

M.C.A DEGREE EXAMINATIONS, APRIL / MAY 2013

R-2009

FOURTH SEMESTER

MC9248: CASE TOOLS LAB

TIME: 3 HOURS

MARKS: 100

1. a. Draw a use case diagram for a ticket distributor for a train system. The system includes two actors: a traveler, who purchases different types of tickets, and a central computer system, which maintains a reference database for the tariff. Use cases should include: BuyOneWayTicket, BuyWeeklyCard, BuyMonthlyCard, and UpdateTariff. Also include the following exceptional cases: Time-Out (i.e., traveler took too long to insert the right amount), TransactionAborted (i.e., traveler selected the cancel button without completing the transaction), DistributorOutOfChange, and DistributorOutOfPaper. (45)
- b. Model Sequence diagrams for any two use cases you have modeled for the above scenario. (45)
- c. *Viva- Voce – 10 marks*

2. Consider the following scenario:

The goal is to process different types of credit applications at a bank. The credit applications include those for home equity loans, home mortgage loans, auto loans, and credit cards. From the bank's perspective, therefore, the customers are home owners, home buyers, auto buyers, and credit card applicants. To process any type of loan or credit card application, the bank needs to check the applicants credit history, based on a report from the credit bureau. For the first two types of loans, the bank summons and assessor to assess the property value before making a decision.
- a. Model a use case diagram. (45)
- b. Model an activity diagram. (45)
- c. *Viva- Voce – 10 marks*

3. a. Consider the following scenario:

Job Portals are the most popular and widely used tool by companies and recruitment teams to facilitate the smooth flow of recruitment process in the competitive world. Job Portals provide a platform for the employers to meet the prospective employees. The job aspirants can register in job Portals by creating a user ID. Job Portals allow users to submit and edit their resumes and apply for specific jobs at companies of their choice. Once registered, job aspirants get e-mail job alerts and can respond to job related questions from the employer companies. The companies have the choice to search for their ideal candidate from the resume database using various options and parameters available in the job Portals. The job portal presents the employers with options to post online questionnaires and latest news to the employees. The portal has the tips to build admirable resume and information on do's and don'ts for the interview. The portal supports the employer from listing of jobs to selecting an ideal candidate. Easy data collection and storage feature of the portal helps in finishing the tasks comfortably and quickly. The employers can get quick returns for their investment as the portal incorporates a simple and quick recruitment method.

- a. Model a use case diagram. (45)
- b. Model a class diagram, stating any assumptions you make. (45)
- c. ***Viva- Voce – 10 marks***
4. a. A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Model a class diagram for this application, stating any assumptions you make. (45)
- b. Generate source code for the class diagram you have modeled. (45)
- c. ***Viva- Voce – 10 marks***

5. a. Consider a MAIL_ORDER database in which employees take orders for parts from customers. The data requirements are summarized as follows:

- The mail order company has employees, each identified by a unique employee number, first and last name, and Zip Code.
- Each customer of the company is identified by a unique customer number, first and last name, and Zip Code.
- Each part sold by the company is identified by a unique part number, a part name, price, and quantity in stock.
- Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded.

Model a class diagram, stating any assumptions you make. (45)

b. Generate source code for the class diagram you have modeled. (45)

c. *Viva- Voce – 10 marks*

6. a. Consider a MOVIE database in which data is recorded about the movie industry. The data requirements are summarized as follows:

- Each movie is identified by title and year of release. Each movie has a length in minutes. Each has a production company, and each is classified under one or more genres (such as horror, action, drama, and so forth). Each movie has one or more directors and one or more actors appear in it. Each movie also has a plot outline. Finally, each movie has zero or more quotable quotes, each of which is spoken by a particular actor appearing in the movie.
- Actors are identified by name and date of birth and appear in one or more movies. Each actor has a role in the movie.
- Directors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie (including one that he or she may also direct).
- Production companies are identified by name and each has an address. A production company produces one or more movies.

Model a class diagram, stating any assumptions you make. (45)

b. Generate source code for the class diagram you have modeled. (45)

c. *Viva- Voce – 10 marks*

7. a. Consider a CONFERENCE_REVIEW database in which researchers submit their research papers for consideration. Reviews by reviewers are recorded for use in the paper selection process. The database system caters primarily to reviewers who record answers to evaluation questions for each paper they review and make recommendations regarding whether to accept or reject the paper. The data requirements are summarized as follows:

- Authors of papers are uniquely identified by e-mail id. First and last names are also recorded.
- Each paper is assigned a unique identifier by the system and is described by a title, abstract, and the name of the electronic file containing the paper.
- A paper may have multiple authors, but one of the authors is designated as the contact author.
- Reviewers of papers are uniquely identified by e-mail address. Each reviewer's first name, last name, phone number, affiliation, and topics of interest are also recorded.
- Each paper is assigned between two and four reviewers. A reviewer rates each paper assigned to him or her on a scale of 1 to 10 in four categories: technical merit, readability, originality, and relevance to the conference. Finally, each reviewer provides an overall recommendation regarding each paper.
- Each review contains two types of written comments: one to be seen by the review committee only and the other as feedback to the author(s).

Model a class diagram, stating any assumptions you make. (45)

b. Generate source code for the class diagram you have modeled. (45)

c. *Viva- Voce – 10 marks*

8. The following narrative describes a simplified version of the organization of Olympic facilities planned for the summer Olympics. The Olympic facilities are divided into sports complexes. Sports complexes are divided into one-sport and multisport types. Multisport complexes have areas of the complex designated for each sport with a location indicator (e.g., center, NE corner and so on). A complex has a location, chief organizing individual, total occupied area, and so on. Each complex holds a series of events (e.g., the track stadium may hold many different races). For each event there is a planned date, duration, number of participants, number of officials, and so on. A roster of all officials will be maintained together with the list of events each official will be involved in. Different equipment is needed for the events (e.g., goal posts, poles, parallel bars) as well as for maintenance. The two types of facilities (one-sport and multisport) will have different types of information. For each type, the number of facilities needed is kept, together with an approximate budget.

a. Model a class diagram, stating any assumptions you make. (45)

b. Generate source code for the class diagram you have modeled. (45)

c. *Viva- Voce – 10 marks*

9. a. A database has to be designed to keep track of information for an art museum.

Assume that the following requirements were collected:

- The museum has a collection of ART_OBJECTS. Each ART_OBJECT has a unique id, 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, Date Born (if known), Date died (if not living), Country of origin, Epoch, Main style, and Description. The Name is assumed to be unique.
- Different EXHIBITIONS occur, each having a Name, Start date, and End date. EXHIBITIONS are related to all the art objects that were on display during the exhibition.

- Information is kept on other COLLECTIONS with which the museum interacts, including Name (unique), Type (museum, personal, etc.), Description, Address, Phone, and current Contact person.

Model a class diagram, stating any assumptions you make. (45)

b. Generate source code for the class diagram you have modeled. (45)

c. *Viva- Voce – 10 marks*

10. a. Develop a Use case diagram for a Banking System. State the business rules you are taking into consideration. (45)

b. Consider the following Use Cases that play a role in the Banking System you have developed:

- i. Deposit
- ii. Withdraw

Model Sequence diagrams for the above two use cases. (45)

d. *Viva- Voce – 10 marks*

11. Consider the following Scenario:

It is proposed to build a system to automate the ordering and billing activities of a restaurant. The system is distributed: waiters are provided with handheld devices to take orders. The handheld devices communicate orders to the kitchen and to the cashier. The handheld devices receive real-time information about availability of the different items in the menu. Once placed, orders can be changed by the customers, within a time frame from the order (5 minutes) or after the time-out, if the corresponding order has not yet been processed by the Cook. The system computes bills and is also used to manage reservations of tables. Reservations can either happen by phone or via the internet.

a. Develop a Use case diagram for the above scenario. (45)

b. Model Sequence diagrams for any two use cases you have identified for the above scenario. (45)

c. *Viva- Voce – 10 marks*

12. Consider the following Scenario:

The purpose of the Open Access Insurance System is to provide automotive insurance to car owners. Initially, prospective customers fill out an insurance application, which provides information about the customer and his or her vehicles. This information is sent to an agent, who sends it to various insurance companies to get quotes for insurance. When the responses return, the agent then determines the best policy for the type and level of coverage desired and gives the customer a copy of the insurance policy proposal and quote.

a. Develop a Class diagram for the above scenario. (45)

b. Develop an activity diagram for the above scenario. (45)

c. *Viva- Voce – 10 marks*

13. Consider the following scenario:

Here is what happens in a microwave oven:

- ✚ The oven is initially in an idle state with door open, where the light is turned on.
- ✚ When the door is closed it is now in idle with door closed, but the light is turned off.
- ✚ If a button is pressed, then it moves to initial cooking stage, where the timer is set and lights are on and heating starts.
- ✚ At any moment the door may be opened, the cooking is interrupted, the timer is cleared, and heating stops.
- ✚ Also while cooking, another button can be pushed and extended cooking state starts, where the timer gets more minutes. At any moment door can be opened here also.
- ✚ If the timer times out, then cooking is complete, heating stops, lights are off, and it sounds a beep.
- ✚ When the door is open, again the oven is in idle state with the door open.

a. Develop a Use case diagram for the above scenario. (45)

b. Develop a state transition diagram for the microwave oven. (45)

c. ***Viva- Voce – 10 marks***

14. Consider the following scenario:

Suppose that you are required to implement a system for a technical college to keep track of student information. The information stored for each student includes the student's number, name, address, phone number and fees due. The college has two types of students, namely, on-campus students and distance students. The points obtained by on-campus students must also be stored. Additional information that must be stored for distance students includes the city of the study centre they will report to and the duration over which they are completing the course. The fee for on-campus students is the sum of the course fee and a lab charge. In the case of distance students the fee is a sum of the subject cost plus a postage cost for notes. Each student enrolls for a course. The details those are stored for each course is the name of the course, the subjects that need to be completed and the minimum duration of the course.

a. Using CASE workbench develop analysis and design models for the above.

(90)

b. *Viva- Voce – 10 marks*

15. Consider the following scenario:

Hamen's bank manages a number of customer accounts. A customer can have one of three types of accounts, namely, a current account, a savings account or a loan account. Details that need to be stored for each customer include the customer's ID number, name, address and telephone number. Each account has an account number and balance. Money can be withdrawn from an account or deposited into the account. In the case of both the savings and current accounts a withdrawal results in the balance being decreased while in the case of a loan account the balance is increased. Similarly, a deposit results in the balance being increased for the current and savings accounts and decreased for the loan account. For each current account the customer's profile, can be gold, silver or bronze. This information needs to be stored for each current account as accounts in these different categories have different benefits. Whenever a deposit is made into a savings account the customer earns interest on the updated balance at a given rate. The interest rate used needs to be stored for each savings account. Additional information needed for each loan account includes the duration of the loan in months, loan limit, and the monthly installments.

a. Using CASE workbench develop analysis and design models for the above.

(90)

b. *Viva- Voce – 10 marks*
