Faculty of Computing and Technology

Department of Computing

Bachelor of Science (Hons) in Computer Science | Software Engineering | Information Technology

End - Semester Examination

Year 2023, Semester 01 -Batch 01

CS|SE|IT1105 – Database Management Systems

Duration: 3 Hours

Instructions to the candidates:

1. Answer all the questions.
2. Illustrate your answers with clear diagrams wherever applied.
3. The paper is marked out of 100 Marks.
4. Follow the General Guidelines given by the Department of Examination for exam Start time and closing time.

Question 01

a) Briefly define a Weak Entity using an example.

02 Marks

b) Define the Degree of a relation?

01 Mark

c) Describe each of the following database terms accurately and concisely. Give example for each.

    i. Descriptive attribute

    ii. Unary relationship

    iii. Total participation

    iv. Composite attribute

08 Marks

d) Explain the difference between an entity and an attribute. Explain using an appropriate example.

04 Marks

e) Describe why it is necessary to use primary key and foreign key in a relation?   05 Marks

[Total – 20 Marks]

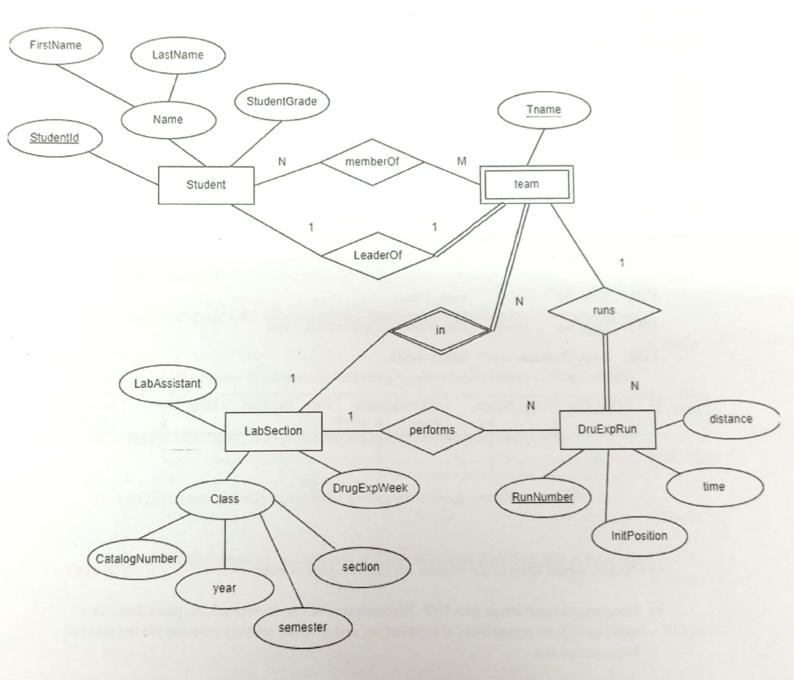## Question 02

ABC Product Tracking System

ABC is a company that maintains up-to-date information about the processing and current location of each shipped item. Shipped items are the heart of the Product Tracking Information System of the company. Shipped items are characterized by a unique item number, a weight, dimensions, insurance amount, destination, and a final delivery date. Shipped items are received into the ABC system at a single retail center. Retail centers are characterized by their type, unique- ID, and address. Shipped items make their way to their destination through one or more transportation events. These transportation events are characterized by a unique schedule number, a type of delivery (ex: flight, truck), and a delivery route.

a) As the database designer of the database of ABC product tracking information system, model the Entity Relationship diagram (ER Diagram) to capture this information. Make all necessary assumptions and clearly mention it.

[Total – 20 Marks]

2

Question 03

Map the ER diagram given below to a relation schema.
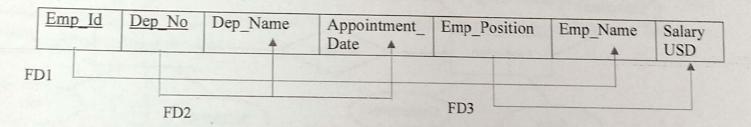

[Total – 20 Marks]

3

Question 04

The table below shows the employee and department information of 'XYZ Private Ltd'.

Dep_Emp

Emp_Id	Dep_No	Dep_Name	Appointment_ Date	Emp_Position	Emp_Name	Salary USD
E01	D01	Finance	01/05/2002	Coordinator	Shalini	75
E02	D02	Marketing	14/08/2012	Manager	Anuki	100
E03	D03	Management	03/07/2013	Senior Lecturer	Perera	126
E04	D04	Computing	25/04/2002	Lecturer	Harsha	56
E05	D05	Nursing	14/04/2006	Coordinator	Ama	45

Dep_Emp table Primary Key: - (Emp_Id, Dep_No)

Answer the following question using the table and dependencies given below on the Dep_Emp table.

FD1   Emp_Id $\longrightarrow$ Emp_Name

FD2   Dep_No $\longrightarrow$ Dep_Name, Appointment_Date

FD3   Emp_Position $\longrightarrow$ Salary USD

Emp_Id	Dep_No	Dep_Name	Appointment_ Date	Emp_Position	Emp_Name	Salary USD

FD1

FD2

FD3

a) Which normal form is the relation in? Explain your answer.   **8 Marks**

b) Decompose the relation into 3NF. For each step of the decomposition procedure, state what functional dependency it is based on, and give the relation schemas are the step has been carried out.

12 Marks

[Total – 20 Marks]

Question 05

Consider the relational schemas given bellow.

Student (<u>Sid</u>, Studentname, GPA, Faculty, Address)

Grade (<u>Sid, Cid</u>, Marks, Grade)

Course (<u>CourseNumber</u>, CourseName, Credits)

Write queries in SQL to retrieve the following information.

a) Retrieve the names of students who belong to the computing faculty and scored the GPA greater than 3.5.

2 Marks

b) Find the average GPA of each faculty. Sort the result by faculty in descending order.

3 Marks

c) Retrieve the names of all courses followed by the student Sampath Weerasinghe.

3 Marks

d) Find the number of A's for the subject Database Management systems.

4 Marks

e) List the names and IDs of students having the average marks greater than 75.

4 Marks

f) List down the names of students whose GPA is greater than Sampath Weerasinghe's GPA.

4 Marks

[Total – 20 Marks]