

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering



Study Programme	: Bachelor of Software Engineering Honours
Name of the Examination	: Final Examination
Course Code and Title	: EEI5467 Software Testing and Quality Assurance
Academic Year	: 2023/24
Date	: 14 th August 2024
Time	: 0930 - 1230hrs
Duration	: 3 hours

General Instructions

1. Read all instructions carefully before answering the questions.
 2. This question paper consists of **Three (3)** questions in **Four (4)** pages.
 3. Answer **all** questions.
 4. Question 1 carry 40 marks. Question 2 and 3 carry 30 marks in each.
 5. Answers should write in the book provide and each question should commence from a **new** page.
 6. This is a Closed Book Test (**CBT**).
 7. Answers should be in clear hand writing.
 8. Do not use red colour pen.
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(Essay Questions) Answer All Questions

Answer All questions referring to the business case given below.

Business Case:

FutureTech, a leading technology company, has initiated on an innovative project to develop the SmartHome app, designed to revolutionize the way users interact with their home automation systems. The SmartHome app aims to provide users with seamless control over their smart devices, such as lights, thermostats, security cameras, and appliances, through a single, user-friendly interface. The project has reached the development phase, and your team has been tasked with ensuring the app's quality and functionality through comprehensive testing. The SmartHome app will feature the following capabilities:

- Users can turn on/off and adjust settings for various smart devices.
- Users can schedule devices to perform specific actions at predetermined times.
- Users receive alerts and notifications for important events, such as security breaches or system malfunctions.
- Different users can have customized profiles with personalized settings and preferences.
- The app integrates with major smart home ecosystems (e.g., Google Home, Amazon Alexa).

You are part of the Quality Assurance (QA) team at FutureTech, responsible for the testing phase of the SmartHome app project.

Question 1 [40 marks]

- A. List down the 8 steps followed in test plan preparation. (8 Marks)
- B. Outline the key components that should be included in the test plan for the SmartHome app. Explain the importance of each component. (12 Marks)
- C. Based on the SmartHome app case study, write detailed test cases to test two functional requirements and two non functional requirements for any selected features of the app listed above. Each test case should include, Test Case ID, Test Description, Preconditions, Test Steps, and Expected Results. (20 Marks)

Question 2 [30 marks]

- A. Briefly explain white box testing and black box testing, mentioning different techniques that can be used in each testing type. (8 Marks)
- B. In the SmartHome app, users can set the thermostat to specific temperatures to control their home environment. The system is designed with the following temperature settings:
 - If the temperature is set to 60°F or lower, the thermostat will not activate.
 - If the temperature is between 61°F and 75°F inclusive, the thermostat will adjust the temperature accordingly.

If the temperature is between 76°F and 85°F inclusive, the thermostat will provide a warning about high temperature settings.

If the temperature is above 85°F, the thermostat will automatically shut off to prevent overheating.

The system receives the temperature setting as an integer in degrees Fahrenheit (°F).

Apply Boundary Value Analysis (BVA) to identify the set of temperature values to be tested, focusing on the values at the boundaries of the equivalence classes. (12 Marks)

- C. In the context of developing the SmartHome app, describe your role as a software tester during each stage of the Waterfall model process. Specifically, address the following stages such as; Requirements Analysis, System Design, Implementation, Integration and Testing. For each stage, explain the responsibilities and activities you would undertake as a software tester to ensure the successful development and quality of the SmartHome app. (10 Marks)

Question 3 [30 marks]

- A. In the context of developing the SmartHome app, briefly explain the term "cyclomatic complexity" and discuss its significance in software testing for this application. (8 Marks)
- B. Draw the flowgraph and calculate the Cyclomatic Complexity for the following code. (10 Marks)

```
def is_prime(n):
    if n <= 1:
        return False
    elif n <= 3:
        return True
    elif n % 2 == 0 or n % 3 == 0:
        return False
    i = 5
    while i * i <= n:
        if n % i == 0 or n % (i + 2) == 0:
            return False
        i += 6
    return True
```

```
def print_primes_up_to(limit):
    for num in range(2, limit + 1):
        if is_prime(num):
            print(num)
```

```
print_primes_up_to(20)
```

C. FutureTech team is considering using prototyping as a part of their development process. Describe the concept of prototyping and explain how it could be applied in the development of the SmartHome app. (12 Marks)

- i. How can prototyping help in understanding and refining the requirements for the SmartHome app?
- ii. What types of prototypes could be used during the development of the SmartHome app, and how would each type contribute to the project?
- iii. What are the potential benefits of using prototyping in the context of the SmartHome app?
- iv. What challenges might arise from using prototyping in the development of the SmartHome app?

~ End of the Paper~