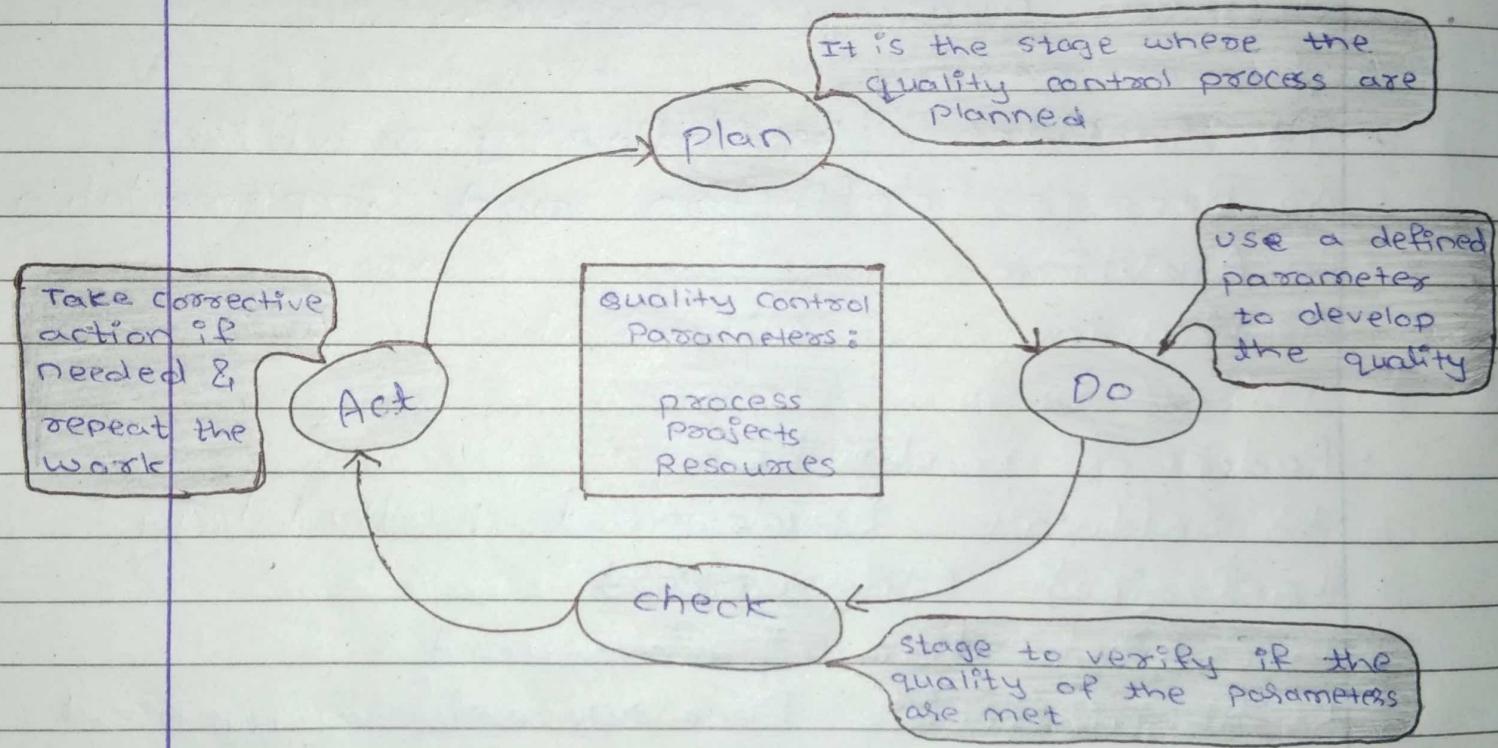


Q) What is Quality control? Explain work of SQA Activities.

Ans - Quality Control is a set of methods used by organizations to achieve quality parameters or quality goals and continually improve the organization's ability to ensure that a software product will meet quality goals.

### • Quality Control Process



- The three class parameters that control software quality are:

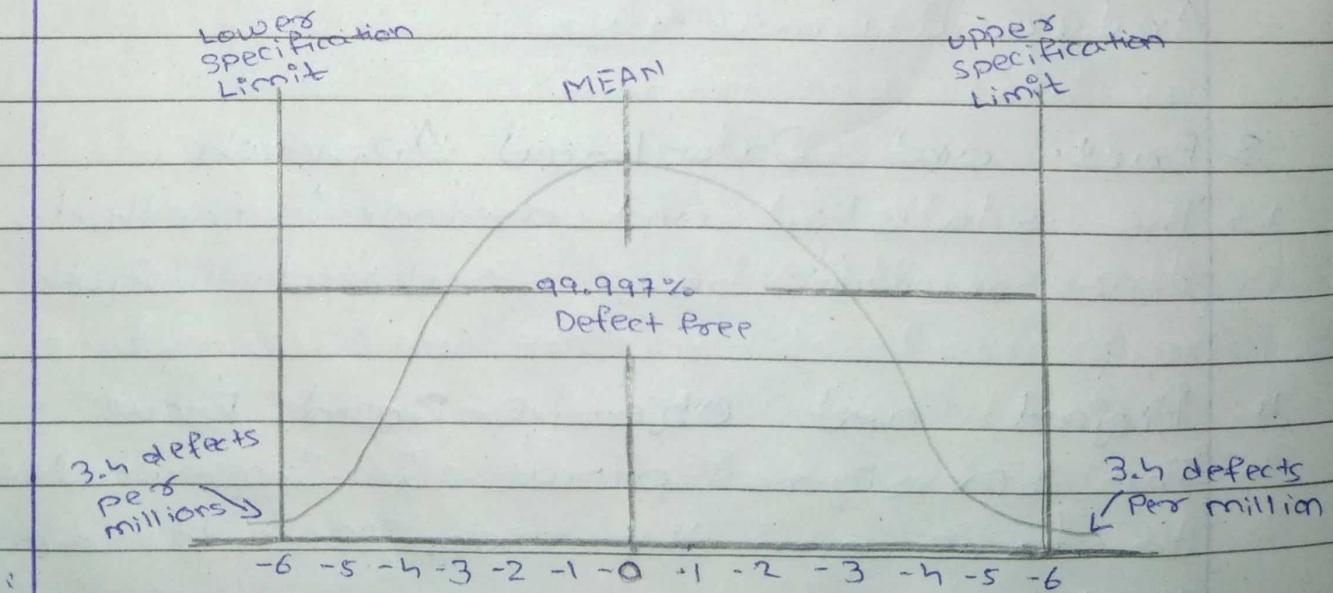
- ↳ Products
- ↳ Process
- ↳ Resources

- Software Quality Assurance (SQA) is a set of activities for ensuring quality in software engineering processes.
  - It ensures that developed software meets and complies with the defined or standardized quality specifications.
  - SQA is an ongoing process within the software Development Life Cycle (SDLC) that routinely checks that developed software to ensure it meets the desired quality measures.
- 
- It includes the following activities-
    - ↳ Process definition and implementation
    - ↳ Auditing
    - ↳ Training
- 
- Processes could be-
    - ↳ Software Development Methodology
    - ↳ Project Management
    - ↳ Configuration Management
    - ↳ Requirements Development/Management
    - ↳ Estimation
    - ↳ Software Design
    - ↳ Testing, etc.
- 
- Once the processes have been defined and implemented, Quality Assurance has the following responsibilities-
    - ↳ Identify the weaknesses in the process
    - ↳ Correct those weaknesses to continually

improve the process.

## 2) Explain 6 Sigma.

- Ans → Six Sigma is the process of producing high and improved quality output.
- This can be done in two phases-
    - ↳ identification
    - ↳ elimination
  - The cause of defects is identified and appropriate elimination is done which reduces variation in whole processes.
  - A six sigma method is one in which 99.99966% of all the products to be produced have the same features and are as free from defects.



(Six Sigma Curve)

## • Characteristics of Six Sigma

### 1. Statistical Quality Control

- ↳ Six Sigma is derived from the Greek Letters? which denote Standard Deviation in statistics.
- ↳ Standard Deviation is used for measuring the quality of the output.

### 2. Methodical Approach

- ↳ The Six Sigma is a systematic approach of application in DMAIC and DMADV which can be used to improve the quality of production.
- ↳ DMAIC means of Design-Measure-Analyze-Improve-Control.
- ↳ While DMADV stands for Design-Measure-Analyze-Design-Verify.

### 3. Fact and Data-Based Approach

- ↳ The statistical and methodical method shows the scientific basis of the technique.

### 4. Project and Objective-Based Focus

- ↳ The Six Sigma process is implemented to focus on the requirements and conditions.

### 5. Customer Focus

- ↳ The customer Focus is fundamental to the Six Sigma approach.

- ↳ The quality improvement and control standards are based on specific customer requirements.

## 6. Teamwork Approach to Quality Management:

- ↳ The Six Sigma process requires organizations to get organized for improving quality.

- Six Sigma Methodologies:

- DMAIC - is used to enhance an existing business process. Its project methodology has five phases:

1. Define
2. Measure
3. Analyze
4. Improve
5. Control.

- DMAIC - is used to create new product designs or process design. The methodology of this project has five phases

1. Define
2. Measure
3. Analyze
4. Design
5. Verify.

3) Explain Software Reengineering Process

- Ans - Software Re-Engineering is the examination and alteration of a system to reconstitute it in a new form.
- The principles of Re-Engineering when applied to the software development process is called software re-engineering.
  - It affects positively at software cost, quality, service to the customer and speed of delivery.
  - In software Re-engineering, we are improving the software to make it more efficient and effective.

• The need of software Re-engineering :

- ↳ Software re-engineering is an economical process for software development and quality enhancement of the product. This process enables us to identify the useless consumption of deployed resources and the constraints that are restricting the development process so that the development process could be made easier and cost-effective (time, financial, direct advantage, optimize the code, indirect benefits, etc.) and maintainable.

- The software re-engineering is necessarily for having -

(a) Boost up productivity: Software reengineering increases productivity by optimizing the code and database so that processing gets faster.

(b) Processes in continuity: The functionality of older software product can be still used while the testing or development of software.

(c) Improvement opportunity: Meanwhile the process of software reengineering, not only software qualities, features and functionality but also your skills are refined, new ideas hit in your mind.

- This makes the developer's mind accustomed to capturing new opportunities so that more and more new features can be developed.

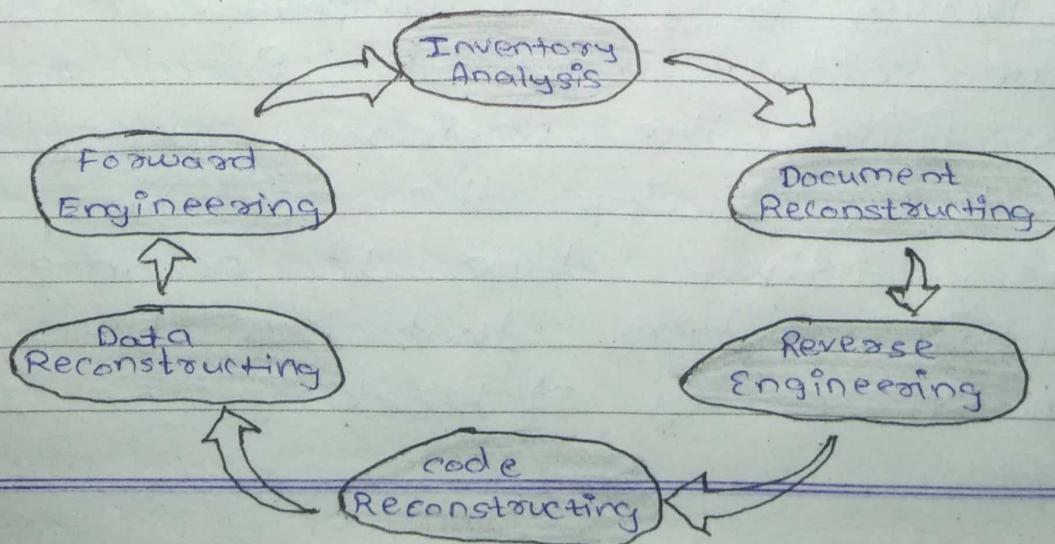
(d) Reduction in risks: Instead of developing the software product from scratch as from the beginning stage help developer's develop the product from its existing stage to enhance some specific features that are brought in concern by stakeholders or its users.

(e) Saves time: As we stated above here that the product is developed from the existing stage rather than the beginning stage so that time consumed in software engineering is lesser.

(f) Optimization: This process refines the system features, functionalities and reduces the complexity of the product by consistent optimization as maximum as possible.

- Re-Engineering cost factors:

- ↳ The quality of the software to be re-engineered.
- ↳ The tool support availability for engineering.
- ↳ The extent of the data conversion which is required.
- ↳ The availability of expert staff for Re-Engineering



Q-4) Explain Reverse Engineering Process.

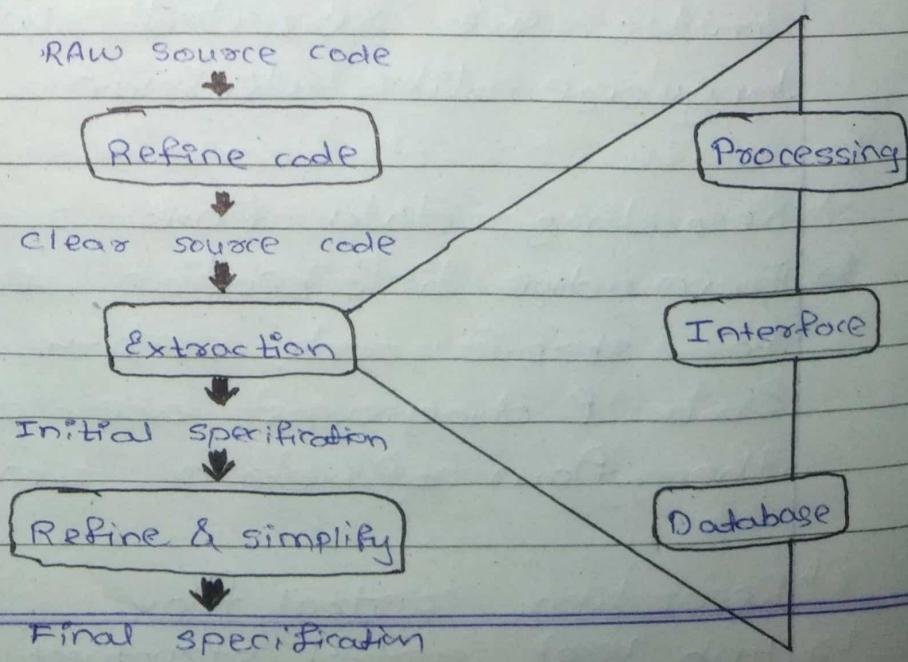
Ans - It is a process of recovering the design, requirement specifications and functions of a product from an analysis of its code.

- It builds a program database and generates information from this.
- The purpose of reverse engineering is to facilitate the maintenance work by improving the understandability of a system and to produce the necessary documents for a legacy system.

#### • Reverse Engineering Goals:

- ↳ Cope with complexity
- ↳ Recover lost information
- ↳ Detect side effects
- ↳ Synthesise higher abstraction
- ↳ Facilitate Reuse.

#### ⑥ Figure :-



## ● Steps of software Reverse Engineering

### 1) Collection Information

- ↳ This step focuses on collecting all possible information (e.g. source design documents etc.) about the software.

### 2) Examining the Information

- ↳ The information collected in step-1 is studied so as to get familiar with the system.

### 3) Extracting the structure:

- ↳ This step concerns with identification of program structure in the form of structure chart where each node corresponds to some routine.

### 4) Recording the functionality

- ↳ During this step processing details of each module of the structure, charts are recorded using structured language like decision table, etc.

### 5) Recording data flow

- ↳ From the information extracted in step-3 and step-4, set of data flow diagrams are derived to show the flow of data among the processes.

### 6) Recording control flow

- ↳ High level control structure of the software is recorded.

- 7) Review extracted design.
- ↳ Design document extracted is reviewed several times to ensure consistency and correctness. It also ensures that the design represents the program.
- 8) Generate documentation.
- ↳ Finally, in this step, the complete documentation including SRS, design document history, overview, etc. are recorded for future use.

### ④ Reverse Engineering Tools

- Reverse engineering if done manually would consume lot of time and human labours and hence must be supported by automated tools.
- Some of tools are given below:
- ↳ CIAO and CIA :- A graphical navigator for software and web repositories along with a collection of reverse engineering tools.
- ↳ Rigi :- A visual software understanding tool.
- ↳ Bunch :- A software clustering/modularization tool.

- GEN++ : An application generator to support development to of analysis tools for the C++ language.
- PBS : Software Books shelf tools for extracting and visualizing the architecture of programs.

### Q) Explain Change Control Process.

- Ans
- It is a software development refers to transition from an existing state of software product to another improved state of product.
  - It controls, supports and manages changes to artifacts, such as code change, process changes or documentation changes.
  - While CCP (Change Control Process) mainly identifies, documents and authorizes changes to a software application.
  - CCP does not comes under any phases of SDLC still it has a great importance in the entire software development process.
  - There are various types of change management tools are used for various purposes like to adopt, control, represent and effect the change required.

- For example :- Change management tool for flow charting, Project Planning, Data collection etc.

- Process of change Management :-

↳ When any software application/product goes for any changes in an IT environment, it undergoes a series of sequential processes as follows:

1. Creating a request for change
2. Reviewing and assessing a request for change.
3. Planning the change
4. Testing the change
5. Creating a change proposal
6. Implementing changes
7. Reviewing change performance
8. Closing the process.

- Importance of change Management:-

- ↳ For improving performance
- ↳ For increasing engagement
- ↳ For enhancing innovation
- ↳ For including new technologies
- ↳ For implementing new requirements
- ↳ For reducing cost.

### • Source of change:

- There may be multiple reasons involved during the development process for which certain changes are required to be implemented in the product.

These sources are as-

- ↳ Business reorganization
- ↳ New Market conditions
- ↳ New equipment
- ↳ Fixing any bugs/errors
- ↳ New customer needs
- ↳ Performance or reliability improvement
- ↳ Budgetary or scheduling constraints.

### • Key points to be considered during change management:

- ↳ Reason of change
- ↳ Result of change
- ↳ Portion to be changed
- ↳ Person will change
- ↳ Risks involved in change
- ↳ Alternative to change
- ↳ Resources required for change
- ↳ Relationship between changes.