RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
Second Year - Semester II Examination –Oct./ Nov. 2017

COM 2308–SOFTWARE ENGINEERING

Time: Three (03) hours

- This paper contains **five (05)** questions on **three(03)** pages.
- Answer **All** questions.
- The total maximum mark attainable is 100. The marks assigned for each question and section, thereof are indicated in square brackets.
- This is a closed book examination.
- Mobile phones or any other communication devices are not permitted.
- Clearly state the assumptions you make. If you have any doubts regarding the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

---

1. (a) The XYZ company has a software systems that has been used for 10 years. Though, it has become difficult to keep maintain it, this system has a good business value.

Describe the problem the XYZ company is facing with regard to this software system using the software engineering challenges?

[6 marks]

(b) Describe a strategy for the evolution of the system described in **1(a)**.

[6 marks]

(c) Describe the **four (04)** maintenance cost factors.

[2X4 marks]

2. (a) Assume that you are working as a consultant for a software development company that has experience in developing a wide range of software systems. The company had many experienced software developers and managers who have used different types of process models.
You are tasked with advising project managers with decisions regarding different software projects. The following two projects have been selected for development. Suggest the suitable process model for each project considering the pros and cons of each scenario.

1. ABC is a hotel and travel company that owns multiple hotels in the country. ABC needs a central hotel management system to manage the hotels and travels. The system needs to be created within 14 months.
2. DEC is an electronics company involved with developing IoT based solutions. This project is electronics R & D project which will be finished within 18 months.

Thecompany has developed similar projects to the 1st project and have experience in developing electronics projects and R & D work.

[2x6 marks]

(b) Considering the 2nd project described in **2 (a)**, describe how would you perform the verification and validation activities on the IoT solutions.

[8 marks]

3 (a) Suggest a programming language for the 2nd project in **2 (a)**,considering the factors that affects the programming language selection.

[6 marks]

(b) Discuss what Pair Programming is and its advantages.

[6 marks]

(c) Briefly discuss the following terms in configuration management.

- Version
- Variant
- Release

[2x3 marks]

(d) Describe the importance of configuration management.

[2 marks]

4 (a) Suggest project cost estimation techniques to be used for the two projects described in **2 (a)**.

[2x4 marks]

(b) Point down cost components in a software project other than the effort cost.

[2 marks]

(c) As your new project, you have been given a project to develop a student registration system for a university. The initial description is given bellow.

This system will cater for a faculty. The system needs to cover students in all the internal degree programs. Assume that all degree programs have a fixed syllabus. At the beginning of each semester, students should be able to login to the system and register for the subjects that they are following. After the registration period (after the deadline), system should freeze registration and deregistration. After the deadline, only the admins should be able to deregister students.

There should be user accounts for the employees of the examination branch who can insert student grades for the subjects that they have sat for. Adding new subjects to the system should be the responsibility of the admins.
Admins are responsible for managing user accounts of the students and employees.
Super admins manage the accounts of the admins.
Deleting and editing existing subjects should be the responsibility of the super admins.
Please note that even if a student passed out of the university, his/her details should be retained in the system. Even adding and deleting subjects should not alter existing records.
All users (students, admins, employees, etc.) should first login to the system for their activities. Each should have a user account.

System should be able to calculate the GPA of each student. The system should allow the admins to define the criteria for calculating GPA. System should allow to enter the criteria and guidelines for compulsory subjects, optional subjects, mandatory amounts of credits, pre-requisites, etc.

Identify the classes and draw a class diagram which shows the necessary class structure.

[10 marks]

5 (a) Identify the components in the class diagram that you drew in **4 (c)** and restructure it so that it would follow the singleton and façade design patterns.

[20 marks]

END