SWE 4701: Software Metrics and Process

Quiz 1 **Date: 17 November 2023**

Marks: 20 **Time: 30 minutes**

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1. Define Direct and Derived Attributes. Give three examples for each type of attribute. 3

2. Differentiate between interval and Ratio scale. 3

3. What is Experimental Error? Explain with an example - how can you understand experimental error? 3

4. A software company wants to invest more money in Human Resources considering employee performance over the last 5 years. Apply the GQIM framework from the Manager's perspective to improve employee satisfaction. [you have to mention at least 3 questions and indicators while you perform the steps (1- 6) of the GQIM framework.] 6

5. Answer the following MCQ. Consider the options as (a, b, c, d). Multiple answers are possible. 5

   1) Identify meaningful measurement statements considering the unit.
      - ☐ Peter's height is 0.002 km
      - ☑ IUT buildings have Red color
      - ☐ Distance from Earth to satellite is 1.17337e+8 feet
      - ☐ The source code has 30 Lines of comments
   2) Which of the following statements is correct if we use *Rule of Five*
      - ☐ It reduces uncertainty.
      - ☐ It uses the smallest and largest values from the population.
      - ☐ 93.75% chance that the mean of a population is between the smallest and largest values in any random sample of five from the population.
      - ☐ It is used to find the median of the population.
   3) Different types of software applications are developed in XYZ company. For example, desktop, web, and mobile applications. If the Application is considered as an Entity and Type is considered as an Attribute. Which of the following representations will be correct?
      - ☐ M1(type) = { 10 if desktop app, 100 if web app, 50 if mobile app}
      - ☐ M2(type) = {5.96 if desktop app, 12 if web app, 230 if mobile app}
      - ☐ M3(type) = {1 if desktop app, 2 if web app, 3 if mobile app}
      - ☐ M4(type) = {5 if desktop app, 50 if web app, 5000 if mobile app}

4) XYZ company surveyed to know how frequently users use their application. Users gave their preferences from the following options. Which of the following scales is true for the options?

   Always often sometimes seldom never

   - ☐ Ratio scale
   - ☐ Frequency-type scale
   - ☐ Ordinal scale
   - ☐ Likert scale

5) From the managerial perspective, which is a useful measurement?

   - ☐ How productive is the staff?
   - ☐ Are the requirements testable?
   - ☐ How good is the code being developed?
   - ☐ What will be the size of the software?

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Quiz 2 Date: 24 November 2023

Marks: 15 Time: 20 minutes

1. Consider the following *C* code. Calculate program volume and difficulty level using Halstead's defined formula. 5

```
#include<stdio.h>
int main(){
   printf("Divisibility Test");

   //This part deals with the divisibility of a number by 5.
   int id;
   scanf("%d", &id);
   if ( id%5 == 0 )
      printf("Divisible");
   else
      printf("Indivisible");

   return 0;
}
```

2. Propose a metric to compute the estimated size of software by considering any UML design of the Software Design document. 3

3. Give your constructive feedback on the Object Point as a Constructive Cost Model. 3

4. A team of developers developed an application consisting of 5 modules. The team lead is concerned about the implementation of the application. So, he decided to compute the size and complexity of each of the module. The table summarizes the obtained values. Whether there is any relation between size and complexity, compute Spearman's Rank Correlation Coefficient. Comment on your observation. 4

Module	Size (LOC)	McCabe Complexity
A	140	11
B	150	8
C	120	9
D	210	12

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Quiz 3 Date: 02 December 2023

Marks: 15 Time: 20 minutes

1. Consider the following C code.

```
#include <stdio.h>
int main() {
  int n, i, flag = 0;
  printf("Enter a positive integer: ");
  scanf("%d", &n);

  if (n == 0 || n == 1) flag = 1;
  for (i = 2; i <= n / 2; ++i) {
    if (n % i == 0) {
      flag = 1;
      break;
    }
  }
  if (flag == 0)
    printf("%d is a prime number.", n);
  else printf("%d is not a prime number.", n);
  return 0;
}
```

   I. Draw flowgraph and decomposition tree of the program. 4

   II. Consider a D-structured graph only allows {P1, D0, D1} as Basic Control Structure (BCS). Justify whether the program is D-structured program or not. 3

2. Figure 1 represents a component based system where A and B are two components. Within the component elements are represented using numerical value 1 through 11.

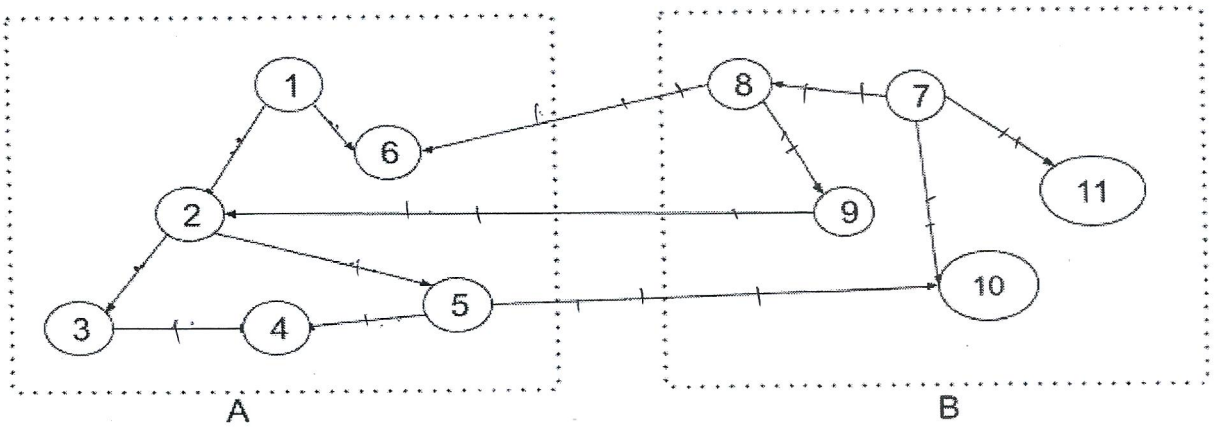

Figure 1: Component based system

   I. What is tree impurity? Calculate tree impurity for component A without considering direction of the edge. 2

   II. Calculate the system coupling. 3

3. How would you measure Maintainability? Draw a decomposition tree to represent Maintainability. 3