

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

**SEMESTER FINAL EXAMINATION**  
**DURATION: 3 HOURS**

**SUMMER SEMESTER, 2021-2022**  
**FULL MARKS: 150**

**SWE 4801: Software Maintenance**

**Programmable calculators are not allowed. Do not write anything on the question paper.**

Answer all 6 (six) questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. You have just joined a team of software engineers in "ABC" Company, in which you are the only one who has studied and practiced software reuse and reusability. The company has no reuse program although they are willing to start one. You are asked to implement the reuse program. 5 × 5  
(CO3)  
(PO1)
  - a) What is the first step that you would take?
  - b) Outline the technical, managerial, and organizational steps you would go through.
  - c) What tactics do you need to employ for the program to succeed?
  - d) Define domain analysis. How will you perform domain analysis for the company?
  - e) Suppose you are identifying reusable components of "XYZ" software. What are the characteristics that should be held by the components?
  
2. A pharmaceutical company wants to analyze their current legacy software. They have given this task to "ABC" software company. "ABC" software company analyzed the maintainability of the legacy software using software metrics. 5+10+  
10  
(CO3)  
(PO1)
  - a) What is software measurement? What are the objectives of measuring a software?
  - b) Explain a mathematical model to calculate the cost of the maintenance process.
  - c) Sometimes rewriting codes instead of changing it becomes less costly, but risky. How will you decide between rewriting or changing codes? Explain with a mathematical model.
  
3. Based on the scenario in Question 2, "ABC" software company suggested that the existing software can be used for another 10 years. In regard to that, the pharmaceutical company requested some new features and modification of existing ones. Before and during the implementation, "ABC" software wants to analyze the areas that will be affected by the change. 4+7+8  
+6  
(CO4)  
(PO2)
  - a) Elaborate how you will conduct impact analysis on the legacy software with a figure. Explain with an example how you will evaluate adequacy and effectiveness of any change made on the legacy software.
  - b) For a given execution trace: ABCrDrrEFGHrrDrrrrx, r and x represent function returns and program exits respectively. If procedure E is modified, find the potentially impacted procedures.

- c) Draw a Program Dependency Graph for the code fragment given in Code Snippet 1:

```

1  int i = 0;
2  do{
3      assert (i <= 15);
4      i = i + 5;
5  } while(i <= 11);

```

**Code Snippet 1:** Code Snippet for Question 3.c)

- d) While analyzing impact in a given source code, it was found that:
- SIS = {A,B}  
 CIS = {A,B,D,E}  
 DIS = {F,G,P,Q}  
 AIS = {A,B,F,G,P,Q}
- Find the false positive impact set.
  - Find error in impact estimation.
  - Find the precision and recall.
4. After implementing the changes mentioned in Question 3, the software of the pharmaceutical company is sent to Software Quality Assurance team. The Quality Assurance team found that a requested feature was not modified by the development team. While investigating the cause, it was found that the developer could not handle the complex code and its relationship with other features as it may break down the core services provided by the program. 8+8+9  
(CO4)  
(PO2)
- What type of testing "ABC" software company will conduct? Write the different types of the test and how these are conducted.
  - Elaborate how you will conduct this testing as a member of Software Quality Assurance team member of "ABC" software Company.
  - Since the mentioned feature could not be modified due to the complexity of the source code in the legacy software system, what solution will you adopt to get the feature as a developer of "ABC" software? How will you construct the solution and adapt legacy software with it?
5. After several years, the software of the pharmaceutical company mentioned in Question 4 could no longer be supported either by wrapping or redevelopment as there is a major technological change. So, "ABC" software company was given the responsibility to handle this case. 8+8+9  
(CO4)  
(PO2)
- What is the best possible solution that "ABC" software can give regarding this case? Explain step-by-step, how they will carry it out.
  - How will you plan the solution to handle this case?
  - If "ABC" software company has adopted the "Composite Database" method, then how will they implement the solution? Explain with figures.
6. Answer the following questions: 8+9+  
(CO  
(PO
- Explain the principles of abstraction, refinement, and alteration in the context of software reengineering.
  - Explain a model which could be used to conduct the reengineering process.
  - Establish relationship between reengineering and reverse engineering through a figure. What techniques can be used for reverse engineering?