

B.TECH  
SEMESTER V

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI  
CS302L SOFTWARE ENGINEERING  
MID EXAM (Oct 10 2022)

TIME: 120 Min  
MARKS: 100

ANSWER ALL QUESTIONS

Please read the entire question paper before you start! Be agile, crisp and sharp in your answers and write assumptions if any! Your answers should be based on discussions in the lectures rather than textbook-driven! Best ☺ Write your answer in the space provided unless you need extra sheets. Partial credit may be given based on Quality of the content, not Quantity.

Section A. Circle True or False and write a one sentence rationale [justification]. 1 mark each, marks will be given only if justification is correct. (5X1= 5 marks)

1. ☒ T ☐ F - Design should happen only after testing

A project is tested if its implemented. To implement, we must design it first

2. ☒ T ☐ F - Quality assurance procedures are included in Software Requirements Specification!

They are Non-Functional Requirements of the System which are a part of SRs.

3. ☒ T ☐ F - Including the users/customers in the process of coding will yield a better product

Coding is something which the user/customer might not understand. Hence, its better to include customers in Requirements and Design Process, which coding process should be handled by Software Developer only.

4. T/F - A way to estimate the duration of one very large task is to break it into smaller sub-tasks, estimate each one independently, and add up the estimates. However, this approach is usually not practical because of the difficulty of knowing all the sub-tasks and of unforeseen interactions among them

There is issue of overestimation & underestimation, as one might miss small minute details that might turn into big issues further.

5. T/F - Git is a centralized version control system

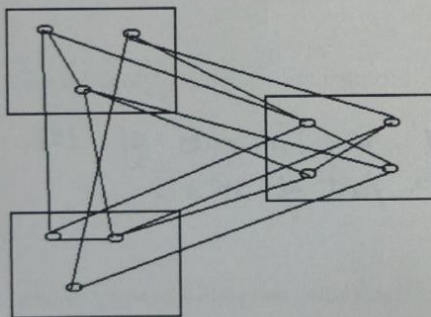
Git is a distributed version control system

Section B. Fill-in-the-blanks/Brief Answer Questions (10X2 = 20 marks)

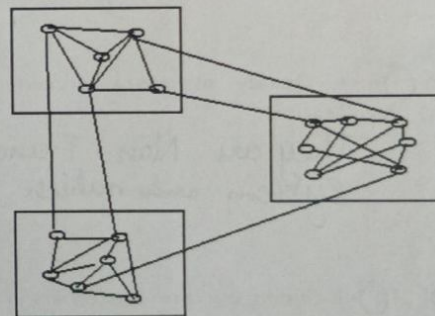
6. The statement "Are we building the product right" denotes

Verification and the statement "Are we building the right product" denotes Validation

7. (a) denotes high connectivity and low coercivity



(a)



(b)

- (b) denotes low connectivity and high coercivity.

Coupling

Cohesion



1 ✓ 8. Communication Technical <sup>skills</sup> Decision Design? <sup>Did you mean</sup>  
(as discussed in class) are the core skills of a Software Engineer

9. Software can be defined as multi- stage construction of multi- paradigmed software.

20 ✓ 10. The goal of feasibility study is to figure out Is software technically possible and economically profitable?

✓ 11. What is the difference between lines of code and function points from estimation perspective?

2 Lines of code ~~also~~ helps estimating the length of code, but if a language is changed, it will not be valid parameter to judge. Function points ~~helps in estimating~~ tells the count of functionalities ~~are~~ implemented. But some of them can be ~~trivial~~, and some can be complex.

✓ 12. When is testing good and when is formal verification or proving programs good?

2 In small and informal projects, in algorithms, proving programs is good.

In large software systems, ~~where~~ where the definiteness of output is ~~not~~ not ~~can~~ not certain, ~~proving~~ ~~pro~~ testing is good.

also in mission critical.

✓ 13. Write two requirement statements that are inconsistent with each other in your project

2 ✓ 1) The Number of Employees taking leave ~~must~~ in a certain department must not exceed 20%.

2) ~~The~~ In case of a severe Medical Emergency in with Employee or his family, he must not be denied from leave.



14. Identify the two major categories of requirements and briefly explain the key difference between them. (remember the examples in class of mobiles, aeroplanes?)

The two major categories of requirements are:

1) Functional Req.: These are the requirements that are expected by the user to be performed by the software... ex -> play videos, do some tasks.. they typically are standard input and output based tasks that the system is expected to perform.

2) Non Functional: These are characteristics that the system must conform to, ie Security, Maintainability, reliability, cross-platform dependence etc.

3) Business: These are business specific requirements or goals fulfilled by the software customers, but their existence doesn't have any significant effect on customers.

15. What does noise and silence mean in the context of SRS specification?

Noise: The information in the SRS document that is irrelevant w.r.t the Software Designing of the product.

Silence: The lack of necessary information regarding requirements and specification of the product in SRS document.

Section C. Short Answer Questions (4 X 10 = 40 marks)



16. Write five key differences between software engineer and programmer - remember the example of an engineer and mason?

Programmer	Software Engineer
1) Specific Input and Output is known	1) Specific input and output is not known
2) Interacting is mainly with machine	2) Interacts with the user/customer to know the requirements
3) Can follow an exploratory approach	3) Needs to follow a systematic approach
4) Proving a program is necessary	4) Testing a software system is necessary
5) Once the required output is obtained, the work is largely done.	5) The requirement keeps changing with time

17. Briefly explain what are essential and accidental difficulties in software engineering and give one concrete example for each.

Accidental difficulties:

These are the ones which are associated with developing software using various tools, and are typically associated with debugging and making various software tools to work for building the required framework acc to SRS. These are the majority time taking difficulties that account for maximum percentage during software projects.

Essential Difficulties:

These are difficulties not necessarily associated with software, but are problems of the domain itself. like security for banking, Speed for video conferencing Apps, etc. these are relatively fewer in amount and are more fundamental to the domain of the software application.

18. Four "ilities" that are important in the context of software engineering, and one concrete example of each!

Utility, Implementability, Sustainability, Security



19. What are the four kinds of maintenance? and Write one example for each in the context of your project!

20. What are Garvin's five perspectives of software quality?

Garvin's five perspectives:

- 1) Easy to Use: The software which is easy to use and understand is of good quality
- 2) Good to Look: The software with good aesthetics is of good quality
- 3) Does the work: The software with more functionalities is called of good quality
- 4) Good to feel: It gives a good feeling to a customer which cannot be explained by him.

21. Explain different kinds of work break down structure? and what are the different strategies?

Work Breakdown can be

- i) function based
- ii) Object based
- iii) Requirement Based

i) function based - if a particular function to be implemented by one group.

ii) Object Based - A particular module/screen to be developed by one group.

iii) Requirement Based - a particular section in SRS to be handled by one group

22. What are the three different ways of assessing software quality? Briefly write one sentence on each, and what are the factors you consider when deciding the right way of assessment?

Verification VS Validation->

1) Testing

Software's quality is dependent on it passing certain predefined testcases

2) Formal methods ( Proofs for correctness)

Formally proving that each component of software is correct is a excellent method of imparting reliability + security for your software.

3) Conformance to standards

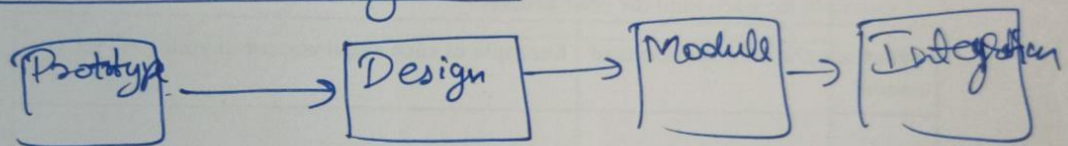
There are many standards like CMMI standards , which measure the quality of software... and companies which make them



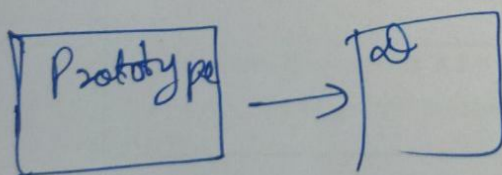
23. What are the differences between *continuous integration*, *continuous delivery* and *continuous deployment*? And one concrete example of when do we need each one of them?

It is a part of Dev Ops.

### Continuous Integration

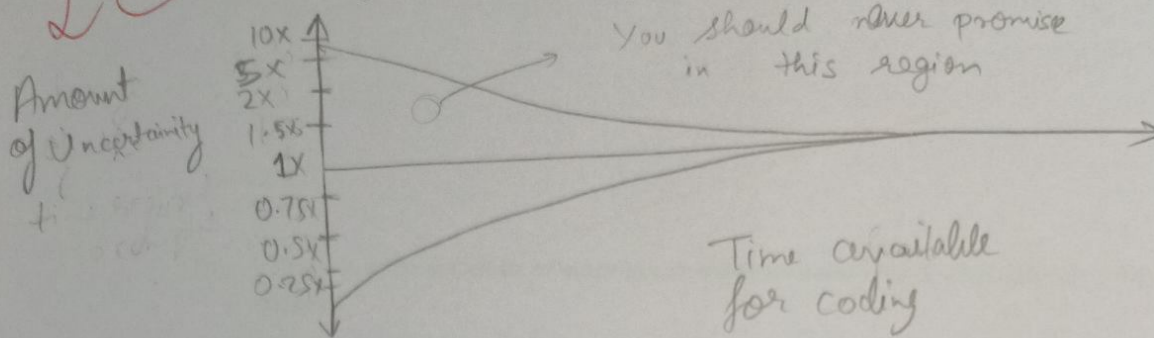


### Continuous Delivery



2

24. Draw the diagram of cone of uncertainty and comment why it is important?



It is important because it tells whether it is advisable to do a promise regarding com?

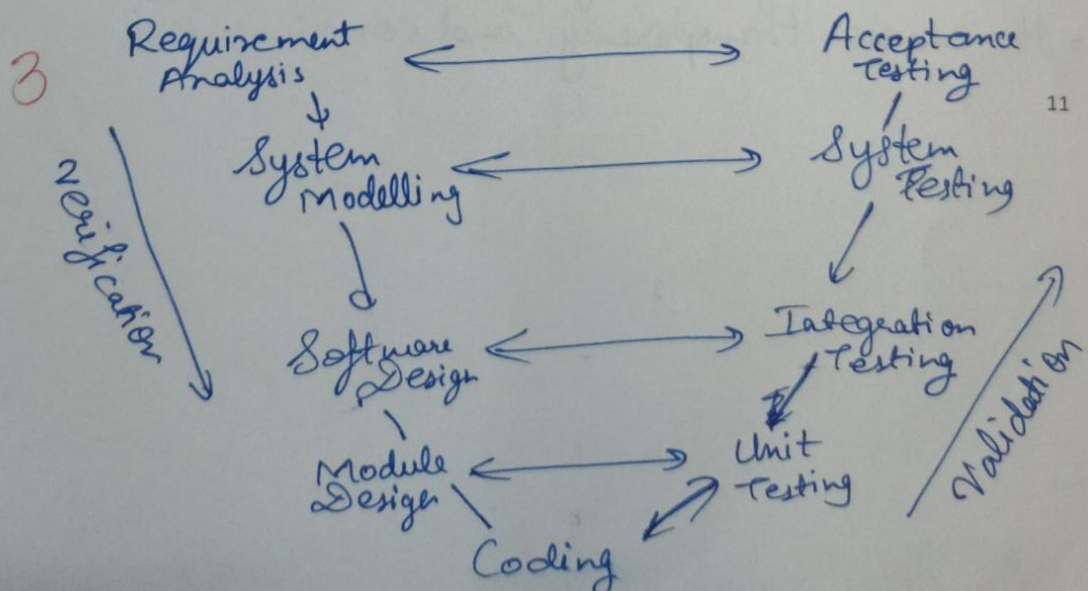
25. What are the four kinds of requirements according to Kano model? Write one example for each kind for your project

What are the different kinds of needs?	Example of such requirement in your project
?	?

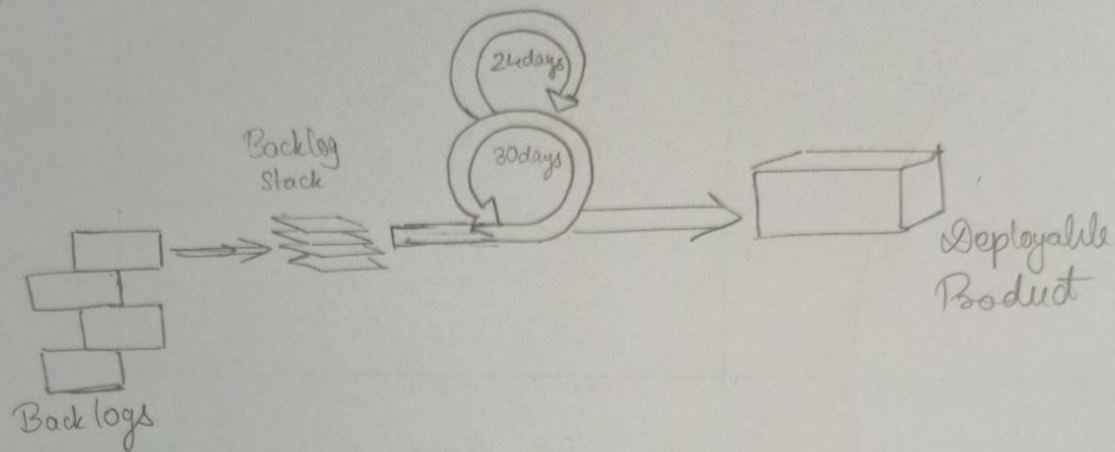



Section D. Long Answer Questions (5 X 5 = 25 marks)

26. Draw the diagram to depict Verification & Validation model (as discussed in class) and briefly explain



27. Explain Scrum using a diagram and explain its key components



It is based on Agile Manifesto.

It involves dividing the task in set of backlogs, and picking a deck of backlogs that are to be completed in a span of 30 days.

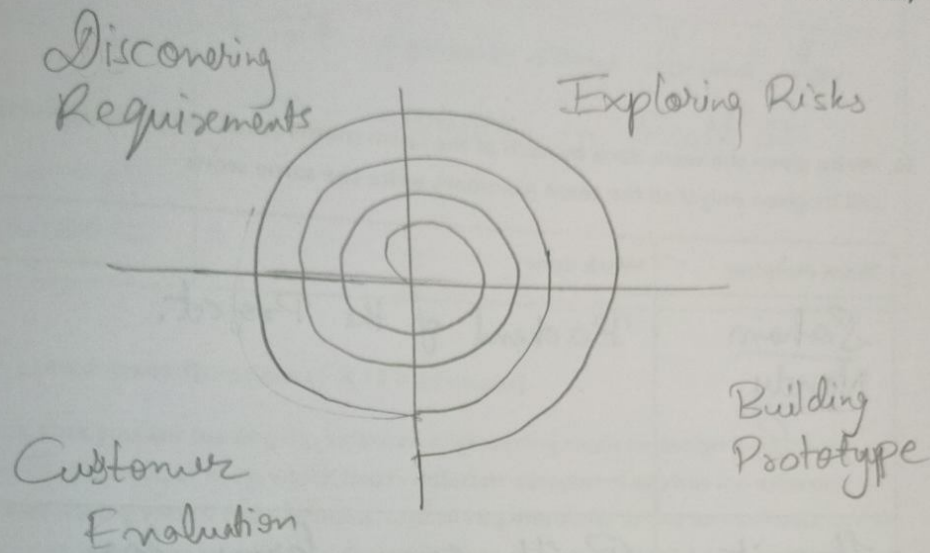
Every day, a meeting is held on the progress of the work and the issues faced.

In this way, a 30-days-24 hour model is Scrum Model aims to deliver a deployable product at the end of 30<sup>th</sup> day.

- It is a light-weight model
- It ensures transparency and communication



28. Draw a diagram that connects all software process life cycle models (such as waterfall, prototype, agile...)




Spiral

Spiral Model connects all software process life cycle models.

29. List 5 concepts (not more than a sentence each) that you learnt in the course related to software engineering other than what you wrote in the previous answers

- 4
- 1) Functional and Non-Functional Requirements
  - 2) Qualities of Good SRS.
  - 3) Reasons of failure of Agile Model
  - 4) Reasons why Software Engineering Projects fail

30. Write down the work done by each of the team members of the project, and marks will be given only if all the team members write the same work

Team Member	Work done
<u>Soham</u> <u>Nandy</u> 	Backend of the Project.
<u>Harmit</u> <u>Singh</u> CS20B012	Built some forms for Modules in React. <i>? which modules</i>
<u>Praman</u> <u>Sutar</u> CS20B029	<ul style="list-style-type: none"> <li>• Built the start prototype of the project with Main Page</li> <li>• Built schemes of the Project (Mongoose)</li> <li>• Admin Page</li> </ul>
<u>Ishaan</u> <u>Kulkarni</u> CS20B018	Helped & Soham in backend and designed finalized what all each module must contain.

①  
Not  
Specific  
Should  
mention  
module  
name



Saurabh Kumar	Built some forms for for modules in React JS
CS20B033	

Section E. Long Answer Questions (1 X 10 = 10 marks)

31. Assume that you are leading the software engineering team to design e-passport system of the Govt. of India which issues different categories of visas for different countries having varied requirements. List 10 requirements in the form of user stories covering at least 3 stakeholders in the envisioned system. Standard requirements such as login, chat and so on will not be considered, and marks will be given to those requirements that cover the different facets of the envisioned system.

- 1) When the user ~~inputs~~ enters the state, then the cities dropdown must contain the cities in that state for ease of usage.
- 2) When the age entered is less than 18, it must ~~display~~ display a warning message.
- 3) When the photo uploaded by user is more than 5Mb, it must ask ~~to~~ user to upload another photo of suitable size.
- 4) When the Aadhar Card Number is not of 12 digits, it must warn the user to enter correct input.
- 5) Before the payments page, the user should be asked whether he wants a cover for the passport along with the passport worth rs. 300/-.



- 4) 5) The OTP verification is necessary ~~in~~ after entering mobile number.
  - 7) Details of the user must be saved if he fails to complete the registration procedure.
  - 8) The user should be ~~ask~~ asked whether he wants to continue the previous saved form or he wishes to start with a fresh form.
  - 9) The total form must be divided in 5 sections so that filling the form doesn't seem overwhelming
- 

After

Rough Work

- 10) ~~Before~~ Pressing the submit button, a pop-up must show a page that has all the fill fields the user filled along with his uploads, for verification