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**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : SOFTWARE ENGINEERING
COURSE CODE : BEC 41803
PROGRAMME CODE : BEJ
EXAMINATION DATE : DECEMBER 2019/ JANUARY 2020
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1**
- (a) Describe the differences between generic software products and customized software products. (6 marks)
- (b) Draw an activity model of a system based on the following case study description.
- An embedded system in an insulin pump used by diabetics to maintain blood glucose control.
 - Collects data from a blood sugar sensor and calculates the amount of insulin required to be injected.
 - Calculation based on the rate of change of blood sugar levels.
 - Logs the correct dose in the insulin log.
 - Sends signals to a micro-pump to deliver the correct dose of insulin.
- (7 marks)
- (c) Consider a task you are not familiar with, such as designing an amphibious vehicle. Explain how would you solve the problem. (7 marks)
- Q2**
- (a) Draw a complete diagram of the extreme programming release cycle. (7 marks)
- (b) Describe the difference between scaling up and scaling out in agile software development. (4 marks)
- (c) Scrum is an agile method that focuses on managing iterative development rather than specific agile practices. Explain the Scrum sprint cycle. (9 marks)

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- Q3 (a)** **Figure Q3(a)** shows the structured specification of a requirement for an insulin pump. Transform this structure specification into the tabular specification of computation for an insulin pump.

Insulin Pump/Control Software/SRS/3.3.2

Function Compute insulin dose: safe sugar level.

Description

Computes the dose of insulin to be delivered when the current measured sugar level is in the safe zone between 3 and 7 units.

Inputs Current sugar reading (r2); the previous two readings (r0 and r1).

Source Current sugar reading from sensor. Other readings from memory.

Outputs CompDose—the dose in insulin to be delivered.

Destination Main control loop.

Action

CompDose is zero if the sugar level is stable or falling or if the level is increasing but the rate of increase is decreasing. If the level is increasing and the rate of increase is increasing, then CompDose is computed by dividing the difference between the current sugar level and the previous level by 4 and rounding the result. If the result, is rounded to zero then CompDose is set to the minimum dose that can be delivered.

Requirements

Two previous readings so that the rate of change of sugar level can be computed.

Pre-condition

The insulin reservoir contains at least the maximum allowed single dose of insulin.

Post-condition r0 is replaced by r1 then r1 is replaced by r2.

Side effects None.

Figure Q3(a)

(10 marks)

- (b) **Table Q3(b)** shows the tabular description of the report weather use-case for a Weather Station System. Transform the tabular description of the report weather use-case to the sequence diagram describing data collection.

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Table Q3(b)

System	Weather station
Use case	Report weather
Actors	Weather information system, Weather station
Description	The weather station sends a summary of the weather data that has been collected from the instruments in the collection period to the weather information system. The data sent are the maximum, minimum, and average ground and air temperatures; the maximum, minimum, and average air pressures; the maximum, minimum, and average wind speeds; the total rainfall; and the wind direction as sampled at five-minute intervals.
Stimulus	The weather information system establishes a satellite communication link with the weather station and requests transmission of the data.
Response	The summarized data is sent to the weather information system.
Comments	Weather stations are usually asked to report once per hour but this frequency may differ from one station to another and may be modified in the future.

(10 marks)

- Q4**
- (a) Describe the testing process goal of validation testing and defect testing. (4 marks)
 - (b) Draw a complete diagram of Test-driven Development (TDD). (7 marks)
 - (c) As a software manager, you have been given a task whether to upgrade or replace or scrap or continue maintaining a legacy system in your company. However, legacy system replacement is risky and expensive. The legacy system is older system that rely on programming language and technology that are no longer used for new system development. Evaluate this task and explain your strategy by providing the legacy system categories assessment. (9 marks)

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- Q5** (a) Describe the sub models in COCOMO 2. (4 marks)
- (b) A passenger aircraft is composed of several millions of individual parts and requires thousands of persons to assemble. A four-lane highway bridge is another example of complexity. The first version of Word for Windows, a word processor released by Microsoft in November 1989, required 55 person-years, resulted into 249,000 lines of source code, and was delivered four (4) years late. Aircraft and highway bridges are usually delivered on time and below budget, whereas software is often not. Discuss what are, in your opinion, the differences between developing an aircraft, a bridge, and a word processor, which would cause this situation? (8 marks)
- (c) Draw the project scheduling process diagram. (8 marks)

-END OF QUESTIONS -

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