questions, all questions carry equal marks.

Answer any FIVE (5) questions

Time: 3 hours

QUESTION ONE

- a) Discuss the differences between the following file organisations:
i) Serial
ii) Sequential
iii) Random [9]
- b) What is meant by data independence? Describe the two levels of data independence. [5]
- c) With the aid of examples discuss the differences between procedural & non-procedural DMLs. [6]

QUESTION TWO

- a) What are the main differences between a file-processing system and a database management system? [10]
- b) Define the following terms giving examples where possible:
i) Data definition language
ii) Entity
iii) Relationship
iv) Attribute
v) Composite attribute [10]

QUESTION THREE

- a) Construct an Entity Relationship diagram for a University registrar's office. The office maintains data about each class, including the instructor, the enrolment and the time and place of the class meetings. For each student-class passing a grade is recorded. [10]
- b) Briefly describe the roles of the following in a database system:
- i) Application programmer
 - ii) Naïve users
 - iii) Data dictionary
 - iv) File manager
 - v) Alternate key
- [10]

QUESTION FOUR

- a) With the aid of a well labelled diagram describe the three level architecture of the DBMS. [10]
- b) List and briefly explain the responsibilities of the Database Administrator. [10]

QUESTION FIVE

- a) Briefly describe the functions of the DBMS and the facilities it offers. [10]
- b) Give a brief description of the factors that may drive an organisation to switch to a DBMS and also those that affect the choice of a DBMS. [10]

QUESTION SIX

- a) What is a data model? [2]
- b) Suppose you are part of the team that has been tasked to design a database for a hospital management system and you have the following information/clues:
- A hospital has a number wards
 - Each ward has a number patients- Patients have only one doctor allowed to prescribe drugs for them.
 - Doctors do their rounds once a day and prescribe drugs by prescription to their patients

- A prescription identifies the drug by code and name, recommended dosage and length of treatment
Draw the E-R diagram for this database system. [12]

- c) Briefly describe the concept of normalisation. Why is normalisation an important aspect in database design? [6]

QUESTION SEVEN

- a) Give brief descriptions of the following database models:
 - i) Relational model [4]
 - ii) Network model [4]
 - iii) Hierarchical model [4]
- b) What is meant by:
 - i) Defining the database [3]
 - ii) Constructing a database [2]
 - iii) Manipulating a database [3]

QUESTION EIGHT

- a) Given the following Customer relation, check if it is in 2NF, if its not what has to be done to transform it to 2NF. [4]

<u>Customer</u>	<u>Item purchased</u>	<u>Purchase price</u>
John	T-Shirt	\$40 000
Richard	Jeans	\$150 000
Peter	T-Shirt	\$40 000
Cosmas	Trousers	\$55 000

b) Consider the following EMPLOYEE table/ relation:

Employee#	Name	Date_Engaged	Degree	Area	Type
23456	Chikukwa	23/02/2003	PhD	Geology	Permanent
23457	Moyo	12/01/2003	BSc	Computers	Part Time
23458	Manase	04/10/2002	MSc	Physics	Permanent
23459	Jonga	04/10/2002	MSc	Geology	Permanent
23460	Gwekwe	26/05/2003	BSc	Electronics	Temporary
23461	Dube	15/09/2003	MSc	Geology	Part Time

- i) If you were tasked to design a database to store this information, what data type would you specify for the field Date_Engaged? [1]
- ii) What is a primary key? Which attribute(s) would you select to be primary key in this relation and why? [4]
- iii) Write an SQL query that would list all the records where the area is Geology. [3]
- iv) Write an SQL query to list all records where the Degree is MSc and the Type is permanent and place them into a separate table called Permanent. [4]
- v) What are the errors in the following query? Rewrite the query correctly.
SELEC DISTINCT NAME, DEGREE, AREA
FROM EMPLOYEE
WERE TYPE = [PERMANENT] [4]

END OF QUESTION PAPER

GOOD LUCK!