Department of Computer Science and Engineering

National Institute of Technology Rourkela

Mid-Semester Examination (Spring Semester) - 2019

B.Tech. VIIIth Semester

Sub: Software Engineering (CS412)

Time – 2 Hours   **Full Marks – 60**

Answer all questions.

1.   **[2 x 10 = 20]**
   (a) Distinguish between a program and a professionally developed software?
   (b) List any four reasons for failure of software?
   (c) An extremely large software that would provide, monitor, and control cellular communication among its subscribers using a set of revolving satellites. Which life cycle model would you follow for developing software for this application? Mention the reasons behind your choice of a particular life cycle model.
   (d) Give the difference between Procedural cohesion and Sequential cohesion?
   (e) Explain the main differences between function-oriented and object-oriented design approaches.
   (f) How does a structure chart differ from a flow chart?
   (g) What is meant by the term coupling in the context of software design? Is it true that in a good design, the modules should have low coupling? Why?
   (h) Give differences between RAD model and iterative waterfall model?
   (i) What do you understand by inconsistent requirement? Give an example?
   (j) Write pre- and post-conditions to axiomatically specify the following function:
       A function named *square-array* creates a 10 element array, where for all elements of the array, the value of any array element is square of its index

2.   **[10+10=20]**
   (a) Explain the Prototyping life cycle model, with a suitable diagram? What are the major advantages of first constructing a working prototype before starting to develop the actual software? What are the disadvantages of this approach? Both the prototyping model as well as Spiral model have been designed to handle the risks. Identify how exactly risk is handled in each model.

   (b) Algebraically specify an abstract data type LIST that contains elements of same type arranged in sequential order. The following operations can be performed on the list.

   create: creates an empty list.
   retrieve: returns an element from the list at any given position.
   insert: inserts an element at any position of the list.
   remove: removes the first occurrence of any element from a non-empty list.
   replace: replaces an element at any position by another element.
   length: returns the number of elements in the list.
   isEmpty: returns true if the list is empty, otherwise returns false.
   isFull: returns true if the list is full, otherwise returns false.

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3. The local newspaper and magazine delivery agency has asked you to develop a software for him to automate various clerical activities associated with his business. The requirements are briefly mentioned below:

- This software is to be used by the manager of the news agency and his delivery persons.
- For each delivery person, the system must print each day the publications to be delivered to each address.
- The customers usually subscribe one or more newspapers and magazines. Customer should be able to initiate new subscriptions and suspend subscription for a particular item either temporarily or permanently through a web browser. Considering large customer database, at least 10 concurrent customer accesses should be supported.
- For each delivery person, the system must print each day the publications to be delivered to each address.
- The system should also print for the news agent the information regarding who received what and a summary information of the current month.
- At the beginning of every month bills are printed by the system to be delivered to the customers. These bills should be computed by the system automatically.
- Customers may request to subscribe new newspapers/magazines, modify their subscriptions list, or stop their subscriptions altogether.
- Customers usually pay their monthly dues either by cheque or cash. Once the cheque number or cash received is entered in the system, receipt for the customer should be printed.
- If any customer has any outstanding due for one month, a polite reminder message is printed for him and his subscription is discontinued if his dues remain outstanding for the period of more than two months.
- The software should compute and print out the amount payable to each delivery boy. Each delivery boy gets 2.5 percent of the value of the publication delivered by him.

For the above software, do the followings:

(a) Prepare the software requirement specification document.
(b) Draw the Context Diagram.
(c) Draw the Level-1 and Level-2 Data Flow Diagram.
(d) Create the Data Dictionary.
(e) Develop the structure chart.

_____**End**_____