Qn. Set Code-1

Semester: 5th
Programme: B.Tech
Branch: CSE, IT, CSCE, CSSE

AUTUMN END SEMESTER EXAMINATION-2022

5th Semester B.Tech

SOFTWARE ENGINEERING

IT3003

(For 2021 (L.E), 2020 & Previous Admitted Batches)

Time: 3 Hours Full Marks: 50

Answer any SIX questions.
Question paper consists of four SECTIONS i.e. A, B, C and D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions. [1 × 10]

(a) What is a baseline in the context of software configuration management? Explain how a baseline can be updated to form a new baseline?

(b) Distinguish between an error, fault, and a failure in the context of program testing.

(c) State the objectives and practices of extreme programming (XP) model of software development.

(d) When a task along a critical path is completed in less time than originally estimated, it should result in faster completion of the overall project. State TRUE or FALSE and support your answer with proper reasoning.

(e) While verification is concerned with phase containment of errors, the aim of validation is that the final product be error free. State TRUE or FALSE and support your answer with proper reasoning.

(f) Explain how you can choose the best risk reduction technique when there are many ways of reducing a risk.

(g) State whether the following statement is TRUE or FALSE. "The essence of any good function-oriented design principle is to map similar functions into a module." Give reasons behind your answers.

(h) What are the four types of non-functional requirements that have been suggested by IEEE 830 standard document? Give one example of each of these categories of requirements.

(i) What are the different types of relationships that might exist among the classes in an object-oriented design? Give examples of each.

(j) State whether the following statement is TRUE or FALSE, "During software testing process, why is the reliability growth initially high, but slows down later on"?

SECTION-B

2. (a) What do you understand by Key Process Area (KPA), in the context of SEI CMM? Would an organization encounter any problems, if it tries to implement higher level SEI CMM KPAs before achieving the lower level KPAs? Justify your answer using suitable examples. [4]

(b) What is common object request broker architecture (CORBA)? Explain CORBA architecture. [4]

3. (a) Define different roles, their responsibilities in the Scrum process of Software Development along with artifacts generated. What is the difference between sprint backlog and product backlog? Explain how late change of requirements can be accommodated in scrum process, provide an example. [4]

(b) What do you mean by the terms software reverse engineering and software re-engineering? Explain the different activities undertaken during reverse engineering and software re-engineering. [4]

SECTION-C

4. (a) How are the abstraction and decomposition principles used in the development of a good software requirements specification? [4]

(b) A customer decides to upgrade her PC and purchase a DVD player. She begins by calling the sales department of PC vendor and they tell her to contact customer support. She than calls customer support and they put her on hold while talking to engineering. Finally, customer support tells the customer about several supported DVD options. The customer chooses a DVD and it is shipped by the mail department. The customer receives the DVD, installs it satisfactorily and then mails her payment to accounts department. Draw the class diagram and sequence diagram for Online Shopping of DVD system. [4]

5. (a) Draw different levels of DFD for the following Medicine Shop Automation (MSA) software: [4]

- A retail medicine shop deals with many medicines procured from various manufacturers. The shop owner maintains different medicines in wall mounted and numbered racks.
- The shop owner maintains as few inventories for each item as reasonable, to reduce inventory overheads after being inspired by the just-in-time (JIT) philosophy.

- Thus, one important problem the shop owner faces is to be able to order items as soon as the number of items in the inventory reduces below a threshold value. The shop owner wants to maintain medicines to be able to sustain selling for about one week. To calculate the threshold value for each item, the software must be able to calculate the average number of medicines sales for one week for each part.
- At the end of each day, the shop owner would request the computer to generate the items to be ordered. The computer should print out the medicine description, the quantity required, and the address of the vendor supplying the medicine. The shop owner should be able to store the name, address, and the code numbers of the medicines that each vendor deals with.
- Whenever new supply arrives, the shop owner would enter the item code number, quantity, batch number, expiry date, and the vendor number. The software should print out a cheque favoring the vendor for the items supplied.
- When the shop owner procures new medicines, it had not dealt with earlier, he should be able to enter the details of the medicine such as the medicine trade name, generic name, vendors who can supply this medicine, unit selling and purchasing price. The computer should generate a code number for this medicine which the shop owner would paste the code number in the rack where this medicine would be stored. The shop owner should be able to query about a medicine either using its generic name or the trade name and the software should display its code number and the quantity present.

- At the end of every day the shop owner would give a command to generate the list of medicines which have expired. It should also prepare a vendor-wise list of the expired items so that the shop owner can ask the vendor to replace these items. Currently, this activity alone takes a tremendous amount of labor on the part of the shop owner and is a major motivator for the automation endeavor.
- Whenever any sales occur, the shop owner would enter the code number of each medicine and the corresponding quantity sold. The MSA should print out the cash receipt.
- The computer should also generate the revenue and profit for any given period. It should also show vendor-wise payments for the period.

(b) Explain why every software system must undergo maintenance or progressively become less useful. Also, explain the important aspects (steps) in starting and maintaining an effective reuse program in a software development organization. [4]

6. (a) What is the difference between a coding standard and a coding guideline? Write down five important coding standards and coding guidelines that you would recommend. Also, Design the black-box test suite for a function that checks whether a character string (of up to twenty-five characters in length) is a palindrome using Boundary Value Analysis method. [4]

(b) What according to you is a quality software product? Describe the six metrics of software reliability. [4]

SECTION-D

7. (a) "Path Coverage is stronger than branch coverage". Justify this statement. How is cyclomatic complexity useful in program testing? [4]

(b) Draw control flow graph for the given code snippet. Also, determine cyclomatic complexity. [4]

```
main( )
{
        int number, index;
        printf("Enter a number");
        scanf("%d",&number);
        index=2;
        while(index < number-1)
        {
                if(number % index == 0)
                {
                        prinf("Not a prime number");
                        break;
                }
                index++;
        }
        if(index==number)
                printf("prime number");

}
```

8. (a) Identify the functional and non-functional requirements in the following problem description and document them in the proper format. [4]

A global clock system software is to be developed that shows up to 8 clocks with the city's names, their day's temperature, and local times. The clocks should be aesthetically designed. The software should allow the user to change the name of any city and change the time readings of any clock by typing m (for modify) on any clock. The user should also be able to toggle between a digital clock and an analog clock display by typing either "d" (for digital) or "a" (for analog) on a clock display. After the standalone implementation works, a web version should be developed that can be downloaded on a browser as an applet and run. The clock should use only the idle cycles on the computer it runs.

(b) Consider a software project scenario with the following activities and their optimistic (O), most likely estimate (M), pessimistic duration (P) in weeks. [4]

Activity	Predecessor(s)	Duration (In weeks)		
		O	M	P
T_1	-	5	6	7
T_2	-	1	3	5
T_3	-	1	4	7
T_4	T_1	1	2	3
T_5	T_2	1	2	9
T_6	T_3	1	5	9
T_7	T_3	2	2	8
T_8	T_5, T_6	4	4	10
T_9	T_2, T_4	2	5	8
T_{10}	T_7, T_8	2	2	8

(i) Construct the activity network for the given details.

(ii) Find the expected duration and variance of each activity.

(iii) Find the critical path & expected project completion time.

(iv) Calculate EST and LFT and mark them on diagram.

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