TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2079 Ashwin

Exam.		Back	
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT 651)*

- Candidates are required to give their answers in their own words as far as practicable.
- *Attempt All questions.*
- *The figures in the margin indicate Full Marks.*
- *Assume suitable data if necessary.*

1. What are the differences of OO Development cycle to other conventional approach? Explain different phases of Rational Unified process. [4+4]
2. Explain associations, dependency and generalization with their corresponding notations. Differentiate between aggregation and compositions relationship with example. [3+5]
3. For the case study given below identify all the classes, relationships and also draw domain model. [6]
The Library Contains books and journals. It may have several copies of the given books. Some of the books are for short term loans only. All the other books may be borrowed by any library member for 1 month. Members of the library can normally borrow upto six items at a time but members of staff may borrow up to 12 items at one time. Only members of staff may borrow journals.
4. Prepare System Sequence Diagram (SSD) for Restaurant Order System with necessary assumptions. Explain the process of transformations from OOA to OOD. [6+4]
5. Assume following scenario for Social Networking Website with the following functionalities:
First of all, the user should create his account. After registration the user can log in to the system. When the user gets a login, the user can upload a profile picture. When the user gets a login, the user can search for a person and when a user searches a person, then there is an option that the user adds that person as a friend or not. But user must first search that person to add him/her as a friend.
Prepare Use Case diagram, Activity diagram and Class Diagram of the system. [6+6+6]
6. What is design pattern? Explain about Creator, Controller and polymorphism design patterns defined by GRASP. [1+7]
7. Describe the term OOP (Object Oriented Programming) and code refactorizing. Consider you are assigned to create Instagram clone project. Identify all classes, their relationships, attributes and methods for each class. Also draw class diagram using standard UML (Unified Modelling Language) notation. [10]
8. Write comprehensive notes on the following: [3×4]

a) Conceptual model vs Implementation model
b) Distributed system implementation issues
c) Agile method
d) CRC cards

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2079 Jestha

Exam.	Back		
Level	BE	Full Marks	80
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Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT 651)*

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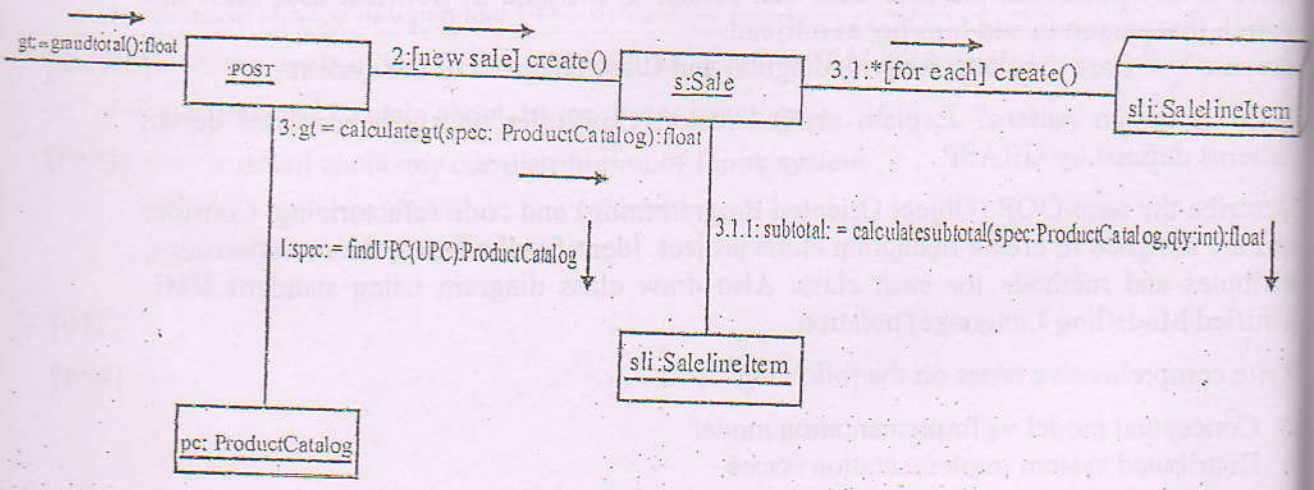
1. Describe about Unified Modeling Language and list out to which models the following models belongs to usecase diagram, activity diagram, conceptual model, sequence diagram, collaboration diagram, state diagram and class diagram. [2+
2. Describe incremental and iterative development process with suitable example.
3. Describe the major components of requirement analysis with suitable example..
4. Describe about extended textural usecase and write extended textual usecase for buy item with cash of Point of Sale Terminal of retail store. [2+
5. List out the possible ways to find out concept name and relationships of domain model and construct domain model of Point of Sale Terminal of retail store that should include the concept of user management, inventory management, sale and payment. [2+2+
6. Describe the importance of system behavior. Provide UML notation of sequence diagram and draw sequence diagram for cash withdraw from Automate Teller Machine with proper guard condition. [2+2+
7. Explain how to construct User Interface Design with proper example.
8. Explain controller pattern and polymorphism pattern of GRASP pattern with suitable example.
9. Describe and list out all types of visibility with suitable example.
10. List out all the association used in the class diagram with suitable example.
11. Construct class diagram and equivalent code from the below collaboration diagram. [6+



12. Discuss about forward and reverse engineering in development.
13. Write short notes on: [3×
    a) Contract

TRIBHUVAN UNIVERSITY
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2078 Poush

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Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT 651)*

- Candidates are required to give their answers in their own words as far as practicable.
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1. Briefly explain the fundamental concepts of object orientation. Highlight the major differences between conventional and modern analysis approach, with suitable examples. [8]
2. Explain the correlation between Object oriented analysis, design and implementation. Apply the object detection and rejection rule to highlight the candidate objects of any scenario of your choice. [7]
3. What is meant by class and object? Explain dependency, association, aggregation and realization with their corresponding notations. [8]
4. Construct a Conceptual model and SSD from Use case of ATM transaction scenario. [7]
5. How does the transition from OOA to OOD works? Explain highlighting the input sources for OOD and deliverables of OOD. [8]
6. What are the differences between a sequence diagram and a collaboration diagram? Prepare a collaboration diagram for withdrawing a book from library. [7]
7. How object and pattern based design assists in OOD? Explain the different types of patterns and visibilities in object oriented design with illustrations. [8]
8. Explain the concept of Interface and Implementation in Object oriented design and implementation. [7]
9. Explain exception and error handling in the context of system implementation. [8]
10. How mapping design into code works? Illustrate with suitable diagrams. [6]
11. Write Short notes on: (Any Three) [3×2]
    a) MVC
    b) Forward and Reverse Engineering
    c) Use Case Diagram
    d) CRC card and its use

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2077 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT 651)*

- Candidates are required to give their answers in their own words as far as practicable.
- *Attempt All questions.*
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1. Explain and illustrate the fundamental concepts of object orientation. What is the key difference between conventional design approaches to modern OO design cycle? Explain with relevant examples. [4+6]
2. Why do we need different types of system models while developing any system? What are the building blocks of UML? Explain in brief. [2+6]
3. Describe domain model with its necessary components. List out the steps to draw domain model and describe each steps and construct domain model with respect to outlined steps for the following case study. [2+2+6]
   Patients are treated in a single ward by the doctors assigned to them. Healthcare assistants also attend to the patients, a number of these are associated with each ward. Each patient is required to take a variety of drugs a certain number of times per day and for varying lengths of time. The system must record details concerning patient treatment and staff payment. Some staffs are paid part time and doctors and healthcare assistants work varying amounts of overtime at varying rates. The system will also need to track what treatments are required for which patients.
4. Describe the importance of system contract and describe pre-condition and post-conditon of contract. Construct a system contract for any one system operation with respect to case study mentioned in Question number 3. [2+2+4]
5. A library has books, videos and CDs that it loans to its users. All library material has unique id and a title. In addition, books have one or more authors, video have one producer and one or more actors, while CDs have one or more entertainers. The library maintains one or more copies of each library item (book, video or CD). Copies of all library material can be loaned to users. Reference-only material is loaned for 2 hours and can't be removed from library. Other material can be loaned for 2 weeks. for every loan, the library. Other material can be loaned for 2 weeks. For every loan, the library records the user, the loan date and time, and return date and time. For users, the library maintains their name, address and phone number.
   a) List out five responsibilities form above case and draw interaction diagram with proper UML notation for any two responsibilities. [2+4]
   b) Create class diagram with appropriate association such as aggregation, composition, realization, generalization and dependencies. [6]
6. What are the key components of collaboration diagram? Describe its importance while designing a system. [5+3]
7. What are the key benefits of using design patterns? Explain MVC design pattern with the help of suitable example. [3+5]
8. Describe the types of exceptions and how it is achieved in any object oriented programming. [6]
9. Write short notes on: (Any Two) [2×5]
   a) CRC card and its importance in object modeling
   b) Deployment diagram and its importance

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- ✓ Candidates are required to give their answers in their own words as far as practicable.
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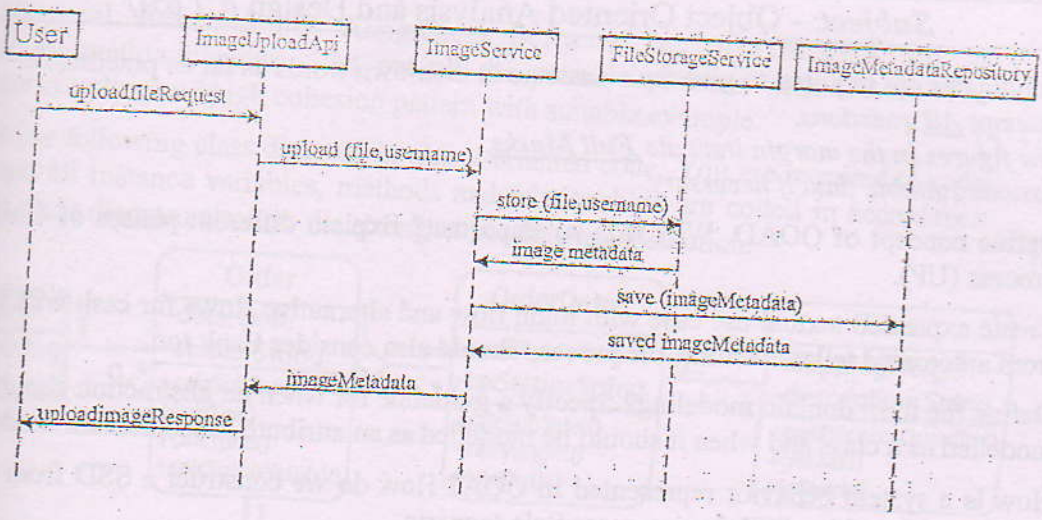
1. What are the differences of OO based system to other conventional design in context with encapsulation and inheritance? Explain association, aggregation, and composition with examples.
2. Compare between Function oriented and Object Oriented system. What are the advanced relationships on Use case diagram? Explain <<include>> and <<extend>> relationship with suitable diagram.
3. How does requirement elicitation process happen in Object Oriented Analysis? List the different types of requirement used to describe the object oriented system.
4. Define Domain modeling. List the candidate conceptual class for Online Movie Ticket Booking System by using the Category list method.
5. Consider the Railway Reservation System. There are a number of trains and each train stops in one or more. Each train has a predetermined number of seats available in each of classes (First class, First AC, Second AC, Third AC, Sleeper and so on). The fare between two stations is determined by the class of travel and the distance. Passenger can enquire about the availability of seats between any two stations and for any class. The Railway Reservation System should be able to handle the queries and perform the necessary reservation/cancellation operations. Draw a Use case diagram with the relationships.
6. Identify the different classes, relationships and draw a Class Diagram for "Online Examination System" as following:

   Students can login to the system with the username and password provided to them. Students can be new or existing. Student can register for the exam through the online form provided in the system. Students are requested to pay for the examination after the registration of the exam. Payments for the registration are accepted through the Bank. Bank verifies the clearance of fee. Administrator manages the system through faculty id, course code, course slot, create exam, delete exam, update exam and check report. Question paper provided to student through the system. Students can give exam and check report after exam.

7. The model depicts the clone of Instagram as figure below. Explain in detail the diagram type with every symbol being used and semantics of this diagram. [8]



8. Describe the term Design Pattern. Explain the purpose and benefits of information expert, Creator, Controller and Polymorphism design patterns defined by GRASP. [8]

9. What is attribute and parameter visibility? How can we create definition and methods from the design class diagram and interaction diagram? Explain with appropriate example. [2+6]

10. Write Short Notes on: [3×4]

a) Conceptual model vs. Implementation model
b) CRC Cards
c) Exception and error handling

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TRIBHUVAN UNIVERSITY
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2078 Baishakh

Exam.	Back		
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Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT 651)*

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1. Define concept of OOAD. Why it is so important? Explain different phases of Unified Process (UP). [2+4]
2. Create expanded textual use case with main flow and alternative flows for cash withdraw from automated teller machine, the process should also consider Bank too. [8]
3. Define the term domain modeling? Specify a guideline for when an abstraction should be modelled as a class and when it should be modelled as an attribute in the domain model. [2+4]
4. How is a system behavior represented in OOA? How do we construct a SSD from Use case? Explain with a SSD for a process Sale scenario. [8]
5. For the case study given below. [6+8]
   a) Identify all the actors, use cases and relationships, Also draw use case diagram.
   b) Identify all the classes, attributes, methods and relationships among the classes, Also draw the UML Design class diagram.

Mobile Recharge Application

Mobile Recharge is a simple application which gives the information about all the mobile service providers available in Nepal. It provides complete information about any mobile service provider in terms of their plans, options, benefits, etc. Suppose, any customer of Nepal Telecom wants to have the information of all the schemes and services provided by the company, he/she can have the information and according to his convenience he can recharge the mobile from the same platform. The major benefit of this application is to have the recharging facility of any service provider under same roof.

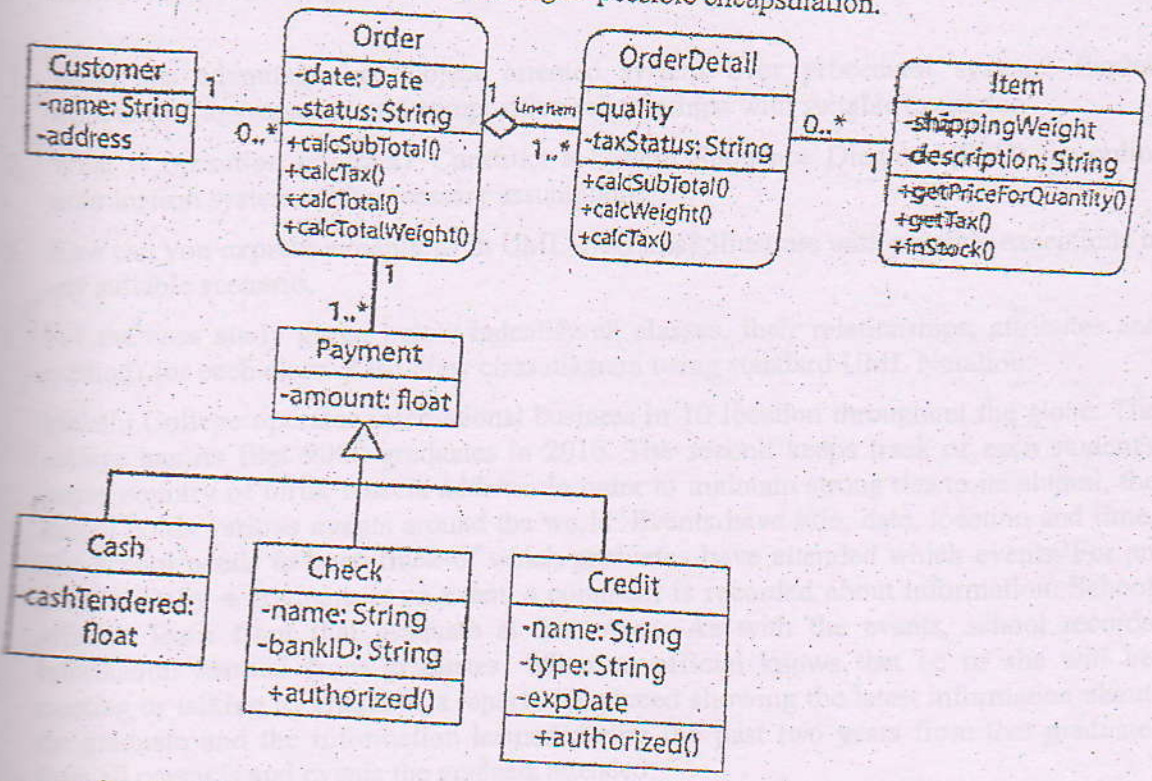
There are various end users in the system. Service provider is the company who are providing the mobile connections to their customer e.g. NTC, NCELL. Functionality of this module is to make the mobile recharging of their company basing on the availability of balance in the admin account. Request comes from the user and it is going to be verified at the admin for the availability of balance and then request is forwarded to the service provided to make the mobile recharge.

Third party System Administrator, who can monitor all users and their transactions. This module also monitors all the Service Providers, all the user accounts, and amounts paid by the user and amounts paid to Service Providers. When the request given by the users, it checks the available balance in the user account then requested user account is forwarded to the Service Provider from there user request gets processed. Admin haves the complete information related to user and all the information related to the schemes and other information of different recharge coupons provided by the Service Providers. All the data is maintained at the Admin level. Admin is having the rights to restrict any user. There

are two categories of customers called registered customer and Visitors. Any person who wants to utilize the services of Online Mobile Recharge at anytime from anywhere they should get registered in this application. After getting registered user can recharge the mobile at any time and from anywhere. Visitor is the one who visits the Online Mobile Recharge application and have the complete information related to the Service Providers and can make the mobile recharge by entering the bank details or by giving the credit card details.

6. Describe General Responsibility Assignment Software Pattern (GRASP) and its importance interaction diagram. List out all the possible patterns with GRASP and describe low coupling and high cohesion pattern with suitable example. [2+2+6]

7. Implement the following class diagram in object-oriented code. You are required to code ensuring that all instance variables, methods and relationships are coded in accordance with design class diagram also use the strongest possible encapsulation. [8]



How exception handling mechanism helps in implementing Object oriented system? You should justify your idea with the help of any OO programming language of your choice. [8]

Write short notes on: (Any Three) [3× 4]

a) MVC
b) Forward and Reverse Engineering
c) Use Case Diagram
d) CRC card and its use

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32 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT651)*

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1. What are advantages of object oriented system over procedural system? Explain association, aggregation and composition relationships with suitable examples. [2+6]
2. What is operation contract? Construct a System Sequence Diagram (SSD) for online examination system with necessary assumptions. [2+6]
3. How can you express exceptions in UML diagrams? Illustrate with possible exceptions in any suitable scenario. [6]
4. For the case study given below indentify all classes, their relationships, attributes and methods for each class. Also draw class diagram using standard UML Notation. [8]

   Makalu College operates international business in 10 location throughout the globe. The college has its first 9000 graduates in 2010. The second keeps track of each student's name, country of birth, current address. In order to maintain strong ties to its alumni, the school holds various events around the world. Events have title, date, location and time. The school needs to keep track of which graduates have attended which events. For an attendance by a graduate at an event, a comment is recorded about information. School officials learn from that graduate at that event. As with the events, school records information learned from graduates. When an official knows that he or she will be meeting or talking to graduate, a report is produced showing the latest information about the graduate and the information learned during the past two years from that graduate from all contacts and events the graduate attended.
5. Describe the term Design pattern? Explain the purpose and benefits of information Expert, Creator, Controller and Polymorphism design patterns defined by GRASP. [1+6]
6. a) Describe the term OOP, code refactoring. [2]

   b) For the class diagram created in Question number 4 apply object oriented techniques to converts such class diagram into implementation code in any of your favorite object oriented programming language. Your implementation code should clearly show class definition, attributes with their proper visibility and method signatures with required parameter. [7]

7. The famous digital eatery at Durbar Marge, "Naulo Restaurant", which is designed by IOE graduate engineers, processes everything either through Robot or with digital device, except food preparation and cooking. Every tables-tops is equipped with large tablet screen and using the table each customers selects the food items they would like to order. Once the customers selects the items, the restaurant system automatically dispatches the food items selected as the order to the kitchen unit of the restaurant. Again, when the food item is prepared, the robot named "Ginger" will get called in by kitchen unit for delivering the food item to the particular table number through system. The food plate, once being loaded onto the tray of Ginger, which delivers the food up to the customer table and then system get updated as the order is delivered and due bill is generated for the food item of that table. This process might be repeated for multiple times as the additional food ordering and serving might happen frequently. Finally, the customer pays accumulated bill either swiping the credit/debit card or through online payment. Order taking process, order dispatching process, food delivery and paper bill carrying up to the table through humans are eliminated so, they claimed it as complete digital restaurant. Now answer the followings: [6×3]

   i) Prepare the USE case diagram of the system.
   ii) Prepare activity diagram of the system.
   iii) Prepare the sequence diagram of the system.

8. Compare the followings: [4×4]

   i) Conceptual model vs. Implementation model
   ii) Forward Engineering vs. Reverse Engineering
   iii) Association types vs. Cardinality constraints
   iv) Design pattern vs. Components reuse

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46 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Baisakh

Exam.	Back		
Level	BE	Full Marks	80
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1. a) What are the main differences of OO based design cycle to other conventional design cycle? Explain with relevant example. [6]
   b) Describe functional and nonfunctional requirements with suitable examples. [3+3]
2. What are the strengths of the agile development method? Explain how the requirement elicitation process happens in OOA. [2+4]
3. Define conceptual class and domain model. Explain primary relationship between class, dependency, association, aggregation and composition with their corresponding notation. [8]
4. Draw the sequence diagram of login page. Use four scenario as following: User, User Interface, Login-Session (active or expire) and System validity. Show all scenarios with brief explanation. [6]
5. The model depicts the online order processing system as illustrated in figure 1. Explain in detail of the diagram type with every symbols being used and semantics of this diagram. [8]

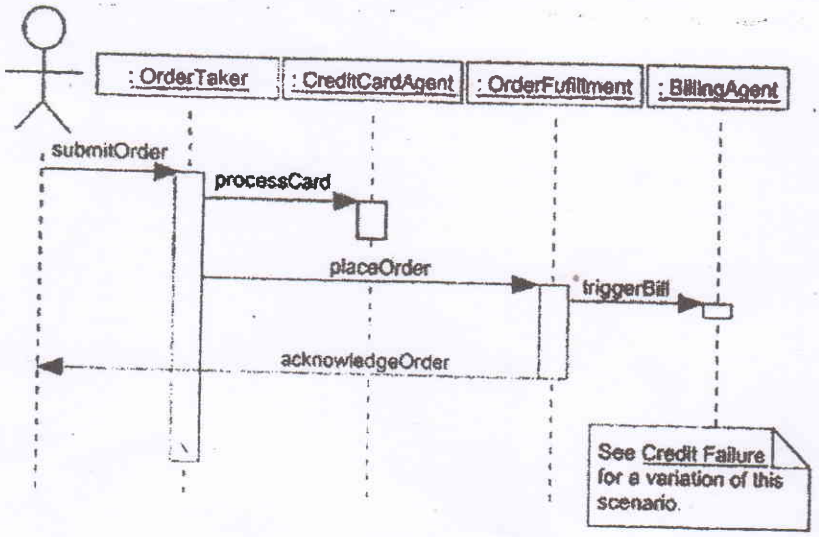

fig.1

6. State-sequence diagram aids the implementation of Reactive system. If you agree on the statement, justify with reason and model diagram. [6]
7. Discuss the mechanism of transformation from OOA to OOD? Prepare the Activity diagram for restaurant booking system. [4+4]

8. Draw a complete Use case Diagram and domain Model with proper UML notation for the following case study. [10]

   A university registrar's maintains data about the following entities: Courses, including number, title, credits, syllabus and prerequisites; Course offerings, including course number, year, semester, section number, instructor (s), timing and classrooms; Students, including student id, name, and program; and instructors, including identification number, name, department, and title. Further the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

9. Prepare an activity diagram for computing a restaurant bill. There should be a charge for each delivered item. The total amount should be subject to tax. There is a service charge of 18% for groups of six or more and 10% for smaller groups. Any coupons and gift certificates submitted by the customer should be subtracted. [8]

10. Write short notes: [4×2]

    a) Design Patterns and its use in OOAD
    b) Distributed system implementation issues

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46 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Bhadra

Exam.	Regular		
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Year / Part	III / II	Time	3 hrs.

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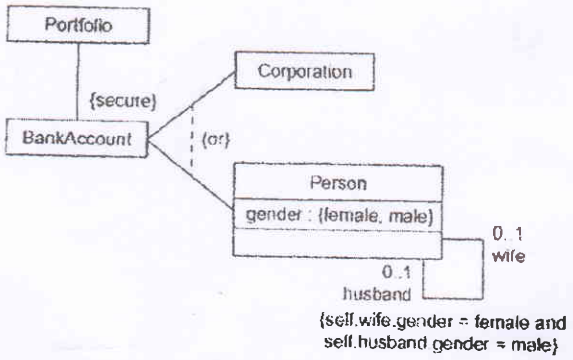
1. a) What are the meaning of Object and Encapsulation in terms of OOAD? Explain briefly with example. [6]

   b) Prepare the fully labeled use cases for cash withdraw case of the banking system. [6]

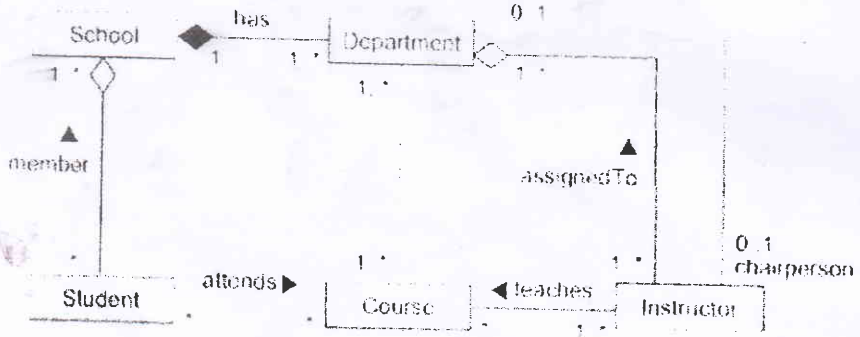
2. IN OOAD, there are various types of models, like conceptual, structural, behavioral, etc. What is the significance of these many different types of model? Explain with illustrative examples. [6]

3. What is the role of constraint specifications in a model diagram? The model below figure depicts about possible types of accounts within the portfolio sub-head in any banking business domain. Identify the constraints highlighted and explain brief, what they mean. Write pseudocode the model diagram. [8]



4. What are the perceptions of applying UML? Consider the Library System. Each book in a library contains bibliography, each bibliography consists of a number of reference to other books. A book will be referred to in many cases and therefore a reference can appear in more than one bibliography. Use noun phrase identification strategies to find the conceptual classes of above cases. [2+4]

5. Present the mapping process for the figure below model using object-oriented based pseudo-codes for capturing all important aspects of the model diagram. [10]



6. Prepare a comparative note on forward versus reverse engineering with mentioning the merits, demerits and implementation challenges. [6]

7. What is the purpose of CRC? Illustrates the concepts of coupling and cohesion in object oriented design with suitable example. [2+3]

8. What are pattern based design and its benefits? Prepare illustrative notes on pattern based design. [6]

9. Identify conceptual class and its supportive attributes for a Photocopier machine from the description given below and draw the conceptual class diagram for the same. Initially the machine is off. When the operator switches on the machine, it first warms up during which it performs some internal tests. Once the tests are over, machine is ready for making copies. When operator loads a page to be photocopied and press 'start' button, machine starts making copies according to the number of copies selected. When machine is making copies, machine may go out of paper. Once operator loads sufficient pages, it can start making copies again. During the photocopy process, if paper jam occurs in the machine, operator may need to clean the path by removing the jammed paper to make the machine ready. [9]

10. Write short notes on: [4×3]

    a) Agile method
    b) Association visibility
    c) Dewey Decimal Numbering and its use in modeling
    d) design Patterns and its use in OOAD

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46 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT651)*

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1. a) What do you mean by Unified process (UP) in OOAD? Explain the phases with suitable diagrams. [3+3]

   b) Consider the scenario of flight booking through an online system at first and then with allowance of certain days of delay for final purchase through second round of payment process completion. Identify all the actors, use-cases and relationship. Also draw use case diagram. [8]

2. a) How does static and dynamic analysis differ in OOAD? Explain in brief. [5]

   b) Draw class diagram and activity diagram with object flow depiction on the following scenario operating condition system:

   Patient can arrange and cancel appointment with physician using scheduler. Physician seceded to prescribe Medication for patient. Physician specificies Drug Info: Medication name, Dosage amount, Number dosages and Refills. Computer cross checks for conflict between Medication and current Medications/Medicals history prescription forwarded electronically to Pharmacy and printed for patient as well. [5+5]

3. a) In what aspects the sequence diagram is different from collaboration diagram? Prepare the sequence diagram of the bus ticket reservation system. [2+6]

   b) Explain the concepts of Controller and Polymorphism as per the definition outlined from GRASP design pattern with illustration. [8]

4. a) With the help of suitable examples, explain how you can handle errors and exception in object oriented system implementation. [6]

b) How can we create class definition and methods from the domain class diagram and interaction diagram? Explain with appropriate example. [4+4]

5. Write short notes on: [3×4]

   i) CRC cards
   ii) MVC pattern
   iii) Swimlanes in activity diagram
   iv) Adornment of relation

6. Compare the followings: [3×3]

   i) Forward vs Reverse Engineering
   ii) Forking vs Joining
   iii) Micro vs Macro processes ooDesign

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46 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
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2073 Bhadra

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1. a) What makes the use-case diagram as an important in UML diagrams? Illustrate your argument with a model use-case diagram for a particular scenario. [3+3]

   b) What are requirements process alternatives before having 00 Analysis? As you are already familiar with IOE exam processes, prepare a brief SRS document following unified process in OOAD. [3+5]

2. a) Describe the strategies to identify conceptual classes. Describe the steps to create a Domain Model used for representing conceptual classes. [6]

   b) Consider a Rental Car System (RCS). A rental agency has multiple offices/locations where customer can test drive and select a car for rental. The period of rental, terms and conditions for rental is flexible. RCS has to take responsibility for loaning cars, keeping track of availability of cars, return of cars, billing, maintenance activities for cars and keeping track of driver's availability and assignment in case of chauffeur driver car rentals. Identify the candidate objects with relationships of above case. [8]

3. a) For the case study given below identify all classes, their relationships, attributes and methods for each class. Also draw class diagram using standard UML Notation. XYZ Marina is privately owned corporation that rents boats and provides boat services on a lake. The Corporation needs automated system to track customers, leased slips (Each space for boat in lake) and boats in the slips. The corporation has two types of boats sail boat and power boat. Both types of boats are uniquely identified by their attributes like registration number, manufacture year and boat length. The boat can be leased on daily basis or yearly basis. The system should perform following tasks creating lease, computing lease amount, assigning boats. The system should also have features of search for vacant slips leased to specific customers and generating customized reports. The system should have to implement billing system as well. [8]

   b) For the above class diagram created apply object oriented techniques to convert such class diagram into implementation code in any of your favorite object oriented programming language. Your implementation code should clearly show class definition, Attributes with their proper visibility and method signatures with required parameter. [8]

4. a) How interface differ from implementation? Explain the concept of interface and implementation in any object oriented programming languages. [6]

   b) What are the major functions of Exceptions and error handling in the programs development? Is it required to develop the program? Justify it. [3+3]

5. What is singleton class? Explain the different types of visibility in object oriented design. [2+6]

6. Write short notes on: [4×4]

   i) Information content in forward and reverse engineering
   ii) Data dictionary stability
   iii) GRASP
   iv) Types of interaction diagram and their focus

46 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Ashwin

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT651)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) Differentiate between functional and non-functional requirement. What are the relationships in Use Case Diagrams and explain <<include>> and <<extend>> relationships with diagram? [5]

   b) For the case study given below identify all the actors, use cases and relationships also draw use case diagram. [5]

   A coffee Vending Machine dispenses coffee to customers. Customers order coffee by selecting a recipe from a set of recipes. Customers pay for the coffee using coins. Change is given back if any to the customers. The Services staff loads ingredients (coffee power, milk, sugar, water and chocolate) into the coffee machine. The service staff can also add a recipe by indicating the name of the coffee, the units of coffee powder, milk, sugar, water and chocolate to be added as well as the cost of the coffee.

2. Explain all types of external actors in relation to System under Discussion (SuD). Draw a system sequence diagram for the Library Management system with the following requirements. You can add additional elements if necessary.

   A college library has 4 librarians to manage and issue the books to the users who are either students or faculty staffs. The library contains the books belonging to Computer and Humanities streams. The books are course books, reference books, book banks etc. The users must log into system to search the required books and may reserve the books earlier. The librarian issues the books to the users and also charge fine in case of delayed return or loss of the book. The librarian asks for the "Sanu Publisher" to supply the necessary books into the library. The librarian manages all the users. [2+6]

3. What do you mean by Domain Modeling? Present the guidelines to add attributes and associations in the domain model. [6]

4. How can you represent the dynamic behavior of the system in Object Oriented Analysis (OOA)? Explain with example. [6]

5. Draw the class diagram and map the design into code for "Health Care Center" as following: Patient can arrange and cancel appointment with physician using scheduler. Physician secedes to prescribe Medication for patient. Physician Specifies Drug Info: Medication name, Dosage Amount, Number Doses and Refills. Computer Cross-Checks for Conflict between Medication and Current Medications/Medical History Prescription Forwarded Electronically to Pharmacy or Else Printed for Patient. [10

6. a) In many ways, a deployment diagram is just a special kind of class diagram, which focuses on a system's nodes. Justify this statement. [5

   b) Draw an exception class hierarchy to present the errors and exceptions derived from the Throewable class. [5

7. How pattern different from framework? Explain information Expert, Creator and Low Coupling design patterns defined by GRASP Design Pattern. [8]

8. a) Explain the concept of interface and implementation in object oriented design and implementation. [5]

   b) During object oriented implementation of design class diagram you may encounter one-to- many relationships between classes. With the help of collection and generic classes, explain how you can represent these relationships in object oriented programming. [5]

9. Compare the followings: [4×3]

   a) Forward Engineering vs. Backward Engineering
   b) Structural Model vs. Implementation Model
   c) Flowchart Vs. Structure chart

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Examination Control Division
2070 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT651)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1 What are the differences between algorithmic decomposition and object-oriented decomposition in the process of systems analysis for a complex system? What is the role of hierarchy, another feature of object-orientation, in such decomposition process? [6 + 4]

2 Explain four primary relations between classes; dependency, association, aggregation, and realization, with their corresponding notations. [8]

3 What is behavior modeling in object-oriented analysis? Present any four sample diagrams that are based on behavior modeling. [4 + 4]

4 A new bus service, Gana Rajya Express (GRE) is starting soon, which has the business plan and operation as detailed below. [10]

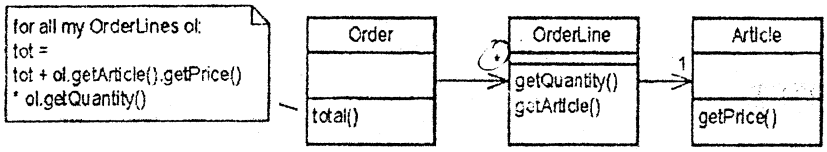
GRE sells tickets only through the web service, not in bus stations or in buses. Tickets must be paid by credit card or online bank payment. Tickets are not bookable. Ticket can be sold to the particular line, but not with particular seating location. The ticket can be cancelled, but GRE returns only a portion of the ticket price. Cancellation can be handled via Internet or via phone services. The closer to departure, the lower part of the price shall be refunded. In addition to ticket cancellation, it is possible to inquire about bus schedule information via phone service. Tickets are electronic tickets delivered via e-mail. The driver checks the right to travel by reading the barcode on the ticket using mobile reading terminal. GRE hires workers for different tasks. Traffic planner establishes and closes down lines. He also shifts in demand, and designs schedules. Price analyst adjusts prices depending on demand and competitors. Driver manager is the head of drivers and allocates drivers and buses, and schedules services and Transportation Department tests for the vehicles. GRE pays hourly rate for drivers and telephone service staff. Other staff will be paid by monthly salary basis. Non-core activities (accounting, payroll, vehicle maintenance, computer maintenance, etc.) will be outsourced.

Prepare and draw Use Cases with elaboration for the above scenario.

5 Bottle recycling machine has a control unit, bottle sensor, belt unit, the sum counter, the end button and the receipt printer.There are at least states such as waiting, on run, on service and receipt printing. The "on run" state can be refined with sub-states working, blocked, failure notification, emptying. You can add few new states according to your own realization. [8]

Draw a state diagram for the control unit

6 Your manager reviews your design and codes of a sub-module that you have prepared, as depicted in the below figure. She suggests you to introduce *subtotal*( ) somewhere in your model thinking about the performance of the system. [8]



Modify your implementation and justify how does this update provides you better performance.

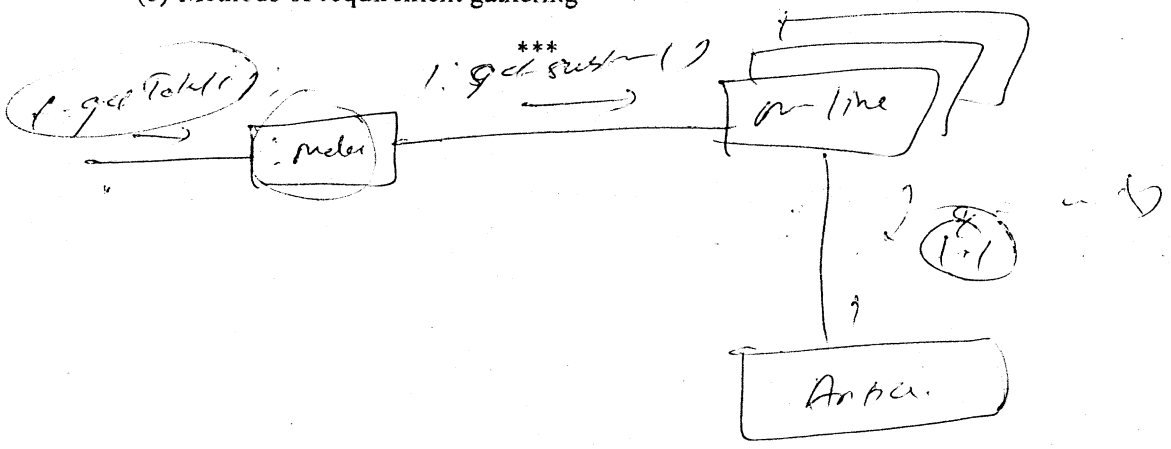
7 What is exception and error handling in the context of system implementation? How does it differ from other conventional method versus the object-oriented method based implementation? [5+5]

8 Explain the forking, joining, and branching features available in object-oriented based modeling? How does these primitive provide the closest implementation model? Relate with any arbitrary sample. [4+4]

9 Write short notes. [2*5]

(a) Focus of control

(b) Methods of requirement gathering



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Examination Control Division
2070 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT651)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. What are the main differences of OO based design cycle to other conventional design cycle? Explain with relevant example. [7]
2. In OOAD, there are various types of models, like conceptual, structural, behavioral, etc. What is the significance of these many different types of model? Explain with illustrative examples. [7]
3. How does the requirement elicitation process happen in object oriented analysis? Explain with reference to system behavior analysis of any exemplary system case. [7]
4. Prepare the list of essential components to be identified in building an activity diagram. Illustrate with an example of your own choice. [7]
5. The model depicts the online order processing system as illustrated in fig.1. Explain in detail of the diagram type with every symbols being used and semantics of this diagram. [8]

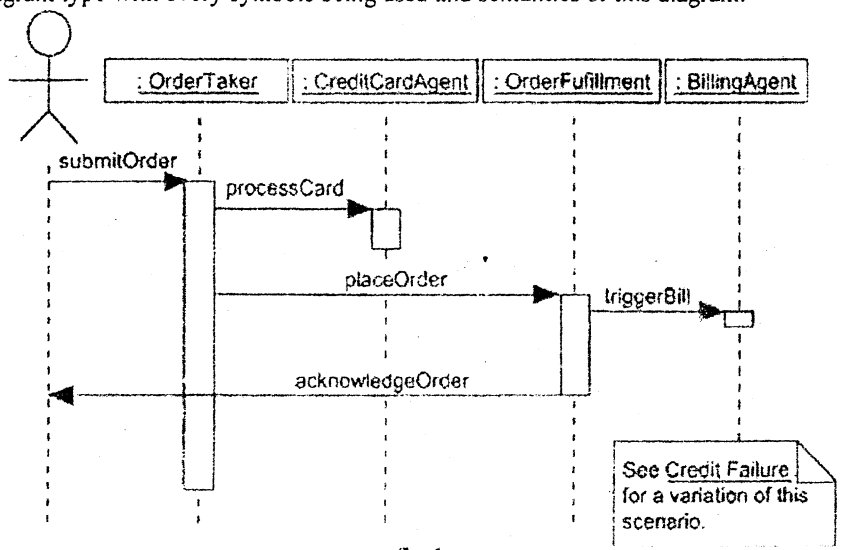

fig.1

6. Imagine your school friend, Miss DilKhus Kumari Vaidya, a very successful entrepreneur at early age, is offering you systems manager position with very good salary in her new business of event management. The proposed system is a complete Online-Event-Management-System (OEMs) that should handle not only event details, rather the revenue, expenditure and transaction details related to various headings of each event and also every personnel involved. Now you have to prepare executive summary and also a class diagram for making your case very strong among the stakeholders for making decision about the project finalization. [4+8]

7. Present the mapping process for the fig.1 model using object-oriented based pseudo-codes for capturing all important aspects of the model diagram. [7]

8. Prepare a comparative note on forward versus reverse engineering with mentioning the merits, demerits and implementation challenges. [7]

9. Explain the importance of error handling issues to be resolved in a system. [6]

10. Write short notes on [4*3]
    a) External agent in Use Case
    b) Effect of design patterns in deployment
    c) Issues on distributed system implementation

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Examination Control Division
2069 Bhadra

Exam.	Regular (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT651)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
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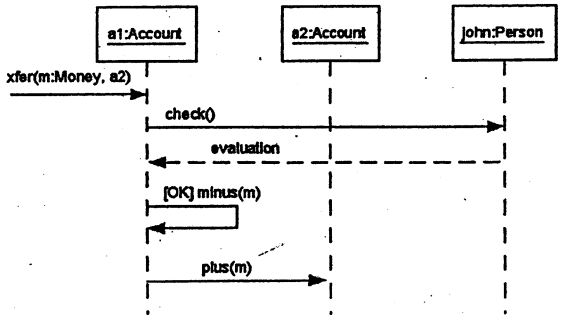
(1) What is the meaning of *Encapsulation* from the viewpoint of structured systems analysis and design? Explain how does *Encapsulation* and *Abstraction* concepts work together in object-orientation? [4 + 6]

(2) Here are some of the requirements for a system that you are going to build for the Grand Care Hospital, which is coming in operation soon. Identify which of the following information are used in building **Conceptual, Specification** and **Implementation** model. [6]
(a) Each out-patient registration process takes an average of 90 seconds.
(b) Liver unit will treat the *Jaundice* patients.
(c) All bio-chemistry tests are carried out in Pathology department
(d) The newly installed GE USG machine can record diagnostic video too. Extended computer interfacing is required with Windows OS and mpeg-4 application.
(e) Each Gastro-patient going to operation theater (OT) is to be re-evaluated for bowel status exactly 30 minutes before their OT schedule.
(f) Some of the gastro-patients visit Liver unit too.

(3) Explain four different types of relationships that we model in object-oriented analysis, which exists between two different classes represented as shown in below figure. [8]

(4) Based on the below diagram for model action of money transfer, answer the following questions: [3*3]
(a) How many numbers of classes are involved in this transfer activity? What are they?
(b) What are the events followed for transfer complete?
(c) Why this *check( )* function is required for this transfer?



(5) A new digital clock, recently available in the market, simultaneously displays the time and date. The time and date displays can be adjusted by the buttons available within the unit. The clock has two buttons, "mode" and "forward". If you wish to change the time you should first press the mode button, after which the time may be changed by the forward-button. If the mode button is pressed again, you can change the date (by the forward-button). If the mode button is pressed once again, you will go back to normal state. When the forward-button is pressed, the display will go a single unit (seconds or days) ahead. If the button is held down for more than two seconds, the display will change rapidly (once in every 0.2 second) ahead so long as the button is pressed. [10]

Draw a state diagram for this clock control unit.

(6) Explain the forward and reverse engineering processes with outlining their merits and demerits in object-oriented implementation. [10]

(7) The Premier Video Rental Shop (PVRS) decides to implement a database-based information system. PVRS acquires the video from the importer or chain trade. An agreement will be signed with both partners and it defines the date, number of copies, time frame of the lease and purchase price. As an additional info of importer also the address and bank details will be recorded. The customer rents a video from the PVRS. From each video the name, ID and rental price information will be recorded. The rental price is calculated from the rental period, the purchase price and the customer relationship. Video types include action, art and children's video. Video may also be a blend of action and art videos. As an action video info the degree of violence will be recorded, and from art videos the awards and from children's videos the age limit. The customer relationship can be a random customer, regular or member of PVRS club. As an overarching customer info the name will be recorded and from regular customer the cumulative sum of the number of rental events. [12]

From the members of PVRS club information, the member address is used in order to advertise new products and offers.

Draw a class diagram, which presents the main classes, properties, methods, and relationships between classes.

(8) Write short notes. [3*5]

(a) Sequence diagram
(b) Swimlanes
(c) Polymorphic signal

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Examination Control Division
2069 Poush

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Object Oriented Analysis and Design *(CT 651)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Explain object oriented system with reference to class, object, encapsulation, abstraction, message, inheritance, interface and polymorphism with suitable examples. [8]
2. IOE is willing to develop a system for the student result management of its BE program. Now prepare the problem statement from the side of Examination control Division. What are building blocks of UML? Explain with suitable examples and notations. [4+6]
3. A web-based online store has "Buy a Product" scenario as follows:
   The customer browses the catalog and adds desired items to the shopping basket. When the customer wishes to pay, the customer describes the shipping and credit card information and confirms the sale. The system checks the authorization on the credit card and confirms the sale both immediately and with a follow-up e-mail.
   Now construct conceptual model for this scenario. [6]
4. Draw a class diagram for point of sale system with association and multiplicity. [6]
5. Read the following case study carefully and answer the given questions.
   Ministry of Health and Population is willing to computerize its system. This new system will be able to tell the population of the country, zone and district and even of the ward of specific place. The system will update its data in monthly basis so that the birth rate and death rate can be easily seen. The home page is displayed when a person enters to the system. Administrators can enter to the admin panel by logging in with an ID and a password. He/she has privileges to enter and modify the data into the database. On the other hand, normal users can view the data but not modify them. They can also visualize the data in graphical form with animated charts, maps as well as in tabular form based on their selection of data. Besides, they can also view the forecasted data. (Make your assumptions if necessary)
   Draw collaboration diagram and use case diagram. [6+6]
6. What is framework? How design pattern is useful? Explain any one design pattern in detail with suitable example. [6]
7. Explain development process with suitable example. How can you map design into code? Illustrate with diagrams produced in question number five by using any object oriented languages like C++, Java, C# etc. [4+7]
8. Construct a system sequence diagram for customer from a "Food ordering system" of a very busy restaurant where seating and ordering is regulated by seating manager. [6]
9. Illustrate how can you create classes from design class diagrams and methods from interaction diagrams (Use C#, Java etc.). [6]
10. Write short notes on: [3×3]
    a) Iterative cycles of development b) Synchronization bar c) Flow of object

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