

Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat
Department of Computer Science and Engineering
B.Tech. III Year (V Semester)
CS321- Software Engineering (Core Elective-1)
Mid Semester Examination - September 2022

Maximum Marks: 30

Date: 28th September 2022

Time: 11:00AM to 12:30PM

Q.1 Answer the following (Any Five):

[10]

- a. What do you understand by the term phase containment of errors? Why phase containment of errors is considered to be important? How can phase containment of errors be achieved in a software development project? **[2]**
- b. Differentiate between the agile process model and structured process model of software development. Give an example of a project for which the agile model would be suitable. **[2]**
- c. As a software practitioner's describes the various software development myths along with the reality that accompanies the myths. **[2]**
- d. Explain the advantages of sliding window planning over a conventional planning with suitable example. **[2]**
- e. Estimate the function point value for a project with the following characteristics: Number of user inputs-35; number of user outputs-60; number of user inquiries-30; number of files-8, and number of external interfaces-2. Assume that various project characteristics determining the complexity of software development to be average. Note: Assume that 14 parameters that can influence the development effort have been counted. **[2]**
- f. As a system analyst suppose you need to collect the requirement for the development of a particular software. Explain in brief the steps you will follow to carry out the requirement engineering process. **[2]**

Q.2 Answer the following (Any Five):

[15]

- a. Why do we need agile approach for the software development? Explain in brief the scrum model with scrum lifecycle. **[3]**

"The semester performance of each student is computed as the average academic performance for the semester. The guardians of all students having poor performance record in the semester are mailed a letter informing about the poor performance of the ward and intimating that repetition of poor performance in the subsequent semester can lead to expulsion. The extracurricular activities of a student are also graded and taken into consideration for determination of the semester performance."
- b. What is wrong with the following paragraph from a requirement document of an activity automation software of an educational institute? **[3]**

i. An e-commerce website for an online shopping. The website displays the product catalogue, allows user to select the product, placed order of the product and carry out the payment processing of the ordered product. *Agile*

ii. A software development project that is beset with many risks. But, assume that it is not possible to anticipate all the risks in the project at the start of the project and some of the risks can only be identified much after the development is underway. *Spiral*

iii. To develop the Placement Assistant Software for Training and Placement section of the SVNIT. The set of activities to be automated are rather simple and are at present being carried out manually. The main objective is when there is a placement opportunity for which they wish to be considered, they would be able to apply for it electronically to let students should be able to access details of available placements via Intranet. Details of interviews and placement offers would all be sent by e-mail. *Iterative waterfall model*

- ✓ e. Represent the decision making involved in the following functional requirement of a library automation system using decision tree and decision table. [3]
- An item when submitted at the counter along with the library identity card, first it is determined if the member has exceeded his quota. If he/she has exceeded his/her quota, then no items can be issued to him/her. If the requested item is a journal, then it is issued for two days only. If it is a book, then it is checked whether it is a reference book. Reference books cannot be issued out. If it is not a reference book, it is determined if anyone has reserved it. Reserved books cannot be issued out. If the book issue request of the member meets all the mentioned criteria, then the book is issued to the member for one month, appropriate entry is made in the member's account and an issue slip is printed.
- ✓ e. Suppose certain software product for business application costs Rs.5, 00,000/- to buy off the shelf product and that its size of organic type software product has been estimated to be 40,000 line of source code. Assume salary of software engineers is Rs. 60,000/- per month (including all overheads). Would it be more cost-effective to buy the product or build it? Justify your answer. [3]
- ✓ e. What is mean by term cohesion and coupling in the context of software design? Is it true that modules should have low coupling and high cohesion in a good design? Justify your answer. [3]

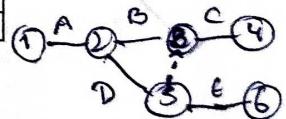
Q.3

Answer the following with necessary steps: (Any One)

- a. Suppose you are the project manager of a software project requiring the following activities: [5]

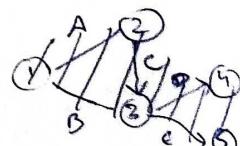
Activity	Activity name	Duration (weeks)	Immediate Predecessor
A	Requirements Collection	5	-
B	Requirement Analysis	7	A
C	Define Subsystem	6	B
D	Develop Database	5	A
E	Make Decision Analysis	10	D
F	Identify Constraints	15	B
G	Build Module 1	8	B
H	Build Module 2	8	G
I	Implementation	4	C
J	Integration and Testing	4	G
K	Write Report	5	E, F
L	Create Maintenance Doc	3	I, H

- i. Draw the Activity on Edge Network of the project.
ii. Determine ES, EF, and LS, LF for every task.
iii. Estimate the slack time of each activity.
iv. Find out the critical activities and critical path for the project activities.

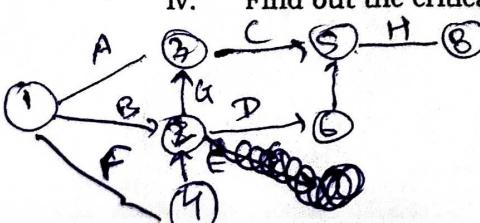


- b. For the following project activities:

Activity	Predecessor	Optimistic (a)	Most Likely (m)	Pessimistic (b)
A	-	5	6	8
B	-	3	4	5
C	A	2	3	3
D	B	3.5	4	5
E	B	1	3	4
F	-	8	10	15
G	E,F	2	3	4
H	C,D	2	2	2.5



- i. Draw the Activity on Edge Network of the project.
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***** All the Best *****

SV National Institute of Technology (SVNIT), Surat
Department of Computer Science and Engineering
B. Tech. III Year (V Semester)
CS321 - Software Engineering (Core Elective-1)
End Semester Examination - December 2022

Maximum Marks: 50

Date: 14th December 2022

Time: 09:30AM to 12:30PM

- Q.1 Answer the following (Any Five):**
- a. What are the objectives of the feasibility study? Explain the important activities that are carried out during the feasibility study of a software development project. [2]
 - b. What is the role of requirement analysis and specification phase? How are the requirement analysis and specification activities carried out and who carries out these activities? [2]
 - c. Why code review is considered as more efficient technique for removing errors from the code compared to testing techniques? Discuss different types of code reviews. [2]
 - d. What do you understand by the term functional independence in the context of software design? What are the advantages of functional independence? How can functional independence in a software design be achieved? [2]
 - e. Why is it difficult to accurately estimate the effort required for completing a software project? Briefly explain the different project estimation methods that are available. [2]
 - f. Differentiate between structured analysis and structured design in the context of function-oriented design. [2]
- Q.2 Answer the following:**
- a. What are the shortcomings of the Data Flow Diagram (DFD)? What do you mean by balancing a DFD? Illustrate your answer with a suitable example. [2]
 - b. Explain the important best practices that have been incorporated in extreme programming model and activities involved in it. [2]
 - c. Develop a UML state machine diagram to model the following informal requirements: A filling station (gas station) is to be set up for fully automated operation. Drivers swipe their credit card through a reader connected to the pump; the card is verified by communication with a credit company computer, and a fuel limit is established. The driver may then take the fuel required. When fuel delivery is complete and the pump hose is returned to its holster, the driver's credit card account is debited with the cost of the fuel taken. The credit card is returned after debiting. If the card is invalid, the pump returns it before fuel is dispensed. [2]
 - d. Instead of having one time testing of a software at the end of its development, why are three different levels of testing- unit testing, integration testing, and system testing are necessary? What is the main purpose of each of these different levels of testing? [2]
 - e. Using the UML graphical notation for object classes, design the following object classes, identifying attributes and operations. Use your own experience to decide on the attributes and operations that should be associated with these objects. [2]
 - i. A printer for a personal computer
 - ii. A bank account

Q.3 Answer the following (Any Five):

- a. Distinguish between the following with suitable examples:
 - I. Software Verification and Software Validation.
 - II. CPM and PERT
 - III. Alpha Testing and Beta Testing[3]
- b. What are the different system views, that can be modelled using UML? What are the different UML diagrams which can be used to capture each of the views? Do you need to develop all the views of a system using all the modelling diagrams supported by UML? Justify your answer. [3]

- c.** What is meant by the term cohesion in the context of software design? Explain the different types of cohesion that a module in a design might exhibit. [3]
- d.** Assume that you are the project manager of a development team that decided to use prototyping model for developing a software. You need to make your team comfortable with the prototyping model by answering the following queries with proper justification:
- What is prototype?
 - Is it necessary to develop a prototype for all types of projects?
 - If you answer to part (ii) of the question is no, then mention under what circumstances is it beneficial to construct prototype.
 - If you answer to part (ii) of the question is yes, then explain does construction of a prototype always increase the overall cost of the software development?
 - What are the strengths and weaknesses of the prototyping model?
 - Give an example of a development project for which prototyping model is appropriate.
- e.** Suppose you have been appointed as the analyst for large software development project. Discuss the aspects of the software product you would document in the software requirements specification (SRS) document? What would be the organization of your SRS document? How would you validate your SRS document? [3]
- f.** What are the different black-box testing techniques? Design a black-box test suite for the following function named predict-longevity using the equivalent class partitioning technique. The function predict-longevity takes three arguments-age: an integer between 30 and 80, degree: either 0, 1, or 2 indicating the highest education level either school, undergraduate, or postgraduate, and wealth: a number in the range 1-10 to indicate the degree of wealthiness. It returns an integer indicating the predicted years to live. [3]

Q.4 Answer the following:

- a.** Based on your experience with a bank ATM, draw an activity diagram that models the data processing involved when a customer withdraws cash from the machine. Draw a sequence diagram for the same system. Explain why you might want to develop both activity and sequence diagrams when modeling the behavior of a system. [15] [3]

b.

Draw the control flow graph for the given program snippet.

From the control flow graph, determine independent paths and its cyclomatic complexity.

Design test suite for the given C programs.

```
void main()
{
    int a, e;
    int mul, count;
    scanf("%d%d", &a, &e);
    if(e>=0)
    {
        mul=1; count=e;
        while(count > 0)
        {
            mul = mul *a;
            count = count-1;
        }
        printf("%d", mul);
    }
    else
        printf("Enter positive value of e");
}
```

- c.** What is the cause-effect graphing method? Based on your experience with a library automation software, perform the cause-effect graphing technique to issue a book to the student member of the library and design the test cases for the same. [3]

- d. The following is the informal description of the requirements of the software that would be used by individual to manage their personal collection of books. Identify the functional and non-functional requirements for the software. [3]

A person can have up to a few hundreds of books. The details of all the books such as name of the book, year of publication, date of purchase, price, and publisher would be entered by the owner. A book should be assigned a unique serial number by the computer. Only a register friend can be lent a book. While registering a friend, the following data would have to be supplied- name of the friend, his address, land line number, and mobile number. Whenever a book issue request is given, the name of the friend to whom the book is to be issued and the unique id of the book is entered. At this, the various books outstanding against the borrower along with the date borrowed are displayed for information of the owner. If the owner wishes to go ahead with the issue of the book, then the date of issue, the title of the book, and the unique identification number of the book are stored. When a friend returns a book, the date of return is stored and the book is removed from his borrowing list. Upon query, the software should display the name, address, and telephone numbers of each friend against whom books are outstanding along with the titles of the outstanding books and the date on which those were issued. The software should allow the owner to update the details of a friend such as his address, phone, telephone number, etc. It should be possible for the owner to delete all the data pertaining to a friend who is no more active in using the library. The records should be stored using a public domain data base management system. The software should run on both windows and UNIX machines.

Whenever an owner of the library software borrows a book from his friends, would enter the details regarding the title of the book, and the date borrowed and the friend from whom he borrowed it. Similarly, the return details of books would be entered. The software should be able to display all the books borrowed from various friends upon request by the owner.

It should be possible for anyone to query about the availability of a particular book through a web browser from any location. The owner should be able to query the total number of books in the personal library, and the total amount he has invested in his library. It should also be possible for him to view the number of books borrowed and returned by any friends over any specified time.

- e. Draw a labelled DFD for the problem statement described in the above question Q.4 (d). Clearly show the context diagram and its hierarchical decomposition up to level 2. [3]

***** All the Best *****