ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION   SUMMER SEMESTER, 2022-2023
DURATION: 1 HOUR 30 MINUTES   FULL MARKS: 75

SWE 4603: Software Testing and Quality Assurance

Programmable calculators are not allowed. Do not write anything on the question paper.
Answer all **3 (three)** questions. Figures in the right margin indicate full marks of questions with
corresponding COs and POs in parentheses.

1. a) Explain the reasons why a bug might not be reproducible to the developer and discuss potential strategies to resolve such issues.   5 + 3
(CO1)
(PO1)

    b) Consider the sample code given in Code Snippet 1 and answer the following: 5 +

      i. Draw the control flow diagram.   3+5+
      ii. Calculate the cyclomatic complexity.   5 + 5
      iii. List all independent paths in the control flow diagram.   (CO2)
            (PO1)
      iv. Design test cases that will cover each of the independent paths identified in Question 1.b)iii.
      v. Identify Data flow testing path using All-c-use strategy for variable payment and All-p-use strategy for variable work.

```c
1  #include <stdio.h>
2  int main()
3  {
4      int work;
5      double payment = 0;
6      scanf("%d", &work);
7      if (work > 0){
8          payment = 40;
9          if (work > 20){
10             if(work <= 30)
11                 payment = payment - (work -25) * 0.5;
12             else{
13                 payment = 50 + (work-30) * 0.1;
14                 if (payment >= 3000)
15                     payment = payment * 0.9;
16             }
17         }
18     }
19     printf("Final payment %lf", payment);
20 }
```

Code Snippet 1: Sample code for Question 1.b

    c) A team is developing a mobile weather application that provides real-time updates and forecasts to users. During testing, they encounter a bug where the app occasionally displayed inaccurate weather data in the wrong format. After investigating, the testers concluded that there are discrepancies between specifications and the actual working application.
Identify and explain the potential discrepancies of documents with such bug production.   7
(CO1)
(PO1)

2. a) "100% multiple-condition coverage gives 100% decision coverage?" - Do you agree with this statement? Justify your answer with a proper example.
   6
   (CO2)
   (PO1)

   b) Calculate the number of test sessions for the pairwise and neighborhood call graph-based integration testing for the call graph shown in Figure 1.
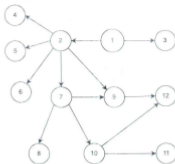   5
   (CO2)
   (PO1)

Figure 1: Call Graph for Question 2.b

   c) Differentiate between each of the following pairs:
   3 × 2
   (CO1)
   (PO1)

   i. Static Analysis and Dynamic Analysis

   ii. System Testing and User Acceptance Testing

3. a) Design a FSM (Finite State Machine) and a state table for state-table testing considering a tea-coffee vending machine with the following specifications:
   4 + 4
   (CO2)
   (PO1)

   - The machine accepts only two types of bills: $5 and $10.
   - Tea costs $5 and coffee costs $10.
   - If $10 is paid for tea, the machine returns $5 as change.
   - If $5 is paid for coffee, the machine indicates that an additional $5 is due.

   b) Discuss the practical advantages of the sandwich integration testing technique over the top-down and bottom-up approaches in software testing.
   7
   (CO1)
   (PO1)

   c) With an example, explain how Single Fault Assumption is applied in equivalence class testing.
   5
   (CO1)
   (PO2)