



Dhirubhai Ambani Institute of Information & Communication Technology  
Gandhinagar, Gujarat.

MScIT Semester II Final Examination

Software Engineering (IT632)

Date: 06 May 2023

Duration: 3 hours

Max. Marks: 100

Instructions:

- All questions are compulsory.
- Figures to the right indicate full marks.
- Understanding the questions correctly constitutes to part of your solution.

1. Answer the following briefly. (2 x 10 = 20)
  - a. Summarise activities carried out during different XP phases.
  - b. Summarise working of spiral development model using a suitable diagram.
  - c. What is the significance and key considerations on deciding increment length for scrum projects?
  - d. Using suitable diagram, summarise flexibility of agile development model to accommodate change.
  - e. What are the symptoms of software crisis? What factors have contributed to the making of software crisis? What are the possible solutions to software crisis?
  - f. Summarise characteristics of a bad SRS document using suitable examples.
  - g. What are the key objectives of structured analysis and design (SA/SD) methodology?
  - h. Differentiate: Decision Tree vs. Decision Table.
  - i. Summarise semantics of data definition used in generation of data dictionary.
  - j. Summarise key building blocks of structure chart. Can we decide on design quality based on it?
2. Visualise following concepts using suitably labelled diagrams. (5x2 = 10)
  - a. Sprint, product backlog, scrum meetings, burn-down chart, customer demo, and key stakeholders.
  - b. CoCoMo based estimation of software metrics.
3. The software system being produced is called On-campus Used Book System or OUBS. It is being produced for a customer (students, faculty, staff, including library) interested in selling used books online. This system is designed to "provide automation support" for the process of placing books for sale online facilitating the actual sale. This system is largely cross-platform and is available to anyone having a valid DA-IICT email. The system will be hosted and running on Amazon cloud with each user having a remote user interface through any web browser as well as an Android/iOS app to interact with it. The OUBS will allow any user to create an account to become a customer. The customer, through the process of account creation, will have the option to become a member of the site. The system will allow customers to browse, search, select, and add books to a shopping cart. Then, provided they have books in their shopping cart, check out books in shopping cart and decrement stock on the inventory that system maintains. The OUBS also allows a manager (often a library personnel) to manage the inventory with full create, retrieve, update and delete (CRUD) functionality with regards to books in the system. It will also allow, on an inventory wide basis, customers and managers to interact with a promotion system that handles percentage-off promotions that can be applied to member's orders. This interaction includes the creation (by managers) and the application to orders (by customers) of the promotions. The OUBS has full email notification capabilities; the automated email functionality will be used to send promotions to members of the system as well as provide the managers with changing stock notifications. The system will provide the customer with a receipt and it will log the transaction details. The OUBS will have an integrated payment gateway to enable online payments processing capabilities. However, it will not allow managers to be customers. The system will not allow multiple promotions to be added to a single shopping cart nor will it allow a customer to add more than one of each item to their cart. The system also will not allow users to retrieve passwords or edit their user details after registration.

In the context of OUBS, answer each of the following.

  - a. Write user-stories considering agile methodology being used.
  - b. Write functional requirements giving following information. (4)  
Req. ID, functional description, pre-conditions, input and output, associated actors, dependency (6)



- c. Construct level 0 and level 1 DFD. (3 + 4)
- d. Construct UML usecase and class model. (3 + 4)
- e. Using template for textual representation, narrate usecase of purchasing used books. (4)
- f. Construct UML sequence diagram based-on 3(e). (4)
- g. List all scenarios in reference to your solution in 3(f). (3)

Answer the following briefly.

(2 x 10 = 20)

- a. Summarise key principles of user-interface (UI) design.
- b. Summarise different message types along with respective notations used in UML sequence diagrams.
- c. What do you understand by the different abstractions of a class model? Summarise using an example.
- d. What are interaction occurrences and combined fragments equivalent to when compared to typical programming constructs? Why are they used in sequence diagrams?
- e. Differentiate various levels of system testing.
- f. How is condition coverage stronger and different than branch coverage? Summarise using an example.
- g. How is equivalence class partitioning different compared to boundary value analysis technique?
- h. How are <<includes>> and <<extends>> different? Depict how its usage may look acceptable as per UML notations, but still be considered a bad software design choice.
- i. What is expert judgement estimation model? Which other model is better preferred? Why?
- j. What do you understand by relationships like association, dependency, and generalization? How are they represented using respective notations in a typical UML class diagram?

Do as directed.

(5x3 = 15)

- a. The machine waits for the start switch to be pressed. After the user presses the start switch, the machine fills the wash tub with either hot or cold water depending upon the setting of the Hot-Wash switch. The water filling continues until the high level is sensed. The machine starts the agitation motor and continues agitating the wash tub until either the pre-set timer expires or the user presses the stop switch. After the agitation stops, the machine waits for the user to press the Start-Drying switch. After the user presses the Start-Drying switch, the machine starts the hot air blower and continues blowing hot air into the drying chamber until either the user presses the stop switch or the pre-set timer expires. Represent the decision making involved in operating software for above washing machine by means of decision table. (1+1+1+2 = 5)

- b. Construct CFG for following source code and using it compute cyclomatic complexity.

```

1.      Begin int x, y, power;
2.      float z;
3.      input(x, y);
4.      if(y<0)
5.          power = -y;
6.      else power = y;
7.      z=1;
8.      while(power!=0)
9.      { z = z*x;
10.         power = power-1; }
11.     if(y<0)
12.         z=1/z;
13.     output(z);
14.     End

```

What is your conclusion from your computed cyclomatic complexity?

(2+2+1 = 5)

- c. Construct four test cases for the source-code given in 4(b) above. Compute code coverage for each test case. What is your conclusion from your code coverage computations? (2+2+1 = 5)

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