



DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

University Examinations 2021/2022

THIRD YEAR SEMESTER 2 EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN TIE

ETI 3210: INTRODUCTION TO SOFTWARE ENGINEERING

DATE: JANUARY 2022

TIME: 2 HOURS

Instructions: Answer Question 1 and Any Other Two.

Question 1: (30 Marks)

- a) Define the following terms **(4 Mark)**
- Software engineering
 - Design pattern
 - Unit testing
 - Weak entity set
- b) What are the four important attributes that all professional software should have?
Explain **(4 Marks)**
- c) What is the TWO most important differences between generic software product development and bespoke software development? Give an example in each case. **(3 Marks)**
- d) The quality of any software is important if the software is to be accepted by the final customer for use. However a number of factors influence the quality of the given software. In light of the above define software quality and **FOUR** factors that affect them **(5 Marks)**
- e) Name four advantages of using decentralized version control (e.g., git or mercurial) over centralized version control (e.g., CVS or subversion). **(4 marks)**
- f) Differentiate between verification and validation **(2 Marks)**
- g) Describe the two characteristics functional requirements are required to possess **(2 Marks)**

- h) State and explain the three main types of testing in professional software development **(3 Marks)**
- i) Software systems always change during development and use. Explain three reasons. **(3 Marks)**

Question 2: (20 Marks)

- a) Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems: **(8 Marks)**
- i. A system to control anti-lock braking in a car
 - ii. A virtual reality system to support software maintenance
 - iii. A university accounting system that replaces an existing system
 - iv. An interactive travel planning system that helps users plan journeys with the lowest environmental impact
- b) Software changes are bound to change and it's for that reason that configuration management is termed as crucial. In light of the above expound on the four activities undertaken during software engineering **(4 Marks)**
- c) List and explain four different symbols used in DFD **(4 Marks)**
- d) The top management of ABC solutions has been informed that the software they had purchased to automate their company's business processes needs to be modified, yet they thought it would never need to change. As the company's ICT officer, you have been invited to discuss suitable causes as to why the company's software may require changes. Discuss any FOUR of these causes **(4 Marks)**

Question 3: (20 Marks)

- a) Systems developed as prototypes should not normally be used as production systems. Discuss. **(3 Marks)**
- b) ABC Bank management have been reviewing the operation of their agency banking system for some time and are concerned on its suitability. You have been invited to share of the different types of software maintenance and the factors that influence each of them. **(6 Marks)**

- c) SE VLabs Inc. is a young company with a few departments spread across the country. As of now, the company has a strength of 200+ employees. Each employee works in a department. While joining, a person has to provide a lot of personal and professional details including name, address, phone #, mail address, date of birth, and so on. Once all these information are furnished, a unique ID is generated for each employee. He is then assigned a department in which he will work. There are around ten departments in the company. In light of the above
- i. Identify the Entities, relationships and cardinality of their relationships **(3 Marks)**
 - ii. Draw the ERD to represent the above case study **(5 Marks)**
- d) As part of a software engineering team, describe **THREE** requirements validation techniques you will use to ensure that correct requirements are collected **(3 Marks)**

Question 4: (20 Marks)

- a) Study the case study below and answer the questions that follow

The Dehub has been recently setup to provide state-of-the-art research facilities in the field of Software Engineering. Apart from research scholars (students) and professors, it also includes quite a large number of employees who work on different projects undertaken by the institution. As the size and capacity of the hub is increasing with the time, it has been proposed to develop a Library Information System (LIS) for the benefit of students and employees of the institute. LIS will enable the members to borrow a book (or return it) with ease while sitting at his desk/chamber. The system also enables a member to extend the date of his borrowing if no other booking for that particular book has been made. For the library staff, this system aids them to easily handle day-to-day book transactions. The librarian, who has administrative privileges and complete control over the system, can enter a new record into the system when a new book has been purchased, or remove a record in case any book is taken off the shelf. Any non-member is free to use this system to browse/search books online. However, issuing or returning books is restricted to valid users (members) of LIS only.

- i. Identify FIVE functional requirements from the above case study **(5 Marks)**
- ii. Identify the non-functional requirements from the above case study **(5 Marks)**

b) Perfect Pizza wants to install a system to record orders for pizza and chicken wings. When regular customers call Perfect Pizza on the phone, their phone number goes automatically into the Pizza system. The phone number invokes the name, address, and last order date comes automatically up on the screen. Once the order is taken, the total, including tax and delivery, is calculated. Then the order is given to the cook. A receipt is printed. Occasionally, special offer (coupons) is printed so the customer can get a discount. Drivers who make deliveries give customers a copy of the receipt and coupon (if any). Weekly totals are kept for comparison with last year's performance.

i. Draw a context diagram for Perfect Pizza **(5 Marks)**

ii. Draw the level 1 DFD **(5 Marks)**