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 4801: Software Maintenance

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. Consider the ER diagram of the Department Shop Management System shown in Figure 1. A maintenance team wants to edit this data model diagram by renaming the Item module to the Product module. From Figure 1, you can see that the Item module is related to many other modules. So, if the Item module is renamed, it will inevitably affect other modules.
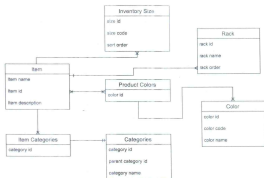

Figure 1: ER diagram for Question 1.a

a) Answer the following questions according to the scenario above.

    i. What Is Impact Analysis?

    ii. Which are the factors need to be considered while performing Impact Analysis?

    iii. Which parameters should be considered while creating an Impact Analysis document? Represent the parameters in an appropriate template.

    iv. Suppose you have 1000 entries in the template, how will you analyze the template?

    v. What are some of the risks of not doing an impact analysis before effecting a change?

    10
    (CO3)
    (PO2)

b) How do Mental Models help developers understand and work with complex software systems in terms of Static and Dynamic elements?

    8
    (CO3)
    (PO2)

c) Prepare a Mental Model for Code Snippet 1.

7 (CO3) (PO2)

```
1   public string method1(string w, int n) {
2       string s = "";
3       char [] A = new char [n];
4       for (int i = 0; i<n; i++)
5           A[i] = w.CharAt[i];
6       char x;
7       int i = 0;
8       int j = n-1;
9       while (i<j) {
10          x = A[i];
11          A[i] = A[j];
12          A[j] = x;
13          i++;
14          j--;
15      }
16      for (int c = 0; c<n; c++)
17          s+= A[c];
18      return s;
19  }
```

Code Snippet 1: A method for preparing Mental Model for Question 1.c

2. A software company of Capability Maturity Model (CMM) level 4 has delivered '*abc*' software to '*XYZ*' company. Later on, '*XYZ*' company requested some feature extensions and bug fixes. The cost for proposed maintenance activities was a burden for '*XYZ*' company as they do not have enough resources now. So, the management team prioritized important features and bug fixes.

   a) What do you understand by software maintenance? Categorize the aforementioned tasks (feature extensions and bug fixes) according to the categories of software maintenance.

   8 (CO1) (PO1)

   b) What model of software maintenance was adopted in the above-mentioned scenario? If you replaced this model with Tautes model, what would have changed? Briefly explain.

   8 (CO2) (PO2)

   c) How will the maintenance process be conducted for the aforementioned scenario? Explain according to the maintenance framework.

   8 (CO1) (PO1)

3. a) Briefly explain how different levels of abstractions could be achieved by Redocumentation and Design Recovery.

   8 (CO3) (PO2)

   b) Discuss different supporting techniques of reverse engineering to represent a system into an equivalent or higher abstraction level.

   8 (CO3) (PO2)

   c) A software architect is tasked with selecting components for building a new web application. The architect needs to choose between using an existing open-source library for user authentication or developing a custom authentication module. What factors need to be considered, when deciding whether to reuse an existing component or develop a custom solution for user authentication? Discuss in terms of component engineering. What are the risks and challenges that may arise if he/she decides to reuse the existing open-source library?

   9 (CO3) (PO2)