Date: 23.02.2018, 8.00-9.30 AM   UNIT TEST – 2   Max. Marks: 50
Academic Year: 2017-2018 EVEN   Batch: 2016-2020
Semester: 4   Faculty: Dr. R. Kanchana and Dr. A. Chamundeswari

Qn.No	Part – A (5 * 2 = 10)	Marks	(KL,COn)
1	Discuss some of the problems that occur when requirements for an application must be elicited from three or four different customers. In reality, the customer and the developer enter into a process of negotiation, where the customer may be asked to balance functionality, performance, and other product or system characteristics against cost and time to market. The intent of this negotiation is to develop a project plan that meets the needs of the customer while at the same time reflecting the real-world constraints (e.g., time, people, budget) that have been placed on the software team, Unfortunately, this rarely happens, each customer has his own views. These views donot match each customer, time is another constraint that matters, each customer may not have time to meet the developer and give the requirements, this further increases the problem.	2	K4,CO2
2	What are the strengths and weaknesses of informal specifications? Strength: Informal specifications are imprecise. They can be ambiguous, contradictory, or incomplete. Weakness: Informal specifications are easy to use, and are easy for the client to understand.	2	K2,CO2
3	Distinguish between functional and non-functional requirements. 1. Functional requirements: The functional requirements for a system describe what the system should do. These are statements of services the system should provide, how the system should react to particular inputs, and how the system should behave in particular situations. In some cases, the functional requirements may also explicitly state what the system should not do. 2. Non-functional requirements: Non-functional requirements, as the name suggests, are requirements that are not directly concerned with the specific services delivered by the system to its users. These are constraints on the services or functions offered by the system. The may relate to emergent system properties such as reliability, response time. And memory use. They may also define constraints on the system implementation, such as the capabilities of I/O devices or the data representations used in interfaces with other systems. Non-functional requirements often apply to the system as a whole rather than individual system features or services.	2	K2,CO2

In reality, the distinction between different types of requirements is not as clear-cut as these simple definitions suggest. A user requirement concerned with security, such as a statement limiting access to authorized users, may appear to be a non-functional requirement. However, when developed in more detail, this requirement may generate other requirements that are clearly functional, such as the need to include user authentication facilities in the system.

4	What is structured system analysis? Mention the tools that are useful for structured analysis.	2	K2,CO2

Structured analysis, considers data and the processes that transform the data as separate entities. Data objects are modeled in a way that defines their attributes and relationships. Processes that manipulate data objects are modeled in a manner that shows how they transform data as data objects flow through the system.

Tools: DFD, ER model, UML based models like use-case diagram, sequence diagram, activity diagram, state diagram, state chart, class diagram, etc.., Petri Nets...

5	Define *Petri net* and mention an application and its requirement which requires Petri net model for a better analysis.	2	K2,CO2

— A powerful modeling technique for specifying systems that have potential problems with interrelations
— suitable for specifying real-time systems is timing
  — Synchronization problems
  — Race conditions
  — Deadlock

Part – B Answer all questions (13+13)

6	a) Why should the following constraints not appear in a specification document? Rewrite them in a better way.
	  i. The product must significantly reduce transportation expenses that arise from distributing our books in Coimbatore.
	  ii. The credit card database must be set up at a reasonable cost.
		4	K3,CO2

Both constraints superficially appear to be precise and scientific, but neither can be measured or tested. Specifically,
  (i)   The term "significantly" is imprecise — significant for whom: client or developer?   Also, this is a reason for developing the product, not a constraint.
  (ii)   The term "reasonable" is imprecise — reasonable for whom: client or developer?

	b) Differentiate user and system requirements. Write a user requirement and corresponding system requirement for *Online course registration* system.	2+3	K3,CO2

Refer lecturenotes

c) Mention the types of non-functional requirements and their metrics.   2+2   K2,CO2

Refer lecturenotes

OR

7   Consider an automated ticket-issuing system that sells rail tickets. Users   4+3+6   K3,CO2
select their destination and input a credit card and a personal
identification number. The rail ticket is issued and their credit card
account charged. When the user presses the start button, a menu
display of potential destinations is activated, along with a message to
the user to select a destination. Once a destination has been selected,
users are requested to input their credit card. Its validity is checked
and the user is then requested to input a personal identifier. When
the credit transaction has been validated, the ticket is issued.

Discover any THREE ambiguities or omissions in the ticket-issuing
system. Why is it so important that the specification document
should have no omissions, contradictions, or ambiguities?

1. Can a customer buy several tickets for the same destination together
   or must they be bought one at a time?
2. Can customers cancel a request if a mistake has been made?
3. How should the system respond if an invalid card is input?

What happens if customers try to put their card in before selecting a
   destination (as they would in ATM machines)?

5. Must the user press the start button again if they wish to buy another
   ticket to a different destination?
6. Should the system only sell tickets between the station where the
   machine is situated and direct connections or should it include
   all possible destinations?

Any such omissions, contradictions, and ambiguities will be carried over
   into the design and implementation.

a) Identify any three functional requirements.
b) Write the complete SRS document following IEEE format.

8   a) Develop a use case for ONE of the following activities and draw   5   K3,CO2
use case diagram:
    i.   Making a withdrawal at an ATM
    ii.   Searching for books (on a specific topic) using an on-line
        bookstore

Withdraw cash:

Actors: Customer, ATM, Accounting system

Inputs: Customer's card, PIN, Bank Account details

Outputs: Customer's card, Receipt, Bank account details

Normal operation: The customer inputs his/her card into the machine.

He/she s promoted for a PIN which is entered on the keypad. If correct, he/she is presented with a menu of options. The Withdraw cash option is selected. The customer is promoted with a request for the amount of cash required and inputs the amount. If there are sufficient funds in his/her account, the cash is dispensed, a receipt if printed and the account balance is updated. Before the cash is dispensed, the card is returned to the customer who is prompted by the machine to take their card.

Exception:

Invalid card. Card is retained by machine; Customer advised to seek advice.

Incorrect PIN. Customer is request to rekey PIN. If incorrect after 3 attempts, card is retained by machine and customer advised to seek advice.

Insufficient balance Transaction terminated. Card returned to customer.

<<<Use case diagram>>>

b) How does a sequence diagram differ from a state diagram? How are they similar?   3   K4,CO2

State diagrams depict the state of the system and show how events affect system states. Sequence diagrams indicate how events cause transitions from object to object.

c) What does win-win mean in the context of negotiation during the requirements engineering activity?   2   K2,CO2

A "Win-Win situation is where the customer wins by getting the system or product that satisfies the majority of the customer's needs and the software team wins by working to realistic and achievable budgets and deadlines.

d) Why are many software organizations reluctant to use formal specifications?   3   K2,CO2

Formal specifications are hard for the development team to learn; hard to use; almost impossible for most clients to understand.

OR

9   a) Enumerate different techniques for requirements elicitation. Tabulate their advantages and disadvantages.   8   K2,CO2
Refer lecturenotes.

b) Describe the different ways in which the requirements can be validated.   5   K2,CO2
Refer lecturenotes.

Part – C (14)

10   a) Consider an automated library circulation system. Every book has a bar code, and every borrower has a card bearing a bar code.   5   K3,CO2

When a borrower wishes to check out a book, the librarian scans the bar codes on the book and the borrower's card, and enters C at the computer terminal. Similarly, when a book is returned, it is again scanned and the librarian enters R. Librarians can add books (+) to the library collection or remove them (−). Borrowers can go to a terminal and determine all the books in the library by a particular author (the borrower enters A= followed by the author's name), all the books with a specific title (T= followed by the title), or all the books in a particular subject area (S= followed by the subject area). Finally, if a borrower wants a book currently checked out, the librarian can place a hold on the book so that, when it is returned, it will be held for the borrower who requested it (H= followed by the number of the book).

Model these requirements using level – 0 DFD. Evolve level-1 DFD by expanding the processes.
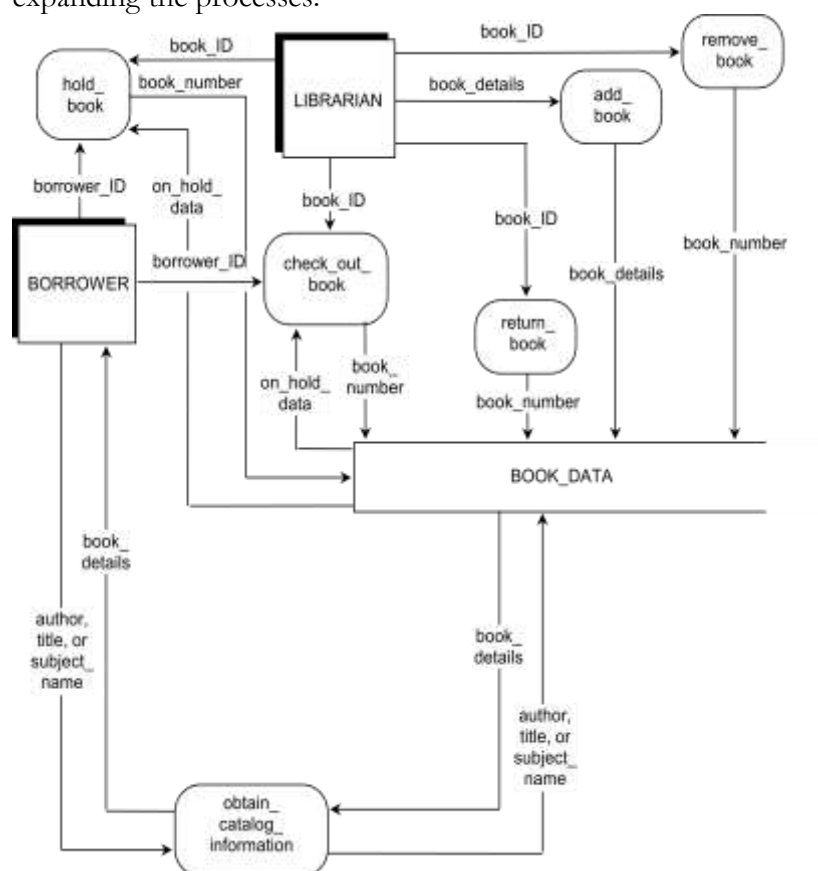
b) Develop a **sequence diagram** showing the interactions involved when a student registers for a course in a university. Courses may have limited enrolment. Hence, the registration process must check whether slots are available. Assume that the student accesses an electronic course catalog to find out available courses.   4   K3,CO2

c) Draw **state transition diagram** of the control software for: 5   K3,CO2
   An automatic washing machine that has different programs for different types of clothes.

***********B E S T   O F   L U C K*********

Prepared by

R. Kanchana	A. Chamundeswari

Reviewed by HoD, CSE