RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Information and Communication Technology
Second Year - Semester I Examination – June/ July 2018

ICT 2402 - SOFTWARE ENGINEERING

Time: Three (03) hours

INSTRUCTIONS TO CANDIDATES

- This paper consists of two parts, **A** and **B** on **six (05)** pages including this page.
- **Sections A** contain **TWO (02)** questions and answer **one (01)** question from **section A**.
- **Section B** contains **FOUR (04)** questions. Answer **ALL** questions from **Section B**.
- This examination accounts for 60% of the course assessment. The total maximum mark attainable is 100. The marks assigned for each question and section, thereof are indicated in 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.

Part A

1. a) Explain the difference between **Systems Engineering** and **Software engineering** in brief.

(3 marks)

b) What is **Legacy Challenge**?

(2 marks)

c) Briefly describe each of the following terms.

i. Portability
ii. Testability
iii. Test-driven development

(2x3 marks)

d) Briefly describe what **Component Based Software Engineering** is.

(3 marks)

e) List **two (02)** alternatives to Natural Language specification and explain them.

(4 marks)

f) Briefly describe what **Modular decomposition** is during the design phase.

(2 marks)

2. a) Name **three (03)** factors that affects the programming language selection.

(3 marks)

b) Briefly describe the practice of **Pair Programming**.

(3 marks)

c) Describe the advantages of Software Inspections over Testing.

(4 marks)

d) List out **three (03)** reasons why Software change is inevitable.

(3 marks)

e) Briefly describe the software development activity known as **System building**.

(3 marks)

f) Explain two **(02)** software cost estimation techniques.

(4 marks)

Section B

Read the following Case study 1 carefully and answer question 3 and 4.

Case study 1: Student registration system

This system will cater for a faculty in a university. The system needs to cover students in all the internal degree programs including both general (3 year) and special (4 year).

All degree programs have a fixed syllabus for the first two years and a wide range of optional subjects for the third and fourth years. 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 registrations. After the deadline, only the admins should be able to deregister students.

There should be user accounts for the employees of the exams who can insert student grades for the subjects that they sit. Adding new subjects to the system should be the responsibility of the admins.

Managing the user accounts of the students and employees is the responsibility of the admins. Managing the admin accounts is the responsibility of the super admins. This system should be available through the Internet so that users can login from anywhere.

Deleting and editing existing subjects should be the responsibility of the super admins. Note that even if a student pass out of the university, his/her details should be in the system. Even adding and deleting subjects should not alter existing records.

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

Currently, the university is using a paper based system to gather and record these details as well as a MS Excel to store the details.

Project duration is 6 months.

3. a) Consider the project given in **Case study 1** above. Assume that you are working as a Project Manager for a mid-size IT company. Currently you have experience with following Software Process Models.

- Waterfall model
- Spiral Model
- Cowboy Coding
- Extreme programming

Suggest a suitable Software Process Model to be used in this project. Justify why you

are selecting it and rejecting others.

(12 marks)

b) Describe the verification and validation techniques that you would use during the development of this Student registration system.

(8 marks)

4. a) It seems you need to hire some staff to supplement the project team. Assume that the local IT industry is showing a strong growth. Discuss the possible problems that you face when hiring the staff for the project described in the **Case study 1**.

(8 marks)

b) Draw a use case diagram for the project described in the **Case study 1**.

(6 marks)

c) Assume that the maintenance of this Student registration system will be handled by your company. Describe the steps that you would take to keep maintenance cost low.

(6 marks)

Read the following Case study 2 carefully and answer question 5 and 6.

Case study 2: University research project

As a university student, you expected to complete a group research project with one year duration during your third year of study.
There, you are expected to work in a group, work under the instructions of a supervisor, create and present designs and progress reviews.
As your project, you are hoping to do an IoT based project with a server hosted backend.

5. a) Discuss the advantages of using a Version Controlling System during the development of the project stated in **Case study 2**.

(8 marks)

b) Describe the verification and validation techniques that you may use during the development of the project in **Case study 2**.

(8 marks)

c) Describe how you may use Cowboy coding during the development of the project in **Case study 2**.

(4 marks)

6. a) Explain the importance of Deployment diagrams during the design of a system.

(6 marks)

b) The task durations and dependencies of a project schedule is given in the Table 1.

i. Create the activity network using the details given in the Table 1.
ii. Identify the date of each milestone and the finish date.
iii. Identify the critical path

(8+4+2 marks)

- Assume that the Project start date is 1st of August 2018 according to the calendar shown in Figure 1.
- In addition to the weekend holidays (Saturday and Sunday), there are public holidays indicated by **PH** mark.

Table 1: The task durations and dependencies

Activity	Duration (days)	Dependencies
T1	8	
T2	10	
T3	5	T1,T2 (M1)
T4	15	
T5	15	T2,T4 (M2)
T6	10	T2,T4 (M2)
T7	8	T4 (M3)
T8	6	T1,T4 (M4)

(8+4+2 marks)

August, 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22 (PH)	23	24	25 (PH)
26	27	28	29	30	31	

September, 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24 (PH)	25	26	27	28	29
30						

Figure 1: Calendar

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