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(KNOWLEDGE FOR DEVELOPMENT)

**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS
THIRD YEAR FIRST SEMESTER**

FOR THE DEGREE IN (COMPUTER SCIENCE)

COURSE CODE: CSC 362E

**COURSE TITLE: OBJECT ORIENTED ANALYSIS
AND DESIGN**

DATE: 16 / 11 /22

TIME: 08.00 A.M – 10. 00 A.M

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a. Differentiate between Object-Oriented Analysis and Object Oriented Design. **[4 marks]**
- b. Develop sequence / collaboration diagrams for the following use case of the banking system: Identify all the classes, responsibilities and collaborators processes for the objects. **[6 marks]**
- i. Deposit in saving account
 - ii. Withdrawal from saving account (both acceptance and denial)
 - iii. Balance checking
- c. Identify the type of cohesion in each of the following : **[2 marks]**
- i. A component reads inputs from tape, disk, and network. All the code for these functions are in the same component.
 - ii. Update record in data base and send it to the printer.
- d. State any TWO complexity attributes and explain how object oriented designs handles it in relation to real world objects object. **[4 marks]**
- e. Explain why we need:
- i. Generalization and aggregation. Describe in details how sub-super class relation and aggregation can be identified in a project. **[5 marks]**
 - ii. Identification of class hierarchy in object-oriented analysis? **[1 marks]**
- f. Explain the different relationships between classes. Identify and show the relationship between classes in the following statement.
- "An airline company has employees. A team build an airplane which has a number of components. An airplane lands and takes off from an air strip in an airport. The airplane carries passengers from a source A to a destination B. an airplane is managed by a captain and a co-pilot along with his cabin crew consisting of airhostess and attendants".*
- [4 marks]**
- g. What is coupling? Identify the type of coupling in the following. The print routine of the customer billing accepts a customer data structure as an argument parses it, and prints the name, address and billing information. **[4 marks]**

QUESTION TWO [20 MARKS]

- a. Name the UML diagrams used for the following: [4 marks]
- i. Modelling requirements
 - ii. Modeling workflows
 - iii. Modeling behavior of an object
 - iv. Interaction between groups of objects
- b. Object modeling develops the static structure of the software system in terms of objects. Explain how this process can be visualized. [4 marks]
- c. A private dental practice wishes to computerize its patient records system. A patient must register with the practice and the system needs to store their name, address and mobile telephone number. Each patient is given a unique seven digit patient number. The system will keep a count of how many patients the practice currently has. Patients can book an appointment with a particular dentist; the system needs to store the date of the appointment and if the patient attended. A text message will be automatically sent out two working days before the appointment. After the appointment the dentist update the system with the cost of the treatment undertaken. The practice employs two types of staff: Receptionists and Dentists. The system needs to record their details; which for all staff includes a four digit employee number, their name, address, gender, contact telephone number and next of kin. Dentists must be qualified; the system will store their highest dental qualification, date awarded and their General Dental Council registration number. A list of appointment statistics is required at the end of each week. This will be a summary of how many patients turned up and how many were no-shows. If a patient repeatedly misses an appointment they will be charged a fixed amount of money. All receptionists must go on a first aid course every year. The system must record the date of when they last attended the course and the name of the course provider.
- i. Identify the *actors*, the *processes* and the *data stores* that will be required in the system. [3 marks]
 - ii. Draw a class Diagram to model the system, remember to include the necessary constraints. [9 marks]

QUESTION THREE [20 MARKS]

- a. i. Differentiate between DFD and UML diagram and explain in details how can be used in modeling a project? **[6 marks]**
- ii. Explain any **THREE** limitation of using a Data Flow Diagram during functional Modeling process. **[3 marks]**
- b. What are the major properties of a-part-of relation? Explain with relevant examples **[4 marks]**
- c. A Library lends books and magazines to member, who is registered in the system. It also maintains the purchase of new books and magazines for the Library. A member can reserve a book or magazine that is not currently available in the library, so that when it is returned or purchased by the library, that person is notified. The library can easily create, replace and delete information about the books, members, and reservation in the system. The books transactions are stored in the database. The fine list while the member returns the book after the due date must be generated. Analyze the users and actors of this system, and the interactions between them must be depicted. Draw a sequence diagram to model this information. **[7 marks]**

QUESTION FOUR [20 MARKS]

- a. How can one develop an object oriented system? Briefly discuss all the phases related to object oriented approach with an example. **[5 marks]**
- b. A busy restaurant consists of one Chef, a customer and one Waiter. The Chef is responsible for order all the food ingredients, preparation of the food and doing the washing up. The Waiter is responsible for taking the customer order, preparing the bill and taking the payment made by the customer. The Customer browses the menu, orders the food, consumes the food, orders the bill and pays the bill. Draw the an activity Diagram for the restaurant showing role of Chef, Waiter and Customer **[7 marks]**
- c. Draw the use case diagram for car rental application. The car rental agency has multiple offices/branches. The customer visits the agency for enquiry and takes a test ride then selects the car by signing the terms and conditions form. The customer can also book the car through telephone call, email and sms. The agency checks the availability of the car and gives the status

to the customer. The customer can also avail the driver facility if required, by paying additional charges. The billing is done based on the type of vehicle and distance travelled. **[8 marks]**

QUESTION FIVE [20 MARKS]

- a.** Differentiate between the following concepts: **[6 marks]**
- i.** Actor and Use Case
 - ii.** Sequence diagram and collaboration diagram
 - iii.** Dynamic modelling and functional modelling
- b.** A University conducts examinations and the results are announced. Prepare a report for the following: Print the marks in the register number order semester wise for each department, Print the Arrears list semester wise, Prepare a Rank list for each department and prepare the final aggregate mark list for final year students. **[10 marks]**
- i.** Identify the problem statement and design the classes for each sequence.
 - ii.** Draw a detailed flow chart using state chart diagrams. Draw all the UML diagrams for designing this system.
- c.** Discuss any TWO design patterns used in object-oriented systems. **[4 marks]**