VIT UNIVERSITY
(Estd. u/s 3 of UGC Act 1956)

SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING
Department of Information Technology
B. Tech. (Information Technology)
Continuous Assessment Test I – August 2019

Course Code: ITE1003
Faculty Name: Dr. Bimal Kumar Ray
Duration: Ninety Minutes

Course Title: Database Management Systems
Slot: F1
Class Number: 2585
Maximum Marks: 50

Answer ALL questions (10 × 5 = 50)

1. (a) What are the different types of database end users? Discuss the main activities of each. (7)

(b) Write down a formal (mathematical) definition of foreign key. (3)

2. The Prescriptions-R-X chain of pharmacies needs to store the following information in their database. Patients are identified by a social security number, and their names, addresses, and ages must be recorded. Doctors are identified by a social security number. For each doctor, the name, specialty, and years of experience must be recorded. Each pharmaceutical company is identified by name and has a phone number. For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer. Each pharmacy has a name, address, and phone number. Every patient has a primary physician. Every doctor has at least one patient. Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another. Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored. Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract. Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Design an entity-relationship diagram for the above data requirements. Indicate key constraints, cardinality constraints and participation constraints on the diagram. (10)

3. Design an enhanced entity-relationship schema diagram to keep track of information for an art museum. Assume that the following data requirements were collected.

The museum has a collection of ART_OBJECTs. Each ART_OBJECT has a unique Id_no, an Artist (if known), a Year (when it was created, if known), a Title, and a Description. The art objects are categorized in several ways, as discussed below. ART_OBJECTs are categorized based on their type. There are three main types: PAINTING, SCULPTURE, and STATUE, plus another type called OTHER to accommodate objects that do not fall into one of the three main types. A PAINTING has a Paint_type (oil, watercolor, etc.), material on which it is Drawn_on (paper, canvas, wood, etc.), and Style (modern, abstract, etc.). A SCULPTURE or a statue has a Material from which it was created (wood, stone, etc.), Height, Weight, and Style. An art object in the OTHER category has a Type (print, photo, etc.) and Style. ART_OBJECTs are categorized as either PERMANENT_COLLECTION (objects that are owned by the museum) and BORROWED. Information captured about objects in the PERMANENT_COLLECTION includes Date_acquired, Status (on display, on loan, or stored), and Cost. Information captured about BORROWED objects includes the collection from which it was borrowed, Date_borrowed, and Date_returned. Information describing the country or culture of Origin (Italian, Egyptian, American, Indian, and so forth) and Epoch (Renaissance, Modern, Ancient, and so forth) is captured for each ART_OBJECT. The museum keeps track of ARTIST information, if known: Name, DateBorn (if known), Date_died (if not living), Country_of_origin, Epoch, Main_style, and Description. The Name is assumed to be unique. (10)

4. Convert the following entity-relationship diagram into relational database schema. (10)
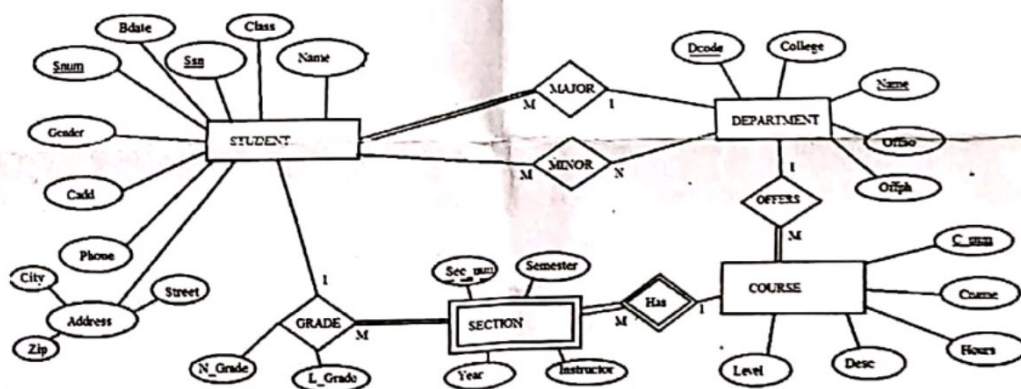
5. Consider the following MAILORDER relational schema describing the data for a mail order company.

PARTS(Pno, Pname, Qoh, Price, Olevel)   CUSTOMERS(Cno, Cname, Street, Zip, Phone)

EMPLOYEES(Eno, Ename, Zip, Hdate)   ZIP_CODES(Zip, City)

ORDERS(Ono, Cno, Eno, Received, Shipped) ODETAILS(Ono, Pno, Qty)

Qoh stands for *quantity on hand*: the other attribute names are self-explanatory. Specify the following queries in relational algebra on the MAILORDER database schema.

(a) Retrieve the names and cities of employees who have taken orders for parts costing more than $50.00. (2)

(b) Retrieve the pairs of customer number values of customers who live in the same ZIP Code. (3)

(c) Retrieve the names of customers who have not placed an order. (2)

(d) Retrieve the names of customers who have ordered parts from employees living in the city Wichita. (3)

2