**Section C:**

Q5:

A large government organisation is about to undertake a development project for a safety critical system; delivery to scope and a very high level of system reliability are seen as critical success factors. The use of an agile approach has been deemed inappropriate. Discuss the features of the software (development) process and/or project management that might be considered of particular importance in this case, explaining in depth and detail the reasons for their importance.

A5:

For software development, whether it is waterfall or agile, or any development model, follow specific development steps. Barrett and Higgins (2006) advocated the project development framework, claiming that the development team completed the delivery of the application system under the guidance of the development plan, including requirements, design, development, and testing. Delivery to a range and very high system reliability is considered a critical success factor for a given safety critical system project. Therefore, the clarity of requirements and testing will be a key element of the development process. In addition, more traditional development methods are more suitable for this situation than agile development.

Demand analysis is to understand the needs of customers to solve problems, and finally form a demand specification. Demand management is to ensure the integrity of the process from requirements to implementation, and any changes contained therein are normative, and the scope of the project does not deviate. In this project, because delivery is important, the requirements must be determined early in the project. The traditional development approach is based on the assumption that customers can provide complete and accurate requirements during the requirements phase. Therefore, it is expected to obtain detailed requirements at the beginning of the project, then strictly control the changes in the requirements, and finally complete the software that meets the requirements. At the same time, agile development focuses on how to respond to changing needs. This short-term planning, direct customer contact, and continuous iteration style is ideal for software with a simple core and a large number of customer-visible features that can be incrementally increased in usability. Both parties need a clear project plan. On the one hand, government agencies may need development teams to provide clear project paths and quality standards. On the other hand, the development team must achieve a reliable project plan within the scope of the defined project. This feature is caused by the software requirements of this project. In addition, the software that the project seeks to develop has considerable internal complexity and stringent quality requirements. Therefore, the software may not be available until it is fairly complete. Therefore, the agile development method is considered inappropriate here.

The purpose of the test is to find defects in the software and to ensure that the delivered application meets the requirements. Testing is critical and even takes longer than development. Ould and Unwin (1986) argue that more defects were discovered in later developments and that the cost of repairing them is higher. For safety critical systems, system reliability values are higher than other factors. In an academic paper comparing traditional methods with agile development, Leau (2012) argues that horticultural development in agile development requires testing to quickly deliver available systems. In contrast, traditional models are much more complicated. The test team starts by writing test cases and then starts unit tests, functional tests, integration tests, acceptance tests, and more. In the process, if any problems are found and development is improved, the development cycle will be extended accordingly, which may result in project delays. What kind of testing method is used in this project, strict safety quality standards should be adopted in the test to achieve safety and reliability.