PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 80   Max Time: 120 mins   Weightage: 40%
ENDTERM FINAL EXAMINATION

I Semester AY 2017-2018   Course: **CSE 213 OBJECT ORIENTED ANALYSIS AND**   21,Dec 2017
DESIGN

Instructions:
   i.   Answers to all questions, use proper diagrams wherever necessary.
   ii. Question paper consists of three parts. Part A, B and C are closed book type.

Part A   (5 Q x 4M= 20 Marks)

Q1. Explain about the different views in UML?

Q2. Explain about the properties of D requirements in requirement analysis.

Q3. State the difference between state diagram and sequence diagram.

Q4. Consider the application is assumed to be a web based application which is deployed in a clustered environment using server1, server2 and server3. The user is connecting to the application using internet. The control is flowing from the caching server to the clustered environment. So draw the deployment diagram of this system.

Q5. What is a bad code smell? How is it related to refactoring?

Part B   (3 Q x 10 M = 30 Marks)

Q6. Many cities have deployed a bicycle rental system. The system is composed of many deposits, distributed all over the city. A deposit contains some dozen bicycles in an open area, the deposit has a number of numbered places (one per bicycle) where bicycles are initially stored with a lock/unlock system. The lock unlock system is connected to the system and works as follows. If a user is authorized by the system, the system opens a lock for a bicycle, the user can get it and becomes responsible for the bicycle until he/she returns it. When the user wants to return a bicycle, he selects an empty place in a deposit, and inserts the bicycle in it. The lock/unlock system senses the bicycle and automatically locks the bicycle. From this moment the user is not responsible anymore for the bicycle. To be able to use bicycles a person must first register with the system, providing his/her name and his credit card information, and obtaining an ID. Next, when a user wants to take a bicycle, he goes to a deposit, inserts in a dedicated interface (made of keyboard and screen) his ID. After the needed checks, the system selects a bicycle available in the deposit and opens the corresponding lock, so the user can take the bicycle. When the user wants to return the bicycle, he selects an empty place in a deposit, and returns the bicycle. No interaction with the keyboard/screen should be needed for return. The rental system must track the state of all bicycles and rentals. Notably, the user pays for the rental a fee that depends on the duration of the rental. Users are encouraged to take the bicycle in one deposit and return it to any other deposit. The system should also monitor the maintenance of bicycles (a bicycle never rented is probably broken), the distribution of bicycles in deposits (no deposit should be always empty, no deposit should be always full), the most common paths used (where bicycles are most frequently taken and most frequently returned). Draw the *UML Use case Diagram* for the above mentioned requirements.

Q7. Give a *UML state diagram* that describes the lifetime of a video tape in a video store. You can assume that a video tape is purchased, packaged properly, put in the video store database, and is then put up for rental. Customers, who choose to rent it, check it out and return it in three days. If a customer fails to return it, the store calls him/her the next day. The call is repeated a second time after two more days, and if the tape is not returned within two more days, the store delegates the matter to a collection agency and removes the video tape from its collection. If the tape is damaged on return, it is removed from the

collection database also. Finally, if the tape is missing during the annual store inventory, it is removed from the collection database as well. Make sure to define events, conditions, actions for transitions in your diagram, where appropriate.

Q8. Given the following problem description, draw a ***UML class diagram***: Draw a UML Class Diagram representing the following elements from the problem domain for a hockey league. A hockey league is made up of at least four hockey teams. Each hockey team is composed of six to twelve players, and one player captains the team. A team has a name and a record. Players have a number and a position. Hockey 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. Draw a class diagram for this information, and be sure to label all associations with appropriate multiplicities. ***Note:*** Assume that each player only plays in one team and each captain only captains one team and each team only plays in one league.

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Part C   (1 Q x 30 M= 30 Marks)

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Q9. **a.** We want to implement a text paragraph. A paragraph is a sequence of lines. Each line is represented by a string. The ***Paragraph*** class has to provide at least the following Methods:
String ***getLine***(int i); // returns i-th line
int ***getCountLines***(); // returns number of lines
void ***addLine***(String s); // appends a line to the end of the paragraph
A text paragraph is always formatted. Whenever a line is added, it is formatted immediately. The format algorithms (e.g., left-align or centered) can be selected at runtime. It also has to be possible to add new format algorithms to the program without modifying the ***Paragraph*** class. As well as we want to develop a Java AWT component that can display formatted text in a flexible way. To do that, we want to reuse the ***Paragraph*** class. Our ***FormattedTextComponent*** will inherit from the following library class:
public class ***TextComponent*** extends ***Component*** { public void ***append***(String str) { ... }
public String ***getText***() { ... }   ... }
Draw the corresponding UML class diagrams and indicate which design patterns are being used in developing a design for ***Paragraph*** that satisfies the above requirements and in developing a design for ***FormattedText Component*** that allows us to reuse ***Paragraph*** and to inherit from ***TextComponent***.

b. Back in the glory days of the Cold War, spies from the West and the East lurked about in a never ending game of cat-and-mouse. To keep their communications secret, each spy would have a code book that would enable him/her to encode or decode their latest secret messages created using the P***aragraph*** class. But since codes were constantly being cracked, the spies would need to change their code book quite often to insure that they had the latest, "un-crackable" code. Since each side was constantly spending millions of dollars or rubles to break each other's codes, the new codes would often have radically different implementations to keep the other side from figuring them out. Design a system of interface(s) and classes that represents the relationship between a spy and their code books, including the fact that the code book may be changed from one implementation to another. Which design pattern is most appropriate to accommodate this change? Draw the corresponding UML class diagrams according to the design patterns are being used.

c) A social network service focuses on building online communities of people who share interests and/or activities, or who are interested in exploring the interests and activities of others. A social network service support groups that people can join. Each group has a title, administrative members, a group type (open/ closed), and a list of related groups. If somebody writes on the wall page of the group, the information is broadcasted to all the members and it is visualized in the news feeds of the members. Users should be able to join a group as well as leave a group if they get bored. Once a user has joined a group it will automatically receive any updates that are published on the wall. Suppose we would like to extend the functionality of a social network service group to spies by adding the possibility that besides normal users a group page can also be a member of another group. For example it should be possible that the group page of the "XYZ Spy" joins the "ABC Spy" group. As a consequence all the members of the "XYZ Spy" group become automatically members of the "ABC Spy" group. Which design pattern is most appropriate to accommodate this change? How the solution proposed in the ***Q9.b)*** shall be extended?

Max Marks: 40   Max Time: 60 Mins   Weightage: 20 %

TEST 2

I Semester AY2017-2018   **Course: CSE 213 Object Oriented Analysis and Design**   **24 OCT 2017**
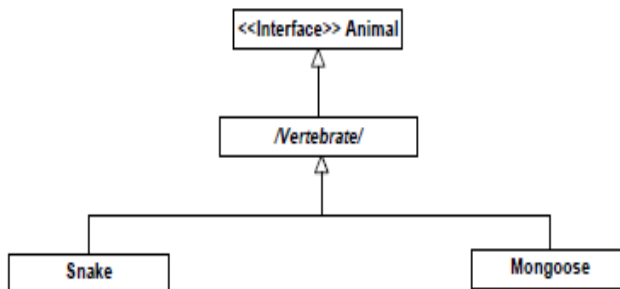
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Instructions:
  i.   Write legibly
  ii.   State your assumption(s) (if any)

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| **Part A**   (3Q x 3 M= 09 Marks) |

1. Consider the following UML class diagram.

a) What is the relationship between *Snake* and *Animal*?
b) What is the association type between *Mongoose* and *Snake*?
c) Identify one thing wrong with this diagram.

2. Sequence diagrams are somewhat similar to the actual code. Why not just code up the algorithm? Why we need to have sequence diagrams?

3. In an online shopping, the customer can select any item from product catalog and selected items are added in to cart. If the customer wants to deselect the item, the added item in cart can be removed. Finally the order can be placed for all the items that are there in cart together. Write a CRC card for the class *"shopping cart"* based on the above scenario.

| **Part B**   (2 Q x 8 M= 16 Marks) |

4. XYZ Company keeps a complete <u>list of all bikes</u> and their <u>details</u> including bike <u>number</u>, <u>type, size</u>, <u>make</u>, <u>model</u>, <u>daily charge rate</u> and <u>deposit</u> etc. It also keeps a <u>record of all customers</u> and their <u>past hire transactions</u>. The company record the <u>details of a hire transaction</u> including the <u>start date</u>, <u>estimated duration</u>, <u>customer</u>, <u>bike</u> and <u>specialist bike</u>, in such a way that it is easy to find the relevant transaction details when a bike is returned. It keeps track of how many bikes a customer is hiring so that the customer gets one unified <u>receipt</u> not a separate one for each bike. The company also copes with a customer who hires more than one bike, each for <u>different amounts of time</u>. It work out automatically, on the return of a bike, how long it was hired for, how many days were originally paid for, how much extra is due. It also records the <u>total amount due</u> and how much has been paid and print a receipt for each customer. It keeps track of the <u>state of each bike</u>, e.g. whether it is in stock, hired out or being repaired. It also provides the means to record <u>extra details about specialist bikes</u>.

Assume that the underlined ones are nouns and apply the following selection criteria in the order and list out the set of unfiltered nouns after applying each selection criteria.

i. After removing attribute nouns

ii. After removing redundancy nouns

iii. After removing vague nouns

5. Student registration is made online in an international school. To register, student has to go to the respective website. Student will request for new registration page by clicking on register button, immediately web server will return with the register page then the student will enter all the required information and submits the form by clicking submit button. Admin verifies the information filled by the student if any information is missing or wrong, request for re-entering the information will be sent to student. If all the entered information is correct the new student will be added to the database of the school and acceptance message will be given to student. Write a sequence diagram for the above given scenario named *"Student Registration".*

Part C (1 Q x 15 M= 15 Marks)

6. Read the following software requirement specification for a XYZ video company management system and answer the following question.

The XYZ Video Company has a number of video hire shops in different areas of the city. They need a system to install in each shop to manage the registration of members and the issue and return of videos. Shops will only issue videos to registered members on their membership list. Each shop maintains its own list. Members can hire videos, which must be returned by the following day, otherwise a further day's hire is charged, for each day the video is overdue. If requested video is not in the stock and the member is willing to wait, then the first copy due to be returned is reserved. A member holding an overdue video cannot hire any more videos until the overdue video is returned and all extra charges are paid. A Video is an item of stock held by a XYZ outlet. All stock is held in a standard format. Videos are categorized according to genre, e.g. horror, thriller, etc. Videos are rented on a nightly basis and assigned to a borrowing member. A video can be in-stock, borrowed, lost, deleted, or damaged. In addition, videos are categorized according to the demand frequency, which applies to them over time.

- Low   - less than four rentals per month.
- Medium - four or more rentals per month.
- High   - ten or more rentals per month

Periodically, the stock controller at central office sends a delivery of new videos, which the shop adds to its stock. The shop manager may also return to the stock controller any videos, which are no longer required because they are damaged or because demand is low. These must be deleted from the shops stock records. Occasionally a member may lose a hired video. If this happens then the member must pay a replacement charge and the video is deleted from stock records. At the end of each month the shop sends a sales analysis report to the sales manager in the central office.

Identify the possible candidate classes of the system and also identify the attributes and methods (along with scope) that are most important for the identified classes. Draw the UML class diagram [Note: specify attributes and methods for each class].

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Max Marks: 40   Max Time: 60 Mins   Weightage: 20 %

TEST 1

V Semester 2017-2018   Course: **CSE 213 Object Oriented Analysis and Design**   21 SEPT 2017

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Instructions:
   i.   Write legibly
   ii. State your assumption(s) (if any)

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Part A   (3Q x 3 M= 09 Marks)

1. What are the three most important characteristics of a requirements specification? Explain why each of them is so important.
2. Explain at least three productivity problems in Information systems development.
3. List and justify three non-functional requirements that could be important for the following system.
    Consider an online reservation system for a bus company. The bus company includes several buses and realizes trips to different cities. The trips are based on a predefined schedule and stop at predefined bus stations. Seats can be reserved by customers on the web site of the bus company. The customer has the option to directly pay for the seat through the website. When the reservation is cancelled, the seat will become free and can be sold to another customer. Both the customer and the company staff must authenticate themselves for performing operations with the system.

Part B   (2 Q x 8 M= 16 Marks)

4. What is Unified Process Model? Explain the iterations, outcomes and Workflow in Unified Process Model with neat diagram.
5. State the different phases and the output deliverables in the traditional life cycle model.

Part C   (1 Q x 15 M= 15 Marks)

6. ABC Printing Service Company wants to automate the process as per the following requirements:
    ABC Company 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 and 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 about the, sufficient paper and ink stock. 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).
    a) Create a UML Use Case Diagram for the ABC Company.
    b) Give a detailed scenario of the use case for *"place an order".*