NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

B-Eng Hons Industrial and Manufacturing Engineering

Supplementary Examination

COURSE	**:**	**MANUFACTURING INFORMATION AND DATABASE SYSTEM**
CODE	**:**	**TIE 6110**
DATE	**:**	**JULY 2013**
DURATION	**:**	**3 HOURS**

INSTRUCTIONS AND INFORMATION TO CANDIDATE

1. Answer **Five** questions at least **Two** from each section.
2. Each question carries (20) marks each
3. This paper contains Seven **(7)** questions.
4. There are Five **(5)** printed pages.
5. You will be penalized for not presenting your work neatly

SECTION A

QUESTION 1

a) Define the following terms
   i) Data coding [2]
   ii) Data encryption [2]

b) Discuss the different levels in ANSI-SPARC architecture of a database management system [6]

c) Explain the two types of data independence in reference to databases:
   i) Logical data independence [3]
   ii) Physical data independence [3]

d) Discuss four disadvantages of Database Management Systems (DBMS) [4]

QUESTION 2

a) Discuss the Hierarchical Database Management System under the following:
   i) Structure [4]
   ii) Advantages [2]
   iii) Disadvantages [2]

b) Why would you recommend your company to implement a Manufacturing Execution System (MES)? [6]

c) With the aid of a diagram show the components of an MES. [4]

d) Give two examples of Enterprise Resource Planning (ERP) systems that you know. [2]

QUESTION 3

a) The Faculty of Industrial Technology at National University of Science and Technology consists of a number of departments. Each department has a department code, name, Head of Department and offers several courses. A number of modules make up each course. Each course has a course code and name. The modules have a module code, name and lecturer. Students have a student number, firstname, surname, year of study and enrol in a particular course and take modules towards the completion of that course. Each module is taught by a lecturer from the appropriate department, and each lecturer tutors a group of students. Each lecturer has an employment number, firstname, surname and qualification.
   i) Identify the entities, attributes, relationships, and cardinality ratios from the description. [2]
   ii) Develop the Entity Relationship (ER) diagram that captures, as far as possible the requirements stated on the relevant information and items you identified in (a). [10]
   iii) Many-to-many relationships are hard to represent in SQL tables. Explain why many-to-many relationships cause problems in SQL tables [4]
   iv) Show how the problems in Question 3(b) may be overcome. [4]

SECTION B

QUESTION 4

a) What is meant by the term network topology? [3]

b) Describe with aid of diagrams and examples of area of application the following network topologies:

i) Bus topology [4]

ii) Hybrid topology [4]

c) Give brief descriptions of the following transmission media highlighting their advantages and disadvantages.:

i) UTP [3]

ii) Fiber optics [3]

iii) Wireless [3]

QUESTION 5

Kango Products has four departments. The marketing department consists of ten personal computers, a shared laser printer and shared marketing programs and data files. It is necessary that the marketing department accept orders from sales representatives who are outside the company.

The design department consists of six personal computers, a shared printer, and shared program and data files. The design department sometimes sends its in-progress work to the marketing department for their evaluation; similarly, the marketing department sends new ideas to the design department. In addition to communicating with each other, both marketing and design occasionally need to communicate with the mainframe computer.

Users in the purchasing, administrative and personnel departments have terminals attached directly to the mainframe computer. The mainframe computer is connected to the mainframe at the headquarters in another country.

You are required to:

a) i) Illustrate, using a diagram, how the networks for the different parts of the system may be set up with the different pieces of hardware and connections needed. [8]

ii) Write a description of the functions of each of the network devices used. [6]

b) With the aid of suitable examples describe the differences between simplex, half duplex and full duplex transmission. [6]

QUESTION 6

You are working with the IT department of your company to set up a network for its three offices shown in Figure Q6.

i) By starting with a given IP address and prefix (subnet mask) assigned by the network administrator, come up with the network documentation and present the results in form of a Table Q6 shown below. [15]

Table Q6: Network subneting

Subnet	Network Address	Host Range	Broadcast Address (Decimal)	Subnet Mask

Assign IP address for the following network media:

i) For the server, configure the second highest usable IP address on the Main Admin LAN. [1]

ii) For RTR1's Fa0/0 interface, configure the highest usable IP address on the Main Admin LAN. [1]

iii) For RTR1's S0/0/0 interface, configure the highest usable address on the existing WAN. [1]

iv) For RTR2's S0/0/0 interface, use the lowest usable address on the existing WAN. [1]

v) For RTR1's Fa0/0 interface, use the highest usable address on the Limpopo Office LAN. [1]

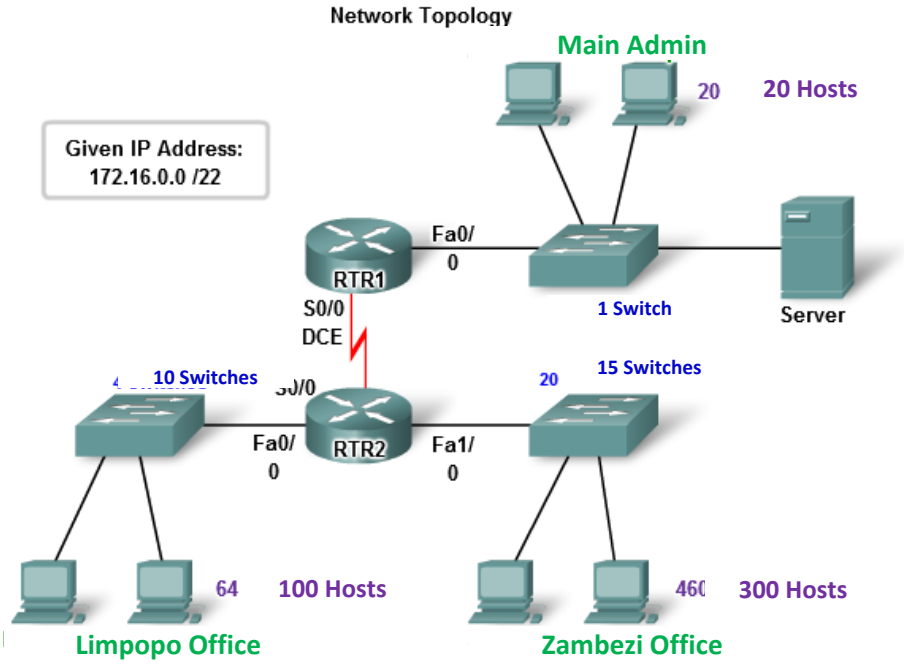

Figure Q6: Network Topology

QUESTION 7

Consider the following LECTURER table/ relation shown in Table Q7:

Table Q7

Employee#	Name	Date_Engaged	Module Code	Module Name
NU24853	Mendo Ntunteni	23/02/2003	TIE 6223	CAD/CAM
NU55612	Johannes Tsvimbo	12/01/2003	TIE 6110	MIDS
NU44879	Jacob Nyathi	04/10/2002	TIE 6220	Automation
NU78962	Edson Masvosve	04/10/2002	TIE 6110	Manufacturing Systems

a) If you were tasked to design a database to store this information in Ms Access, what data type would you specify for the filed Date_Engaged? [3]

b) What is a primary key? [2]

c) Put the table in its 1NF [5]

d) From the table you have created in (c), which attribute would you select to be primary key in this relation and why? [4]

e) Write an SQL statement to replace Jacob Nyathi with Mandulo Siziba from the database [6]