

Answer **ALL** of Part I (Qs 1 & 2) and **TWO** Questions from Part II (Qs 3, 4 &5).

Part I

1.

Consider a small library system with the following transactions:

1. Check out a copy of a book/ Return a copy of a book.
2. Add a copy of a book to/ Remove a copy of a book from the library.
3. Get the list of books by a particular author or in a particular subject area.
4. Find out the list of books currently checked out by a particular borrower.
5. Find out what borrower last checked out a particular copy of a book.

There are two types of users: staff users and ordinary borrowers. Transactions 1,2,4 and 5 are restricted to staff users, except that ordinary borrowers can perform transaction 4 to find out the list of books currently borrowed by themselves. The system must also satisfy the following constraints:

1. All copies in the library must be available for check-out or checked out.
2. No copy of a book may be both available and checked out at the same time.
3. A borrower may not have more than a pre-defined number of books checked out at one time.

Provide:

- a. some scenarios [2]
- b. a use case model [4]
- c. use cases with any relevant extensions [4]
- d. problem domain object list [4]
- e. a preliminary class diagram [4]
- f. a sequence diagram for a selected use case [4]
- g. state diagram for selected class [6]
- h. final class diagram [3]
- i. a selected revised use case [4]

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2.
 - a. What is meant by “Quality”? [5]
 - b. What should be included in a product quality plan? [5]
 - c. What are the key organisational requirements for the establishment of a quality system? [5]

Part II

3.
 - a. Describe the key outputs of a "Fagan" inspection. [5]
 - b. Distinguish between the "influence-function" and "cost distribution" approaches to understanding software costs. Use examples to support your answer. [5]
 - c. What is test data analysis? Give examples of test data analysis techniques. [5]
 - d. Describe the V-model of software development. [5]
 - e. Distinguish between validation and verification. [5]
4.
 - a. What is the incremental software development process? [5]
 - b. Why does it make sense to devote a lot of effort to the early stages of the software development process? [10]
 - c. Judy is working on an implementation of an air traffic control system. The requirements have been defined and specified two years ago. Suddenly the regulations governing air traffic control change. The clients are demanding modifications to meet these changes. Could Judy have anticipated this? What should she do now, and why? [10]

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- 5.
- a. Universal College is redesigning its first year undergraduate computing course. Sketch an IBIS network showing design options and associated rationale. [10]
 - b. The Ministry of Defence wish to procure a large software system for command, control and communication on battle fields for use in event of a tactical nuclear attack. Why might such a system be regarded as posing particular problem for the software developer? [10]
 - c. What is "information hiding" and what are it's benefits? [5]

END OF PAPER