Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination
March/April, 2017

Level : B. E./B. Sc.
Year : IV
Course : COMP 421
Semester : I
Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date APR 07 2017

SECTION "A"
[20 Q. × 0.5= 10 marks]

1. Which of the following Use Case Diagram consists of interaction?
[ ] Product [ ] Use case [ ] Actor [ ] Product and Actor

2. What are prototypes?
[ ] Prototypes is a working model of part or all of a final product
[ ] Prototypes does not represent any sort of models
[ ] Prototype can never consist of full size
[ ] All of the above

3. An Architecture of software based upon____
[ ] Design [ ] Requirements
[ ] All of the mentioned [ ] None of the mentioned

4. What does Software Design consists of?
[ ] Software Product Design (SPD) [ ] Software Engineering Design (SED)
[ ] SPD and SED [ ] None of the mentioned

5. How many feasibility studies is conducted in Requirement Analysis ?
[ ] Two [ ] Three [ ] Four [ ] Five

6. The requirements that result from requirements analysis are typically expressed from one of three perspectives or views. What is that perspective or view?
[ ] Developer [ ] User [ ] Non-Functional [ ] Physical

7. To arrive at a form which is suitable for implementation in some programming language is the purpose of___
[ ] Structured Analysis (SA) [ ] Structured Design (SD)
[ ] Detailed Design (DD) [ ] None of the mentioned

8. What is Software architecture?
[ ] It is the structure or structure of systems [ ] It comprises of software components
[ ] Relationship among components [ ] All

9. Which of the following phases of software development does NOT incorporate software architecture?
[ ] Requirements gathering [ ] Software implementation
[ ] Software testing [ ] None

10. Which one of the following is NOT desired in a good Software Requirement Specifications (SRS) document?
[ ] Functional Requirements [ ] Non-Functional Requirements
[ ] Goals of Implementation [ ] Algorithms for Software Implementation

11. Which requirements are the foundation for the quality?
[ ] Hardware [ ] Software [ ] Programmers [ ] None of the mentioned

12. Activity diagram, use case diagram, collaboration diagram and sequence diagram are considered as types of_____
[ ] non-behavioral diagrams [ ] non structural diagrams
[ ] structural diagrams [ ] behavioral diagrams

13. Kind of diagrams which are used to show interactions between series of messages are classified as
[ ] activity diagrams [ ] state chart diagrams
[ ] collaboration diagrams [ ] object lifeline diagrams

14. Diagrams which are used to distribute files, libraries and tables across topology of hardware are called
[ ] deployment diagrams [ ] use case diagrams
[ ] sequence diagrams [ ] collaboration diagrams

15. Dynamic aspects related to a system are shown with the help of_____
[ ] sequence diagrams [ ] interaction diagrams
[ ] deployment diagrams [ ] use case diagrams

16. Data type which can be fixed length or varying length as CHAR(n) and VARCHAR(n) respectively is classified as
[ ] ternary string [ ] binary string
[ ] schema string [ ] character-string

17. Which UML diagram adds the dimension of time to object interactions?
[ ] Communication [ ] Interaction Overview Diagram
[ ] Composite Structure Diagram [ ] Sequence Diagram

18. Which diagram is like a flow chart which shows the steps, decision points and branches?
[ ] Sequence Diagram [ ] Composite Diagram
[ ] Interaction Overview Diagram [ ] Activity Diagram

19. In UML diagrams, relationship between object and component parts is represented by .....
[ ] ordination [ ] aggregation [ ] segregation [ ] increment

20. A class is divided into which of the following components?
[ ] Name Component [ ] Attribute Component
[ ] Operation Component [ ] All

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Semester : I
Time : 40

SECTION "B"
[6 Q. × 5 = 30 marks]

Attempt *ANY SIX* questions:

1. What is Software Architecture? Why do we need Software Architecture?
2. Define the Key Design Principles of Software Architecture.
3. What is UML? Explain Structural and Behavioral Diagrams.
4. Compare between Object and Class.
5. Explain the Blackboard Architecture and explain the use of Blackboard Architecture..
6. What is Pipe and Filter? Explain the inter relationship between Pipe and Filter with the proper real example.
7. Define Use Case Diagram. Why do we need Use Case Diagram?

SECTION "C"

Requirements Statement for ATM System. **[10]**

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of $20), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)
The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned - except as noted below.
The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of $20.00. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.

3. A customer must be able to make a transfer of money between any two accounts linked to the card.
4. A customer must be able to make a balance inquiry of any account linked to the card.

A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine.
The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.)
If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back.
If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction.
The ATM will provide the customer with a printed receipt for each successful transaction, showing the date, time, machine location, type of transaction, account(s), amount, and ending and available balance(s) of the affected account ("to" account for transfers).
The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on" position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the "off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.
The ATM will also maintain an internal log of transactions to facilitate resolving ambiguities arising from a hardware failure in the middle of a transaction. Entries will be made in the log when the ATM is started up and shut down, for each message sent to the Bank (along with the response back, if one is expected), for the dispensing of cash, and for the receiving of an envelope. Log entries may contain card numbers and dollar amounts, but for security will *never* contain a PIN.

Read the Requirement Statement and answered the following questions.

a. Draw the Use Case Diagram
b. Develop the Class Diagram
c. Design the Startup Sequence Diagram
d. Develop the Activity Diagram

   OR

e. Draw the State Chart Diagram