

Date of Examination: 23/05/2019

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department: Computer Science and Engineering

Program: Bachelor of Science in Computer Science and Engineering

Semester Final Examination: Fall 2018

Year: 3rd

Semester: 2nd

Course Number: CSE3223

Course Name: Information System Design and Software Engineering

Time: 3 (Three) hours

Full Marks: 70

[There are seven questions carrying a total of 14 marks each. Answer any five questions.
Marks allotted are indicated in the right margin.]

1. a) It is often seen that significant class time is wasted on taking attendance, or the class may face interruption due to late entries of students. Therefore, to improve security, and the value-added services at the campus, university authority have decided to come up with a “One card solution” which uses radio frequency identification (RFID) and magnetic stripe readers. Typically, this smart card can be filled with credit using any authorized debit card which allows them to use their IDs like an on-campus debit card. For a greater level of security, this can be verified with a 4-digit PIN while making a transaction for on-campus services. Beyond the security benefits, this “One card solution” offers wide range of additional benefits: -

1. Controlled entries on the entire campus
2. Attendance recording of the students
3. Payment of semester fee
4. Vending machine purchases without the hassle of searching for coins
5. Student deals at Canteen and Books with reduced prices
6. Activity passes for workshop, seminar and conferences
7. Car parking management system
8. Fundraising activities in the campus
9. Controlled access to Library, Reading Room and Common Room

Now from the given project description,

- i) Perform feasibility study to decide whether the proposed system is worth implementing or not. [3]
 - ii) Design some close-ended and open-ended questions to gather user requirements. [5]
- b) Draw a sequence diagram that models the following scenario. Make sure to model all relevant actors and the interactions between them. [6]

A final exam question for a given course is prepared by the instructor of that course and submitted to the departmental moderation committee by a certain date. After some checking and correction, the moderation committee further sends all questions to the controller of the examination where copies are made in a secret room named strong room. On the day of the exam, copies are given to the room in charge who takes them

to the room where the exam takes place. The students write the exam on an exam copy and return to the invigilator of that room at the end of the exam. The written exam copies are given to the instructor for marking.

2. a) The students of different departments have decided to arrange an intra-university premier league (UPL). A cricket team can have players from different departments. The following is an object model which captures some basic information about UPL. In answering the following questions, state and describe any assumptions that you make.

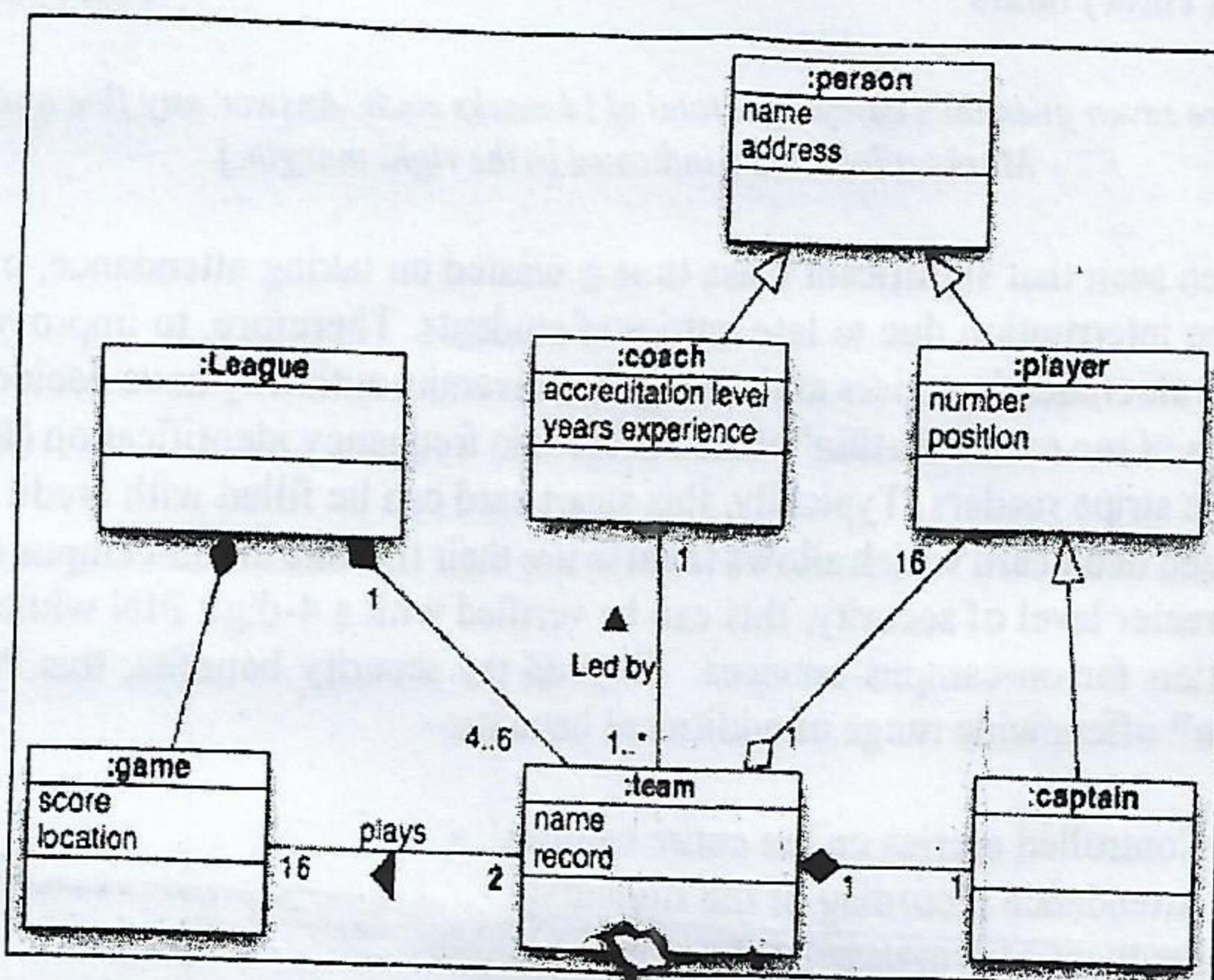


Figure 1. Object Diagram of UPL

- How many games will a captain play in? [1]
- What is the maximum number of games that any given coach can be involved in? [1]
- In the model, the relationship between player and team is shown as an aggregation, while that between captain and team is shown as a composition. Is this a good choice? Why? [2]
- The UPL actually has two types of game: *regular games and playoffs*. Each team plays 4 regular games against each of the other teams. Every team also gets to play in the playoffs, which are conducted as a knockout – a team is out of the playoffs when it loses a playoff game. How would you modify the model to capture this additional information? [3]
- The UPL is being expanded to include five different age groups. Players are placed into teams based on their year of birth, and teams only play other teams from the same age group. How would you modify the model to capture this additional information? [3]

- b) The **UPL** cricket league described in the previous question is planning to write a program to keep track of information during the cricket season, with the object model (from the previous question) as an initial design. So far, two use cases have been identified:
- Registering a new coach who wants to coach a particular team. [2]
 - Recording the result of a game (which includes updating the teams' records) [2]

Use sequence diagrams to sketch an initial design for each of these two use cases, showing which class will be responsible for the various functions, and how these classes will communicate via method calls. State any assumptions you make, including any changes you think are necessary to the class model.

3. a) Identify different stakeholders for the following scenario. List the functional and non-functional requirements grouped by each individual stakeholder. [7]

Picnics RUs (PRU) is a small catering firm with five employees. During a typical summer weekend, PRU caters 15 picnics with 20 to 50 people each. The business has grown rapidly over the past year, and the owner wants to install a new computer system for managing the ordering and buying process. PRU has a set of 10 standard menus. When potential customers call, the receptionist describes the menus to them. If the customer decides to book a picnic, the receptionist records the customer information (e.g., name, address, phone number, etc.) and the information about the picnic (e.g., place, date, time, which one of the standard menus, total price) on a contract. The customer is then faxed a copy of the contract and must sign and return it along with a deposit (often by credit card or check) before the picnic is officially booked. The remaining money is collected when the order is delivered. Sometimes, the customer wants something special (e.g., birthday cake). In this case, the receptionist takes the information and gives it to the owner who determines the cost. The receptionist then calls the customer back with the price information. Sometimes the customer accepts the price. But other times, the customer requests some changes, which have to go back to the owner for a new cost estimate. Each week, the owner looks through the picnics scheduled for that weekend and orders the supplies (e.g., plates) and food (e.g., bread, chicken) needed to make them. The owner would like to use the system for marketing as well. It should be able to track how customers learned about PRU and identify repeat customers so that PRU can mail special offers to them.

- Describe the Waterfall model of software development. Use a diagram to illustrate your version of the waterfall model. [3]

- Consider a project with the following parameters. Compute the function points for this project. [4]

1. External Inputs
 - 12 with low complexity
 - 5 with average complexity
2. External Outputs
 - 16 with low complexity

- b. 2 with average complexity
- c. 8 with high complexity

3. External Inquiries

- a. 9 with low complexity
- b. 17 with high complexity

4. Internal Logical Files

- a. 6 with low complexity
- b. 11 with average complexity
- c. 13 with high complexity

5. External Interface Files

- a. 3 with low complexity
- b. 5 with average complexity

Functional Units	Weighting Factors		
	Low	Average	High
External Inputs (EI)	3	4	6
External Output (EO)	4	5	7
External Inquiries (EQ)	3	4	6
Internal Logical Files (ILF)	7	10	15
External Interface Files (EIF)	5	7	10

No Influence	Incidental	Moderate	Average	Significant	Essential
0	1	2	3	4	5

In addition to above, system also requires:-

1. Moderate Data Communication
2. Significant Performance
3. System is incidentally designed for multiple installation
4. The system requires no reliable backup and recovery
5. Significant influence on the internal processing complexity
6. The application is designed for essential change and ease of use by the user
7. Designed code maybe significantly reusable
8. The system requires moderate on-line data entry
9. No influence on the internal processing complexity

~~Other complexity adjustment factors are treated as average.~~

4. a) Design an ER diagram to capture the following requirements. State any assumptions you have that affects your design. Make sure cardinalities and primary keys are clear. [5]

A Bus Company owns a number of busses. Each bus is allocated to a particular route, although some routes may have several busses. Each route passes through a number of towns. One or more drivers are allocated to each stage of a route, which corresponds

to a journey through some or all of the towns on a route. Some of the towns have a garage where busses are kept and each of the busses are identified by the registration number and can carry different numbers of passengers, since the vehicles vary in size and can be single or double-decked. Each route is identified by a route number and information is available on the average number of passengers carried per day for each route. Drivers have an employee number, name, address, and sometimes a telephone number.

- ✓ b) Compare the Walston-Felix model with the SEL model on a software development [4] expected to involve 4 person-years of effort.

Models	Effort		Duration	
	a	b	a	b
SEL	1.4	0.93	4.6	0.26
Walston-Felix	5.2	0.91	4.1	0.36

- i) Calculate the number of lines of source code that can be produced.
 ii) Calculate the duration of the development.
 iii) Calculate the productivity in LOC/PY (Person Year).
 iv) Calculate the average manning.

- ✓ c) What is sampling? Briefly describe different probabilistic sampling methods. [2]
- ✓ d) What is COCOMO model? Compare different COCOMO models in terms of project [3] size, nature of project, innovation, deadline, and development environment.
5. a) Consider the scenario described in Question 3(a), draw a Use Case diagram that [6] contains Actors, Use Cases and their relationship from that scenario.
- ✓ b) What are the project management activities in order to plan and execute a project? [2]
- ✓ c) Differentiate between the following: - [6]
- i) Testing vs Debugging.
 ii) Use Case vs Test Case.
 iii) Black Box Testing vs White Box Testing.
- ✓ 6. a) Suppose that you are a manager of a project, draw a Gantt chart from the following [4] description (duration is in weeks). Identify the busiest week for the project.

Description of work	Task	Predecessor	Duration
Primary Proposal	A	None	3
Requirement Analysis	B	A	4
Feasibility Analysis	C	A	2
Design Class Diagram	D	None	4
Design Use Case Diagram	E	B	2
Design Entity Relationship Diagram	F	C	2
Design Interface	G	D,E	3
Programming and Implementation	H	D,B,F	4
Documentation and Installation	I	F,G,H	5

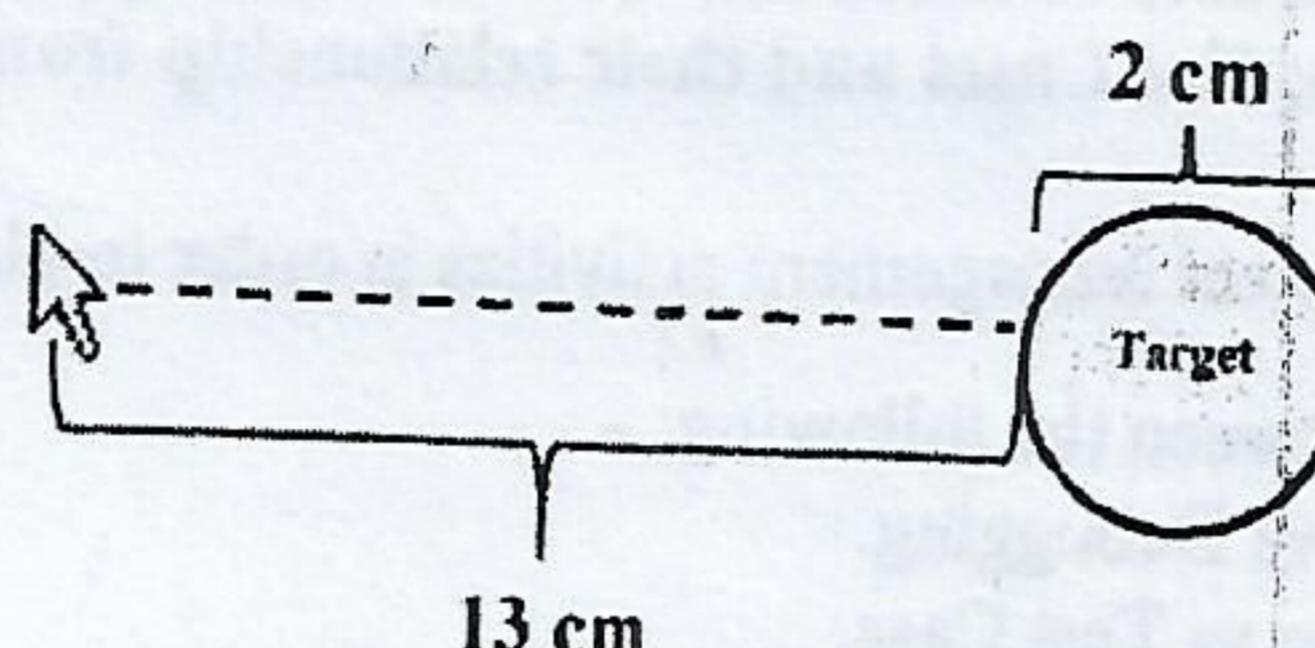
- b) What is Skill Audit? Explain it with an example. [2]
- c) In a recent study, it was shown that people don't get sad because their Facebook friends are sad. We get sad because our Facebook "friends" are happy. Some of the example scenarios are, [5]
- Notifications of career success from people who is in the same field as you, but you are unemployed.
 - Celebrations from Argentinian fan when you are a Brazilian supporter.
 - Pictures of your friends enjoying when you are in extreme final exam pressure.

Now your company wants to develop a Facebook Application which can control news feed based on the current status of a particular user. For instance, "Preparing for Exam", "Unemployed" and so on. Assume that you are the project manager of the aforementioned project. You are using your own windows machine for the development of this project and although you know web development, Facebook application development is new to you.

As a project manager, perform Risk Assessment with proper plans to mitigate the risks.

~~(d)~~ What is **60-30-10** rule? Why is blue the chosen color for different popular websites [3] like Facebook and Twitter?

~~a)~~ Consider the following situation, where you have to click a circle target which is 13cm away from the initial cursor position.

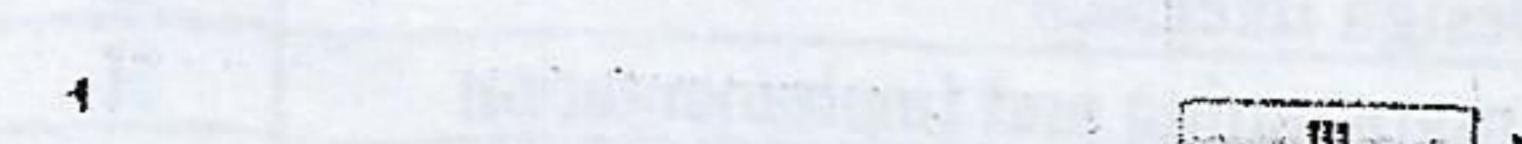


- How do you calculate the ID (*Index of Difficulty*) for this case? [2]
 - What is the significance of a and b in the Fitts' Law? How would we measure a and b? [2]
 - If $a=2$ and $b=5$, can we calculate Movement Time in this case? [1]
- b) The following figure shows the scroll bars on Windows versus Mac. Compare [2] between the two scroll bars and explain which one is better in terms of usability?

MAC



Windows



- c) Differentiate among Failures, Faults and Errors. [2]
- d) How would you design a test suite for this following web page using black box testing strategies? Be sure to give example tests for each suitable technique. [5]

You have been asked to test a web page intended to set up secure access to a banking system. The web page consists of a form that requests the user's date of birth (*dd-mm-yyyy*), 9-digit social security number (*all digits*) and an answer to a secret question (*open ended*), and stores these in a database.

Date of Examination: 27/06/2019 (4)

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department: Computer Science and Engineering

Program: Bachelor of Science in Computer Science and Engineering

Clearance / Improvement / Carryover Examination: Fall 2018

Year: 3rd Semester: 2nd

Course Number: CSE3223

Course Name: Information System Design and Software Engineering

Full Marks: 70

Time: 3 (Three) hours

[There are seven questions carrying a total of 14 marks each. Answer any five questions.
Marks allotted are indicated in the right margin.]

1. a) A dance studio receives an inquiry from a customer. A receptionist notes the inquiry into an inquiry file and forwards the file to the scheduling department. The scheduling department coordinator searches in the course catalog book to find a course description that best matches the customer's needs. The scheduling coordinator then searches the schedule files to find dates and times for that course. Finally, the scheduling coordinator sends the course description along with scheduled dates and times to the customer. Now the studio wants this process to be automated.

Now from the given project description,

- i) Perform feasibility study to decide whether the proposed system is worth [3] implementing or not.
- ii) Design some close-ended and open-ended questions to gather user [5] requirements.

- b) Draw a sequence diagram that models the following scenario. Make sure to [6] model all relevant actors and the interactions between them.

The Red Cross Blood Donor Centre (RCBDC) operates as follows: On the day of a blood donation, the Donation Unit receives blood donations from donors and sends them to the Testing Unit which tests each blood donation for blood type and potential viral agents. The Testing Unit then sends the blood donation along with test results to the Processing Office (another unit of the Centre) which fills a form for each tested blood unit where the tests are OK and sends the blood units and forms to the Distribution Office. If tests indicate that a blood unit may be contaminated with a viral agent, the Processing Office destroys that unit.

2. a) Draw a class diagram representing a book defined by the following statement: "A book is composed of a number of parts, which in turn are composed of a number of chapters. Chapters are composed of sections." Focus only on classes and relationships. [5]

- b) Draw an object diagram representing the first part of this book (i.e., Part I, Getting Started). Make sure that the object diagram you draw is consistent with the class diagram of the previous question 2(a). [5]
- c) Extend the class diagram to include the following attributes: [4]
- a book includes a publisher, publication date, and an ISBN.
 - a part includes a title and a number.
 - a chapter includes a title, a number, and an abstract.
 - a section includes a title and a number.

3. a) Identify different stakeholders for the following scenario. List the functional and non-functional requirements grouped by each individual stakeholder. [6]

ABC bank gives small loans to business owners in developing countries. The business owners meet weekly in groups, known as "*village banks*". Each group has an ID number and name. Each group is supported by a single loan officer, who may support many groups. ABC bank wants to set up a system to track group information along with the employee ID, name, and cell phone numbers of the loan officers. In addition, ABC bank system will store the following basic information about each client: ID number, name, gender, age, and current loan amount.

- b) What is UCD? Write down some important User Interface (UI) design principles. [4]
- Consider a project with the following parameters. Compute the function points for this project. [4]

1. External Inputs

- 6 with low complexity
- 8 with average complexity
- 8 with high complexity

2. External Outputs

- 6 with low complexity
- 12 with average complexity

3. External Inquiries

- 7 with low complexity
- 15 with average complexity
- 4 with high complexity

4. Internal Logical Files

- 4 with low complexity
- 3 with high complexity

5. External Interface Files

- 13 with low complexity
- 8 with average complexity

Functional Units	Weighting Factors		
	Low	Average	High
External Inputs (EI)	3	4	6
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In addition to above, system also requires:-

1. Moderate Data Communication
2. System is incidentally designed for multiple installation
3. The system requires no reliable backup and recovery
4. The application is designed for essential change and ease of use by the user
5. Designed code maybe significantly reusable
6. No influence on the internal processing complexity

Other complexity adjustment factors are treated as average.

4. a) Design an ER diagram to capture the following requirements. State any assumptions you have that affects your design. Make sure cardinalities and primary keys are clear. [5]

A football club has a name and a ground and is made up of players. A player can play for only one club and a manager, represented by his name manages a club. A footballer has a registration number, name and age. A club manager also buys players. Each club plays against each other club in the league and matches have a date, venue and score.

- b) Compare the Walston-Felix model with the SEL model on a software development expected to involve 8 person-years of effort. [4]

Models	Effort		Duration	
	a	b	a	b
SEL	1.4	0.93	4.6	0.26
Walston-Felix	5.2	0.91	4.1	0.36

- i) Calculate the number of lines of source code that can be produced.
- ii) Calculate the duration of the development.
- iii) Calculate the productivity in LOC/PY (Person Year).
- iv) Calculate the average manning.

- c) What is software development loop? Briefly explain the different stages. [2]

- (d) What is COCOMO model? Compare different COCOMO models. [3]
5. a) Consider the scenario described in Question 3(a), draw a Use Case diagram that contains Actors, Use Cases and their relationship from that scenario. [5]
- b) What is Gutenberg Rule? Write down some design issues for text. [4]
- c) Differentiate between the following: - [5]
- i) Use Case vs Test Case.
 - ii) Black Box Testing vs White Box Testing.
6. a) Suppose that you are a manager of a project, draw a Gantt chart from the following description (*duration is in weeks*). Identify the busiest week for the project. [4]

Description of work	Task	Predecessor	Duration
Primary Proposal	A	None	4
Requirement Analysis	B	A	5
Feasibility Analysis	C	A	3
Design Class Diagram	D	None	5
Design Use Case Diagram	E	B	3
Design ER Diagram	F	C	3
Design Interface	G	D,E	4
Implementation	H	D,B,F	5
Documentation	I	F,G,H	6

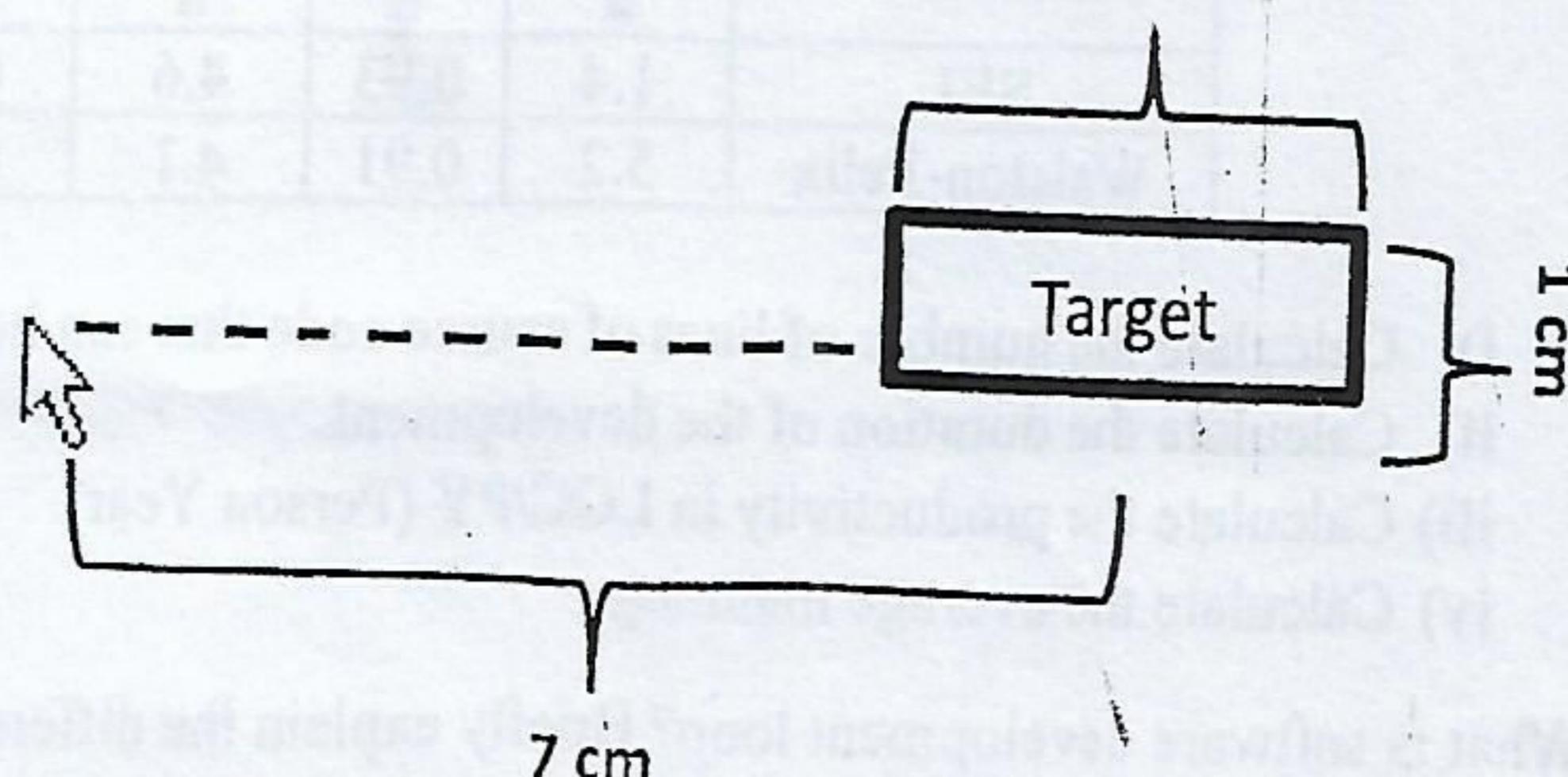
- b) What is Skill Audit? Explain it with an example. [2]
- You are designing a simple Twitter App for the iPhone. Your app will show users the tweets of people located nearby, and you want to find out if that influences the phrases and #hashtags they use. You are using your own MacBook for development and although you are experienced at using the Twitter API, you have never written an iPhone App before. [5]

Perform Risk Assessment with proper plans to mitigate the risks.

- d) What is Usability? What are the consequences of poor usability? [3]

7. a) Consider the following situation, where you have to click a rectangle target which is 7 cm away from the initial cursor position.

3.33 cm



- i) How do you calculate the ID (*Index of Difficulty*) for this case? [2]
 - ii) What is the significance of a and b in the Fitts' Law? How would we measure a and b? [3]
 - iii) If a=3 and b=6, can we calculate Movement Time in this case? [2]
- b) How would you design a test suite for this following registration page using black box testing strategies? Be sure to give example tests for each suitable technique. [7]

You have been asked to test a registration form of an e-commerce system. The form requests the user to enter their email address (*username@serviceProvider.com*), 11-digit phone number (*all digits*) and some other related fields.

Just design some suitable test cases for the email address and phone number.

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AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department: Computer Science and Engineering

Program: Bachelor of Science in Computer Science and Engineering

Semester Final Examination: Spring 2018

Year: 3rd Semester: 2nd

Course Number: CSE3223

Course Name: Information System Design and Software Engineering

Full Marks: 70

Time: 3 (Three) hours

[There are seven questions carrying a total of 14 marks each. Answer any five questions.
Marks allotted are indicated in the right margin.]

- 1 a) Draw a **sequence diagram** for the following scenario: [6]

To give an examination, an instructor first notifies the students of the examination date and the material to be covered. She then prepares the examination paper (with sample solutions), gets it copied to produce enough copies for the class, and hands it out to students at the designated time and location. The students write their answers to exam questions and hand in their papers to the instructor. The instructor then gives the exam papers to the teaching assistants (TAs), along with sample solutions to each question, and gets them to mark it. She then records all marks and returns the papers to the students.

- b) Construct a network for a project whose activities and their predecessor relationship are given in the following Table: [8]

Activity	A	B	C	D	E	F	G	H	I	J	K
Predecessor	-	A	B	A	C, D	E	E	E	H	F	G
Completion Time (Weeks)	2	2	3	2	4	5	5	5	8	6	7

- Construct a PERT (Program or Project Evaluation and Review Technique) network.
- Determine how many dummy activities you need to include in order to draw the network and explain why you need those dummy activities.
- Find the critical path in the network using Earliest Start (ES), Latest Start (LS), Earliest Finish (EF), Latest Finish (LF) and slack times for each activity.
- Construct the GANTT chart.

2. a) Draw a Data Flow Diagram (DFD) on Context Level and Level-1 for the following [8] scenario:

The print-on-demand service provides customers the possibility to print posters, flyers, or books on demand. The customer should be able to select a type of product (poster, flyer, or book), a desired quantity, and a paper type. In case a book has to be printed, additionally the customer can choose between hard cover and soft cover. Finally, the customer needs to provide a PDF file containing the desired content.

In order for the customer to be able to place an order, he or she must have an account. The customer can create an account by choosing a username/password combination. Furthermore, his or her address and credit card number can be linked to the account, which is required information when placing an order.

Once a customer has provided the information for an order, the system checks if all required information is there, either given in the order (type of product, quantity, etc.), or in the account (address and payment information). If any information is lacking, the system will inform the customer that it needs to be added before the order can be placed. Once all information is in place, the order is placed, and the credit card information is sent to the bank for approval. If the bank approves the card, the order is finalized.

A printing agent is in charge of actually performing the printing. He or she inspects the provided PDF files of finalized orders. If a file does not meet the quality requirements, the customer will be informed about this, and the order is temporarily put on hold until the customer has provided a new PDF file.

Finally, the administrator monitors if at all times, sufficient paper and ink stock is present. Whenever the amount of paper or ink is running low, an order must be placed at the appropriate supplier (either the paper or ink supplier).

- b) Consider the following code segment and its specification :

```
int is_leap(year):  
    leap = False;  
    if (year % 4 == 0 and year % 100 == 0) or (year % 400 != 0):  
        leap = True;  
    return leap
```

[4]

Specification: *is_leap* function takes a year as input and check whether the year is a leap year or not.

- Perform the *black box* and *white box* testing to test *is_leap* function .

- 3) c) What are the key differences between E-commerce and M-commerce? [2]
- a) Draw a UML Class Diagram representing the following elements from the problem domain for a Bangladesh Premier League. [5]

Bangladesh Premier League is made up of at least eight cricket teams. Each cricket team is composed of eleven players, and one player captains the team. A team has a name and a record. Players have a number and a position. Cricket teams play games against each other. Each game has a score and a location. Teams are sometimes lead by a coach. A coach has a level of accreditation and a number of years of experience, and can coach multiple teams. Coaches and players are people; and people have names and addresses.

- b) Consider the following code: [7]

```
int binSearch (int A[], int size, int tarVal)
{
    int first=0, last=size-1, mid;
    if(first <= last)
    {
        mid = (first + last)/2;
    }
    if (tarVal < A[mid])
    {
        last = mid-1;
    }
    else if (tarVal > A[mid])
    {
        first = mid+1;
    }
    else return mid;
}
```

- Draw the *flow diagram* and compute the *Cyclomatic Complexity* of the above code segment.
- Show the steps to perform the Unit testing on *binSearch function*.

- c) Define expert system. What do you mean by the open source software? [2]

Collaborative
expert

a) The Gourmand Food and Wine Magazine keeps track of each recipe it tests and publishes in its highly acclaimed publication, Gourmand: The Magazine of Heavy Eating. They keep each recipe in a file folder which is filed alphabetically by the recipe name. Each entry of the recipe file folder lists the ingredients, instructions, and author of every recipe they have published. In addition, each entry has information on the date of testing, the tester, all dates of publication and the title of the article where the recipe appeared (a recipe may be published several times). [5]

- Propose a Use Case diagram for the information stored in the Gourmand recipe file.

b) What is the main focus of the proactive risk strategies? What are the steps for risk management? [5]

c) Identify the *tangible and intangible cost* from each of the following scenarios: [4]

i) Let's examine the costs associated with a customer who has received broken merchandise and the company refund the value of the product to the customer.

ii) If a toy company produces a toy that ends up injuring a portion of the children that play with it, that company will likely have damage to their reputation.

iii) If you buy a new computer system for your company and ask your staff to learn the system and to adjust their work routines to the new technology.

iv) A startup company pays their employee paychecks and also purchases some office components.

5. a) Examine the interview structure presented in the sequencing of the following questions: [6]

I. What kind of documents do I require to open a bank account?

II. How can I add a nominee to my account?

III. How long will it take to get my cheque book?

IV. What are the charges of the debit card?

V. How can I operate my account?

VI. What loan am I eligible for?

VII. How can I apply for a loan?

VIII. How do I repay the loan?

IX. Could you please explain your online banking system?

X. Can I send money overseas through your bank?

- What structure is being used and justified your answer.
- Rearrange the interview by changing the sequence of the questions (you may omit some if necessary). Label the reordered questions with the name of the structure you have used.

- b) A software company, Virtusa released software for its client Phase Forward but within few days the software didn't work as per the requirement of the clients and the software had to undergo inspection, the result was the failure in providing the complete requirements by the client. [4]

In max 4 sentences make a proposal about which model or method will be best suitable, and give at least 2 reasons why it really is (in your opinion).

*Limiting
Central
tendency*

- c) ~~What are the key factors for sampling?~~ A group of the researcher will conduct a survey to find out the opinion on public transport among students and service holders. Suppose 75% student use the public transport. How large should a sample size be used in the study to be 90% certain (certainty factor is 1.65) with acceptance error within the interval of 0.02? [4]

6. a) What are the key factors of extreme programming design? How do you differentiate between the extreme programming and RAD (Rapid Application Development) model? [4]

- b) What do you mean by *halo effect*? What type of question is the below one intend to be? [4]

Indicate the extent to which you agree with the following statements as they related to your job, by circling the appropriate number against each, using the scale given below.

*True
False*

Strongly Agree (1)	Agree (2)	Neither Agree (3)	Strongly Disagree (4)	Strongly Disagree (5)
<i>The following opportunities offered by the job are very important to me:</i>				

a)	Working independently	1	2	3	4	5
b)	Completing a task from beginning	1	2	3	4	5
c)	Using a number of different skills	1	2	3	4	5

- c) Explain *break even analysis* with an example. What is the present value of 100000 taka one year from now, assuming a 10% discount rate? [4]

- d) If the cost of the developing 18 components is 550000 taka and 80% probability that 30 of 75 software components will have to developed, then calculate the risk exposure. [2]

7. a) A target product has 24 simple inputs, 46 average inputs, and 8 complex inputs. There are 56 simple outputs, 30 complex inquiries, 18 average master files, and 19 simple interfaces. [5]

Component	Level of Complexity		
	Simple	Average	Complex
Input Item	3	4	6
Output Item	4	5	7
Inquiry	3	4	6
Master File	7	10	15
Interface	5	7	10

Various processing complexity factors are: 4, 1, 0, 3, 3, 5, 4, 4, 3, 3, 2, 2, 4, 5.

Average Productivity = 10 FP/pm

Labor rate = \$5000 pm

Find out the following:

Cost per

- Estimated Function Point.
- Total Estimated Project Cost.
- Total Estimated Effort.

- b) In a web development project, there are six different segments like sign in page, homepage, customer details page, customer order details page, new customer creation page and new product growth page. The login name should not below six characters. [3]

Now considering this above scenario, how and who will perform the following test:

- Sanity testing
- Stress testing

- c) Considering the following scenario create a Class-Responsibility Collaborator (CRC) [3] card.

User Jane Doe buys the track "Road" from the iTunes store for 1GBP. Jane has an account with iTunes. She has enough credit to buy the track. She does not already have it in her personal library. Once she had purchased it, it gets downloaded to her library and her account is debited accordingly.

- d) What is the formation of the SCRUM team? Given one real world example for each [3] of the following process model:

- Waterfall model
- Agile

Date: 18/09/17

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

Third Year, Second Semester Final Examination, Spring 2017

Course No: CSE 3223

Time: 3 Hours

Course Title: Information System Design and Software Engineering

Full Marks: 70

[Answer any 5(Five) sets from 7(Seven) sets.]

[Marks allotted are indicated in the right margin within '[]'.]

1. a) The X Company wants to develop a system to help managers ensure a smooth and efficient running of the organization. Information collected by these systems is structured so that the managers can easily evaluate the company's current performance analyzing previous outputs. This system also manages sales and marketing, inventory control etc.

Now propose a system which is best suited for this scenario and justify your answer. [4]

- b) Consider the following activity-time chart and answer the following questions.

Activity	Immediate Predecessor	Completion Time(weeks)
A	-	7
B	-	17
C	-	12
D	A	9
E	A	15
F	B, E	5
G	B, E	8
H	C	11
I	D, F	15
J	D, F	10
K	G, H	10
L	G, H	8
M	J, K	10
N	L	7

- i. Construct a PERT network.
ii. Find the Critical Path using Earliest Start(ES), Latest Start(LS), Earliest Finish (EF), Latest Finish (LF) and slack times for each activity. [4]

[6]

- 2.a) i. What is tangible cost & intangible cost?
ii. What is tangible benefit & intangible benefit? [2+2]

- b) Alamo Foods wants to introduce a new branch. For these reason they have planned to take a loan of taka 203,000 with an interest rate of 15.60% from "X" Bank. Alamo Foods have to pay taka 440,230 in total with interest. Find the total payback period. [4]

- c) Glenn's Electronics, a small company, has set up a computer service. The table that follows shows the revenue expected for the first five months of operation, in addition to the costs for office remodeling and so on. Determine the cash flow and cumulative cash flow for the company. When is Glenn's expected to show a profit? [6]

	July	August	September	October	November
Revenue	35,000	36,000	42,000	48,000	57,000
Costs:					
Office Remodeling	25,000	8,000			
Salaries	11,000	12,100	13,300	14,600	16,000
Training	6,000	6,000			
Equipment Lease	8,000	8,480	9,000	9,540	10,110
Supplies	3,000	3,150	3,300	3,460	3,630

- 3.g) "Precision Tools" sells a line of high-quality woodworking tools. When customers place orders on the company's Web site, the system checks to see if the items are in stock, issues a status message to the customer, and generates a shipping order to the warehouse, which fills the order. When the order is shipped, the customer is billed. The system also produces various reports for accounts department. The system also produces management reports from employees and management also counts the working hours of the employees for their salary. Now you will have to draw a Data Flow Diagrams (DFD) on Context Level and Level 0 for the above given scenario. [8]

- b) Write a short note on the following topic: [6]
- Alpha and Beta Testing
 - White Box Testing and Black Box Testing
 - Regression Testing

- 4.a) Consider the Bookshop specified below. [2]
- The bookshop has a number of books from different titles. Each book may appear in two versions: hard-cover or soft-cover and thus may have two different prices. A user shops for a book by searching for the book title and receiving the prices of available versions of the title. Afterwards, the user either pays the price and buys the book using a credit card or cancels the purchase. Credit card payment concerns a credit card number, name of the owner, expiration date and the amount to be withdrawn. A credit card payment should be authorized by the bank. The bookshop owner can add books (of possibly new titles) to its stock.
- Draw a use case diagram for the system.
 - Give a detailed description of one use case.

- b) Define Management Information Systems (MIS). How does Management Support System differ from Decision support systems? [4]
- c) What are project feasibilities? Describe all three types of feasibilities with respect to system design. [4]

5.a) What is software? Describe different kinds of software products with a suitable example. [4]

b) What are the benefits of the Smoke testing? [2]

c) Find the Cyclomatic Complexity of the following code segment and show all possible independent path for the given code segment. [6+2]

```
int BinSearch (char *item, char *table[], int n)
{
```

```
    int bot = 0;
    int top = n - 1;
    int mid, cmp;
```

```
    while (bot <= top)
    {
```

```
        mid = (bot + top) / 2;
        if (table[mid] == item)
            return mid;
        else if (compare(table[mid], item) < 0)
            top = mid - 1;
        else
            bot = mid + 1;
```

```
    }
    return -1; // not found
}
```

6. a) What are the drawbacks if you use waterfall model for developing the project? Also discuss the benefits of waterfall model. [3]

b) Describe incremental process model with its drawbacks and benefits. When you should use incremental process model? [4]

c) What is Agile? Describe Scrum framework with necessary diagram. [2+5]

7. a) Why is project scheduling important? [1]

b) What is integration testing? Describe top-down integration and bottom-up integration. Discuss the basic difference between them. [2+3]

c) What is the difference between stubs and drivers in unit testing? [2]

d) You are given the records and the estimation of the previous projects of a software company(Figure- 1). You are asked to estimate the upcoming project. Now create FP(Function Point) based cost estimation. The previous software projects were executed by several XP(Extreme Programming) teams. A team member can perform 6.2 FP per month on average and the average salary of each team members is \$5700 [6]

per month. You have to find

- i. Estimated FP
- ii. Total Estimated Project Cost
- iii. Total Estimated Effort

Factors	Values
Backup and recovery	4
Data communications	2
Distributed processing	2
Performance critical	3
Existing operating environment	1
Online data entry	4
Input transaction over multiple screens	5
Master files updated online	3
Information domain values complex	3
Internal processing complex	7
Code designed for reuse	4
Conversion/installation in design	3
Multiple installations	3
Application designed for change	7

Information Domain	Optimistic	Most Likely	Pessimistic	Weight
Number of external inputs	19	23	27	3
Number of external outputs	11	13	15	6
Number of external inquiries	19	25	31	7
Number of internal logical files	5	7	9	8
Number of external interface file	3	4	6	5

Figure 1: Records and the estimation of the previous projects

1. (b) LS, LF

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

3rd Year, 2nd Semester, Semester Final Examination (Spring-2016)

Course No: CSE 3223
Time: 3 Hours

Course Title: Information System Design and Software Engineering
Full Marks: 70

[Direction: There are 7 (seven) questions. Answer any 5 (five) questions INCLUDING QUESTION NO 1. Marks are shown at the end of each part of a question. Follow standard rules and conventions for all the charts/diagrams.]

1. a) Draw a Data Flow Diagram (DFD) on Context Level and Level 0 for the following 8 scenario:

Padma Automobiles factory is situated in Gazipur. It is one of the largest bus repairing factories. When a bus comes for repairing, at first a sales agent records bus ID and the reason of the repairing work. Then a supervisor checks and informs a sales agent about services and parts required for the repairing works. The sales agent calculates the service charges, servicing queue and delivery date of the bus and then informs the customer. Then sales agent sends the bus to the repairing chain when the customer pays 50% of the service charge.

A team of mechanics checks the bus, determines the condition of it and then performs repairing. After repairing, the bus is sent to the delivery chain and the mechanics team sends a summary report to the supervisor and the accountant. The accountant calculates the extended parts and services if those are used for repairing work, and submits the total cost to the customer. When the customer pays the total cost, the bus handover is taken place. The accountant updates the system of delivery chain and inventory file. The employee generates a management report to the system. The management counts the working hours of the employees for their salaries.

- b) Consider the following activity-time chart and answer the questions below:

Activity	Immediate Predecessor	Completion Time (weeks)	Staff Needed
A	-	5	3
B	-	6	4
C	A	4	2
D	A	3	4
E	A	1	5
F	E	4	2
G	D,F	14	3
H	B,C	12	6
I	G,H	3	4

- i. Construct a PERT network. 3
 ii. In a matrix, show the Critical Path in the network by calculating Earliest Start (ES), Latest Start (LS), Earliest Finish (EF), Latest Finish (LF) and slack times for each activity. 3

2. a) Read the following scenario and answer the following questions. Do the necessary 7 assumptions to support your answer.

Mind Tree software farm wants to develop a Library Management System (LMS) for providing the best LMS of the planet. It is used to manage the catalog of a library. This helps to keep the records of whole transactions of the books available in the library.

- i. What are the reasons behind selecting this project?
- ii. Analyze different feasibilities for developing this project. *Pro, Tech, open*
- iii. What would be the needs and requirements of the project/ organization?
- iv. What would be the tangible and intangible costs and benefits?

- b) Assume that you are a system analyst of a company which basically supports the 4 professional works. The company needs a system that can create new technology for development works. Recommend a system type and explain the reason of choosing that system.
- c) What are the qualities of a System Analyst? Briefly discuss about it. 3

3. a) As a part of your ISD project development, you need to take an interview of a telecom and software expert named Mr. Amir. Your project is based on automation of university management system by sending SMS to students through the telecom network. Prepare a questionnaire for collecting technical information. Your question type must follow the structure of Funnel model. *tech* 5

- b) What do you mean by risk management in Software Engineering? What are the different 4 phases of the risk management processes? *Identify, Analyze, monitor, control* , 3
- c) What is sampling? What are the steps of designing sample size? 3
- d) Why is project scheduling important? 2

4. Read the following high level requirements and answer the questions followed. Do the necessary assumptions to support your answer.

bestbuy.com.bd is a popular web portal for buying and selling products online. This is a virtual market place for all buyers and sellers. In this web portal any user can register themselves either as buyer or seller. While registering as buyer or seller, the user just fills the registration form and upon activating through the email, the user receives a valid login ID and password to do the online business on this virtual market place.

A seller can sell products but s/he needs to login first. To sell a product, the seller provides product name, feature of the product, select product type, product quantity, product status and s/he must upload the picture of the product. Finally the seller clicks the button Sell. The seller may delete the product also.

On the other hand, a buyer can buy products and s/he also needs to login first. While buying a product, the buyer may pay by cash or by credit card. In case of paying by credit card, the site must check the validity of the card with the respective bank. To buy a product, the buyer selects the category of the product and selects the product which then display the feature, quantity and status of the product selected by the buyer. The buyers then enters the quantity of the product and finally clicks the button Buy.

- a) Draw the Use Case model of the software requirements described above. 8
- b) Provide detail description of the use cases: 'Buy Product' and 'Sell product'. 4
- c) Propose a GUI for the 'Buying Product'. 2

5. (a) Read the following high level requirements and answer the questions followed. Do the necessary assumptions to support your proposed model which also includes data types.

The world-renowned Pizza chain, globally known as Pizza Hut, was initiated in the year 1958 by brothers Dan and Frank Carney in their hometown of Wichita, Kansas. Pizza Hut Inc., commonly referred to simply as Pizza Hut, is an American restaurant chain and international franchise that offers a variety of delicious Pizzas alongside other mouth-watering menu items including a wide range of Starters, Soups & Salads, Pastas, Sandwiches, Desserts and Beverages.

In this popular fast food restaurant, Customer can order Pizza online. A customer has customerID, name, cell number and email. Pizza is a Food and every food has foodName and price. On the other hand, Pizza has topping and size. Customer can also order CokaCola where CokaCola is a Drink. Every drink has drinkName and price. Manager receives the order placed by a customer and a manager has managerID, name and cell number. Both customer and manager are Users and every user has userID and password which is used for online authentication. Customer can place order for the pizza and a manager can check the order using the online system. Pizza also has Coleslaw which is made of Cabbage and Card. The customer order has orderDate, quantity and pizza type.

During the order of the Pizza after login into the system, a customer selects pizza type, pizza topping, and enters quantity and date of the order and clicks the Order button. While checking the order of the Pizza, the manager checks the customerID and sees the detail of the order placed for Pizza and confirms the order by clicking the Confirm button.

- a) Develop an object model for the proposed high level requirement specification. 8
- b) Propose a GUI for the 'Ordering Pizza'. 3
- c) Write at least four (4) test cases based on ordering of pizza. 3

6. a) What is a software? Describe different kinds of software products with a suitable example. 4
- b) Suppose you have been assigned to develop a large scale project. Which process model will you follow and why is so? 5
- c) What is the widely used agile process? Write about different framework activities of this process. 3
- Plan
Dev
Code
Test

d) What is the formation of a SCRUM team?

2

17. a) Write short notes on the following topics:

9

- i. Alpha and Beta Testing
- ii. RAD Model
- iii. SDLC

b) You are given the records and estimation of previous projects and now you are asked to estimate the upcoming project by **LOC based cost estimation by considering the Likely values only.**

5

The previous project was executed by a SCRUM team. A team member can do 620 LOC per month on average and the average salary of the team member is \$9000 per month.

- i. Find the Total Estimated Project Cost and the Total Estimated Effort.
- ii. Find the Estimated Effort through any two (2) Empirical Model.

Functions	Optimistic	Likely	Pessimistic
User Interface	1200	1300	1500
2D Geometric Analysis	4000	4200	4400
Database Management	5000	5600	6000
Computer Graphics	4200	4600	5200
Peripheral Control	2000	2200	2500
Module Design	9000	10000	11000

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

3rd Year, 2nd Semester, Final Examination, Fall-2015

Course No: CSE-3223 Course Title: Information System Design and Software Engineering

Time: 3 hours

Full Marks: 70

[Answer any 3 (Three) from Section 'A' and any 2 (Two) from Section 'B']

[Use any programming language to answer the question, if needed. Remember, you are meant to be an engineer, not a story teller!]

[Marks allotted are indicated in the right margin]

Section 'A' (Information System Design)

- 1.a) What is system development? Briefly describe all the phases of classical project development. 7
- 1.b) Elaborate all five levels of CMM (Capability Maturity Model) with respect to risk and competitiveness associated. 7

- 2.a) What is discovery prototyping? Write down two advantages and two disadvantages of it. 4
- 2.b) When will you deploy RAD model in a system development? Point out four drawbacks and four advantages of this model. 10

- 3.a) Why UP model is best suited for object-oriented system design? What are it's main features? 2

- b) Suppose you have to design an automated ticket booking system for Bangladesh Biman. Besides ticket booking and purchasing, the system must also preserve other maintenance issues. How would you specify such scenario in UP model? Draw the two basic diagrams of UP model to depict the user interaction and data flows within the system. 12

- 4.a) Calculate annual ROI of project X from the information given in table-I: 4

Year	Estimated Benefits	Estimated Costs
2015	0	60,000
2016	5,000	30,000
2017	100,000	10,000
2018	100,000	0

Table-I

~~(b)~~

A system has 60 components, 18 of which may get affected by risk A. The probability associated with risk A is 80% and cost associated with those 18 components is 25,000 in total. What is the risk exposure (RE) of risk A to those 18 components? 3

~~(c)~~

A set of tasks and their necessary information are provided in table-II. Draw a PERT network and find out the critical tasks, critical time to complete the project. 7

Task	Preceding Task	Time
A	-	5
B	-	6
C	A	4
D	A	3
E	A	1
F	E	4
G	D,F	14
H	B,C	12
I	G,H	2

Table-II

Section 'B' (Software Engineering)

~~(a)~~

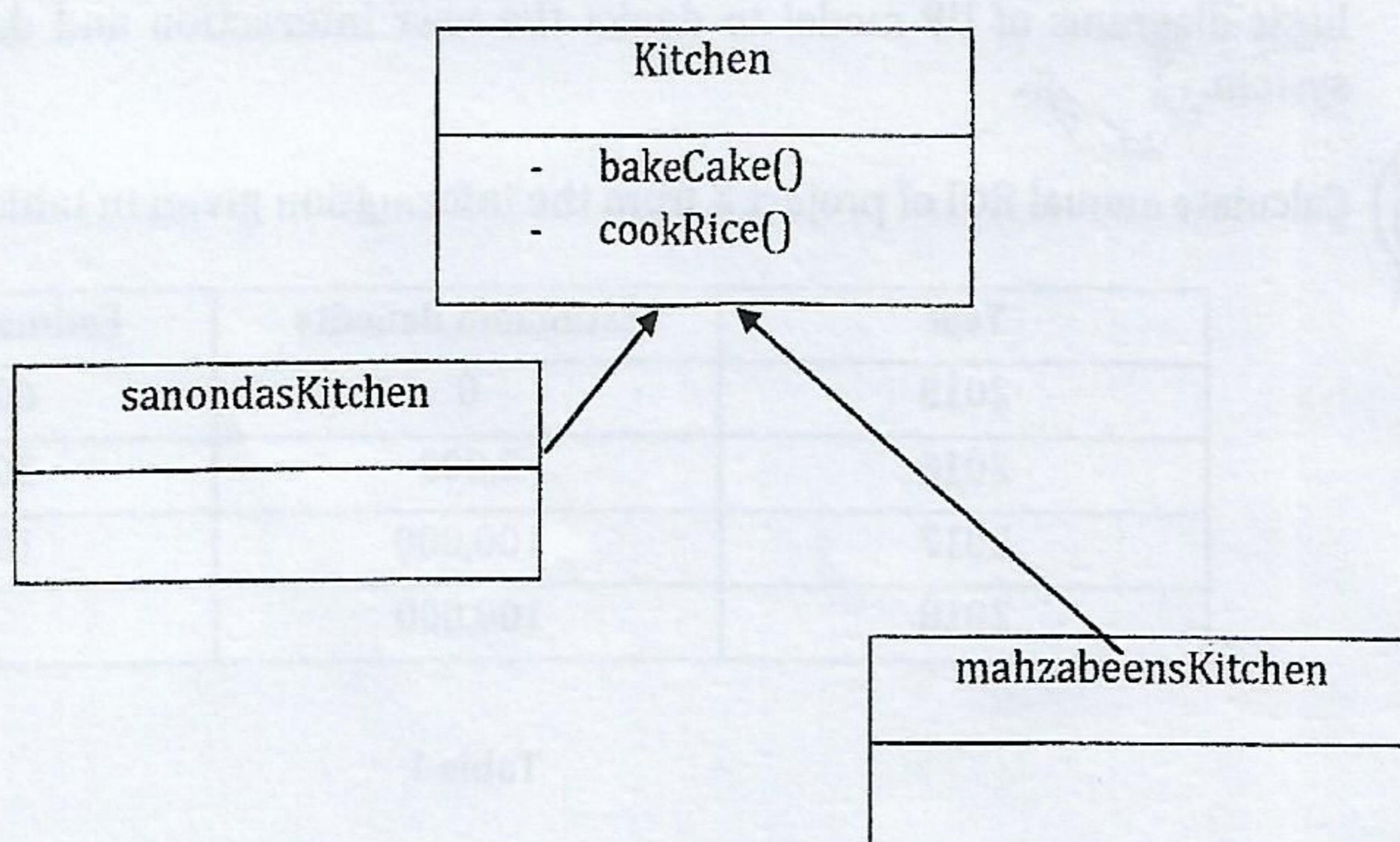
What is verification and validation in software testing? Write down four differences between testing and debugging. 6

~~(b)~~

Define lazy and eager instantiation. In singleton design pattern, what are the ways to make lazy instantiation a thread safe one? Elaborate with an appropriate example and code. 8

~~(a)~~

Consider the class diagram given below :



- b) Compute Coupling (C) from the information below for a code snippet.

5

No. of input data parameter : 7, No. of input control parameter : 2,
No. of output data parameter : 3, No. of output control parameter : 4
No. of global variables as data : 10, No. of global variables as control : 5

Fan-out : 0

Fan-in : 3

What can you suggest by the value of C obtained?

- 7.a) In JAVA, collection classes like vector or stack implement a method *elements()* which returns an element in the structure. Older JAVA versions used Enumeration to return this, later versions started using an Iterator. Both of these are interfaces. Enumeration interfaces have *hasNextElement()*, *nextElement()* methods. Iterators have *hasNext()*, *next()*, *remove()* methods.

8

Now, draw a class diagram and write codes to convert Enumerator functions to an Iterator.

- b) When do we use Abstract Factory pattern? Explain with an appropriate scenario and its class diagram.

6

Date: 08/10/15

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

3rd Year, 2nd Semester, Final Examination (Spring-2015)

Course No: CSE 3223 Course Title: Information System Design and Software Engineering
Time: 3 Hours Full Marks: 70

[Directions: There are 7 (seven) questions. Answer total 5 (five) questions INCLUDING QUESTION NO 1. Marks are shown at the end of each part of question. Follow standard rules and conventions for all the charts/diagrams.]

1. a) Write short notes on the following topics (give examples if necessary) : 3
- i) Data and Information
ii) Model and Prototype in ISD (Information System Design)
iii) Reverse Engineering
- b) Define project scheduling in terms of WBS (Work Breakdown Structure). When 2 will you use a dummy activity in your scheduling network? Explain with a simple example.
- c) Consider the following activity-time chart and answer the questions below:

Activity	Immediate Predecessor	Completion Time (weeks)	Staff Needed
A	-	5	3
B	-	6	4
C	A	4	2
D	A	3	4
E	A	1	5
F	E	4	2
G	D,F	14	3
H	B,C	12	6
I	G,H	3	4

Chart - 1

- ✓ i) Construct a PERT network. 3
- ii) In a matrix, show the Critical Path in the network by calculating Earliest Start (ES), Latest Start (LS), Earliest Finish (EF), Latest Finish (LF) and slack times for each activity. 6
2. a) Construct a GANTT chart elaborately, using the information obtained from your answer to question no (1.c.ii) and given chart-1. 5

Date: 08/10/15

- Q b) Calculate staff utilization from your previous GANTT chart. 2
- c) If no more than 6 people can work at a time during the whole project scope, what will be the effects? Use a time-activity fitter chart to depict the modified situation. 6
- d) What is meant by crashing critical activity in PERT/CPM network? 1

Consider the scenario below for answering Question no. 3 and/or 4.

Suppose you and your group mates are assigned a project to automate the result publishing system of AUST. For this, each teacher will be given an account. The teacher prepares the grade sheet and sends it to the scrutinizer for a second check. If everything is correct, the grade sheet is forwarded to the departmental Head who later forwards it to the exam controller's office. The task of exam controller is to make lists of all registered students for each course by checking previous semesters' result of each student. After obtaining current semester's grade sheet, the exam controller checks whether all the previous requirements were carried and publishes the result if everything is okay. To ensure confidentiality, each student is assigned an individual portal where s/he can check his/her own grades only.

3. a) Analyze different feasibilities for developing this project, considering you have a 10 member team and all the development tools are available to you in a fixed cost. Each member needs two PCs. 4
- b) What are the seven fact-finding methods of requirements analysis? Give a brief explanation of each with a view to developing the mentioned project. 7
- c) What do you mean by risk management in Software Engineering? What risks may appear in this project and how do you plan to mitigate each? Describe briefly. 3
4. a) Draw an Ishikawa diagram for identifying the problems and their causes in advance for developing the software. 3
- b) For various stages of the project development, which modeling process/processes will you use and why? 4
- c) Identify sub-systems, actors, use-cases for the project. Draw a use-case diagram to depict the design as elaborately as possible. 7
5. a) For making a cup of tea you need tea-bags, sugar, water etc. Assume all those reside in your kitchen (temporary storage) except sugar which has to be brought 4

from store room (permanent storage). You have customers who wished to have tea, you are the chef. Now, using a DFD (Data Flow Diagram) depict the procedure of making tea and delivering to your customer. Explicitly mention the processes, data stores, sources/sinks.

✓ b) What is verification and validation in software testing? Write down four 4 differences between debugging and testing.

c) A singleton pattern ensures that only one object of a class exists, if any. Consider 6 a class *Duck* with some attributes and methods. We must ensure only one *Duck* object exists. There can be two types of ducks - *DonaldDuck* and *GoofyDuck*. How will you implement it in your code so that either one *DonaldDuck* or one *GoofyDuck* exists? Write down the code snippet. Is your code thread-safe? Why?

6. a) What is CMM model? Describe different levels of CMM models for assessing an 5 organization's maturity.

b) Why do we use adapter pattern? In JAVA, collection classes like vector or stack 9 implement a method *elements()* which returns an element in the structure. Older JAVA versions used Enumeration to return this, later versions started using an Iterator. Both these are interfaces. Enumeration interfaces have *hasNextElement()*, *nextElement()* methods. Iterators have *hasNext()*, *next()*, *remove()* methods.

Now, draw a class diagram and write codes to convert Enumerator functions to an Iterator.

✓ a) What is cohesion and coupling? Discuss different types of cohesion and coupling 7 from a good designer's perspective.

b) Compute Coupling (C) from the information below for a code snippet. 3

No. of input data parameter : 7, No. of input control parameter : 2,
No. of output data parameter : 3, No. of output control parameter : 4
No. of global variables as data : 10, No. of global variables as control : 5

✓ Fan-out : 0 ✓ Fan-in : 3

What can you suggest by the value of C obtained?

c) When do we use Abstract Factory pattern? Explain with an appropriate scenario 4 and its class diagram.

1
d1 x2 c1 x
d2 x2 c2 x

Date: 22.08.13

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

Final Examination, Spring 2013

Course No: CSE 323

Third Year, Second Semester

Time: 3 Hours

Course Title: Information System Design & Software Engineering.

Full Marks: 70

[Section 'A' is mandatory]

[Answer any 3 questions from Section 'B' and any 3 questions from Section 'C']

Section 'A'

1. You have had an experience in this summer season about the high demand of the fruit juices at roadside food shops. So, you have made a plan to initiate a project that is a Juice store close to your university in the next summer. To do this work you have to prepare a project memorandum that reflects the activities of your target. The activities are mainly managing customers and productions in regular basis. Customer will come to store's counter and order the juice items. Then the customer will be served the required juice items. Customer will have to ensure payment before leaving the order counter. After the payment, order counter will provide a money receipt. Employees of the store produce juices and storing them in a continuous manner. To maintain the production with an efficient rate you will have to contact with a vendor for the raw materials supply and vendor will get the payment for the raw materials only after the product will be delivered. You will have to forecast the sales report to the employees and have to pay them for their timed works. Now you will have to draw a Data Flow Diagrams (DFD) on Context Level and Level 0 for the given scenario. 10

Section 'B'

2. a) Define the term Expert System. How do Expert Systems differ from Decision Support Systems? 3
b) List three roles that the system analyst is called upon play. Provide a definition for each one. 3
c) What personal qualities are helpful to the System Analysts? List them. 2
d) What are the values of the Agile approach? 2
3. a) Define Technical feasibility for project management. What does COTS stands for? 2
b) Define Tangible cost and benefits. Give an example each of one. 2
c) For initialize a project, you have planned to take a loan of tk.50,000 from a bank. You have to pay back tk.75,000 to the bank in the next 3 years. Find out the interest rate of the bank for your loan? 2
d) Draw a Gantt Chart on the below scenario 4

Description of work	Task	Must Follow	Time (weeks)
Employment of Human Resources	A	None	2
Shipment of Hardware	B	None	3
Open Box Inspection Activity	C	A	4
Installment Work	D	B	4
User Acceptance Test of Hardware	E	D	2
Training of the Human resources	F	B,E	3

- 4 a) As part of your Information System Design project to update the Automated Bus Ticket Management for ALIX Bus Ltd, a luxury AC bus company having routes all over Bangladesh. You will interview Miss Malizia, Chief Executive Officer. Prepare questionnaires for collecting information. You question type will be a combination of open end and close questions with a structure of either Pyramid or Funnel model. 5
- b) Describe the seven concrete elements of the decision maker's physical environment that can be observed by the system analyst using STROBE. 5
5. a) Do You know that it costs a lot of money to get a 'Certificate Java Programmer' certificate? It could cost you thousands of dollars. Let's imagine you will develop a browser-based training system to help people prepare for such a certification exam. A user can request a quiz to the system. The system picks a set of questions from its database, and composes them together to make a quiz. It rates the user's answers and gives hints if the user requests it. In addition to users, we also have tutors who provide questions and hints. And also Judges who must certify questions to make sure they are not too trivial. 6
- Make a use case diagram to model this system. Work out some of your use cases. Since we don't have real stakeholders here, you are free to fill in details you think is sensible for this example.
- b) Define Associations, Generalization and Inheritance in term of Class diagram. Give an example. 4

Section 'C'

6. a) What is the difference between software engineering and system engineering? 2
- b) Write briefly about Unit testing and Smoke testing process. 4
- c) Define Alpha and Beta testing. Why software debugging process is difficult? 4
7. a) Describe the general characteristics of the Waterfall model. 2
- b) Write down the advantages of the Incremental Development & Delivery. 2
- c) Describe the role of risk analysis in evolutionary process models like the spiral model. 3
- d) What are the drawbacks of the Evolutionary and Spiral Process Model? 3
8. a) What is Agility? List the principles to achieve Agility. 3
- b) Describe the framework activities of XP. 4
- c) What is the formation of a SCRUM team? What is Daily SCRUM? 3
9. a) You are given the records & estimations of previous projects and you are asked to estimate the upcoming project. Now create LOC based cost estimation. 5
- The previous project was executed by a SCRUM team. A team member can do 620 LOC per month on average and the average salary of the team members is 8000\$ per month.
- i. You have to find out the Total Estimated Project Cost and the Total Estimated Effort. ^{W/2} ^{W/2}
- ii. Find out the Estimated Effort through Bailey-Basili Model.

Functions	Most Likely
User interface and control facilities	2300
Two-dimensional geometric analysis	5300
Three-dimensional geometric analysis	6800
Database management	3300
Computer graphics display facilities	4900
Peripheral control function	2100
Design analysis modules	8400

b) Create FP based cost estimation

5

Factors	Values
Backup and recovery	4
Data communications	2
Distributed processing	0
Performance critical	4
Existing operating environment	3
Online data entry	4
Input transaction over multiple screens	5
Master files updated online	3
Information domain values complex	5
Internal processing complex	5
Code designed for reuse	4
Conversion/installation in design	3
Multiple installations	5
Application designed for change	5

Information Domain	Optimistic	Most Likely	Pessimistic	Weight
Number of external inputs	20	24	30	4
Number of external outputs	12	15	22	5
Number of external inquiries	16	22	28	4
Number of internal logical files	4	4	5	10
Number of external interface files	2	2	3	7

A team member can do 6.5 FP of work per month on average. The average salary of the team members 8000\$ per month. Find out Estimated FP, Total Estimated Project Cost and Total Estimated Effort.

Y.

W/X.

fall → II	fall → I
Sp - II	Sp - I
fall - 10	
Sp - 10	

2012

U.S.D)

I.S.O. (Jaww)

Date: 1.3.12

Ahsanullah University of Science & Technology

Department of Computer Science and Engineering

Year: 3rd, Semester: 2nd, Final Examination (Fall 2011)

Course Title : Information System Design and Software Engineering

Course No: CSE 323

Full Marks: 70

Time: 3 Hours

[There are Seven (7) Questions. Answer any Five (5) Questions.]
 [Marks allotted are indicated in the margin.]

- Q1. a) What are the characteristics of a System? [4]
 b) What is SDLC? Describe each step of SDLC with relevant examples. [10]

- Q2. a) Describe the required skills for a system analyst. [7]
 b) Describe the three stage model of strategic planning. [3]
 c) Differentiate open and closed question with example. [4]

- Q3. a) Describe the information gathering tools briefly. Mention the differences between interview and questionnaire. [6+3]
 b) If an publishing house has a discount policy like this:
 i) If customer/libraries buy more than 15 books, will get a 20% discount, NIL otherwise.
 ii) If bookstore buys more than 50 books, will get a 30% discount, NIL otherwise.
 Draw a decision tree diagram for the discount policy stated above.

- Q4. a) What is DPD? Think about an Airline reservation system. Draw DFD of the system that describe the process of ticket reservation. You can assume the rules of any standard system. [3+4]
 b) Explain "Software does not wear out". [4]
 c) From your viewpoint of software engineering, list the general qualities of software. [3]

- Q5. a) What does software process model do? Briefly describe the waterfall model. [2+5]
 b) Differentiate between spiral and prototyping model. [3]
 c) Write shortly about i) Reactive risk ii) RMMM [2+2]

- Q6. a) Describe about all types of "Software People". [7]
 b) What is DRE? [2]
 c) For an employee database management software, assume all weighting factors are complex and all measurement parameter values are 3. For [5]

each $F(i)$, $F(i)$ is average. Compute the Function Point for this project.

- Q7. a) Describe the characteristics of testability. [4]
b) Define independent path. [2+8]

Find the basis path set for the following code:

```
int a,b;
if(a>b)
{
    printf("%d",a);
    While(a>0)
    {
        a--;
    }
}
else
{
    printf("%d",b);
    While(b>0)
    {
        b--;
    }
}
```

Date - 14/08/2011

I-30 (SP-11)

AHSANULLAH UNIVERSITY OF SCIENCE & TECHNOLOGY
Dept. of Computer Science and Engineering
Year: 3rd, Semester: 2nd, Final Examination, Spring-2011

Course No.: CSE323
Total Marks: 70

Course Title: Information System Design and Software Engineering

Time: 3 Hours

There are Seven (7) Questions. You must answer Questions 1 and 2.
Answer any Three (3) from the remaining Questions from 3 to 7.
All Questions are allotted 14 marks.

You must answer both the questions:

Case for Question 1 - Please read the following requirement specifications carefully, and then answer the following question:

Alien Builders Ltd. is an apartment construction firm. At any time, it has several construction projects in which its employees actively participate. Each employee has a unique ID number. For each employee, other information like name, office location, home address, job title and telephone number is maintained. For each project, a unique project code is given and the project's description, location, project's start date and completion date is maintained as part of the project-related information. An employee may be assigned to work on one or more project. For each such assignment, we would like to maintain the start date and end date of the particular assignment along with a project role for the employee, and a percentage of her/his time dedicated to this project. A project must have at least one employee assigned as the project director for the lifetime of that project.

Question 1 - Show the conceptual design by drawing an E/R Diagram. If necessary, modify the E/R diagram to eliminate any many-to-many relationship. Show the logical design using the relational data model. (14 marks)

Case for Question 2 - Please read the following requirement specifications carefully which is in addition to the requirements above, and then answer the following question:

Alien Builders Ltd. wants to implement a project time tracking system that will record the time-in and time-out of every employee on a daily basis. The goal is to generate a report at the end of the month, showing how many hours were worked in total, with a breakdown of which employee worked for many hours.

Question 2 - Draw the Data Flow Diagram (DFD) of this project time tracking system. (14 marks)

Answer any 3 of the following 5 questions:

Question 3 – Describe the roles of systems analyst/designer and highlight the skills required for a good systems analyst (you may use figures and lists). Briefly describe the PARIS model of systems analysis. (14 marks)

Question 4 – What is effective communication? What are the communication types and forms? Briefly describe interview planning process and a fact finding interview structure? What are the advantages of using Questionnaires in an interview? (14 marks)

Question 5 – What is WIMP interface? Briefly describe the Macintosh Human Interface Guideline. What is WYSIWYG? What are the components or platforms of today's IT infrastructure ecosystem? What is TCP/IP? What is LAMP? (14 marks)

Question 6 – List the software testing objectives and principles. What is the difference between "verification" and "validation"? Briefly describe the steps in your software testing strategy that will ensure both verification and validation. (14 marks)

Question 7 – Describe the 7P's of project management? Compare linear sequential process and prototyping process for a software project. What are the project resources to consider for project planning? Describe the process of defining and scheduling tasks for project scheduling. (14 marks)

I.S.D (5p-10)

Aligarh Muslim University of Science and Technology

Department of Computer Science and Engineering

3rd year, 2nd semester, Final Examination, Spring-2010

Course No.: CSE 323, Course Title: Information System Design and Software Engineering

Time: 3 Hours

Full Marks: 70

[Direction: There are 7(seven) questions. Answer any 5(five). Marks allocated are indicated in the margin.]

1. a) Write the use case narrative for the use case *Withdraw Cash from ATM*. 5+2
Booth & then identify the relevant classes.
b) Let you want to visit a doctor. Now explain the complete task sets and then 7.
draw the use case diagram for the scenario.

2. a) What is the MVC architecture? 3
b) Draw and explain the class diagram, object diagram and interaction diagram 10
for the graphical drawing tools scenarios.

3. a) Consider the task set given in the table below. Assume that the task starts 7
from 20 July, 2010. Draw the task network and using critical path method
calculate ...
1) Earliest start date for each task.
2) Earliest end date for each task.
3) Latest end date for each task.
4) Slack time for each task.
5) The Critical path.

Task	A	B	C	D	E	F	G	H
Dependency	-	A	A	B,C	D,B	D	E,F	G
Duration	4	5	7	8	5	6	3	5

- b) Briefly describe different software project estimation techniques. Assume 4+3
that in a project the code has to be understood and integrated. If the
productivity of engineers in integrating this code= 1000/day, adaptation
adjustment multiplier= 5, the number of lines of generated code= 700000
and percentage of code automatically generated=100000, then estimate the
total effort for the project in person-month.

4. a) What is time boxing? 2
b) What is the difference between system analysis and system design? 2

Please Turn Over

c) What is JRP? What guidelines should be followed for conducting JRP?

d) What types of feasibilities should be assessed about candidate solutions? How? Explain.

5. a) Write briefly about classic project phases and their activities.

b) Discuss the Unified Process (UP) application development strategy along with its phases, advantages and drawbacks.

6. a) What should be done / not be done while conducting an interview? What types of questions should be avoided for an interview? Give examples of each type of questions. 3+4

b) What is human engineering? Describe the human engineering guidelines.

7. a) What is composite pattern? Show the general structure, code (with indication of composite and component class), applicability, advantages of composite pattern.

b) In which case, a factory method pattern is used? Give an example and draw the structure for the factory method pattern. Show a sample code for singleton pattern. 2+3+2