

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

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MID SEMESTER EXAMINATION
DURATION: 1 HOUR 30 MINUTESWINTER SEMESTER, 2022-2023
FULL MARKS: 75**CSE 4513: Software Engineering and Object-Oriented Design**

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 whereas corresponding CO and PO are written within parentheses.

1. a) In a software development project, the development team has successfully implemented all the Functional Requirements (FRs) outlined by the stakeholders. However, during testing, it was discovered that the application does not meet the non-functional requirement of handling 1000 concurrent users. Explain how this situation highlights the significance of non-functional requirements and its impact on the *Definition of Done*. 7
(CO1)
(PO1)
- b) You are assigned to develop a Hospital Management System (HMS). The HMS needs to store detailed patient information, including medical history, personal details, and treatment records. It should also contain information about hospital staff, including doctors, nurses, and administrators. An external source of medication details is utilized to store the data about available medications, dosages, and prescriptions within the system. The system should be able to keep track of patient appointments, scheduling, and availability. It also stores lab and test results for patients by maintaining an interface with external laboratories. It should also be capable of Managing patient admissions and discharges, including room assignments. Patient billing, insurance claims, and financial transactions also be there in the system. The system needs to deal with insurance companies and Government regulations to manage the insurance claim. The system can also track hospital supplies, equipment, and usage and handle staff work schedules, shifts, and rotations. The system allows users to search for patients' details. Users can make inquiries about their billing, and they can also check medication availability. The system can generate summary reports when a patient is discharged. It can also print prescriptions for patients. It can also generate the employee's attendance summary reports. The system allows patient registration when they are admitted to the hospital. Hospital employees can update their employee information using the system.
- i. Identify at least 5 ILF, 4 EIF, 2 EQ, 2 EO, and 2 EI for the above-mentioned HMS.
- ii. Assume that all the functions you identified in Question 1. b) are average (EI-10, EO-7, EQ-4, ILF-5, and EIF-4) complexities. In addition, the system requires significant performance, average end-user efficiency, moderate distributed data processing, and significant data communication. Other General System Characteristics (GSCs) are incidental. Compute the Adjusted Function Points using FPA.
- c) Why does an iterative process make it easier to manage changes? Is it possible to complete a project in just one iteration and still be agile? Explain your answers. 4 + 4
(CO1)
(PO1)
2. a) Explain the purpose and benefit of refactoring. 5
- b) What is the difference between a requirement and its corresponding specification? 5
- c) Netflix is an internet service for streaming movies and TV shows to personal computers and TVs. Anyone can browse the Netflix library (by title, actor, director, genre), but one must have a subscription to be able to stream videos. A user can activate (i.e., create), suspend, or

cancel their membership. An account is active as long as it has not been suspended or canceled. The subscription fee is \$7.99 per month, charged on the monthly anniversary of the day that the subscription was activated. If a user has an active subscription and accesses the website from within Canada, then the user can stream as many videos (from the Netflix library) as he or she wants, whenever he or she wants. A user can pause, rewind, fast-forward, or stop a stream as often as they like.

- i. Create a use-case diagram for the Netflix service.
- ii. Write a description for the use case *Stream Video*.

3. a) The ICPC is a two-tiered competition held annually among teams of students, with each team representing the students' university. Teams first compete in Regional Contests, held around the world. The winning team from each Regional Contest advances to the ICPC World Finals. The ICPC is a team competition. New teams are formed each year. A team consists of three students, each of whom is enrolled in university and has had less than five years of university education at the time that the team registers for a Regional Contest. Students who have previously competed in two World Finals or five Regional Contests are ineligible to compete again. During a contest, the teams are given 5 hours to solve between 8 and 12 programming problems. A team submits solutions as programs in C, C++, or Java. The submitted programs are run on test data. If a program fails to give a correct answer, the team is notified and can submit another program. The winner is the team that solves the most problems correctly. If teams solve the same number of problems, their relative ranking is determined by the time that it took a team to submit each correct solution (since the start of the contest), plus a 20-minute penalty for each incorrect submission for a problem ultimately solved.

Prepare a class diagram for this scenario.

- b) Discuss the tradeoffs involved in the choice between inheritance and composition.
- c) Discuss how cohesion, coupling, and SRP work together in software development for better code maintainability.

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