Computer Engineering Department, S V N I T, Surat.
Mid-Semester Examinations, Sept-Oct 2019
B Tech – IV (CO)– 7th Semester
Course: (CO-401) Software Engineering

Dated: 30th **September, 2019** **Time: 16:00 to 17:30 hrs** **Max Marks: 30**

Instructions:
1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books, while write your B.Tech Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

Q1. Consider an online email software that enable users to send, receive mail from their Web browsers. [6]

When logging into an email service, users simply enter site URL in their browser's address and can access their account by typing in a username and password.
Services offered by this software are :

- Interface: easy-to-use graphical interface through which user can access their mail service.
- Compose Mail: the ability to create new message(email)
- Delete Mail: the ability to delete mails from inbox.
- Contact Management: the ability to store data about contacts
- Inbox Files: the ability to store emails and create folder to store sorted email
- Spam Filter: An automated service that will filter spam email to a junk folder
- Files: the ability to send and receive file attachments in email messages
- Email Forwarding: allows user to forward mail.

a. Prepare a use case diagram for this system.

b. Prepare a sequence diagram corresponding to any two use cases that you have identified for this system.

c. Model Data Flow Diagram up to level 0 for this system.

Q2. **Answer the following:**

a. Consider a simple microwave oven whose behaviour is governed by the following rules: [3]

- The microwave has a door, a light, a power-tube, a button, a timer, and a display.
- When the oven is not in use and the door is closed, the light and the power-tube are turned off and the display is blank.
- When the door is open, the light stays on.
- If the button is pushed when the door is closed and the oven is not operating, then the oven is activated for one minute. When the oven is activated, the light and the power-tube are turned on.
- If the button is pushed when the oven is operating, one minute is added to the timer.
- When the oven is operating, the display shows the number of seconds of cooking time remaining.
- If the door is opened when the oven is operating, the power-tube is turned off.
- When cooking time is completed, the power-tube and light are turned off.
- Pushing the button when the door is open has no effect.

Model Finite State Machine for the given system.

b Consider a Vending machine described as follows : [5]

- The vending machine dispenses two kinds of snacks, 15/- rupees snack and 20/- rupees snack.
- Only two types of coins can be inserted in the machine, 10/- rupee coin and 5/- rupee coin. The machine does not return any change.
- After insertion of each coin, machine waits for limited duration of time for the next coin.
- Machine returns inserted coins if this time limit exceeds at any moment else at the end, it dispenses the requested snack.

Model a Timed-Petri Net for the described system.
Also, State, Whether this system can be modelled using Colored Petri Nets? Justify your statement.

Q3. Answer the following:

a. Consider the software for updates of scores of a live cricket match. The purpose of this software is to provide scores of live cricket matches (International and domestic) daily which is happening totally around the world. It consists of a database which comprises of information about all the players from different countries in all formats (Date of birth, runs scored, wickets, catches etc...). [5]

Write down the functional and non-functional requirements of this software.

OR

a. Consider the software for online job portal. The purpose of designing the online job portal is to give the job seekers a platform for finding a right and a satisfactory job according to their qualification. It also connects the job seekers with the major recruitment agencies.

Write down the functional and non-functional requirements of this software

b. Consider the software for event management system. This software is designed to manage different events such as party, marriage. This will take the users requirements for the events. According to the user requirement, it estimates the cost for whole event. [5]

What are the problems/issues faced while creating this software.

c. Assume that you are a project manager of three projects with the following characteristics: [6]

- **Project 1:** A complex real-time system whose requirements can be relatively easily identified and are stable.
- **Project 2:** A web-site for a local library. Requirements are vague and are likely to change in the future.
- **Project 3:** An order processing system with a web-site for a local business. Requirements are vague but stable (i.e. unlikely to change in the near future).

Which of models would you choose for each of your projects? Your choices should be properly justified.

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Computer Engineering Department, SVNIT, Surat.
Mid-Semester Examinations, March 2019
M Tech I(CO) – 2nd Semester
Software Engineering Methodologies –CO604

Dated: 7th March 2019 Time: 14:00 hrs to 15:30 hrs Max Marks: 30

Instructions:
1. Assume any necessary data but give proper justifications.
2. Be precise and clear in answering the questions.

Q.1 Answer the following:

1. Consider the description of the following (binary) counter. The marking of a place represents a binary value (1 or 0). The combination of the markings of the places represents the natural number that is displayed by the counter. For example, the binary number 101 (i.e., 5) marks two places corresponding to a "1" (i.e., the places 2^2 and 2^0) and one place corresponding to a "0" (i.e., the places 2^1). Draw a Petri net model of a counter able to count from 0 to 7. [12]

2. Consider the control of a (small part of a) chemical plant. Temperature and pressure levels must be monitored for safety reasons. Sensors are installed to detect and generate appropriate signals. Temperature and pressure each have two different associated signals; one indicates a slight deviation from the acceptable value and the other a dangerous deviation from the acceptable value. In the latter case, the system must be shut off immediately. [5]

In case of slight deviation of one of the two signals, the system enters a recovery state in which it tries to apply a recovery action. If after a while the recovery action succeeds, the system is automatically reset to the "normal' state, and the message "Everything is ok" is sent to the external environment. Otherwise, the alarm signal must be raised and plant must be shut off. The system must be switched off when it is trying to recover from one kind of anomaly and the other signal is raised. It is assumed that the two signals cannot occur simultaneously. Specify the above requirements using Finite State Machine.

3. Consider the petrinet model of the external button(Up button of floor no. j) of the elevator as shown in fig 1. [2]

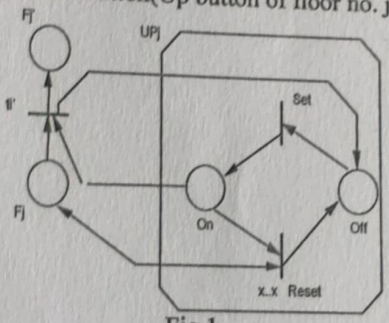

Fig.1

Write down the set of requirements modeled by this petrinet.

Q.2 Answer the following: [11]

1. Suppose a system for office automation is to be designed. It is clear from the requirements that there will be five modules of size 0.5 KLOC, 1.5 KLOC, 2.0 KLOC, 1.0 KLOC and 2.0 KLOC respectively. The coefficients to be used are a=3.2, b=1.05, c=2.5 and d=0.38. Consider complexity and reliability requirements are high, programmer's capability and experience is low i.e 1.40, 1.30, 1.13, 1.17 respectively. All other factors are of nominal ratings (i.e 1.0). Use appropriate COCOMO model to determine overall cost and schedule estimates. Also calculate the cost and schedule estimates for different phases. Phase values for μ_p and τ_p are (0.06, 0.16, 0.26, 0.42, 0.16) and (0.10, 0.19, 0.24, 0.39, 0.18) respectively. [5]
2. Briefly discuss classification of informal behavioral approach and informal modeling based approach for requirement elicitation. [3]
3. Software requirements are of two types viz., user requirements and system requirements. Why these two categories of requirements are desirable in Software Requirement Specification (SRS) document? Give suitable examples of these two types of requirements. [3]

Q.3 Answer the following: [7]

1. Discuss the static aspects of the process in 'The Rational Objectory' software engineering process. [4]
2. "Defining the priority function is of high importance in WaterSluice software engineering methodology"- Discuss the statement in brief using a suitable example. [3]

OR

2. Explain the classic waterfall model of life cycle for software engineering and discuss how it is different from Bohem-Waterfall methodology using a suitable example. [3]

Computer Engineering Department, S V N I T, Surat.
Supplimentary Examinations, July 2019

M.Tech. I (CO) – 2nd Semester
Course : Software Engineering Methodologies-CO604

Dated: 9th July, 2019 Time: 10:00 hrs to 13:00 hrs Max Marks: 50

Q.1 (A) The controlling software for elevator system is to be modeled using petri nets. Identify atleast five rules for the elevator system and specify them using 1) the natural language specification and 2) petri nets. [7]

Q.1 (B) Identify the scenario where the tokens are required to assign some values in the petri net modelling. [3]

Q.2 (A) Draw the finite state machine model for producer consumer problem. Clearly specify the requirements. [5]

Q.2 (B) Show the importance of the use of life cycle model. For large and complex applications, which model do you suggest ? Explain with suitable diagram and application scenario. [10]

Q.2 (C) Discuss the problems associated with non functional requirement elicitation process. [5]

Q.3 (A) Specify an abstract data type Bag (i.e. Multiset) [7]

A bag is similar to a set, which can be thought of as a collection of elements taken from some universe of elements. The distinction between the two is that, with respect to a set, each element of the universe is simply either a member, or not a member. With a bag, we have the notion that an element may occur in it any number of times (i.e., zero or more). For example, the set given by the enumeration

{ 4, 2, 0, 2, 3, 4, 7 }

is exactly the same as the one given by

{ 2, 4, 7, 3, 0 }

However, viewed as bags, they differ because the first contains two occurrences of both 2 and 4, while the second contains only one of each.

Write the algebraic specification for Bags while considering the following operations:

Sort - Bag (Elem)

isEmpty→ checks whether a bag is empty or not

NumOcc →returns number of occurrences of an item in a bag

Size→ returns a total number of occurrences of all items

Empty→ yields a bag with no members

Insert→yields a bag obtained by inserting an elem

Delete→yields bag obtained by deleting an elem

Q.3 (B) Explain any three properties of Formal methods in software specification. [3]

Q.4 (A) Consider the software for library management system with the following requirements: [5]

- A library maintains records of all the books and members.
- To borrow a book, a member requests for a book and a librarian check the status of the book. If the book is available in the library, then a book is issued to the member.
- Upon successful issue of the book, a receipt is generated.

Design a sequence diagram for the above scenario.

Q.4 (B) Tic-Tac-Toe is a computer game in which a human player and the computer make alternate moves on a 3 x 3 square. A move consists of marking a previously unmarked square. The player who is first to place three consecutive marks along a straight line on the square wins. As soon as either the human player or the computer wins, a message congratulating the winner is displayed. If neither player manages to get three consecutive marks along a string line, and all the square on the board are filled up, then the game is drawn. The computer always tries to win a game. Draw Level 0 and Level 1 data flow diagram. [5]