UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2020 – 2nd Year Examination – Semester 3

IT3105: Object Oriented Analysis and Design
PART 2 – Structured Question Paper

2020
(ONE HOUR)

To be completed by the candidate
BIT Examination Index No: ....

Important Instructions:

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **2 questions** and **09 pages**.
- **Answer All questions**.
- All questions will carry equal marks.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.
  If a page is not printed, please inform the supervisor immediately.

Questions Answered
Indicate by a cross (✗), (e.g. ✗) the numbers of the questions answered.

	Question numbers		
To be completed by the candidate by marking a cross (✗).	1	2	
To be completed by the examiners:			

1.	'Salon Sarasi is a hair and beauty parlor. Currently the saloon uses a manual procedure to deal with its management processes. Its customers do not have a proper way to make an appointment, other than making a call or visit the Salon premise. Salon manager, employees, and customers need to keep reminders on their mobiles over appointments. The salon manager and her employees maintain a diary to note down the details of appointments. Details of the services provided by the salon are also written in papers. The manager has no proper way to manage her employees and clients.
	A system needs to be developed to solve the above-mentioned problems prevailing at 'Salon Sarasi.' It is expected to provide a Salon Management System Software to manage the employees, clients, client appointments, reminders, services, resources and payments while providing a dashboard to view information. Generation of crucial reports to support the decisions of higher managerial is also a requirement of the system.
	The functional requirements of the system in detail are as follows:
	There should be a facility to create profiles of salon staff and maintain their details. At the same time system should facilitate creating profiles of regular customers who obtain services provided by the saloon regularly. The manager should be able to activate or inactivate accounts of employees and customers.
	There are various services provided by the salon, including hair treatments, facials etc. There should be a facility to create such services offered by the saloon and maintain their details such as price, the time required for each service etc. ,
	Similarly, the system should help in maintaining resources available at the saloon premises by adding, updating, or removing the resources.
	Also, the system should facilitate appointment handling through an event calendar provided by the system. . to fulfill that requirement, maintaining the holidays and details of staff on leave is a necessity.
	A Reminder generating facility provide through the system should send reminders to all the respective stakeholders, including customers and employees, about the appointments via SMS.
	The system needs to handle customer payments with an invoice generated through the system.
	Finally, the system should generate various reports to support the higher managerial decisions
	a) Salon Manager is one of the system actors for the above system. Identify two (2) other system actors and list down seven (7) Use Cases that are responsibilities of the Salon Manager.

ANSWER IN THIS BOX

Customer, Employee

Maintain Customers/Clients, Maintain Staff/Employees, Maintain Appointments, Maintain Resources , Maintain Services, Payments, Maintain Holidays, Maintain Leave, Generate Reports etc. (Any seven)

(35 Marks)

b) i. According to the requirements described, identify six (6), potential Entity Classes, for the system.

ANSWER IN THIS BOX

Appointment/Event, Payment, Employee, Service, Customer, Resources, Leave, etc.

(16 Marks)

ii. Using the classes identified in 1) b. i, draw a Class Diagram for the system. Indicate multiplicities clearly in the relationship.

ANSWER IN THIS BOX

(A Solution)
Employee 1----------0..* Leave
Employee 1..*----------* Appointment

Appointment 1…………* Services
Appointment 1………1 Payment

Customer 1.. ,,,,,,,,,,* Appointment

Services *………..* Resources

(31 Marks)

(c) Identify three(3) problem domain objects need to interact with each of the following scenarios. Make Appointment, Make Payment

ANSWER IN THIS BOX

Make appointment – Customer, Appointment , Service

Make Payment – Customer, Service, Payment

(18 Marks)

| 2 | (a) | The two concepts, known as "Coupling" and "Cohesion," plays a vital role in Object-Oriented Design (OOD). |

(i). Briefly explain the two terms, "Coupling" and "Cohesion"

ANSWER IN THIS BOX

I.   Coupling:

The degree to which one class/module is connected to or relies upon other classes/modules.

II.   Cohesion:

the degree to which the attributes and behaviors of a single class are related to each other.

(8 Marks)

(ii). Fill in the blanks using the most suitable word given within the parentheses.

    I. A good Object-Oriented design should be **------------(A)--------------** (loosely, highly) coupled and **…………………….(B) …………………………**(loosely, highly) cohesive.

    II. A repeatable solution for a commonly occurring problem in OOD is known as **------(C)---------** (OO Pattern, Design Pattern, Multivariate Pattern).

<u>**ANSWER IN THIS BOX**</u>

  I.   <u>**A – loosely**</u>

       <u>**B- highly**</u>

  II.   <u>**C - Design Pattern**</u>

(6 Marks)

(iii)   State three (3) benefits of a good Object-Oriented Design.

<u>**ANSWER IN THIS BOX**</u>

I.

II

III

(6 Marks)

(b) The following table lists down several models used in Object-Oriented Analysis and Design. Fill in the table. The first one is done for you.

ANSWER IN THIS BOX

	Diagram	View (Dynamic/Static)	Elements
e.g	Use Case Diagram	Static	Use-cases Actors & Relationships
(i).	Class Diagram	………………… Static	I.…………………………………………… II.…………………………………………… Classes, Relationships, collaboration
(ii).	Sequence Diagram	………………… Dynamic	I.…………………………………………… II.…………………………………………… Objects, Messages
(iii)	Collaboration Diagram	………………… Dynamic	I.…………………………………………… II.…………………………………………… Object, Messages
(iv)	Activity Diagram	………………… Dynamic	I.…………………………………………… II.…………………………………………… III.…………………………………………… Activities, Transitions between activities, Control flows (Decision points, and synchronization bars).

| (v). | **State Diagram** | ....
Dynamic | I...

II...

III...
States, Transitions, Events, Activities | |

[25 Marks]

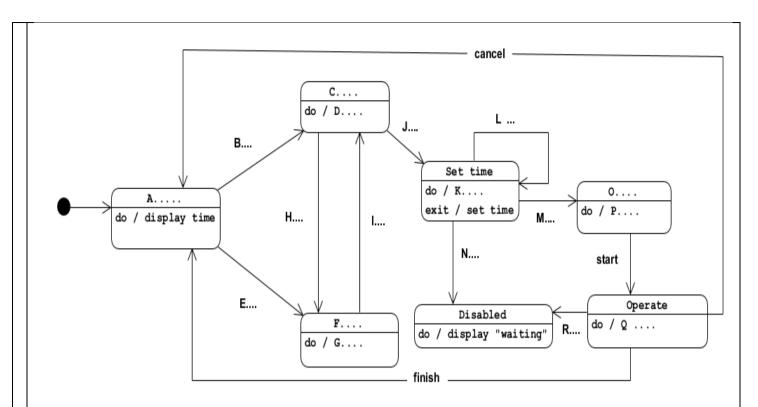(c) Consider the below description for a microwave oven.

This is a simple microwave oven that operates based on two cooking states. Initially, when the power is on, the microwave oven is at the waiting state. The user can place the food inside and should select the cooking state; Convention cooking state, or Microwave cooking state. The user can change the state after choosing the initial state, either to convention cooking or to the microwave cooking state.

At the convention cooking state, the oven will set the power to 100, and at the microwave cooking state, it will set the power to 150.

Next, the user should set the timer for the appropriate cooking time. Once the time is set and if the oven door is closed, the Start button will be enabled and displays the message "Ready." The user can push the start button to start the oven operation, and the cooking takes place for the user-specified time. The user can cancel the operation at any time by pushing the "Cancel" button or pause the operation by pushing the "Pause" button.

At the end of the cooking cycle or if the operation is canceled, the system will return to the waiting state. If the operation is paused or if the door is opened, the oven will change its state to Disabled and will display the message "waiting."

The below illustrates a "State Transition Diagram" for the above description. Identify the most suitable words to fill in the table from A-Z.

ANSWER IN THIS BOX

A.	**J.**
B.	**K.**
C.	**L.**
D.	**M.**
E.	**N.**
F.	**O.**
G.	**P.**
H.	**Q.**
I.	**R.**

(55 Marks)

cancel

Microwave Cooking
do / set power=150

Microwave Cooking

timer

time

Set Time
do / get time
exit / set time

close door

Enabled
do / display "Ready"

Waiting
do / display time

Convention cooking

Microwave cooking

open door

start

Convention Cooking

Convention Cooking
do / set power=100

Disabled
do / display "Waiting"

pause

Operate
do / operate oven

finish

*****