L-3/T-1/CSE Date : 14/01/2017

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-1 B. Sc. Engineering Examinations 2015-2016

Sub : **CSE 307** (Software Engineering and Information System Design)

Full Marks : 280 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. A library keeps records of current loans of books to borrowers. Each borrower is identified by borrower number and each copy of a book by an accession number. The information held about books is the title, author's name/s, publisher's name, publication date, international standard book number (ISBN - a unique book identifier), purchase price, classification (reference or fiction), and number of pages. A given book may be written by a number of different authors. A book may cover a number of different subjects. When a member of the library issues a borrow request, s/he is granted it if the book is available and his/her personal borrowing restriction is not violated. Each member has a restriction of maximum number of books to be allowed to borrow at a time depending on the type of membership, e.g., student/teacher. When a book is borrowed, the return date is automatically recorded based on the current date and the borrower's classification. Other borrowers, pending their return, may reserve books out on loan. Borrowers who hold overdue books or who have reached their loan limit, are flagged to prevent further borrowings. **(15+18+13 2/3)**

   (i) Design a **Class** diagram to implement Library system described above.

   (ii) Design **Collaboration** diagram for the book borrowing scenario.

   (iii) Draw a **State** Diagram for an Object of Book class showing the associated actions.

2. (a) Suppose we are designing an Accounting Software. We have a class named **Account** to represent the accounting heads in the chart of accounts. In each transaction one account is debited and at the same time another account is credited. There are classes called **Debtor** and **Creditor** which stores the information which account is debited and which account is credited. An account may have children. The account that does not have any child is called leaf account. An account that has any transaction associated with it cannot be deleted. Also an account which has child cannot be deleted. **(18)**

   Draw the sequence diagram of an account deletion use case where the user is first presented with a list of accounts and user can select one to delete. If the deletion is successful the user will be notified and if it is not possible then the user will be shown a message saying why it is not possible.

   (b) Discuss *white-box* testing in brief. What are the advantages and disadvantages of white-box testing? **(12 2/3)**

   (c) Discuss how *confidentially*, *integrity* and *non-repudiation* are implemented for software applications. **(16)**

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3. (a) The requirement specification of a web-based software application stated that maximum 100 users may access simultaneously. After deployment the application failed to response properly when 90 users accessed at a time. It was recovered later and then on a certain occasion 150 users tried to access and again it crashed. Which two software testing methods could prevent those two failures respectively? **(8)**

(b) Discuss MVC architecture with advantages and disadvantages. What indirect benefits are offered by Code Review practice in a software development company? **(12+10 2/3)**

(c) If a student gets mark less than 50, s/he gets F grade. For 51-60 s/he gets C, for 61-70 gets B, and for marks obtained more than 70 he received grade A. Mark less than 0 is invalid. Write a java method to implement JUnit testing that will take mark as input and test the program that computes grade with the rule discussed above. Check for all boundary values as well as invalid input. **(16)**

4. (a) A news agency gathers new and publishes them to different subscribers. You need to create a framework for an agency to be able to inform immediately, when event occurs, its subscribers about the event. The subscribers can receive the news in different ways: Emails, SMS, etc. The solution need to be extensively enough to support new types of subscribers (may be new communication technologies will appear). What will be the appropriate design pattern to implement this scenario? Draw the diagram and write Java code to implement the solution. **(20)**

(b) Briefly discuss eight common bad practices found in software development from the security viewpoint. **(12)**

(c) What should you keep in mind to avoid merge conflict in version controlling systems? What are the advantages of distributed version control system? **(14 2/3)**

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) What are different layers in software architecture? Briefly explain. **(10)**

(b) In terms of use-case modeling, define the "extends" relationship with example. **(10)**

(c) Distinguish between thin client and fat client. **(6 2/3)**

(d) The Pizza Ordering System: **(20)**

The Pizza Ordering System allows the user of a web browser to order pizza for home delivery. To place an order, a shopper searches to find items to purchase, adds items one at a time to a shopping cart, and possibly searches again for more items. When all items have been chosen, the shopper provides a delivery address. If not paying with cash, the shopper also provides credit card information. The system has an option for shoppers to register with the pizza shop. They can then save their name and address information, so that they do not have to enter this information every time that they place an order. Develop a use case diagram, for the Pizza Ordering System. The system should allow a user to register and log in, and PaybyCredit, which requires credit card payments.

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6. (a) What is payback analysis? Explain briefly how it works. **(10 2/3)**

(b) Distinguish between distributed and centralized architecture. What are the disadvantages of distributed architecture? **(12)**

(c) Consider the following problem description: **(20)**

A major penal centre (PC) has been built outside the town of Dhaka for keeping prisoners convicted of only one offense of white collar crimes. The prison facility has a constant flow of prisoners into and out of the prison. They are also moving prisoners within the prison based on their good behaviour. On a day to day basis, approximately 136 prisoner changes take place. The changes are processed in the prison control centre office by Control Centre Officer (CCO). Each day, the new prisoner processing division receives the new prisoners, conducts a physical examination, assigns the prisoners to living quarters and sends the information file on the new prisoners to CCO's office. CCO adds information on the new prisoner to a prisoner information database kept on the PC. CCO also updates the prisoner locator log which keeps records of where each prisoner resides. Finally, CCO files the actual folder away in an enormous storehouse of file cabinets which contain information on all prisoners who have ever stayed at Dhaka prison. If a new prisoner is found to have been a previous occupant of Dhaka prison, CCO consolidates both files. As prisoners stay at Dhaka prison, the officials review their behaviour record. Good behaviour or closeness to release time warrant an upgrade in accommodations, usually to minimum security housing. Movement of prisoners to new quarters is done on a weekly basis. Orders are issued to move the prisoners and the move information is sent to CCO. CCO makes these changes in the prisoner locator log and the prisoner information database. CCO also pulls the prisoners long term file and notes good behaviour commendations. A release review and parole board reviews prisoner records on a daily basis and generates a set of prisoners to be released either into the custody of a parole officer or without any restrictions. They notify the prisoner and send an update of the release to CCO's office. CCO removes the prisoner from the prisoner information database and prisoner locator log and update the long-term file of the prisoner to reflect the release.

Draw a data flow diagram for describing the functional requirements of the above system.

(d) What is discovery prototyping? **(4)**

7. (a) What is software validation? Describe the software testing phases with necessary diagram. **(10)**

(b) Discuss about the phase of classic life-cycle model. Write down the advantages of the model. **(10)**

(c) Draw the activity diagram of project planning process. **(10)**

(d) Describe the difference between plan-driven and agile approaches with a diagram. What are the advantages and drawbacks of agile approaches? **(16 2/3)**

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8. (a) The following table sets out a number of tasks of a project, their durations and dependencies. How many days are required to complete the project? Draw a bar chart showing the project schedule. **(16 2/3)**

Task	Duration (days)	Dependencies
T1	10	
T2	15	T1
T3	10	
T4	20	T2, T3
T5	15	
T6	10	T3, T5
T7	20	T3
T8	25	T6
T9	15	T4
T10	5	T5, T9
T11	10	T1, T3, T9
T12	20	T11

(b) Suppose you have got a project to develop a fully functional system within a very short time period. Which process model will you choose to complete such a project? Illustrate the model. What are the factors that may influence you to reject the project offer? **(15)**

(c) Briefly discuss about the risk management process with necessary diagram. Write down the potential indicators for each of the following risk type: **(9+6=15)**

(i) People

(ii) Organizational

(iii) Estimation
