UNIVERSITY OF ESWATINI

FACULTY OF SCIENCE AND ELECTRONIC ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE

MAIN EXAMINATION, 2018: 1ST SEMESTER

Title of Paper	:	**Databases and their Design II**
Course Number	:	**CSC 371**
Time Allowed	:	**Three (3) Hours**
Instruction	:	**Answer ANY FIVE questions**

This paper should not be opened until permission has been granted by the invigilator.

Question 1.

a) Define the following: **[9]**
   i) Functional dependency
   ii) Partial dependency
   iii) BCNF

b) Differentiate between a relational database and a traditional file system. **[4]**

c) Discuss the execution of a query involving an index between mainframe and microcomputer systems. **[3]**

d) Explain with reference to examples, the differences between entity integrity and referential integrity. **[4]**

Question 2.

a) Describe a view and its advantages and disadvantages. **[4]**

a) Briefly describe the stages involved in the design of a database. **[6]**

b) How can the catalogue system be made useful on a small scale database? **[3]**

c) Describe normalization and its purpose. **[7]**

Question 3.

Given the following functional dependencies:

A, B ---> C, D, E ({A, B} is the primary key)

C ---> A

D ---> E

a) Identify and discuss each of the indicated dependencies **[6]**

b) Normalise this database to 3NF relations **[6]**

c) Given a new set of functional dependancies of attributes F to L, break it up into two new dependency diagrams one in 2NF and another in BCNF **[8]**

   F, G ---> H, I, J, K, L

   J ---> L

   I ---> F

Question 4

a) Describe the second normal form and state what types of problems are encountered in tables that are not in the third normal form. **[5]**

b) The following table concerns invoice information. for a given invoice (identified by the invoice number) there will be a single customer. The customer's number, name, and address appear on the invoice as well as the invoice date. Also, there may be several different parts appearing on the invoice. For each part that appears, the part number, description, price, and number of shipped units will be displayed. **[15]**

List the functional dependencies in the following table, subject to the specified conditions. Convert this table to an equivalent collection of tables that are in 3NF

INVOICE(inv_numb, cust_numb, cust_name, address, invdate, part_numb, part_desc, unit_pce, numb_shipped)

Question 5.

Sipho owns a chain of four book stores. Design a database for his chain of book stores. Sipho gathers and organises information about publishers, authors and books. Each book has a code (uniquely identifies each book). In addition, he records the title, the publisher, the type of book, the price, and whether the book is paper back or not. He also records the author or authors of the book along with the number of units of the book that are in stock in each of the branches. Sipho uses this information in a variety of ways. For example, a customer may be interested in books written by a certain author or of a certain type. He wants to be able to tell his customers which books (by author or by type) he currently has in stock. If not in stock in one branch he needs to be able to determine if any of the other branches currently have it.

Design a database to manage Sipho's chain of book stores database. **[20]**

Question 6

Examine the table below and answer the questions that follow stating all assumptions made.

BRANCH_EMPLOYEES

StaffNum	*BranchNum*	*Branch_Addr*	*Staff_name*	*Position_held*	*hours*

a) Identify all dependencies and draw its dependency diagram. **[6]**
b) Why is this table not in 2NF? **[4]**
c) Describe and illustrate the process of normalizing the relation to 3NF tables. **[7]**
d) Identify all keys in your 3NF relations. **[3]**