

Computer Engineering Department, SVNIT, Surat.
Mid-Semester Examinations, September 2016
M.Sc. 4th year (Maths) - 7th Semester
Software Engineering- (CO 321)
Time - 4 p.m. to 5:30 p.m.

Total Marks- 30

23/9/2016

Instructions:

1. Write your Msc Admission No/Roll No and other details clearly on the answer books while write your MSc 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.

Answer the following:

- 16
- a) Compare the relative advantages of waterfall model and spiral model. Give some suitable examples, the type of problems for which you would adopt the waterfall model for software development and the type of problem for which you would adopt spiral model.
 - b) List three common types of risks that a typical software project might suffer from. How you can identify the risks that your project is susceptible. Suppose you are the project manager of a large software development project, point out the main steps you would follow to manage risks in your software development.

OR

Suppose you are the project manager of the large product development team and have to make a choice between the democratic and the chief programmer team organizations. Which development structure would you adopt for your team? Justify your answer.

Draw a context level and level-0 DFD for below scenario:

- A supermarket needs to develop the software to encourage customers. For this, the customer needs to supply his residence address, telephone number, and the driving licence number. Each customer who registers for this scheme is assigned a unique customer number (CN) by the computer.
- A customer can present his CN to the checkout staff when he makes any purchase. In this case, the value of his purchase is credited against his CN. At the end of each year, the supermarket awards surprise gifts to 10 customers who make the highest total purchase over the year. Also, it awards a 22 carat gold coin to every customer whose purchases exceed Rs 10,000. The entries against the CN are reset on the last day of every year after the prize winners lists are generated.

Consider a scenario of the student admission procedure in an IIT. The following are requirements for the software system :

- An academic section should maintain the record of all students in the institute .
- An account section should maintain the records of fee status of every student in the institute.
- There is a hostel office in an institute that deals with the operations such as room allotment, hostel fee structure and catering facility in the hostel.
- The institute has a health centre that is responsible for the health care of the students in the institute.
- Each department maintains the records of the student who is registered with that department.

Considering the above requirements, design an activity diagram for the software system.

Answer the following:

Describe Functional, Non-Functional and Domain requirements with suitable case study.

Write a short note on: Requirement Engineering Process

Draw a Petri Net model for Producer-Consumer system (Integrated Petri Net for 2 buffers).

OR

Draw a Finite State Machine (FSM) for Producer-Consumer system (Integrated Petri Net for 2 buffers).

List out the limitations of Data flow Diagrams (DFD) and a FSM.

OR

Draw a Petri Net model for the dining philosopher problem. There are 4 philosophers and 4 forks around a circular table. Each philosopher has access to 2 forks, one on either side. Each fork is shared by 2 philosophers. Each fork may be either on the table or in use by one philosopher. A philosopher must have 2 forks to eat.

Department of Computer Science and Engineering, SVNIT, Surat.
End-Semester Examinations, December 2021

B.Tech. - IV (CO)-7th Semester

Course: Software Engineering (CO401)

Date: 30/11/2021

Time: 09:30 AM to 12:30 PM

Marks:50

Answer the following:

(a) Justify your answer with appropriate reasoning which software lifecycle is suitable for the following software projects: [5 Marks]

1. A simple compiler
2. The front-end graphical interface of a large software product.
3. A complex software system whose requirements are clearly identified before the development begins and it doesn't change throughout the process.
4. A commercial website for an online store that has a long list of desired features it wants to add, and it wants a new release with new features to be done very frequently.
5. A software product needs to be developed in a very short period of time (60 to 90 days) and uses reusable software components during development.

(b) Describe the challenges of the software development according to Brook's as described in his paper "No Silver Bullet-Essence and Accident in Software Engineering". [2 Marks]

OR

(b) What is the cleanroom technique? Explain software defect avoidance using the cleanroom process. [2 Marks]

(c) How CMM and ISO address the issues of quality and process management to create a quality product. Compare and contrast CMM and ISO. [3 Marks]

Answer the following:

(a) Consider an online food ordering system such as 'zomato'. Following are the steps to order:

- A customer can login with a valid user id;
- The system receives the order and forwards it to the restaurant, simultaneously it assign a delivery agent who delivers the food to the customer;
- Restaurant will accept the order and store it in the order data store;
- The process delivers food and the bill to the customer;
- It also maintains inventory details and updates it after each delivery.

Draw level 0 and level 1 DFD for the above system. [5 Marks]

(b) A weather station is a package of software controlled instruments that collects data, performs some data processing, and transmits this data for further processing. The instruments include air and ground thermometers, an anemometer, a wind vane, a barometer, and a rain gauge. Data is collected periodically. When a command is issued to transmit the weather data, the weather station processes and summarizes the collected data.

The summarized data is transmitted to the mapping computer when a request is received.

Identify the object classes for weather stations and draw the following diagram for the same: [5 Marks]

1. Sequence models diagram that shows the sequence of object interactions.
2. State machine models diagram that shows how individual objects change their state in response to events.
3. Class diagram of the weather forecasting system.

Answer the following:

(a) Size and cost drivers for the software project are given below:

Size:200 KLOC

Cost Drivers: Analyst Capability=1.36, Use of software tools=0.65, Product Complexity=0.80, Execution Time Constraint=1.00

Mode	a_i	b_i	c_i	d_i
Organic	2.4	1.05	2.5	0.38
Semidetached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Calculate the Efforts, Development Time and Person required using Basic COCOMO Model for three types projects e.g., Organic, semidetached and embedded. [5 Marks]

(b) Who should perform the validation testing? Software Developer or Software User? Justify your answer. [3 Marks]

(c) Explain the difference between Functional and Non-functional Requirements with two examples in each category. [3 Marks]

OR

(c) Explain CASE tools with examples. [3 Marks]

Q4 Answer the following:

(a) Consider the following program: [5 Marks]

```

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

```

1. Draw the flow graph for the above program component.
2. Find the cyclomatic complexity for the flow graph.

(b) An Abstract Data type (ADT) representing a STACK has the following operations associated with it: **New**: Bring a stack into existence; **Push**: Add an element to the top of the stack; **Top**: Evaluate the element at the top of the stack; **Retract**: Remove the top element from the stack and return the modified stack; **IsEmpty**: Checks if there are no elements on the stack; **ReplaceItem**: Replaces the top element of the stack with the given value; Define the ADT using Algebraic specification. [5 Marks]

Q5 Answer the following:

(a) Explain the following term briefly: [5 Marks]

1. Regression Testing
2. Smoke Testing
3. Alpha Testing
4. Stress Testing
5. Performance Testing

(b) Distinguish between Blackbox testing, White box testing, and Grey box testing. [5 Marks]