Unit 1 : The software Problem.

Q.1] What is software Engineering? Differentiate between industrial strength software and student software.

→ i] software is a program or set of program containing instructions that provides desired functionality and Engineering is the process of designing and building something that serves a particular purpose and finds cost effective solution to problems.

ii] Software engineering is a process of designing & developing testing and maintaining software.

iii] It is a systematic and disciplined approach to software development that aims to create high quality, reliable & maintainable software.

iv] Software engineering includes variety of techniques tools & methodologies.

Industrial strength software	Student strength software
1) Others are the users. • bugs are not tolerated • UI is very IMP issue	1) Developer is the user • bugs are tolerable • UI not important.
2) Supports important functions or business	2) Software not in critical use
3) Reliability, robustness are very imp.	3) Reliability, robustness not imp.
4) Heavy investment	4) No investment

s) probability is a key   d) Don't care about probability
issue here

Q.2] List and explain the 6 software quality attribute
Software quality attributes are features that facilitate
the measurement of a software products performance
by software testing professionals.
    following are the quality attributes :-

① functionality :-
                The first from the list of software
quality attribute we will be focusing on functionality. This
attribute determines the conformity of a software driven
system with the defined requirements and specifications.
            Most software testing professionals view this attribute as
the most important one as an application fails on the most
basic level if it doesn't function as expected.

② performance -
                It can be understood as the ability of a software
driven system to conform to timing requirements from a test
point of view, it implies that QA testers must check whether
the system responds to various events within defined time
limits.

③ Reliability :-
                Reliability is to check if the application or the
testing product with different combinations to see if
it withstands it's nature & produce the expected result by
different combinations, we mean testing it in different
browsers, operating system environments & so on

④ Security :-

The number of cyber attacks has been on the rise and users have started prioritizing a product safety, so the security attribute measures the ability of a system to protect and block malicious or unautorized actions that could negatively impact the user or destroy the system.

⑤ Flexibility :-

If keeping up with the security threats is a key aspect, so is the systems ability to keep up with the upcoming trends and requirements and for that, the system should be flexible enough or should be able to modify accordingly.

⑥ Efficiency :-

An inefficient application might work well only when it consumes excess resource that slows down the application or the system on the whole. In addition to checking how long it takes to complete process, it also important to check the level of system resource usage.

Q.3 Explain the phases of waterfall model.

① The classical waterfall model is the basic software development life cycle model. It is very simple but idealistic.

② This model considers that one phase can be started after another the completion of the previous phase. Thus the development process can be considered as sequential flow in the waterfall.

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┌─────────────┐                              ┌─────────────┐
│ System      │          feasibility         │ Requirement │
│ feasibility │             Report           │ analysis and│
│             │                              │ project     │
│   Validation│                              │ planning    │
└─────────────┘                              │    Validation│
                                             └─────────────┘
        Requirement
        document     and project plan

┌─────────────┐                              ┌─────────────┐
│ System      │        System design         │ Detailed    │
│ Design      │          Document            │ Design      │
│             │                              │             │
│  Verification│                             │   Verification│
└─────────────┘                              └─────────────┘

        detailed    design document

┌─────────────┐                              ┌─────────────┐
│ Coding      │          Programs            │ Testing &   │
│             │                              │ Integration │
│  Verification│                             │             │
└─────────────┘                              └─────────────┘
        test plan & report
        and manual

┌─────────────┐      Installation            ┌─────────────┐
│ Installation│        Report                │ Operation & │
│             │                              │ maintenance │
└─────────────┘                              └─────────────┘
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③ Phases of waterfall model:-

1) Feasibility study: The main goal of this phase is to determine whether it would be financially and technically feasible to develope the software.

The feasibility study involves understanding the problem and then determining the various possible strategies to solve the problem.

2) Requirement analysis & specification: The aim of the requirement analysis and specification phase is to understand

the exact requirement of the customer & document them properly.

3) Design - The goal of these phase is to convert the requirements aquired in the SRS into a format that can be coded in a programming language. A software design document is used to document all of this effort (SDD)

4) Coding and unit testing: In the coding phase software design is translated into source code using any suitable programming language. Thus each designed module is coded. The aim of the unit testing phase is to check whether each module is working properly or not.

5) Integration and system testing: Integration of different modules are undertaken soon after they have been coded. and unit tested. Integration of various modules is carried out incrementally over a number of steps. After all the modules have been successfully integrated and tested, the full working system is obtained and system testing is carried out on this

6) Maintainance: Maintainance is the most important phase of software life cycle. The effort spent on maintainance is 60% of the total effort spent to develope a full software. ex. Corrective maintainance, Adaptive maintainance, Perfective maintainance.

Q.4] List and explain phases of Iterative developement ~
with diagram.

i) After the first version if there is need to change
the software, then a new version of software is
created with new iteration.

ii) Every release of iterative model finishes in an easy
& fixed period that is called iteration.

Design 0 → Design 1 → Design n

Implement 0   Implement 1   Implement n

Analysis 0 ← Analysis 1 ← Analysis n
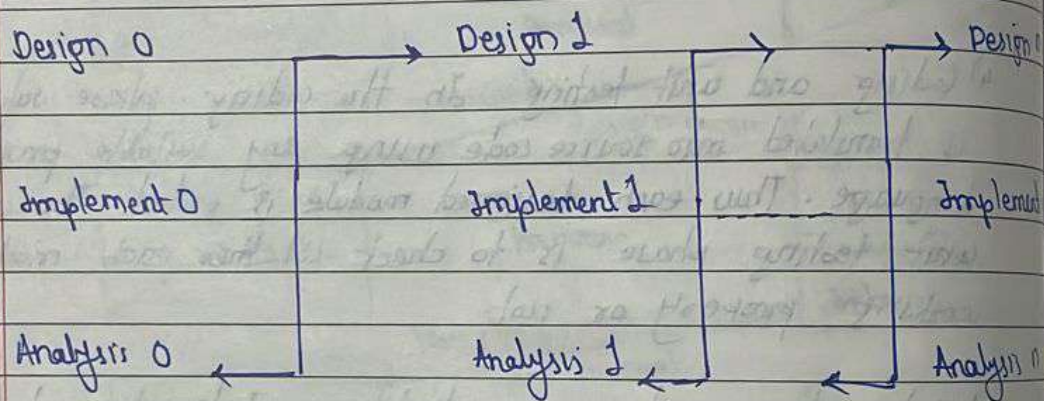
iii) There are three phases of iterative model-
  1] Design
  2] Implementation
  3] Analysis.

1] **Design:**
  i) In design phase, team design the software by
  different diagrams like data-flow diagram, activity program
  class diagram, state transition diagram.
  ii) The software design team must provide simple
  documentation for software developement team

2] **Implementation:-**

i) In the implementation requirements are written in coding language

ii) Transformed into computer programs which are ca[lled] software.

iii) The developer will implement the chosen design using predetermined coding

iv) During coding development, they must implement unit test at each level.

v) Software developers erealize the program/function

3] Analysis :-

i) In this phase, requirements are gathered from customers & check by an analyst whether requirement wi[ll] fulfil or not.

ii) Analyst check that needs will achieve within b[] or not. After all of this, the software team skips to nex[t] step.

Q.5] Elaborate the phases & milestones of each phase of RU[P] model with diagram.

i) Rational Unified process (RUP) is a software developer process for object oriented models. It is also known a[s] the unified process model.

ii) It is created by Rational corporation and is designed document using UML.

iii) There is total of five phases of the life cycle of[]

iv) RUP reduces unexpected development cost.

v) Phases of RUP.

1) Inception

2) Elaboration

3) Construction

4) Transition

5) Production.

vi) A phase is simply the span of Time between two major milestones.

1) Inception phase:-

 i) Communication and planning are the main ones.

 ii) Identifies the scope of the project using a use-case model allowing managers to estimate the cost & time required.

 iii) The project plan, project goal, risk, use-case model allowing managers to estimate cost & time required

 iv) Project is checked against the milestone.

- Milestone: The major milestone associated with the inception phase is called life cycle objetive. This indicates that project has <u>reached this milestone</u> include the following:-

 1) The major stakeholder agree on the scope of the proposed system.

 2) The candidate architecture clearly addresses a set critical high level requirement

2] Elaboration :-

 i) planning and modeling are the main ones.

 ii) A detailed evalution & developement plan is carried out and diminishes the risk

 iii) Revise or redefine the use-case method (approxi business case & risk

 iv) Again check against milestone criteria & if it

couldn't pass it then again project can be cancelled or redesigned.

iv) Executable architecture baseline.

Milestone - The completion of this phase is the lifecycle architecture milestone.

At the end of this phase, it is expected that most of the requirements have been identified and specified and the architecture of system has been designed.

3] Construction phase:- 1) The objective of this phase is develope & complete.

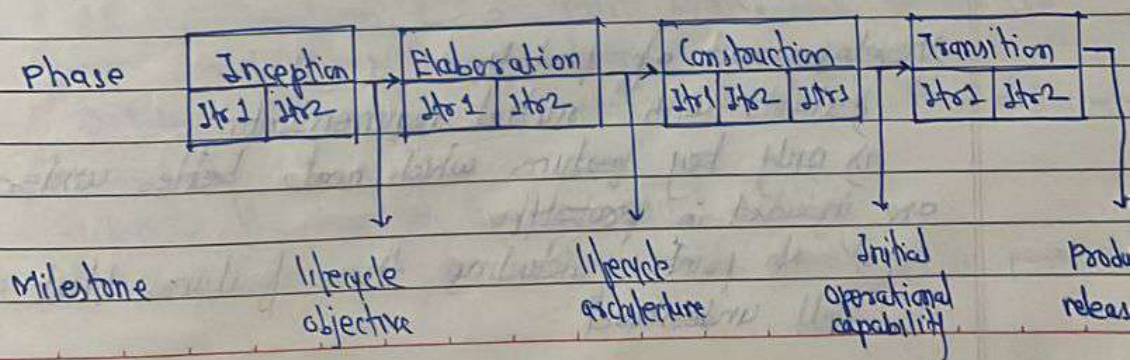2) System or source code is created & then testing is don

3) Coding takes place.

4) The construction phase of RUP is the longest & most complex.

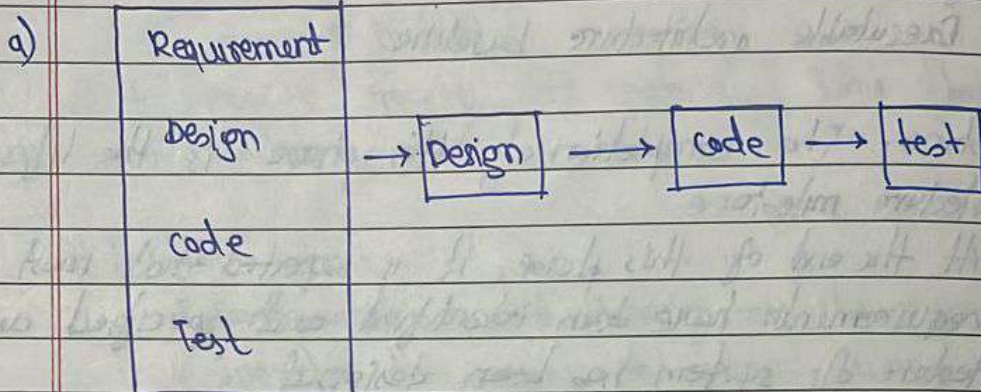5) This phase takes place over a period of six months

6) The application is built & tested in the construction phase of RUP.

Milestone:- Successfully completing construction phase results in initial operational capability milestone being achieved.

Phase	Inception		Elaboration		Construction			Transition	
	Itr 1	Itr2	Itr1	Itr2	Itr1	Itr2	Itr3	Itr1	Itr2
Milestone	lifecycle objective		lifecycle architecture		Initial operational capability			Produ releas	

Q.6] Short Notes :-

a)

| Requirement |
| Design |
| Code |
| Test |

→ Design → Code → test

Requirement Analysis.

a) Prototype model :

i) Prototyping addresses the requirement specification limitation of waterfall.

ii) Instead of freezing requirement, only by discussion, a prototype is built to understand the architecture.

iii) Helps alleviate the requirement risk

iv) A small waterfall model replaces the requirement stage

v) Prototype model is one of the most popularly used software development life cycle model.

vi) This model is used when customers do not know the exact project requirements beforehand.

vii) In this model, a prototype of end product is first developed, tested & refined as per customer feedback

•) Development of prototype
1) starts with initial requirements
2) only key features which needs better understanding are included in prototype
3) No point including those features that are well understood.

4) feedback from user taken to improve the understanding of the requirements.

•) Cost can be kept low:-
   1) build only features needing clearification
   2) "quick & dirty" - quality not important, scripting etc. can be used.
   3) Things like exception handelling, recovery, standards are omitted.
   4) Cost can be few % of total.

Advantages:- req. will be more stable, req. frozen later, experience helps in the main developement.

Disadvantage:- potential hit on cost & schedule.

Applicability - i) When req. are hard to elicit and confidence in requirement are low, where req. are not well understood.
   ii) Increase management visibility of project progress.
   iii) Increase product team productivity & motivations.

2] Timeboxing model :-
   1) Iterative is linear sequence of iterations.
   2) Each iteration is a mini waterfall decide the specs, then plan the iteration.
   3) Time boxing for an iteration duration. Then determine the specs.
   4) Devide the iteration in few equal stages.
   5) Use pipelining concept to execute iterations in parallel

6) General iterative development - Fix the functional for each iteration, then plan & execute it
- In timed iteration fix the duration of iteration and adjust the functionality to fit it
- Completion of Time is fixed, the functionality to be delivered is flexible.
- has predictable delivery time

7) Makes time a non-negotiable parameter & helps focus attention on schedule

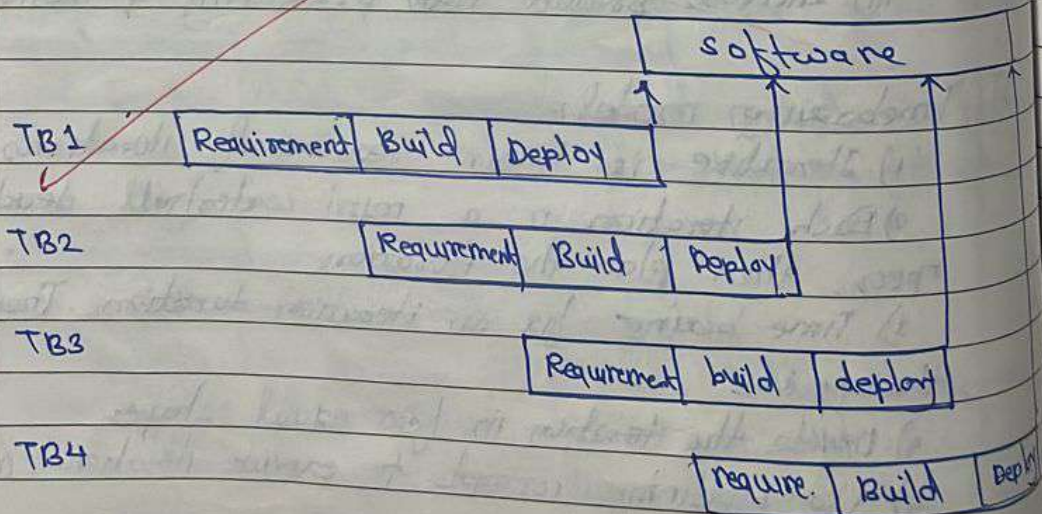8) For parallel execution can borrow pipeline concept from hardware.

•) Pipeline execution.
   1) AT start executing it-1
   2) AT finishes, hands over it-1 to BT, start executing it-2
   3) AT finishes it-2 hands over BT. BT finishes it-1, hands off over to DT; AT starts it-3, BT starts it-2 (& DT, it-1)

Timeboxing model.

		software		
TB1	Requirement Build Deploy			
TB2		Requirement Build Deploy		
TB3			Requirement build deploy	
TB4				require. Build Deploy

•) Timeboxing execution -

1) At first iteration finishes at time T.
2) Second finishes at $T+T/3$; Third at $T+2T/3$ - & so on.
3) In steady state, delivery every $T/3$ time.
4) If T is 3 weeks, first delivery after 3 weeks, second after 4 weeks, 3rd after 5 weeks.
5) In linear execution, delivery time will be 3, 6, 9 weeks.

Q7) Explain in detail Extreme programming. (XP)

Extreme programming is one of the popular and well known approaches in the family of agile method

And to accommodate change the development process has to be lightweight and quick to respond.

Development process of XP :-

1) An extreme programming starts with user stories which are short description of what scenives the customer and user would like the system to support.
2) Do not contain detailed requirement
3) Each story written as a sperate card.
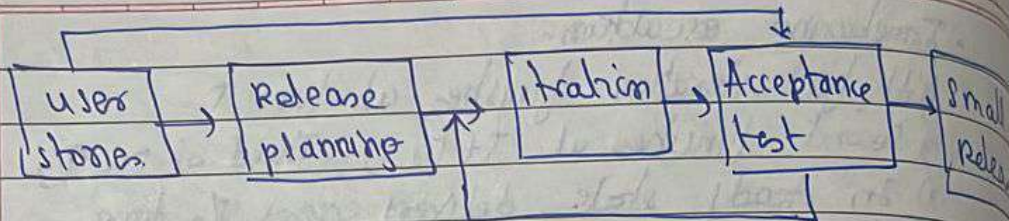4) Development team estimate time time to can implement user stories.
5) Defines which stroes are to be build in which system release and date of the release.
6) Development done in iterations.
7) Iteration starts with iteration planning in which select stories to be implemented, higher priority to high value & high risk stories.
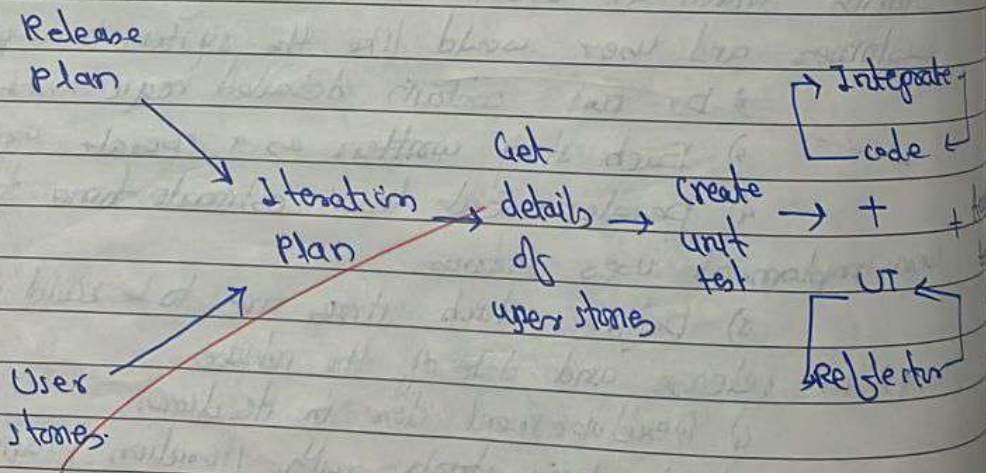8) Handling of failed acceptance test in previous iteration.

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┌───────┐   ┌──────────┐    ┌─────────┐  ┌──────────┐   ┌──────┐
│ user  │→  │ Release  │ →  │iteration│→ │Acceptance│ → │Small │
│stories│   │ planning │    │         │  │  test    │   │Relea │
└───────┘   └──────────┘    └─────────┘  └──────────┘   └──────┘
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overall process in XP:

Development approach is used in iteration.

1] Encourage ensure that development by pair of programmer.

2] To build code, write automated unit test first and then code to pass the test.

3] Design devised earlier may become unsuitable for further development.

4] Encourage frequent their integration of different unit.

One pair at a time can release their chan and integrate into the common code base.

Release
Plan
                                              Integrate
                                               code
              Iteration   Get   Create
              Plan   details → unit   → +   +
                           of   test   UT
User   users stories   Refactor
stories.

Q8] Case study: Automated library management sy

→ i] Software problem:-

Survey related that two libraries, surveyed gave several problems such as inadequet of infrastructure and hardware problem in the software, lack of trained & skilled staff and lack of funds.

- The study makes recommendation to overcome these problems & achieve self successfull automation.

2] Cost :

i] If we can go for automated methods, the system can be virualized for less than Rs 32 lakh.

ii) A comparison for cost for different aspect of reviving the library system using manual & automated method. of graphically provided in the different charts.

schedule.

i] Planning.

The first & formost step in any automation project is the idea to initiate the project. The next step is the planning stage is to conduct a feasible study about proposed project.

2] Designing stage:-

i) Before designing a new automated system one should carry out a study of the existing. system.

ii) This study is an evaluation of how current methods are lackings working & problems involved

ex.) • what is being done?
    • How long does it take
    • How is it being done.

3] Operational stage:-
               If the above two stages are passed
through satisfactory a good result the operational
stage may be expected.

Quantity 1.
               Designed as an overview of major facts of
information of automation activity, this article surveys
the content of current state of computer application in
6 areas of library work.
    1. circulation control
    2. Description cataloging.
    8. Catalog maintainance & production.
    4. Reference service
    5. Acquistion.
    6 Serial control.

a) Scale & maintainance.
               1) Maintanance of library material involves
kinds of stacking shelf arrangement cleaning.
               2) Binding of documents will also the discuss of
as it is essential for care & repair of document for their long libr
               3) library documentation acatually references to
the use of computer to automatic the typical procedure of
libranies such as cataloging & circulation.
               - library Maintainance uses computer & othe tech. to
support the system and services.