

(10)

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, 2022-2023
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 with corresponding COs and POs in parentheses.

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|----|---|--------------------------------|
| 1. | a) Define maintainable software. Write all the characteristics of a maintainable software. | 7
(CO1)
(PO1) |
| | b) Explain the categories of software maintenance tasks with real-world examples. | 8
(CO1)
(PO1) |
| | c) Outline a plan how you are going to conduct the software maintenance tasks in a newly formed company that lacks proper knowledge of maintenance to improve the quality of your companies' products. | 10
(CO3)
(PO2) |
| 2. | a) What do you understand about software measurement? What are the objectives of measuring software? | 5
(CO1)
(PO1) |
| | b) Explain a mathematical model to calculate the cost of a maintenance process. | 8
(CO3)
(PO1) |
| | c) Discuss different types of software metrics used for measuring various aspects of software quality, performance, and development process. | 12
(CO1)
(PO1) |
| 3. | a) Explain the principles of abstraction, refinement, and alteration in the context of software reengineering. | 5
(CO1)
(PO1) |
| | b) Represent a model with a figure that can be used to conduct the reengineering process. | 8
(CO1)
(PO1) |
| | c) What are some common challenges and obstacles encountered in software maintenance projects, and how can they be addressed? Discuss the impact of factors such as legacy code-base, lack of documentation, and evolving business requirements on maintenance activities. Provide strategies for mitigating these challenges to ensure successful maintenance outcomes. | 4 +
4 + 4
(CO3)
(PO1) |
| 4. | a) A pharmaceutical company has given its current legacy software maintenance task to ABC software company. Upon analyzing the maintainability of the software using software metrics, 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 change. Elaborate how you will conduct impact analysis on the legacy software. | 5
(CO4)
(PO2) |

- b) Consider a given execution trace: ABCrDrrEFGHrrrDrrrrx. In the trace, r and x represent function returns and program exits, respectively. If procedure E in the execution trace is modified, find the potentially impacted procedures. (CO4) (PO2)
- c) Draw a Program Dependency Graph for the code fragment given in Code Snippet 1. Derive the static slice and dynamic slice from the Program Dependency Graph. 7 + 8 (CO4) (PO2)

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1 int main() {
2     int n, sum = 0;
3     printf("Enter a number: ");
4     scanf("%d", &n);
5     for (int i = 1; i <= n; i++) {
6         sum += i;
7     }
8     printf("Sum of numbers from 1 to %d: %d\n", n, sum);
9     return 0;
10 }

```

Code Snippet 1: Code Snippet for Question 4.c

5. Continuing from the scenario described in Question 4.a, after implementing the changes, the software of the pharmaceutical company was sent to the software QA team. The QA team found that a requested feature had not been modified by the development team. Upon investigation, it was found that the developers had difficulty handling the complex code and its relationship with other features, fearing it might disrupt the core services provided by the program.
- a) What type of testing will ABC software company conduct? Describe the different types of such testing and how each type is conducted. 10 (CO4) (PO2)
- b) Explain the challenges that may arise during testing. 5 (CO4) (PO2)
- c) As a developer of ABC software, what approach will you take to address the inability to modify the mentioned feature due to the complexity of the source code in the legacy system? Describe your approach to construct a solution to integrate the desired feature with the legacy software. 10 (CO4) (PO2)
6. Continuing from the scenario described in Question 5, after several years, the software of the pharmaceutical company 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 issue.
- a) What is the best possible solution that ABC software can provide to handle this case? Explain step by step about how they will carry it out. 7 (CO3) (PO2)
- b) If ABC software company has adopted the *Composite Database* method, then how will they implement the solution? Explain with figures. 9 (CO3) (PO2)
- c) If ABC software company wants to migrate the software to a modern cloud-based platform, explain what kind of migration strategy needs to be followed. 9 (CO3) (PO2)