SLIATE
SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION
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Higher National Diploma in Information Technology
Second Year, First Semester Examination – 2019
HNDIT2313/IT3103 – Object Oriented Analysis and Design

Instructions for Candidates:	No. of questions : 06
Answer five (05) Questions.	No. of pages : 04
All questions carry equal marks.	Time : 03 Hours

Question 01

(i). Differentiate between object oriented analysis and object oriented design. (06 Marks)

(ii). Define the terms coupling and cohesion in the context of object oriented programming. Explain how coupling and cohesion can lead to either good or bad software design. (05 marks)

(iii). Give the object oriented terminology for each of the following object oriented features and supply an example of code that illustrates the feature:

a) A blueprint for an object which defines all the data items contained in the object and the operations that are permitted for the data.

b) A representation of something within the domain that the program models which contains values of data and which implements operations on that data.

c) An operation which will manipulate the data contained in an object.

(09 marks)

(Total 20 marks)

Question 02

(i). Define the terms encapsulation and data hiding and describe the relationship between them. (04 marks)

(ii). How does method overloading differ from method overriding? (04 marks)

(iii). The atoms of different elements have different numbers of protons, neutrons and electrons. Electrons are negatively charged, protons are positively charged, and neutrons have no charge.

a) Using C++ programming language, write a definition for an atom class that contains:

i. fields for storing the numbers of protons, neutrons and electrons with appropriate visibility

ii. setter and getter methods for manipulating these fields, ensuring that the minimum value for electrons and protons is 1, and the minimum value for neutrons is 0

iii. a constructor that initialises new objects of atom to be the smallest element (Hydrogen), for which the number of protons is 1, the number of electrons is 1, and the number of neutrons is 0. (09 marks)

b) Write a new method for the atom class called getAtomicMassNumber that will calculate and return the atomic mass number of the atom.

(***Hint:*** Atomic mass number of an atom = number of protons + number of neutrons) (03 marks)

(Total 20 marks)

Question 03

(i). What is the main purpose of use case modeling? (03 marks)

(ii). Describe the meaning of <<extend>> and <<include>> in a UML use-case diagrams. (05 marks)

(iii). Draw a use case diagram for the following Hospital Management System. (12 marks)

The hospital has several specialized departments like Cardiology, Gynecologic, Orthopedics, Pediatrics, ENT etc. OPD is another independent department. A doctor is only associated with one specialized department at a time though he/she can be a member of the OPD (Outside Patients Department). Each doctor has a visiting time and day in a week.

At reception the patient details are entered and the fees are also taken and the patient is tracked on the basis of the ID generated. In routine a patient can visit the doctors either directly selecting a doctor or by getting admitted to the hospital and then a doctor visits the patients.

A doctor can prescribe tests for the patient to perform. The patient visits the lab to get done the tests prescribed by his/her doctor. The reports are given to the patient. The payments pertaining to the tests are done at the reception. Referring the reports, the doctor prescribes the patient medicines or further tests or is asked to get admitted.

A patient is admitted into a ward of a specialized department (if available) as per the doctor's prescription. The number of wards is limited and if there is no vacant ward the admission of the patient is rescheduled.

As per the prescription of the doctor the patient is operated on a specified date and time as decided by the doctor who is doing the operation.

After the completion of the treatment a patient may get discharged on an advice of a doctor and upon the complete payment of all due charges at the reception. On payment of full dues the reception generates a discharge ticket for the patient.

(Total 20 marks)

Question 04

(i). Briefly describe the purpose of drawing component diagram. (03 marks)

(ii). Show how composition and aggregation inter-class relationships would be represented in a UML class diagram. Briefly describe the difference between them. (05 marks)

(iii). Draw a class diagram for the Hospital Management System given in question number three (03) part three (iii). (12 marks)

(Total 20 marks)

Question 05

(i). State the main features of Unified Software Development Process (USDP). (04 marks)

(ii). Mention two differences between activity diagram and sequence diagram. (04 marks)

(iii). Consider a book store in a shopping mall. Prepare a sequence diagram for bookstore checkout system.

A brief description is given below.

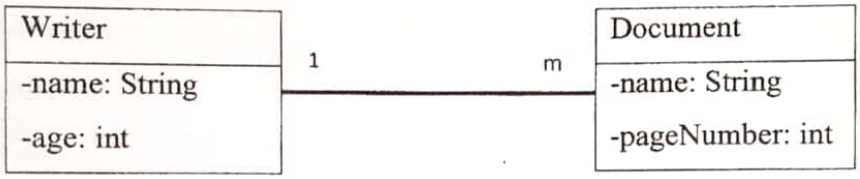
The customer selects the books from racks to purchase. The customer brings selected books to cashier. The cashier scans each item with checkout system to prepare an order. The cashier requests to customer for payment. The customer gives credit card to cashier. The verifier and checkout system scans the card. The verifier accepts the card and payment is accepted. Customer signs the credit card slip. The purchased books are handed over to customer. (12 marks)

(Total 20 marks)

Question 06

(i). Briefly describe the purpose of drawing deployment diagrams. (04 marks)

(ii). Draw a sample object diagram for the following class diagram. (04 marks)



(iii). Consider the class for telephone line with following activities and states:
As a start of a call, the telephone line is idle. When the phone receiver is picked from hook, it gives a dial tone and can accept the dialling of digits.
If after getting dial tone, if the user doesn't dial number within time interval then time out occurs and phone line gets idle.
After dialling a number, if the number is invalid then some recorded message is played.
Upon entry of a valid number, the phone system tries to connect a call & routes it to proper destination.
If the called person answers the phone, the conversation can occur. When called person hangs up, the phone disconnects and goes to idle state.
Draw the state transition diagram for above description of telephone line.

(12 marks)

(Total 20 marks)