SLIATE
SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION
(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Information Technology
First Year, First Semester Examination – 2016
HNDIT 11052 - Database Management System.
Marking Scheme

Q1.

a) Define or explain followings
   [12Marks]
   i.   Data vs Information

Data	Information
Data consists of raw facts and figures. It does not have any meaning until it is processed and given a context.	Information=data + context+ meaning Or Information is data which has been processed within a context in order to give it meaning. Therefor information can be used to make decisions.

OR

   ii.   Meta data - Data that describes data
   iii. Database - An organized collection of logically related data.
   iv.   DBMS - It is a collection of programs that enables user to create and maintain (edit, delete, update) a database. **Also** it is general-purpose software that provides the users with the processes of defining, constructing and manipulating the database for various applications.
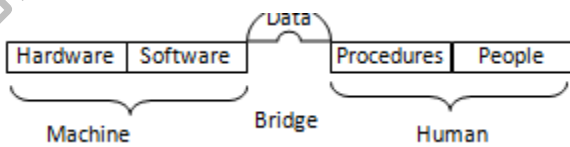
b) Simplified database system architecture with a suitable diagra   [08 Marks]

D	*Software to Access stored data*	A	*Users/Programs*	F/E	*Meta Data*
B	*Application Programs /Queries*	E/F	*Stored Database*	H	*DBMS software*
C	*Software to process Queries/Programs*	G	*Database system*		*ER Diagram*

c) Explain about components of the DBMS Environment.   [05 Marks]

- Hardware (a single PC, a single mainframe, client-server model)
- Software (DBMS, NETWORK SOFTWARE, PROGRAMMING LANGUAGES, …)

- PEOPLE (data & database administrators, database designers, application developers, end users,)
- Data (operational data, metadata, system catalog)
- Procedures (log on to DBMS, start & stop DBMS)

<div align="right">(Total 25 marks)</div>

Q2.

a)

i. **Internal schema**   (one view)

- describes physical storage structures
- access paths, indexes used
- Typically uses a physical data model

ii. **Conceptual schema** at the conceptual level (one view)

- describes the logical structure and constraints for the whole database for a community of users
- Uses a conceptual or an logical data model

iii. **External schemas** (many view)

- Many views describe how users see data
- Information about schemas is stored in the system catalog   (5 marks)
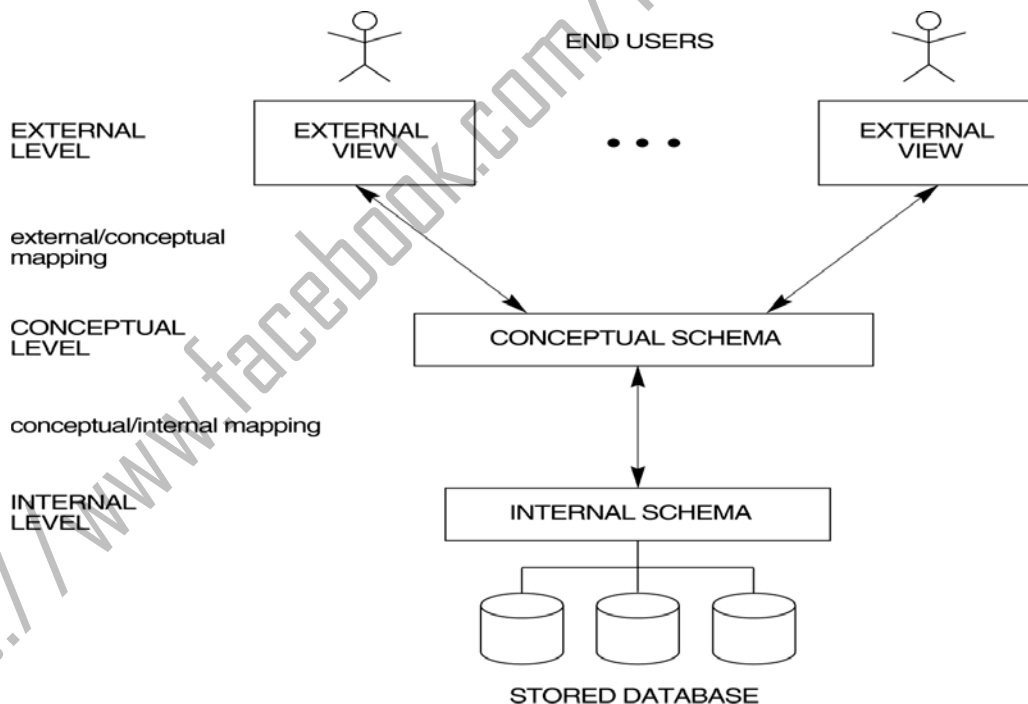
Mappings among schema levels are needed to transform requests and data. Programs refer to an external schema, and are mapped by the DBMS to the internal schema for execution ➜ data independence

b) What is the difference between logical data independence and physical data independence?

- **Logical Data Independence**: The capacity to change the conceptual schema without having to change the external schemas and their application programs.

- **Physical Data Independence**: The capacity to change the internal schema without having to change the conceptual schema. (4marks)

c) Briefly explain following DBMS Languages

   i. Data Manipulation language (DML) - A **data manipulation language** (**DML**) is a family of syntax elements similar to a computer programming language used for inserting, deleting and updating data in a database. Performing read-only queries of data is sometimes also considered a component of DML.

   ii. Data Definition Language (DDL) - A **data definition language** or **data description language** (**DDL**) is a syntax similar to a computer programming language for defining data structures, especially database schemas.

   iii. Data Control Language (DCL) - A **data control language** (**DCL**) is a syntax similar to a computer programming language used to control access to data stored in a database. In particular, it is a component of Structured Query Language (SQL).

(6 marks)

d) What is benefit of using **Input Masks** in MS Access Database**?** (4 marks)

An input mask is used to pre-format a field to "look/act" a certain way when a user inputs data. Examples: Social Security Number input mask automatically inserts the dashes; phone numbers automatically inserts the parentheses and dashes. The input mask data can either be stored in the table or simply displayed and not stored

e) Details of sponsors are stored in the sponsor table. The structure of the Sponsor table is as follows. **Give suitable MS Access data type for each field** (6 marks)

| Field name	Description	Data Type
Sponsor_Ref	Unique number of Sponsor	Number
Title	Title of sponsor-on of Dr,Mr,Miss,Mrs	Text
First_Name	First name of the sponsor	Text
DOB	Date of birth of sponsor	Date/Time
Address	Address of sponsor	Text
Amount donated	Amount of money sponsor has donated	Currancy

(Total 25 marks)

Q3.

a) What is mean by "Degree of a relationship" and explain three type of it using suitable diagram.

Degree – the number of entity types that participate in a relationship

A unary or recursive relationship is a relationship between the instances of one entity type

A binary relationship is a relationship between instances of two entity types

A ternary relationship is a simultaneous relationship among instances of three entity types

Unary

Binary

Ternary
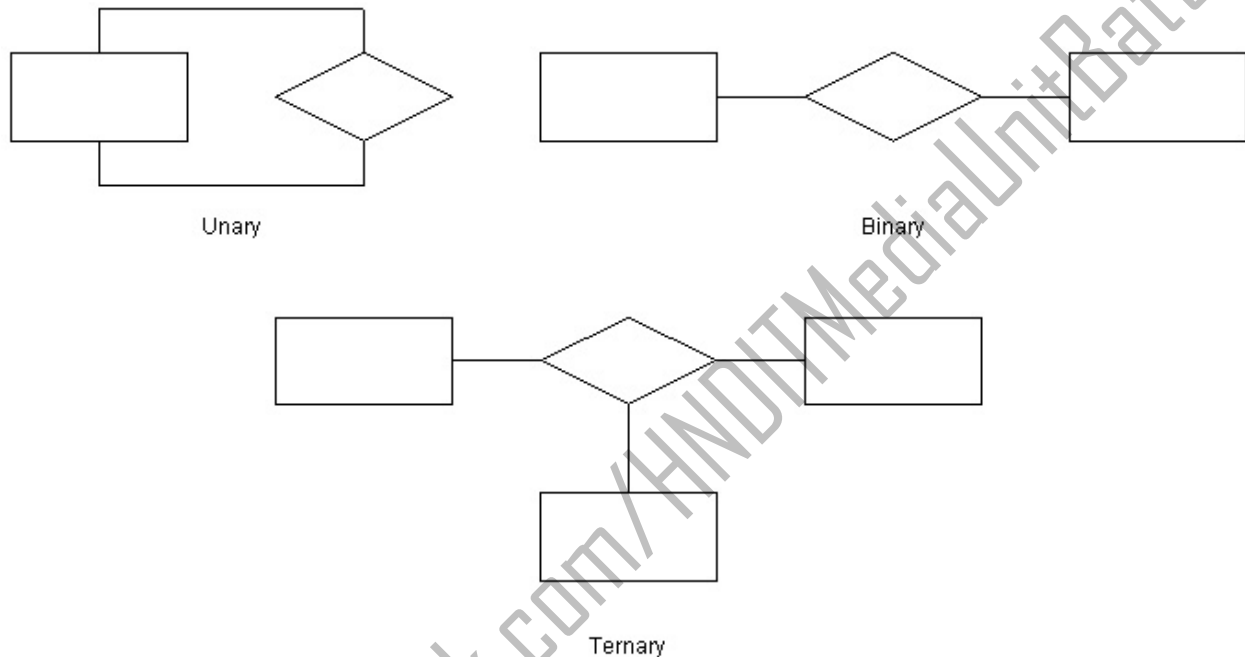
(04 Marks)

b) Consider following ERD fragment and write the name of following attribute if it exist.

i.   Name key attribute
ii. Multivalue attribute
iii. Composite Attribute
iv. Derived Attribute
v.   Stored Atribute

SubjectID   Lecture_Room   Start_date   SUBJECT   days
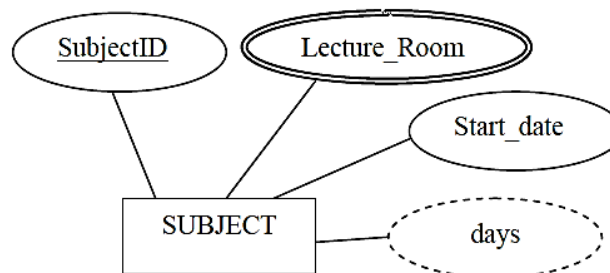
(04 Marks)

c)
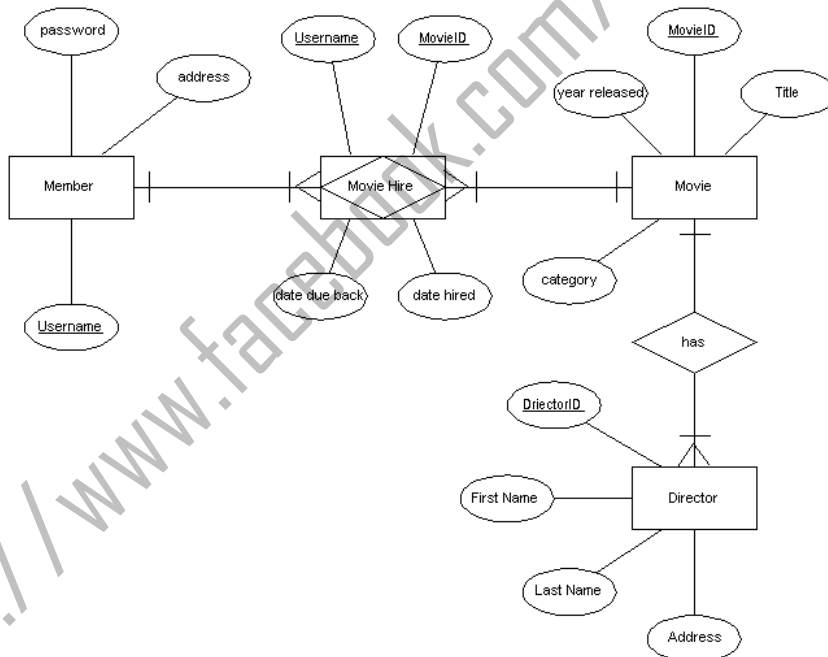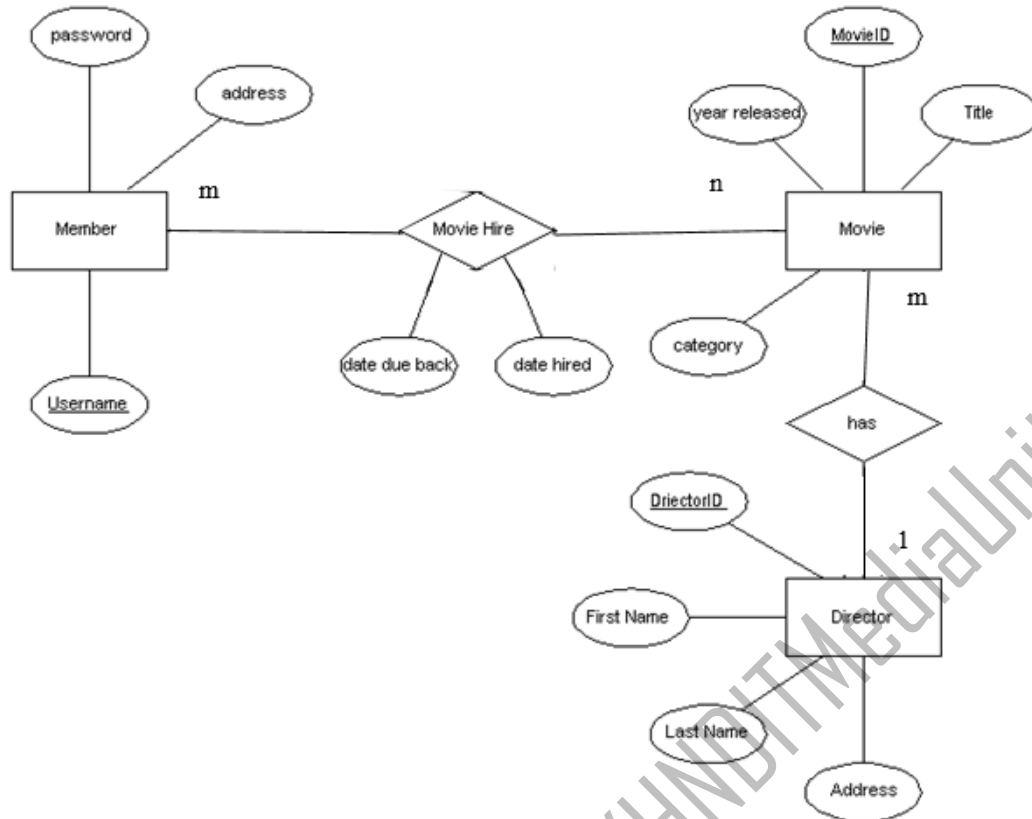
d) Convert following ERD fragment to corresponding relations.   (08 Marks)

Stident(Student_ID , FirstName, LastName, Date_of_Birth)
Subject(Subject_code , Title)

Subject_Lecturer (<u>Subject_code</u> , Lecturere)

Stu_Register_Sub (<u>Student_ID , Subject_code</u> , Date)

Identifying Relation , Primary key and attributes 02 marks x 4 =08 marks

(Total 25 marks)

Q4.

a) Consider the following schema:

Student_Info(StudentNo:Integer; Name:varchar(50), Major:char(4); GPA:float)

Write SQL statements to perform the following   (3*6 = 18 Marks)

i. Create the above table

CREATE TABLE Student_Info (

StudentNo Integer,
Name varchar (50),
Major:char(4),
GPA real,
PRIMARY KEY (StudentNo)
);

ii. Insert the following information:

StudentNo	Name	Major	GPA
100	Sampath	EE	3.5
101	Nishani	CSE	3.4

INSERT INTO Student_Info **VALUES** (100, 'Sampath', 'EE', 3.5)

INSERT INTO Student_Info **VALUES** (101, 'Nishani', CSE', 3.4)

iii. Update Sampath's GPA to 3.7.

UPDATE Student_Info **SET** GPA = 3.7 where StudentNo=100;

iv. Write the SQL statement to delete student_Info table from the Database

DROP TABLE Student_Info;

v. Add a column address (i.e. address: varchar(50)) to the *Student* table.

ALTER TABLE Student_Info **ADD** address VARCHAR(50);

vi. Change the data type of address column into varchar(100).

ALTER TABLE Student_Info **ALTER COLUMN** address VARCHAR(100);

b) Consider the following schemas: Write SQL statements to perform the following

Emp_Information (**EId**, name, salary, dept, address)

Department (**DeptNo**, dname, building, mgr)

i. Print all employee names. (2 Marks)

Select * from **Emp_Information**

ii. Print names of employees working for 'Administration' (i.e. dname) department.
(2 Marks)

SELECT   e.name

FROM   **Emp_Information** e, **Department** d

WHERE   e.dept=d.DeptNo AND d.dname=' Administration'

iii. Print names of employees working for 'Administration' (i.e. dname) department and getting a salary > Rs. 50,000. (3 Marks)

SELECT   e.name

FROM   **Emp_Information** e, **Department** d

WHERE   e.dept=d.DeptNo AND d.dname=' Administration' AND e.salary> Rs. 50,000

Q5.

a) Normalization is the process of decomposing relations with anomalies to produce smaller, well-structured relations.
   a. It is the primary tool to validate and improve a logical design so that it satisfies certain constraints that avoid unnecessary duplication of data.
   b. A formal process for deciding which attributes should be grouped together in a relation.
   c. There are several rules to convert into normal forms.
   d. (Any 02 answers, 05 marks)

b)
- VIN--→Make, Model, Color
   o VIN is the determinant and make, model and color are dependencies (02 marks)

- ISBN--→Title, Author name, Price
   o ISBN is the determinant and title, author name and color are dependencies (03 marks)

c) 1st Normal form (1NF)

a. First normal form = contains no multivalued attributes.
b. Contains only atomic values.
c. There are no repeating groups.   (01 mark)

2nd Normal form (2NF)

Already in 1NF and every nonkey attribute is fully functionally dependent on the primary key.
Thus no nonkey attribute is functionally dependent on part (but not all) of the primary key.
                                                                          (02 marks)

3rd Normal form (3NF)

3NF = already in 2NF and no transitive dependencies exist
Transitive dependency = a functional dependency between two (or more) nonkey attributes.
(02 marks)

d) To bring this table to first normal form, we split the table into two tables and now we have
    the resulting tables:

    1NF

    TABLE_PRODUCT_PRICE

Product ID	Price
1	15.99
2	23.99
3	17.50
4	9.99
5	29.99

    TABLE_PRODUCT_COLOR

Product ID	Color
1	red
1	green
2	yellow
3	green
4	yellow
4	blue
5	red

                                                                          (05 marks)

e) 2NF

    TABLE_PURCHASE

Customer ID	Store ID
1	1
1	3
2	1
3	2
4	3

    TABLE_STORE

Store ID	Purchase Location
1	Los Angeles
2	New York
3	San Francisco

                                                                          (05 marks)
                                                                       (Total 25 marks)