

Level: Bachelor
Programme: BE
Course: Object Oriented Design and Modelling
through UML

Semester – Fall

Year : 2012
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

What are various notations provided by the UML for capturing the static and dynamic aspects of a software system? Explain with figures. 7

Explain how the change in requirements is handled on an iterative development. List out the advantage of an iterative and incremental process of software development over waterfall development process. 8

What is the basic procedure to find out the use cases? List benefits of writing use cases during software development process? 5

Explain when the changes occur in mapping design to code. 5

How do we assign responsibilities to objects? Explain with a suitable example. 5

What are various relationships that might exist between different domain elements? Explain using a Patient billing system as an example. 8

What are the important contents of a Post condition of an operation contract? How is mapping of these operation contracts done during Object Oriented design phase? 7

OR

Define role of multiplicity and non primitive types with suitable examples. 7

What is the significance of using interaction diagram during design? Compare and contrast system sequence diagram and collaboration diagram in terms of its weakness and strength. 8

When is it desirable to use Controller pattern instead of using Information expert pattern when assigning responsibility to objects? 7

What are the conditions for preparing a contract? Does writing 7

- contracts leads to domain model updates, defend your answer.
- b) Why is it desirable to expect and plan for change and deviation from the design even during programming phase? Explain
6. Case Study: Online Hotel Reservation System
- When making a reservation a customer must register his /her personal information. To speed up the process details of previous customers will be stored and made available later. By this system the customer can make reservation and cancel it. When making a reservation the customer can choose the number of rooms, the type of room, services (laundry, meal, transportation etc). The reservation is confirmed when customer pay 10% of the total charges. After the reservation, the customer will get an e-mail of the details of the reservation.
- Within a hotel there is a reservation administrator who is responsible for controlling reservations at the hotel. He is also responsible for processing no-shows (When the reservation at the hotel doesn't show up at reserved date) and makes a reservation for a customer.
- Now answer the following questions:
- a) Identify all the use cases and actors and draw a use case diagram. Also write all the course of events for one use case.
 - b) Draw class diagram for the above scenario.
7. Write short notes on **any two**:
- a) Visibility
 - b) Relationship between GRASP and UML
 - c) High cohesion and low coupling

POKHARA UNIVERSITY

Level: Bachelor
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Semester: Spring

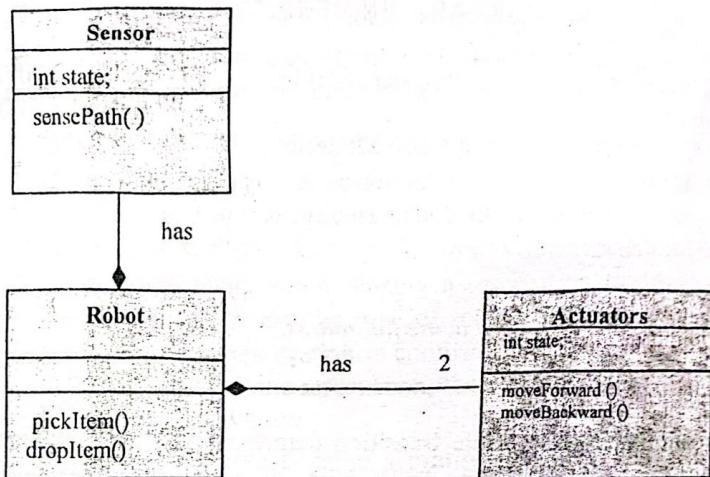
Year : 2012
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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Attempt all the questions.

- a) Differentiate between state transition diagram and activity diagram, component diagram and deployment diagram with appropriate examples. 8 7
- b) Describe the importance of Unified Process in OOAD. List out and describe briefly all the phases of Unified Process. 7
- a) Define Use Cases. How Use Cases benefits the software development process explain with an example. 7
- b) Describe the importance of Contract in OOAD. Explain contract in detail for at least one system operation for any kind of example of your own. 8
- a) What are the activities performed during the domain modeling process? How can potential domain elements for a particular scenario be identified? 8
- b) 'Well designed interaction diagram are valuable in object oriented analysis and designed', Justify your answer. Describe the mutually exclusive condition of UML Collaboration diagram. 7
-) Show with an example how can conditional messages be portrayed in a Collaboration diagram and a Sequence diagram. 7
-) What is the difference between knowing and doing responsibilities? How does making use of Design Patterns help in correctly assigning responsibilities to objects? 8
-) How cohesion and coupling affect good design, explain with a suitable example? 7
-) Map the following design to code in any programming language that supports Object Oriented Paradigm 8



6. a) Explain how code can be generated from collaboration diagram and design class diagram. Explain with a suitable example.
- b) What do you mean by fault, error and failure? How are exceptions addressed by UML?
7. Write short notes on: (Any two)
 - a) Code reuse
 - b) Real Use Cases.
 - c) Requirements Capture.

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2013
Programme: BE Full Marks: 100
Course: Object Oriented Design and Modeling Pass Marks: 45
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Attempt all the questions.

- a) "Good and Precise Requirements leads to good design", justify it. 8
State Expanded Use case with suitable example describing main flow and alternative flow.
- b) How are objects perceived in design phase? Explain with suitable example. Distinguish between OOAD and Structural Analysis and Design. 7
- a) Why do you make a system sequence diagram? Explain all the steps while designing domain model with example? 7
- b) Describe the importance of contract in OOAD. Design is initiated by contract, justify your answer with suitable example. 8
- a) Define the term visibility and explain different types of visibility between objects? Illustrate with an example. 8
- b) Explain the importance of pattern in design. How do cohesion and coupling effect design? Explain. 7
- a) Distinguish between class and object, what are the major factors for designing Design Class Diagram (DCD), explain with suitable logic. 8
- b) How does design traces and adjusts the change of requirement during design phase and coding phase? Explain with suitable example and reasoning? 7

Library Management System

System Description:

This system is a Library management system which controls and grants access to different types of users such as system administrator, head librarian, librarian and members. This system should be able to manage

books, loans, late fees, searching of books, should be able to keep members in a queue for loans. It should be able to generate automatic email and SMS message before expiry of book loan.

Add qualitative requirements according to the need of the scenario.

- a) Draw complete use case diagram.
- b) Draw behavioral model of this case.
6. a) Explain how can code be generated from collaboration diagram
Explain taking suitable examples.
- b) State the importance of development process in design. What do you understand by updating of class definitions? Illustrate with an example.
7. Write short notes on: (Any two)
 - a) Error and Exception handling.
 - b) Unified Process.
 - c) Activity Diagram.

Candidates are required to give their answers in their own words as far as practicable.

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n. What do you state with an

- i) How is Object Oriented Analysis and Design paradigm different from other paradigms? Write down the advantages of object oriented approach.
- ii) What are the important components of a use case model? Illustrate the importance of use case diagram for a system being developed.
- iii) What do you mean by System Event and System Operation? Draw a System Sequence diagram for return book use case of a Library system.
- iv) What is a contract? Write down a contract for enterItem system event explaining the significance of post conditions?
- v) What is a Domain Model? How do you construct the Domain Model? Explain with example.
- vi) Define associations and attributes. Taking a system into consideration, draw the necessary classes of the system and represent the association and attributes of these classes. (You are free to choose any system of your choice like POS, Library System)
- vii) Define pattern and list out different types of GRASP pattern. How Expert pattern differs from Creator pattern, explain with suitable examples?
- viii) How do you make a conceptual model? Illustrate.
- ix) Why is interaction diagrams used? Compare and contrast the different types of interaction diagrams.
- x) Explain how code can be generated from collaboration diagram

and design class diagram. Justify with necessary examples.

Case Study

15

In hospital a patient goes to registration machine he press the on button then the screen opens. He enters patient id number. He books for the doctor for his checkup. He checks the category of disease from given list, then he chooses doctor's name from given doctors name list, he enters time he wants to meet with doctor. For this registration he need to enters the amount, if the amount digit is ok it accepts the registration and prints the registration slip, otherwise it will give a signal of alarm of insufficient amount.

Now draw a use case model(no description required), Domain model, interaction diagrams and design class diagram from these information.

Write short notes on: (Any two)

2x1

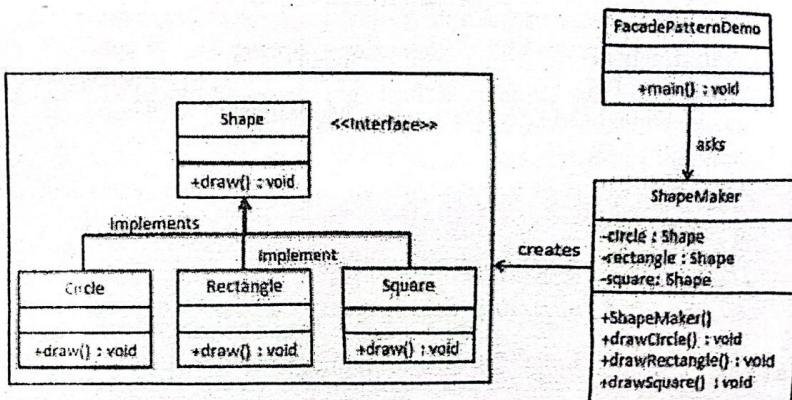
- a) Exceptions and Error Handling
- b) Programming and development process
- c) Representation of system behavior.

Candidates are required to give their answers in their own words as far as practicable.

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Attempt all the questions.

- Explain different phases and disciplines of Rational Unified Process? 6
- What are the important components of a use case model? Illustrate the importance of use case diagram for a system being developed. 9
- What are the different methods of identifying use cases? List the difference between essential and real use cases with suitable examples 8
- Associations and attributes are essential components of a conceptual model. Do you agree or disagree? Justify your opinion. 7
- What is a collaboration diagram? How do we represent mutually exclusive conditions in a collaboration diagram? Justify with an example. 1
- What do you mean by system behaviour? List its types. Explain the guidelines for preparing a contract. 1
- What are the GRASP patterns? Explain with an example how you apply the creator pattern during object design. 1
- Why is class diagram important? Explain the structure of a class diagram with a necessary figure. Also list the difference of a Class diagram during analysis phase and design phase. 1
- What is a Contract? How do you derive a contract? What are the essential parts of a contract? Explain its role taking an example. 1
- What do you understand by updating of class definitions? Illustrate with an example. 1
- Convert the given Design Class Diagram into an equivalent code. (you can choose any language like Java, C++, etc). 1



- b) What do you understand by three tier architecture? How this architecture can be deployed in various configurations?
7. Write short notes on (*Any Two*)
- Visibility
 - Domain Analysis
 - Exceptions and error handling

POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2015

Programme: BE

Full Marks: 100

Course: Object Oriented Design and Modelling
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Pass Marks: 45

Time : 3hrs.

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Attempt all the questions.

You are developing a system to handle checkout duties at a library. Library members may checkout books and videos from the library. The system must keep track of which books and videos each member currently has checked out.

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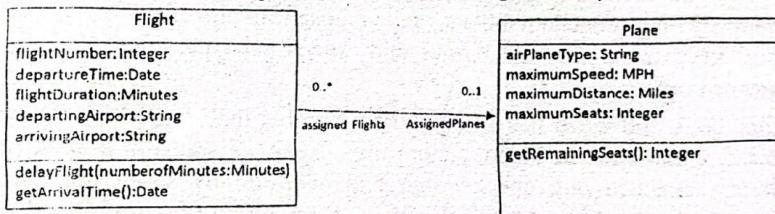
Each book and video has a unique item number that is used by the system to index that book or video, a clerk may check the status of a book (in the library, checked out, checked out and overdue) by supplying the item number. A clerk may also check either on a book by supplying the title and author or on a video by supplying only the title.

Each library member has a library card that includes his or her membership number and the item number of the book or videos (in total), and if the borrower has no overdue books or videos, the book or video is loaned to the borrower. The conditions of the loan include a due date (two weeks for books and three days for videotapes.).

For the above case study:

- a) List use cases and prepare use case diagram.
- b) Identify conceptual classes, and prepare a domain model.
- c) Create a sequence diagram when a library member wants to borrow a book or videotape.
- a) Explain workflows of iterative software development model. 7
- b) What do you mean by object oriented development cycle? Explain with an example. 8
- a) What is a contract? Explain different parts of the contract with suitable example. How do the contracts help in devising collaboration diagram? 8

- b) What is attribute visibility how it is different from parameter visibility, explain with example. 7
4. a) Define conceptual class. Explain the role of domain modelling with an example 8
- b) Explain the use of state chart diagram? Show mutual exclusive condition in Collaboration diagram with example 7
5. a) How DCD is different from Domain models? Explain method name issues in DCD. 7
- b) Define GRASP. Explain the purpose of Creator pattern with an example? 8
6. a) Explain steps of mapping design to code with an example. 8
- b) Convert the DCD to equivalent source code (java/c++). 7



7. Write short notes on: (Any two) 2x5
- Sequence diagram
 - High coupling pattern
 - UML multiple perspectives

Level: Bachelor
Programme: BE

Semester: Fall

Year : 2016

Course: Object Oriented programming and Design
through UML

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

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Attempt all the questions.

You are developing a system to handle checkout duties at a book and video store. Sales boy may checkout books and videos from the store. The system must keep track of which books and videos have been sold out.

Each category of book and video has a unique item number that is used by the system to index that specific book or video, a sales boy may check the status of a book (in stock or not) by supplying the item number. He may also check either on a book by supplying the title and author or on a video by supplying only the title.

For the above case study:

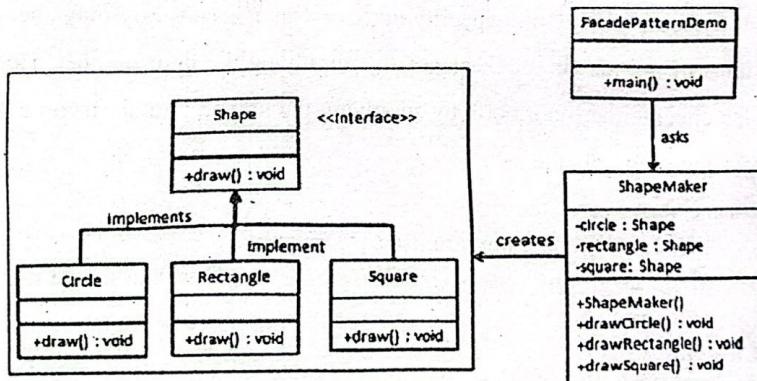
- a) List use cases and prepare use case diagram. 8
- b) Write down any one essential use case text from the above use case diagram. 7

2. Case Study

Consider an online travel agency system. A new user can create a new profile with a username and a password. This profile can be changed at any time if the user wants. The user logs to the system using his/her username and password. After logging into the system, the user inquires about different flights. The user can book, change or cancel a flight reservation. This includes choosing a payment method, and making a payment.

- a) Now draw a use case model (no description required), Domain model, 15

- interaction diagrams and design class diagram from these information.
3. a) How are system event and system operation important. Assume the scenario of reserving a hotel room online and draw a SSD for it. 7
 - b) Why are contracts essential? Assume the scenario of reserving a hotel room online and draw a contract for it. 8
 4. a) What are interaction diagrams? What are its types? How is sequence diagram similar to collaboration diagram? 8
 - b) What are the GRASP patterns? Explain with an example how you apply the creator pattern during object design. 7
 5. a) What is visibility? Describe the use of visibility among classes while designing class diagram. 8
 - b) How procedure Analysis and Design is different from OOAD, illustrate with examples? 7
 6. a) Describe the importance of interaction diagrams for developing methods during coding. 5
 - b) 10



For the given diagram, develop the equivalent code in any high level programming language.

7. Write short notes on: (Any two) 2×5
 - OO Development Cycle
 - Associations and Attributes
 - Patterns

POKHARA UNIVERSITY

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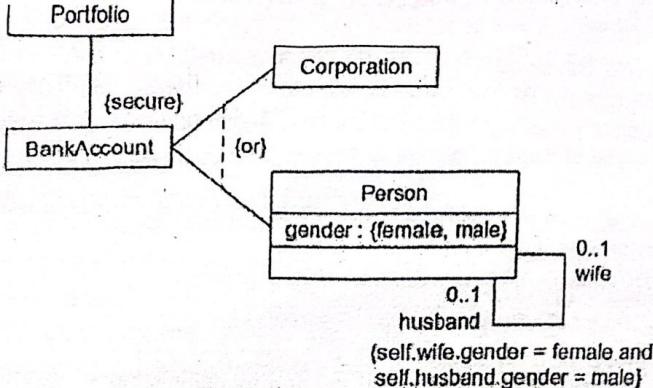
Time : 3hrs.

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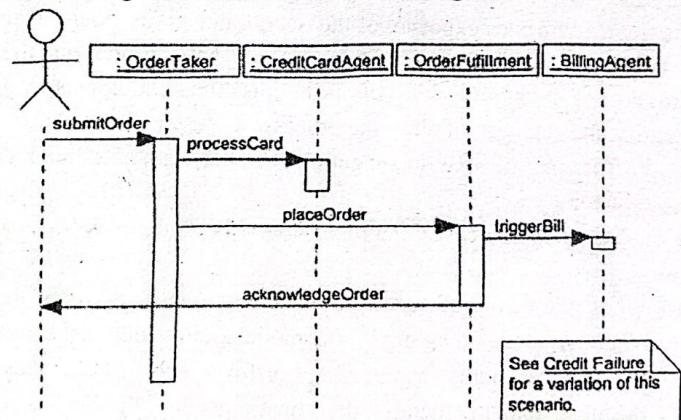
The figures in the margin indicate full marks.

Attempt all the questions.

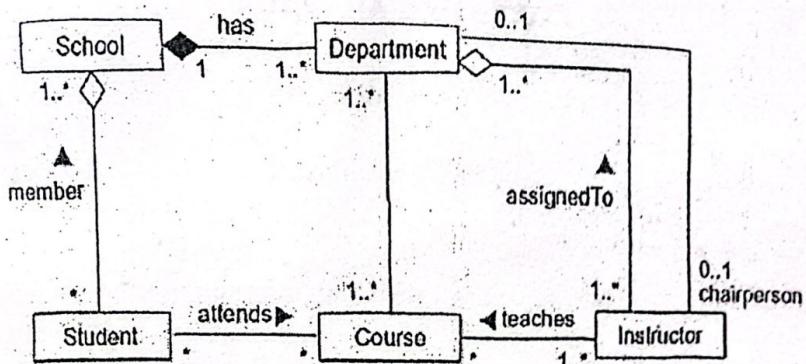
- a) What is the role of notations in a modelling tool? Illustrate any five different notations used in UML with brief notes of each. 3+5
- b) In OOAD, there are various types of models, like conceptual, structural, behavioural, etc. What is the significance of these many different types of model? Explain with illustrative examples. 3+4
- 2. Imagine you are hired as IT consultant for the task of building Pokhara University Exam Management System (PU-EMS), considering your four-year/8-semester exposure of the overall university board exam as well as college exams. As a domain study, you have found out there is the provision of double checking of all the questions and copies to ensure the integrity and standard of all of the processes. 8+
 - a) Prepare a brief SRS document of PU-EMS with all details as per SRS document. 2+
 - b) Draw the Use-case diagrams for this system with proper stick diagrams. 2+
 - a) What is the role of constraint specifications in defining the systems behavior model diagram? The model below depicts about possible types of accounts within the portfolio sub-head in any banking business domain. Identify the constraints highlighted and explain in brief, what they mean. 2+:



- b) List out all the possible association types, which exist in UML based Object Oriented design, with sample drawings of each type with clear labelling of association, attribute, naming, and adornments. 8
4. a) The model depicts the online order processing system as illustrated in below diagram. Explain in detail of the diagram type with every symbols being used and semantics of this diagram. 2+



- b) Present the mapping process for the above model using object-oriented based pseudo-codes for capturing all important aspects of the model diagram. 8
5. a) Prepare sample codes that should cover all of the classes, existing associations and other details depicted through following model diagram. 8



- b) Prepare the class diagram for the SRS and Use case diagrams that you have already developed for Question No. 2 system. 7

Compare the followings: 3x:

- a) X-axis (Left-right) versus Y-axis (top-down) Information ordering in Sequence (Interaction) diagram
- b) Forking versus Joining in Activity diagram
- c) Structural versus behavioral patterns in design reuse

Write short notes on: (Any two) 2x:

- a) Reverse Engineering in OOD
- b) Analysis using CRC
- c) Exception handling through UML

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SEMESTER : FALL
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Attempt all the questions.

- 1. a) Explain the difference between Object Oriented Analysis and Object Oriented Design with an example? 7
- b) Explain the role of UML model in software design? Explain types of use cases with examples. 8
- 2. a) Explain difference between incremental and iterative software development model. 7
- b) Explain system event and system response? Explain the purpose of SSD with an example. 8
- 3. a) Explain the guidelines for preparing a contract with its purpose. 7
- b) What is Global visibility how it is different from parameter visibility, explain with example. 8
- 4. a) Define conceptual class. Explain the role of domain modeling with an example. 8
- b) Explain the use of state chart diagram? Show mutual exclusive condition in Collaboration diagram with example. 7
- 5. a) How DCD is different from Domain models? Explain method name issues in DCD. 7
- b) Define GRASP. Explain the purpose of Controller pattern with an example? 8
- 6. CASE STUDY: Draw equivalent use case, sequence diagram and class diagram for the given scenario below. 15

A customer wants to draw money from his bank account. He enters his card into an ATM (automated teller machine). The ATM machine prompts "Enter PIN". The customer enters his PIN. The ATM (internally) retrieves the bank account number from the card. The ATM encrypts the PIN and

the account number and sends it over to the bank. The bank verifies the encrypted Account and PIN number. If the PIN number is correct, the ATM displays “Enter amount”, draws money from the bank account and pays out the amount.

7. Write short notes on: (Any two)

- a) Object diagram
- b) Creator pattern
- c) UML multiple perspectives

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Attempt all the questions.

- a) What is UML? How agile is applied to software development process? 7
- b) What is object oriented analysis and design? Describe the most used software development life cycle used nowadays? 8

Case Study: Bank Transaction System:

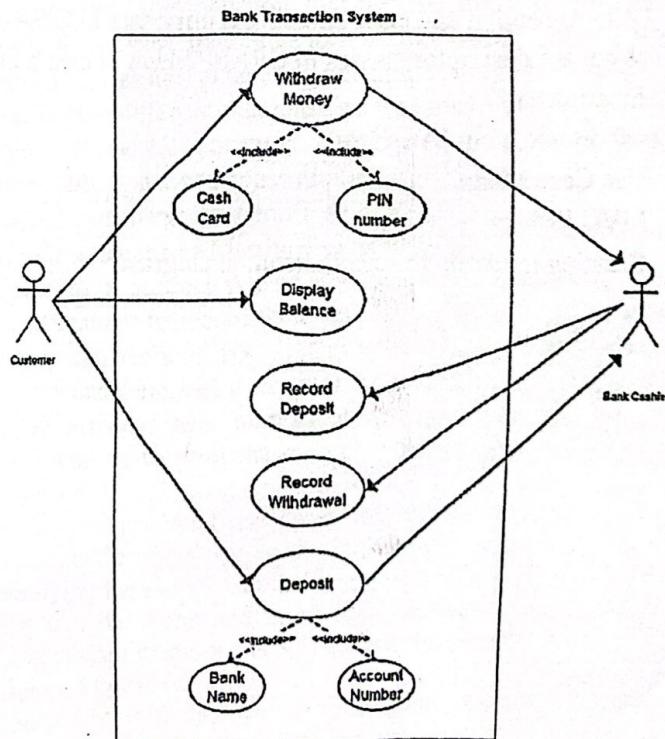


Fig: use case of Bank Transaction System

On the basis of above Use case:

- a) Develop the system sequence diagram for Withdraw Money and Deposit functions.
- b) Write the contract for any one of the system operations you identify.
3. a) What is conceptual Model used for? How system behaviour can achieve data abstraction and Encapsulation? Explain.
- b) When contracts are used? Explain in context of an example by using the standard guidelines.
- I. a) What does visibility controls in Object oriented programming? Describe different types of it with example.
- b) What are the roles of objects and patterns in OODM? Describe the different patterns used.
5. a) How domain model can be built from use case? Illustrate the steps used.
- b) What are the important things to be handled during mapping design to code? Illustrate with an example.
6. a) Why exception and error handling is important in OOAD? Explain.
- b) What are descriptor classes in GRASP? How does it achieve singleton functionality?
7. Write short notes on: (Any two)
a) Use Case Model
b) MVC Pattern
c) Creating methods from collaboration diagram

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Attempt all the questions.

1. a) Explain data and behavioral abstraction with suitable examples? How is the responsibilities assigned to objects different from the behavior that they exhibit? 8
- b) Explain the process of performing requirements elicitation and specifying those requirements using a visual modeling tool? 7
2. a) What are use cases and how can they be used for identifying and recording system requirements? How would you differentiate between include and extend relationship between use cases? 8
- b) What are the different relationships that may exist between Domain concept elements? Construct a domain model for a patient care system making necessary assumptions. 7
3. a) How are system events identified? 9

Student Attendance Monitoring System:

In case of a Student Attendance Monitoring System, the system allows students to record their daily attendance through a Biometric Finger scan device. The system records the daily attendance of students and generates a report at the end of every month that shows the late arrival details, number of absentees etc. The system allows staff members to print the reports and configure the system as per their need.

Identify the potential use cases for scenarios and elaborate them further by coming up with individual sequence diagrams for identifying the system events belonging to the individual scenario. 6

- b) How can iterations and conditional messages be shown using a Collaboration diagram and a Sequence diagram?

4. a) Cheque Payment:

A customer presents a cheque to the bank employee. The employee checks if the cheque and the signature are valid and that the

customer has enough amount of balance in the account. The maximum amount of withdrawal allowed is 100000 per cheque unless the customer is a Privileged Customer in which case the customer can make a withdrawal of 500000 per cheque. Upon successful verification, the system records the successful completion of the transaction and the cash is handed over to the customer.

- i. Perform domain modeling of the above scenario.
- ii. Draw the sequence diagram for the events that occur in the scenario.

- b) What is the difference between coupling and cohesion? How can you make use of the Information Expert Pattern rather than the Controller pattern for delegating responsibilities to objects while designing a system?
5. a) In the UML, how can error generated and exceptions thrown by operations be illustrated in a Sequence diagram? Explain with the necessary figure.

b) **ATM:**

A customer having a Savings account in a Bank swipes a card in an ATM machine and types in the PIN number using the keyboard of the ATM. The System checks if the PIN matches the card. If the PIN does not match, the system rejects the card and display the rejection message in the ATM display. If the PIN is found to be a valid one, the customer types in the amount to be withdrawn. The system checks if the customer has enough amount of balance in that account. If he does, the system debits the account and dispatches cash thru the dispenser of the ATM and a receipt gets printed and issued to the customer.

Come up with a design class diagram for the scenario above and then map those classes to code in any programming language that supports Object Oriented Paradigm.

6. a) What are the artefacts created during the Object Oriented Analysis phase of software development and how do those artefacts get converted into concrete design during the Object Oriented Design phase thru elaboration?
- b) Why should one expect and plan for change and deviation from the design even during programming? Explain.

7. Write short notes on: (Any two)

- a) Activity Diagrams
- b) Iterative Process
- c) Local and Global Visibility

7

7

8

8

7

2x5

POKHARA UNIVERSITY

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Attempt all the questions.

- a) Why is it necessary to form abstractions? Explain the process of forming data and behavioural abstraction with suitable examples? 8

b) Explain the difference between requirements specification and requirements elicitation? How are they performed? 7

a) Differentiate static and dynamic model used in software development life cycle with a concise diagram of each. 7

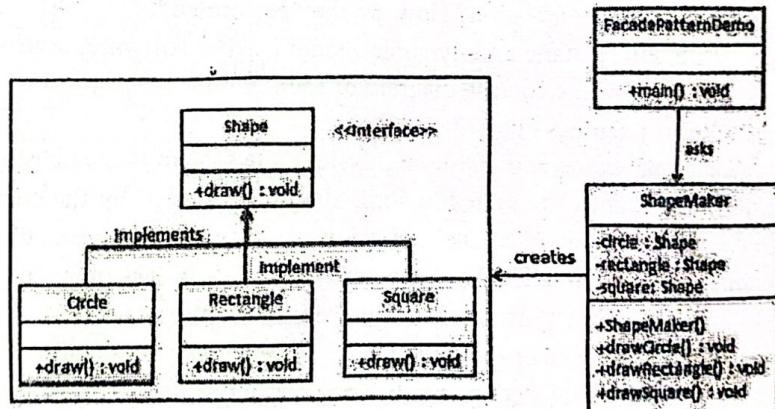
b) Yummy Online Food Ordering: 10

In case of an Online Food Ordering System, the system allows customer to order food online. The system records the orders placed by the customers and generates a report at the end of every month that shows the order details. The system notes the customers who place orders more frequently and provides discount as per the published discount scheme. It also allows the system administrator to configure the system and print reports.

For the above mentioned scenario, come up with the potential use cases and elaborate them further by coming up with individual sequence diagrams for identifying the system events belonging to the individual scenario.

- a) How do you come up with the Domain concept elements from the requirements specified by the customer? Your college is wanting to automate the manual tasks being conducted in the Exam section, come up with a domain model for this scenario by making the necessary assumptions.
 - b) Explain system response, event and operation. Explain the purpose of SSD with an example.
 - a) How do the artifacts created during the Object Oriented Analysis

- phase of software development get converted into concrete design during the Object Oriented Design phase? Explain with an example.
- b) Differentiate between coupling and cohesion by drawing class diagrams of interconnected classes? When would you rather make use of the Information Expert Pattern than the Creator pattern for responsibility delegation to objects while designing an Object Oriented system?
5. a) Differentiate between sequence and communication diagrams with regards to their strength and weakness. Draw a diagram for mutually exclusive conditional path.
- b) What is class diagram? How class diagram can be drawn? Explain step by step methodology along with the notations used to create them.
6. a) On the basis of given figure, convert it to code using a complete source code.



- b) Differentiate between errors and exceptions. What features are provided by the UML for modeling exception handling?
7. Write short notes on: (Any two)
- Steps to create a domain model.
 - Visibility of objects
 - Creating class definitions from DCD's.

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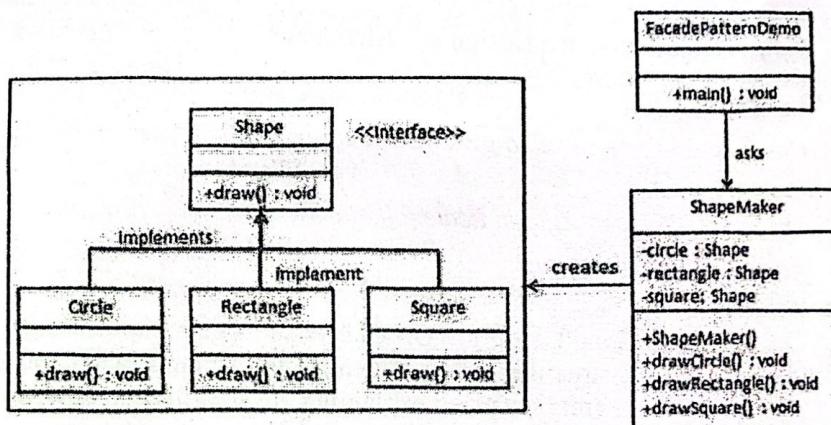
Candidates are required to give their answers in their own words as far as practicable.

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Attempt all the questions.

- a) "Unified Modeling Language (UML) is a language for specifying, visualizing, constructing, and documenting the artifacts of software systems". Justify this statement explaining the significance of UML in OOA/D. 8
- b) What are the various formats to represent a Use case? Explain Fully-Dressed format with an example. 2+5
- a) How System Behaviour can be represented in UML? 8
- b) What is conceptual Model? How can one build a conceptual model? Explain the steps involved. 7
- a) Describe the significance of GRASP. Explain Information Expert Pattern with an example. 7
- b) How do you denote mutually exclusive conditional paths in Interaction Diagram? What are the DO-ing and KNOW-ing responsibilities of an object? 8
- a) What is a collaboration diagram? How do we represent mutually exclusive conditions in a collaboration diagram? Justify with a complete block example. 7
- b) What do you mean by system operation, events and behaviour? Draw a SSD for makePayment() function. 8

5. a) Convert the given Design Class Diagram into an equivalent code. (you can choose any language like Java, C++, etc)



- b) What do you mean by Exception in OOA/D? How are Exceptions addressed by UML?
6. a) How object oriented is used in SDLC?
 b) "Contracts in UML provides a more detailed description of system behavior when use cases are insufficient". Explain this statement with an example.
7. Write short notes on: (Any two)
- a) System event and system operation illustrating un UML
 b) Visibility
 c) High Cohesion and Low Coupling

2

Level: Bachelor Semester: Spring Year : 2019
Programme: BE Full Marks: 100
Course: Object Oriented Design and Modeling Pass Marks: 45
through UML Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

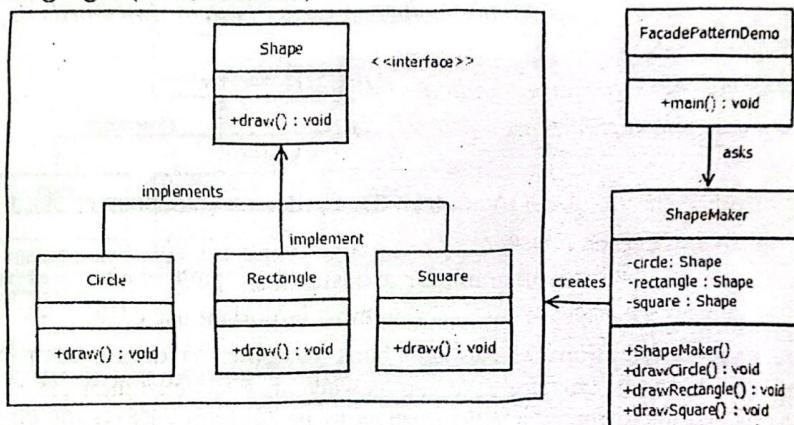
Attempt all the questions.

- a) Explain the terms OOA and OOD. Elaborate your answer with key activities in each phase. 7
- b) Draw an use case diagram for a business of your choice and write fully dressed use case by selecting most important use case. 8

Use Case Description: Allows any bank customer to obtain cash from their bank account. This use case begins when an ATM customer chooses a type of account from which the cash is to be withdrawn (e.g. checking) from a list of possible accounts, and to choose a dollar amount from a list of possible amounts. The system sends the transaction to the financial system for verification. If the financial system approves the transaction, the machine dispenses the appropriate amount of cash and issues a receipt. The dispensing of cash is also recorded in the ATM's log.

- a) Draw a use case diagram on the basis of above case study. 8
- b) Draw a domain model of the above use case by choosing the noun and noun phrases of your use case diagram. 7
- a) Discuss about the different methods for identifying conceptual classes. 7
- b) What do you understand by the term association? Explain multiplicity with an example. 8
- a) How cohesion and coupling affects the object pattern. Describe using the dependency diagram. 8
- b) What is Contract? Pre and post conditions are essential for drawing a contract. Describe it using a suitable use case condition. 7
- a) Why design patterns are considered as important artifacts in object oriented design? Explain the use of Creator and Information Expert patterns. 8
- b) What is visibility? Describe the use of attribute and parameter 7

- visibility among classes while designing class diagram.
6. a) How errors and exceptions can be handled during Mapping codes to design?. Elaborate using a simple code snippets using any Object oriented programming language of your choice.
- b) Convert the diagram into code using any of the object oriented languages (C++, Java etc.)



7. Write short notes on: (Any two)
- Unified Process
 - Sequence versus collaboration diagram
 - Mapping design to codes steps

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2020
Programme: BE Full Marks: 100
Course: Object Oriented Design and Modeling Pass Marks: 45
through UML Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

- How does OOD differ from OOA? Explain the key OOA activities with example. 7
- Explain different phases and disciplines of Rational Unified Process. 8
- What do you mean by UML? Draw a use-case diagram for a library management system and write fully dressed use case for "issue-book". 8
- Explain the importance of object-oriented analysis, in identifying conceptual classes and other elements and to construct a domain model, with a scenario. 7
- What is the role of Domain Model in developing a software? How can you construct a domain model? 7
- How does classes are linked to one another? Discuss association with its name and multiplicity with examples. 8

Case Study: Course Registration System

At the beginning of each semester students may request a course catalog containing a list of each course offerings for the semester. Information about each course, such as professor, department, and prerequisites will be included to help students for prompt decisions. The system will allow students to select four courses that are going to be offered for the coming semester. In addition, each student will indicate two alternative choices in case a course offering becomes filled or canceled. No course offerings will have more than ten students or fewer than three students. A course offering with fewer than three students will be canceled. Once the registration process is completed for a student, the registration system sends information to the billing system so the student can be billed for the semester. Professors must be able to access the online system to indicate which courses they will be teaching, and to see which

students signed up for their course offerings.

- a) Considering above scenario, draw the collaboration diagram.
 - b) Identify the classes, assume the necessary attributes and draw the class diagram.
5. a) What is visibility in OOP Language? Describe its role in obtaining high abstraction. What are the various types of them? Elaborate using diagram and code snippets for the private visibility.
- b) Why do we need design patterns? Explain the use of low coupling and high cohesion patterns.
6. a) How can we make our system more robust? Discuss the use of exception handling in OOA and OOD.
- b) Ultimately diagrams are not executable, so we need to convert them into code. Explain necessary steps to convert design to code with example.
7. Write short notes on: (Any two)
- a) Elaborating use case
 - b) Representation of system behavior
 - c) Mapping design to code

POKHARA UNIVERSITY

Level: Bachelor

Semester - Spring

Year: 2020

Program: BE

Full Marks: 70

Course: Object Oriented Design and Modeling through UML

Pass Marks: 31.5

Time: 2 hrs.

Answers are required to answer in their own words as far as practicable.

Answers with a valid set of UML diagrams indicate full marks.

Attempt all the questions.

Group - A: (5×10=50)

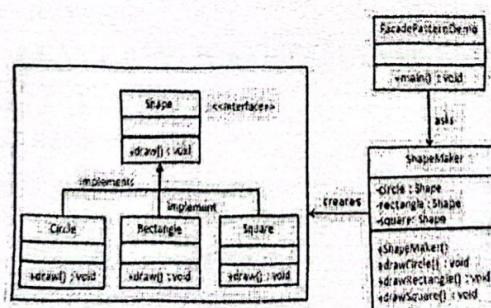
- Q. N. 1 Discuss the emergence of OOA and OOD phases in addition to the existing OOP. Support your answer with key activities in each phase chronologically. 10
- Q. N. 2 Differentiate the structural and behavioral analysis process. Elaborate your understanding by using appropriate artifacts for both. 10
- Q. N. 3 Consider a business of your choice and develop a domain model. Follow the standard practices to find conceptual classes, attributes and associations to develop the domain model. 10
- Q. N. 4 Differentiate sequence diagram with collaboration diagram. Why Contracts are used and what are its format? 10

OR

What is visibility in OOAD? Describe its role in obtaining high abstraction.

What are the various types of them? Elaborate using diagram and code snippets.

- Q. N. 5 Convert the diagram into code using any of the object oriented languages (C++, Java etc.) 10



Group - B: (1×20=20)

Q. N. 6

Case Study

20

Due to COVID-19 outbreak many sectors have been seriously affected. Face masks are mandatory in public places because it is a respiratory sensitive disease. A reputed hospital in Kathmandu wants to hire a software development team to develop a smart face mask detection system.

The system needs to be connected with several cameras for detecting human faces to make sure whether there is anyone without a face mask. The admin can add different wards with details including a supervisor and rooms with cameras in each ward. The supervisor can monitor own ward with a dashboard showing the total number of faces with mask and without masks. Additionally, there is a smart entrance gate that will block the people without a face mask.

Consider yourself as a team lead of the software development team. Illustrate your understanding about the context by developing and finalizing the following artifacts.

Use Case Diagram, Sequence Diagram, Class Diagram, Communication Diagram .

POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2021

Programme: BE

Full Marks: 100

Course: Object Oriented Design and Modelling
through UML

Pass Marks: 45

Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

- a) How is the Unified Process different than other traditional processes like waterfall model? Discuss with regard to the distinctive features of Unified Process. 8
- b) "UML is a language for specializing, visualizing, constructing and documenting the artifacts of the system." Justify this statement explaining the significance of UML in OO/AD. 7
- 1. a) What are use cases and how they can be used for identifying and recording system requirement? How would you differentiate between include and extend relationship between use cases. 8
- b) Why do we need Conceptual Classes? Discuss with an example. 7
- 3. a) "Contracts in UML provides a more detailed description of system behavior when use cases are not sufficient". Explain this statement with an example. 5
- b) **LEAVE APPLICATION MANAGEMENT SYSTEM:** 10
SYSTEM MODULES

Register:

One user has to register on this interface with its actual data to be filled and applied in the same interface, then press enter to be saved in the database. Further, move to log in.

Login:

The user inputs its secure user id and password and enters the system. User can login multiple times as many times he wants

Leave apply:

Here is the module for applying for leave to the interface. One has to enter his details about the leave like reason of the leave.

Choose the dates of the leave. Depending upon the user's account and policy of the company or premise the cost of the leave is calculated and shown to the interface.

Live review:

After successful application of the leave application is will come under scrutiny done by an admin. According to his need, he will review it and take necessary action in next module.

Leave approval:

Here admin approves the leave or not is reflected by admin to the users. Here all the real-time updates will be shown to the users. Users can see only their own leave request there.

Log out:

In the end, the user can log out the system to release the resources held for the purpose of anything else.

- i. Identify the use cases and draw the use case diagram for the system
 - ii. Draw SSD for the scenario of leave application.
4. a) Discuss the importance of using Patterns in OOD. Provide an example scenario for applying high cohesion pattern.
- b) Why are interaction diagram developed during OOD? Differentiate between Sequence and Collaboration diagrams.
5. A hospital's ICU department uses various devices during the treatment of patients. Each patient is monitored to measures factors such as temperature, heart rate, and blood pressure. The device regularly reads the values and record them. For each patient, medical staff also specifies safe ranges for each factor. If a factor falls outside a patient's safe range, or if a device fails, the nurses' station is notified.
- Develop a Domain model, Sequence diagrams and Class diagram from these details.
6. a) Explain with an example, how class diagram can be used to generate code.
- b) What are exceptions and errors? Explain the ways for handling them.
7. Write short notes on: (Any two)
- a) Visibility
 - b) Test-First Programming
 - c) Identifying Conceptual classes

POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2021

Programme: BE

Full Marks: 100

Course: Object Oriented Design and Modeling

Pass Marks: 45

Object Oriented
through UML

Time : 3 hrs

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) How does OOA differ from OOD? Elaborate your answer with key activities in each phase.
b) What are use cases and how they can be used for identifying and recording system requirements? How would you differentiate between include and extend relationship between use cases?

2. a) What are different strategies for identifying conceptual classes? Explain with examples.
b) What is an operation contract? Is it essential to develop an operation contract for each and every system operations? Explain.

3. a) What is visibility? Describe the use of attribute and parameter visibility among classes while designing class diagrams.
b) Discuss the necessity of interaction diagram during software design. How are conditional messages and mutually exclusive conditional paths illustrated in interaction diagrams? Explain.

4. a) Explain different types of relationship used in class diagram.
b) "UML is a language for specializing, visualizing, constructing and documenting the artifacts of the system." Justify this statement explaining the significance of UML in OOA/D.

5. a) What is the significance of studying exception and error handling in objects oriented analysis and design? Explain briefly about exception handling technique.
b) Explain the process of mapping design to code (both class definition and method definition) with example. Support your answer by using a design class diagram and collaboration diagram.

6. Online Learning platforms help students to search for courses as per their criteria. If the system shows a suitable course then the students registers for the course and paying for it. Interaction with teacher can be done by registered students. Students need to attend the class and submit their assignments regularly. Students who attended 80% of the classes and submitted all their assignment are awarded with a course completion certificate at the end of the course. Also, the system facilitates the students to cancel their registration and refund the payment if it is done within a week.

Now draw a use case model (no description required), Domain model, interaction diagrams and design class diagram from these information.

7. Write short notes on: (Any two)

2x:

- a) Functional Vs. Non-Functional Requirements
- b) Coupling and cohesion
- c) Reverse Engineering

POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2022

Programme: BE

Full Marks: 100

Course: Object Oriented Design and Modeling
through UML

Pass Marks: 45

Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Mention the significance of analysis and design in software development lifecycle from an object oriented perspective. 7
- b) Define unified process with its advantages and disadvantages? 8

2. a) Case Study 8

A college canteen system has been planned to be implemented at XYZ College to improve the efficiency and convenience of purchasing food and drinks. The aim of the project was to streamline the process of ordering and payment while providing a better overall experience for the students. Students can order food items using a mobile app and get notified when the item is prepared. Chef uses a kitchen terminal to get orders, prepare the ordered food item and mark it as prepared after preparation.

Draw use case diagram above system and activity diagram for food ordering activity.

- b) What do you understand by the term domain model? Explain components of a domain model. 7

3. a) "A conceptual model is the source of a design class diagram", elaborate this statement with an appropriate example. Also mention the steps involved. 8

b) How does a conceptual class differ from a software artifact? Discuss about the different methods for identifying conceptual classes. 7

4. a) What is a collaboration diagram? How do we represent mutually exclusive conditions in a collaboration diagram? Justify with an example. 8

b) Why design patterns are considered as important artifacts in object oriented design? Explain the use of Creator and Information Expert patterns. 7

- a) What is visibility? Describe the use of attribute and parameter visibility among classes while designing class diagrams. 8
- b) Draw system sequence diagram for enterItem in POS. Explain system events and system operation. 7
- a) What is the significance of studying exception and error handling in objects oriented analysis and design? Explain briefly about exception handling technique. 7
- b) Explain the process of mapping design to code (both class definition and method definition) with example. Support your answer by using a design class diagram and collaboration diagram. 8

Write short notes on: (Any two)

2x5

- a) Functional Vs. Non-Functional Requirements
- b) Operation contract
- c) Representation of system behavior

POKHARA UNIVERSITY

Level: Bachelor

Semester : Spring

Year : 2023

Programme: BE

Full Marks: 100

Course: Object Oriented Design and Modeling
through UML

Pass Marks: 45

Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

- | | | | |
|----|-------------------|---|----|
| 1. | a) | Explain the difference between Object-Oriented Analysis and Object-Oriented Design with an example. | 7 |
| | b) | Why is use case description important? Provide an example and discuss about the important section of a use case description. | 8 |
| 2. | a) | Discuss about the different phases of unified process and their role during software development. | 8 |
| | b) | What is a contract? Explain different parts of contract with suitable example. | 7 |
| 3. | a) | What is the purpose of developing a conceptual model? How is a domain model represented? Discuss its components. | 7 |
| | b) | “Designers make a bridge between customer requirements and the actual working code”, Justify this statement using major sets of design artifacts. | 8 |
| 4. | Case Study | | 15 |

Online Medical Store system allows us access their system with a valid mobile number. We can search for medicines in their systems by providing the doctor's prescription list. The prescription list is compared and a list of available medicines is displayed to us. Then we select the medicines and proceed to checkout and make payment. We also indicate the address for delivery. The system displays the expected delivery date. After that, a SMS with the delivery details is sent to our mobile number. Also, the system facilitates the customers to cancel their order 1 week before delivery with no cancellation charge. After 1 week no cancellation can be made.

Draw a use case model, Domain model, collaboration diagrams and design class diagram from these information.

5. a) Discuss the scope and visibility of objects. Elaborate the use of parameter visibility and local visibility in details 7
- b) How cohesion and coupling affect a good design? Explain with suitable points. 8
6. a) Explain about Fault, error and failure with relevant examples. Discuss the steps to handle exception in object oriented programming. 8
- b) Designs are for programmers not for end users. Show how different design diagrams help programmers for writing code. 7
7. Write short notes on: (Any two) 2×
- a) Conceptual class category list
 - b) Collection Classes
 - c) Information expert

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2023
Programme: BE Full Marks: 100
Course: Object Oriented Design and Modelling through Pass Marks: 45
UML Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Explain the difference between Object-Oriented Analysis and Object-Oriented Design with an example. 7
- b) What is Use case diagram? Explain include and extends relationship with example. Draw Use Case Diagram for Online Hotel Reservation System. 8
2. a) What is a contract? Explain different parts of contract with suitable example. 8
- b) What is the purpose of developing a conceptual model? How is a domain model represented? Discuss its components. 7
3. a) What is the purpose of using system sequence diagram? Explain it with suitable example. 8
- b) What is class diagram and why they are important in designing the software system? How are classes linked to each other? Show with different relationship used in class diagram with examples. 7
4. a) What is GRASP and list out all the patterns also provide the reason why design patterns are used in object oriented design? Explain the use of low coupling and high cohesion. 8
- b) Discuss the scope and visibility of objects. Elaborate the use of parameter visibility and local visibility in details 7
5. a) Explain the overall process of Object-Oriented Software Development (analysis, design and modelling, implementation). 8
- b) Explain the process of mapping design to code (both class definition and method definition) with example. 7
6. a) Differentiate error and exceptions. How are exceptions handled in UML diagram? Explain. 7

- b) Why is it important to list the requirements before making the actual design? Explain with the help of Library Management System. 8
7. Write short notes on: (Any two) 2×5
- a) Unified process
 - b) Sequence vs Collaboration diagram
 - c) Creating methods from collaboration diagram