THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME 2015/2016
FINAL EXAMINATION
CPU2140: SYSTEM ANALYSIS AND SOFTWARE ENGINEERING
DURATION: TWO HOURS ONLY (2 HOURS)

Date: 24th January, 2017 Time: 9.30 a.m. to 11.30 a.m.

Answer **FOUR** Questions **including QUESTION 01** which is **compulsory**.

All questions carry equal marks.

Q1).

i. Identify the most suitable UML diagram that can be used to show the following situations.
   a. To show the different states of an object which are controlled by external and internal events.
   b. To show the collaboration of objects based on a time sequence.
   c. To show the flow plan of the activities of system functionalities.

ii. What is the difference between *aggregation, composition,* and *association*?

iii. The Department of Mathematics and Computer Science is planning to offer a Master's degree programme in Computer Science from the next academic year. The student who register for this programme can take courses as they wish. Courses can be based on lectures or lab classes. Each student must take at least one course and they can obtain a grade for the registered course. Each course is coordinated by a lecturer and 03 demonstrators. Students, lectures and demonstrators have a name, ID no an their join date.

   a. Which of the UML diagram is most suitable to describe the above case?
   b. Draw the identified diagram.

iv. New Science and Technology building at the Open University of Sri Lanka, Nawala is going to have an elevator installed. The functionality of the elevator is as follows.

- *The elevator* has a set of 3 buttons, one for each floor. They illuminate when they are pressed by the passenger and then it takes the passenger to the corresponding floor. The illumination is disabled when the elevator comes to the corresponding floor.
- *Each floor*, except the ground floor and the top floor has two buttons, one for up-elevator and one for down-elevator. These buttons illuminate when they are pressed. The illumination is disabled when an elevator reaches the floor and then moves in the direction given by the passenger.
- When the elevator has no requests, it remains at its current floor with its door closed.

   a. Draw the *Activity Diagram* to show *the elevator*.
   b. Draw the *Sequence Diagram* to show the process *of floor button*.

Q2).

i.

a. Differentiate *computer software* and *computer program.*

b. How does project management aid to improve the customer satisfaction? Briefly explain.

ii. Assume you are the lead software engineer of a software company and you are asked to submit a software product within a restricted time frame without cost barriers. What is the software model you select? Give reasons.

iii. Assume you are asked to develop a software to control an elevator/lift.

a. Is it a critical system? Give reasons.

b. If it is a critical system, what are the requirements you need to consider when developing the requirement catalogue than the functionality of the system.

Q3).

i.

a. What are the established practices of the software requirement engineering process?

b. Discuss, why many systems fall below the user expectations, though there is an established practice of software requirements engineering.

ii. Model-driven engineering is used in software development to represent the system as a set of models. Discuss how system models help in software development.

iii. What are the things to be considered in architectural design decisions for a system?

Q4).

i.

a. Why does rapid software development exist today?

b. What are the rapid software development approaches you can see in today's Software industry? Briefly explain them.

ii. What is meant by *performance testing* and *regression testing*?

iii. "*Testing is conducted by the developer of the software or an independent test group*". Comment on this statement.

Q5).

i. Briefly describe the software implementation process.

ii. Explain why it is needed to be careful when implementing a system in the production environment than the other steps in the software development life cycle?

iii. Explain why it is necessary to maintain a software system over its lifetime. Identify the various types of maintenance that software systems require and give an example of each type.

Q6).

i.

a. List the cost estimation techniques.

b. Suppose there is a system to be developed which is lacking detail information. What is the technique you can use to estimate the cost? Give reasons.

ii. Briefly describe the way to have a quality culture within a software development organization or a team.

iii.

a. What is meant by a system build?

b. How does configuration management help to do a system build?