

## **UNIT – I**

### **SOFTWARE PROCESS**

Software Process Maturity Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process. Process Reference Models Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

### **PART-A**

#### **1) Explain Principles of Software Process Change?**

People:

- ☐ The best people are always in short supply
- ☐ you probably have about the best team you can get right now.
- ☐ With proper leadership and support, most people can do much better than they are currently doing

Design:

- ☐ Superior products have superior design. Successful products are designed by people who understand the application (domain engineer).
- ☐ A program should be viewed as executable knowledge. Program designers should have application knowledge.

#### **2) Six basic Principles of Software process change:**

- ☐ Major changes to the process must start at the top.
- ☐ Ultimately, everyone must be involved.
- ☐ Effective change requires great knowledge of the current process
- ☐ Change is continuous
- ☐ Software process changes will not be retained without conscious effort and periodic reinforcement
- ☐ Software process improvement requires investment

#### **3) . Describe about Software Process Assessment?**

Process assessments help software organizations improve themselves by identifying their crucial problems and establishing improvement priorities. The basic assessment objectives are:

- ☐ Learn how the organization works
- ☐ Identify its major problems
- ☐ Enroll its opinion leaders in the change process

The essential approach is to conduct a series of structured interviews with key people in the organization to learn their problems, concerns, and creative ideas.

#### **4) 3Define Initial Process?**

Usually ad hoc and chaotic - Organization operates without formalized procedures, cost estimates, and project plans. Tools are neither well integrated with the process nor uniformly applied. Change control is lax, and there is little senior management exposure or understanding of the problems and issues. Since many problems are deferred or even forgotten, software installation and maintenance often present serious problems.

#### **5) List the important basic project controls**

- Project management
- Management oversight

- Quality assurance
- Change control

**6) Describe about Repeatable Process?**

This level provides control over the way the organization establishes plans and commitments. This control provides such an improvement over Level 1 that the people in the organization tend to believe they have mastered the software problem. This strength, however, stems from their prior experience in doing similar work.

**7) Give some major risks when presented with new challenges**

New tools and methods will affect processes, thus destroying the historical base on which the organization lies. Even with a defined process framework, a new technology can do more harm than good.

When the organization must develop a new kind of product, it is entering new territory. Major organizational change can be highly disruptive. At Level 2, a new manager has no orderly basis for understanding an organization's operation, and new members must learn the ropes by word of mouth.

**8) Define the defined process.**

The organization has the foundation for major and continuing change. When faced with a crisis, the software teams will continue to use the same process that has been defined. However, the process is still only qualitative; there is little data to indicate how much is accomplished or how effective the process is.

**9) Explain about Managed Process?**

There are many sources of potentially valuable measure of the software process, but such data are expensive to collect and maintain. Productivity data are meaningless unless explicitly defined. For example, the simple measure of lines of source code per expended development month can vary by 100 times or more, depending on the interpretation of the parameters.

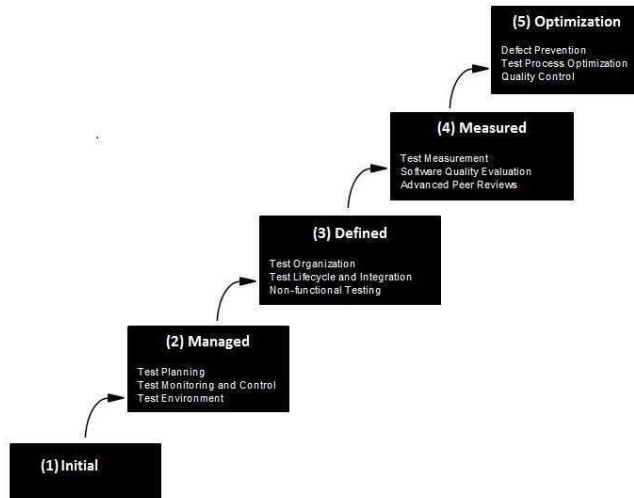
**10) Define Optimizing Process.**

software development managers have largely focused on their products and will typically gather and analyze only data that directly relates to product improvement. In the Optimizing Process, the data are available to tune the process itself. For example, many types of errors can be identified far more economically by design or code inspections than by testing.

**11) Define Process reference models.**

The process framework or reference model acts as an interface between the way the content is organized and the way work is performed. A uniform process model organized under a process reference model makes business modeling and systems designing much easier.

**12) Draw the diagrammatic representation for levels of CMM**



### 13) What is CMMI ?

CMM Integration project was formed to sort out the problem of using multiple CMMs. CMMI Product Team's mission was to combine three Source Models into a single improvement framework to be used by the organizations pursuing enterprise-wide process improvement. These three Source Models are :

- ☐ Capability Maturity Model for Software (SW-CMM) - v2.0 Draft C
- ☐ Electronic Industries Alliance Interim Standard (EIA/IS) - 731 Systems Engineering
- ☐ Integrated Product Development Capability Maturity Model (IPD-CMM) v0.98

### 14) List the objectives of CMMI:

- ☐ Produce quality products or services: The process-improvement concept in CMMI models evolved out of the Deming, Juran, and Crosby quality paradigm: Quality products are a result of quality processes. CMMI has a strong focus on quality-related activities including requirements management, quality assurance, verification, and validation.
- ☐ Create value for the stockholders: Mature organizations are more likely to make better cost and revenue estimates than those with less maturity, and then perform in line with those estimates. CMMI supports quality products, predictable schedules, and effective measurement to support management in making accurate and defensible forecasts. This process maturity can guard against project performance problems that could weaken the value of the organization in the eyes of investors.
- ☐ Enhance customer satisfaction: Meeting cost and schedule targets with high-quality products that are validated against customer needs is a good formula for customer satisfaction. CMMI addresses all of these ingredients through its emphasis on planning, monitoring, and measuring, and the improved predictability that comes with more capable processes.

### 15) Give the several disciplines/bodies of knowledge in CMMI

**Systems Engineering:** Systems engineering covers the development of complete systems, which may or may not include software.

**Software Engineering:** Software engineering covers the development of software systems.

**Integrated Product and Process Development:** Integrated Product and Process Development (IPPD) is a systematic approach that achieves a timely collaboration of relevant stakeholders

throughout the life of the product to better satisfy customer needs, expectations, and requirements.

Supplier Sourcing: As work efforts become more complex, project managers may use suppliers to perform functions or add modifications to products that are specifically needed by the project.

#### 16) Give the CMMI structure

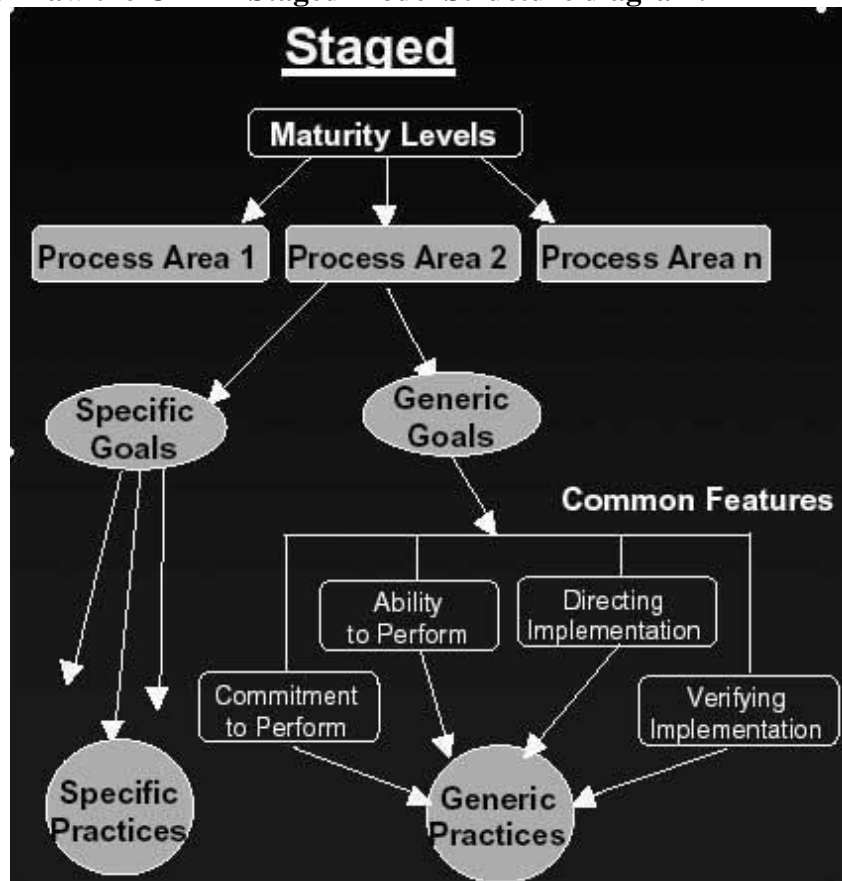
The CMMI is structured as follows

- ☐ Maturity Levels (staged representation) or Capability Levels (continuous representation)
- ☐ Process Areas
- ☐ Goals: Generic and Specific
- ☐ Common Features
- ☐ Practices: Generic and Specific

#### 17) What is Staged Representation?

The staged representation is the approach used in the Software CMM. It is an approach that uses predefined sets of process areas to define an improvement path for an organization. This improvement path is described by a model component called a Maturity Level. A maturity level is a well-defined evolutionary plateau towards achieving improved organizational processes.

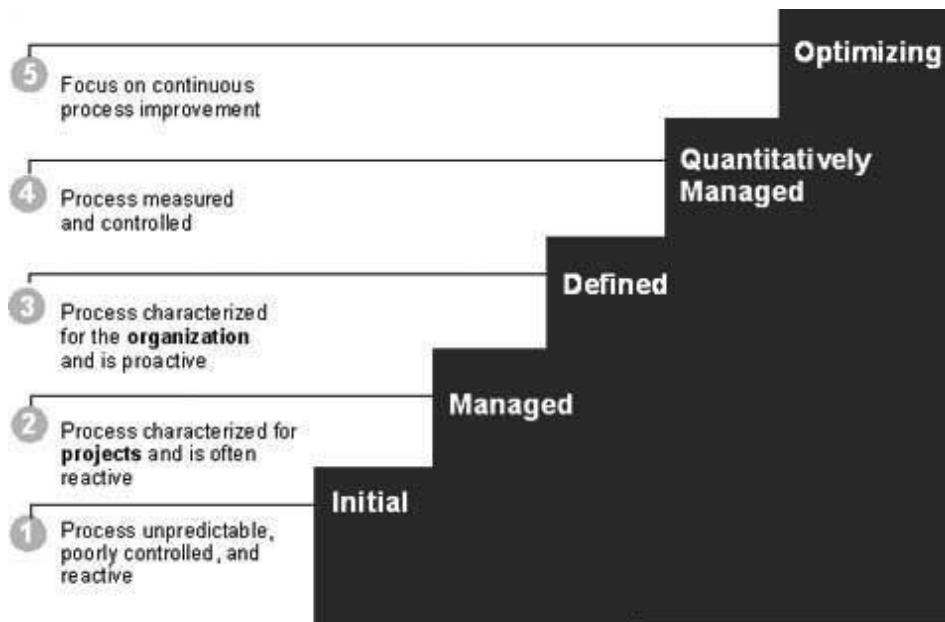
#### 18) Draw the CMMI Staged Model Structure diagram.



### 19) Compare Continuous and Staged representation

Continuous Representation	Staged Representation
Process areas are organized by process area categories.	Process areas are organized by maturity levels.
Improvement is measured using capability levels. Capability levels measure the maturity of a particular process across an organization; it ranges from 0 through 5.	Improvement is measured using maturity levels. Maturity levels measure the maturity of a set of processes across an organization: it ranges from 1 through 5.
There are two types of specific practices: base and advanced. All specific practices appear in the continuous representation.	There is only one type of specific practice. The concepts of base and advanced practices are not used. All specific practices appear in the staged representation except when a related base-advanced pair of practices appears in the continuous representation, in which case only the advanced practice appears in the staged representation.

### 20) Explain CMMI Staged Representation Maturity Levels pictorially.



## **PART-B**

- 1) Distinguish between software process and software project
- 2) Discuss in detail the Initial process, the repeatable process and the managed process.?
- 3) What are process reference models? Explain any two of them?
- 4) Explain the CMM model.
- 5) Explain about the Optimizing Process in details?
- 6) List the various Maturity Levels and explain their Process Areas.
- 7) Explain about CMMI model.
- 8) Explain about the PCMM Process Reference Model in details?
- 9) Describe Personal Software process.
- 10) Compare PSP and TSP

## **UNIT II**

### **SOFTWARE ECONOMICS AND LIFECYCLE**

Software Project Management Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way. Life-Cycle Phases and Process artifacts Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

#### **PART A**

##### **1. What is conventional software management?**

Conventional software management: In the past, organizations used conventional software management. This management utilized custom tools and process and virtually custom components built-in primitive languages.

Thus, the performance of the project was very much predictable in the schedule, cost, and quality.

##### **2. What are the three successive process of software project management?**

Project planning, execution, monitoring and contro

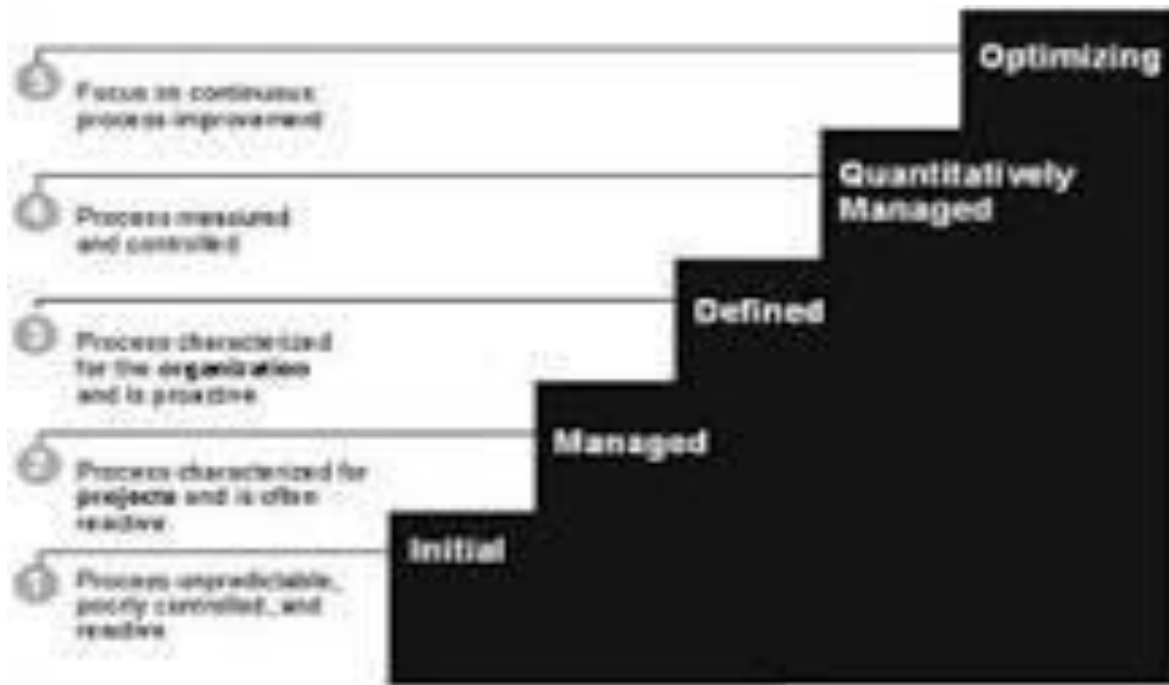
##### **3. What are conventional methods in software engineering?**

There are several techniques that have been given a practical explanation to raise and increase and quality includes involving customer, prototyping, simplifying design, conducting inspections, and hiring good and best people.

##### **4. How does it differ from conventional software development?**

Traditional software development is the software development process used to design and develop the simple software.

**5. What are the disadvantages in conventional software management performance?**



Conventional Software Management performance.

Software development is still highly unpredictable. Management discipline is more of a discriminator in success or failure than are technology advances. The level of software scrap and rework is indicative of an immature process.

**6. What is meant by software economics?**

Software economics is the study of how scarce project resources are allocated for software projects. Software economics helps software managers allocate those resources in the most efficient manner. As the size of a software project, the unit cost (or average cost) rises.

**7. How can we evaluate the economics of a software project?**

These are:

- Payback Method.
- Return on Investment (ROI)
- Total life cycle cost (present value method)



- Savings/investment ratio (benefit/cost ration method)
- Net present Value (NPV)
- Internal rate of return (IRR)

## **8. How software economics can be improved?**

Software economics improvements should come from reducing size, improving software processes, improving team effectiveness, improving automation through software environments, and achieving the required quality.

## **9. What are the five stages of the project life cycle?**

Five Phases of The Project Management Lifecycle

- Project Initiation.
- Project Planning.
- Project Execution.
- Project Monitoring and Control.
- Project Closure.

## **10. Define Life cycle phases.**

Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. An overemphasis on production.

### **Life cycle phases:**

Characteristic of a successful software development process is the well-defined separation between "research and development" activities and "production" activities. Most unsuccessful projects exhibit one of the following characteristics

: ☐ An overemphasis on research and development

☐ An overemphasis on production. Successful modern projects-and even successful projects developed under the conventional process-tend to have a very well-defined project milestone when there is a noticeable transition from a research attitude to a production attitude. Earlier phases focus on achieving functionality. Later phases revolve around achieving a product that can be shipped to a customer, with explicit attention to robustness, performance, and finish. A modern software development process must be defined to support the following:

☐ Evolution of the plans, requirements, and architecture, together with well defined synchronization points

- ☐ Risk management and objective measures of progress and quality
- ☐ Evolution of system capabilities through demonstrations of increasing functionality.

### **11. what is mean by inception phase.**

The Inception Phase is an opportunity to undertake a 'reality check' of the proposed work and to present the updated/confirmed ('adaptive' management) approach to the stakeholders of the project and to seek approval of the work plan and budget from the first Project Steering Committee.

### **12. What is the purpose of elaboration phase?**

Concept: Elaboration Phase. The second of four phases in the project lifecycle, when architecturally significant risks are addressed. The purpose of this phase is to mitigate technical and non-technical risks.

### **13. What is the process of elaboration in software engineering?**

The purpose of the Elaboration Phase is to analyse the problem domain, establish a sound architectural foundation, develop the project plan, and eliminate the highest risk elements of the project. To accomplish these objectives requires the "mile wide and inch deep" view of the system.

### **14. What is elaboration plan?**

An Elaboration is a phase of the delivery engagement where we create our initial project plan by reviewing the business requirements and elaborating on what the requirements are to fulfill those requirements

### **15. What are the 5 phases of construction?**

The five phases of the construction project lifecycle are: Project Initiation and Conception.  
...

- Project Initiation and Conception. ...
- Project Planning and Definition. ...

- Project Execution and Launch. ...
- Project Performance. ...
- Project Close.

#### **16. What is a transition phase?**

The transition phase focuses on the activities required to place the software into the hands of the users. Typically, this phase includes several iterations, including beta releases, general availability releases, and bug-fix and enhancement releases.

#### **17. What are the steps in transition phase?**

The Transition phase can include running old and new systems in parallel, migrating data, training users, and adjusting business processes.

#### **18. What is phase transition example?**

Phase transitions are transitions between different physical states (phases) of the same substance. Common examples of phase transitions are the ice melting and the water boiling, or the transformation of graphite into diamond at high pressures.

#### **19. What are the five types of artifact sets?**

Artifacts of the life-cycle of software are generally organized and divided into two sets i.e., Management set and Engineering set.

...

Artifact (software development)

- Requirement Set.
- Design Set.
- Implementation Set.
- Development Set.

#### **20. What is management artifacts?**

Artifacts are documents related to the project. These documents align projects to business objectives, address the needs of sponsors and clients, and properly set the project team's expectations. Examples of artifacts include: Project Charter, Business Case, Requirements, and customer/stakeholder analysis.

## **21. What are examples of artifacts management?**

Some examples of project management artifacts include: the project charter, business case, dashboards, logs and registers, contracts and agreements and reports. Basically, any documentation or visual data presentation that helps the project team understand what is required and do their jobs effectively.

## **22. What is an engineering artifact?**

An artifact is the documentation of a result of a step of system development in software or systems engineering. There are many instances of artifacts such as data models, requirements documents, software or system specifications, architecture descriptions, program modules, test cases, and quality requirements

## **23. What is model based architecture?**

Model-driven architecture (MDA) is a type of approach to software design, development and implementation. As the name suggests, this approach uses models as a set of guidelines used in structuring design specifications.

## **24. Model-based analysis:**

Model based architectural analysis techniques depend on a system's architectural description and manipulate that description to discover properties of the architecture. As they are tool-driven, the cost is less. Goals: consistency, compatibility and internal completeness.

## **25. What is scenario and model based architecture analysis?**

A structured method for scenario-based architectural analysis is presented, using scenarios to analyze architectures with respect to achieving quality attributes. Finally, lessons and morals are presented, drawn from the growing body of experience in applying scenario-based architectural analysis techniques.

## **PART –B**

1. Describe the Principles of Conventional Software Engineering.

2. Explain Improving Software Economics in detail.
3. Describe in detail the old way and the new way.
4. What is meant by life cycle phases in detail with example.
5. Describe in detail the inception phase.
6. What is elaboration and explain why elaboration is complex?
7. Define Construction Phase? And explain 5 types of phase in detail.
8. Describe artifact sets in software development process in detail.
9. What are pragmatic artifacts and explain their issues in detail.
10. Describe model-based software architectures in detail.

## UNIT III

### SOFTWARE PROCESSES PLANNING

Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments. Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

#### PART A

##### 1. What are workflows in software development?

Your development workflow is **the process by which your organization develops software**. A typical development workflow starts with product definition, and then moves through development, testing, release, and production stages.

##### 2. What is Check Point in software project execution?

Projects occur as a series of phases, structured along a time line designed to produce deliverables, meet stated goals, and utilize allocated resources. Checkpoints provide a basis for analysis and evaluation, to determine whether the project is proceeding as planned, and to take corrective action as needed.

##### 3. What are the Examples of Workflows Across Different Industries

Workflows are as diverse as the industries and people that use them. The following are simple examples of how workflows may be used in various industries.

- **Human Resources:** Workflows can dictate new hire processes, how leave is processed, annual training requirement, and pay processes.
- **Pharmaceutical Manufacturing:** Using workflows in quality control in areas such as testing of raw materials, production of medicines, packaging of products, post-manufacture testing, and preparation for shipment.
- **Customer Service:** A workflow which assigns investigations for customer complaints.
- **Military:** Deploys workflow to manage a hostile situation and follow the rules of engagement.
- **Travel:** Employs a workflow to manage a client's flight, hotel, tours, and auto rental reservations for a travel agency.
- **Healthcare:** A workflow which manages the receipt of a prescription from a physician through its filling and eventual pick up processes by the patient.
- **IT:** Uses workflows to dictate how each type of software/hardware issue called in by a staff member is addressed.

#### **4. Workflows and Checkpoints of process Software process workflows?**

In software development, all system-wide events are held at the end of every phase of development. These checkpoints provide visibility to milestones in life cycle and also to system-wide issues and problems. These checkpoints generally provide following things :

- It simply synchronizes management and engineering perspectives.
- It also verifies that goal every phase has been achieved or not.
- It provide basis for analysis and evaluation so as to determine whether or not project is proceeding as planned, and also to make correction and right action as per requirement.
- It also identifies risks, issues, or problems that are essential and conditions that are not tolerable.
- For entire life-cycle, it performs global assessment.

#### **5. List the sequences of project checkpoints?**

These three types of joint management reviews are given below :

- 1. Major Milestones**
- 2. Minor Milestones**
- 3. Status Assessments**

#### **6. Define Major Milestones**

Major milestones are system-wide event that is performed at the end of each phase of development. These milestones can be used in various process models even in conventional waterfall model. They generally help in providing visibility to system-wide issues. They also help to synchronize management and engineering perspectives. It helps in verifying that target or goal of each phase has been achieved successfully or not. They are used to achieve concurrence among every stakeholder in present state of project. These milestones are very much essential to confirm and ensure that requirements understanding, life-cycle plans, and product's form, function, and quality are at their balanced levels of details. It also helps in ensuring consistency between different artifacts.

#### **7. Define minor milestone**

Minor milestones are also called as micro milestones. They are simply monitoring points that project manager generally uses to maintain control of activities of each day. Minor milestones are iteration-focused events that are conducted to review data or content of an iteration in detailed manner and also to authorize work that has been continued. They generally divide elapsed time between major milestones into short time intervals. This is done to give confidence to us that major milestones will be achieved. Early iterations simply focus on analysis and design whereas later iterations focus more on completeness, consistency, usability, and change management.

## 8. Define Status Assessments

Status Assessments generally provides mechanism that is useful for addressing, communicating, and resolving issues or problems regarding management, technical, and project risks. Its main objective is to ensure that all expectations of all parties are synchronized and consistent. These are done to address and have check on progress and quality indicators, ensure continuous attention to dynamics of project. It also maintains communication between all stakeholders. It also provides management with frequent and regular insight into progress that is being made.

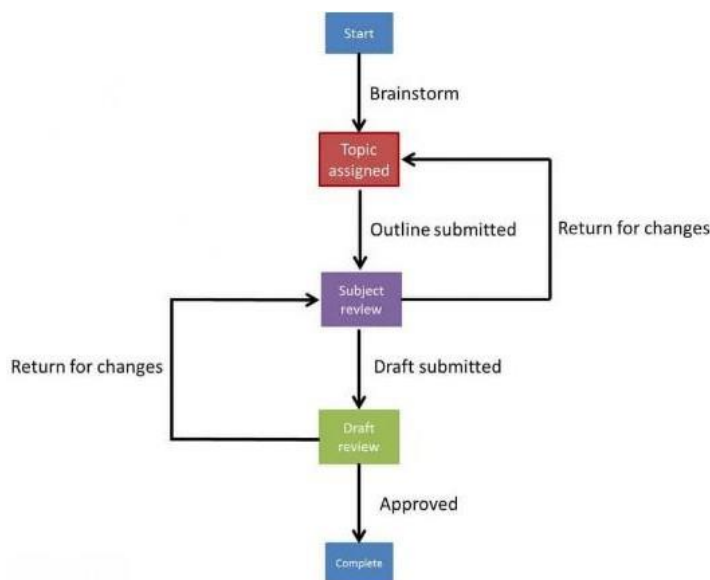
## 9. Define Work Breakdown Structure

It includes dividing a large and complex project into simpler, manageable and independent tasks. The root of this tree (structure) is labelled by the Project name itself. For constructing a work breakdown structure, each node is recursively decomposed into smaller sub-activities, until at the leaf level, the activities becomes undividable and independent. It follows a Top-Down approach.

### Steps:

- **Step-1:** Identify the major activities of the project.
- **Step-2:** Identify the sub-activities of the major activities.
- **Step-3:** Repeat till undividable, simple and independent activities are created.

## 10. What are the components of workflow?





## 11. What is Periodic Status Assessments?

Periodic status assessments serve as project snapshots. While the period may vary, the recurring event forces the project history to be captured and documented. Status assessments provide the following:

- A mechanism for openly addressing, communicating, and resolving management issues, technical issues, and project risks
- Objective data derived directly from on-going activities and evolving product configurations
- A mechanism for disseminating process, progress, quality trends, practices, and experience information to and from all stakeholders in an open forum

## 12. What is Iteration Planning Process in Software Project Management?

**Iteration planning** is generally process to adapt as project unfolds by making alterations in plans. Plans are changed simply due to based upon feedback from monitoring process, some changes on project assumptions, risks, and changes in scope, budget, or schedule. It is very essential to include the team in planning process. Basically, planning is generally concerned with explaining and defining and the actual sequence of intermediate results. It is an event where each of team members identifies how much of team backlog, they can commit to delivering during an upcoming iteration.

## 13. Cost and Schedule Estimating Process

The cost and schedule estimation process helps in determining number of resources to complete all project activities. It generally involves approximation and development of costing alternatives to plan, perform or work, deliver, or give project. A good estimation is very much essential for keeping a project under budget.

Two perspectives are generally required to derive project plans. These perspectives are given below :

### **Forward-Looking :**

- The Forward-Looking approach is also known as Top-Down approach. This approach generally starts with describing and explaining various project tasks that involve starting with project aim or end deliverable and breaking it all down into smaller planning chunks.
- Top-down budgeting also refers to a method of budgeting where project managers prepare a high-level budget for organization.

□

### **Backward-Looking :**

- Backward-Looking approach is also known as Bottom-up approach.
- In this approach, project team breaks requirements of clients down, determining lowest level appropriate to develop a range of estimates, covering overall scope of project based on available definition of task.

#### 14. Define Iteration Planning Process in Software Project Management and its types?

**Iteration planning** is generally process to adapt as project unfolds by making alterations in plans. Plans are changed simply due to based upon feedback from monitoring process, some changes on project assumptions, risks, and changes in scope, budget, or schedule. It is very essential to include the team in planning process. Basically, planning is generally concerned with explaining and defining and the actual sequence of intermediate results. It is an event where each of team members identifies how much of team backlog, they can commit to delivering during an upcoming iteration.

- **Inception iterations**
- **Elaboration Iterations**
- **Construction Iterations**
- **Transition Iterations**

#### 15. Define Planning guideline

**Planning guidelines** are generally written statement that contains guidance to be referred before any development and establishing take place of a project. Planning guidelines are often used for purpose of uniformity, comfort, and safe development. These planning guidelines should be followed by any party for development. These are initial planning guidelines that are made on basis of experience of many other people. Planning guidelines creates a convenient living environment. These guidelines are therefore considered credible bases of estimates and build some amount of confidence in the stakeholders.

#### 16. What are the 7 phases of SDLC?



The new seven phases of SDLC include **planning, analysis, design, development, testing, implementation, and maintenance.**

#### 17. Software Project Planning

A Software Project is the complete methodology of programming advancement from requirement gathering to testing and support, completed by the execution procedures, in a specified period to achieve intended software product.

## **18. Need of Software Project Management**

Software development is a sort of all new streams in world business, and there's next to no involvement in structure programming items. Most programming items are customized to accommodate customer's necessities. The most significant is that the underlying technology changes and advances so generally and rapidly that experience of one element may not be connected to the other one. All such business and ecological imperatives bring risk in software development; hence, it is fundamental to manage software projects efficiently.

## **19. What are the types of project planning?**

While there are numerous project management types, there are seven primary ones that get used the most often.

1. Waterfall Project Management.
2. Agile Project Management.
3. Scrum Project Management.
4. Kanban Project Management.
5. Lean Project Management.
6. Six Sigma Project Management.
7. PRINCE2 Project Management.

## **20. What are the 5 stages of SDLC?**

The SDLC has five phases:

- **inception,**
- **design,**
- **implementation,**
- **maintenance,**
- **audit or disposal**

## **PART B**

1. Workflows and Checkpoints of process Software process workflows
2. Iteration workflows, Major milestones, minor milestones
3. Process Planning Work breakdown structures
4. Define Periodic status assessments
5. Cost and schedule estimating process 6.Iteration planning process, Pragmatic planning.

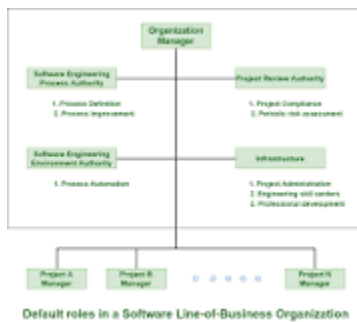
## UNIT IV

### PROJECT MANAGEMENT AND METRICS

Project Organizations Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

#### PART – A

##### 1. What is a line of business organization?



Line-Of-Business Organizations :

Line of business simply **a general term that describes and explains products and services simply offered by a business or manufacturer.**

##### 2. What is Project organization in software engineering?

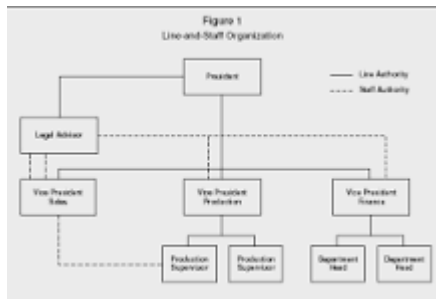
A project organization is **a structure that facilitates the coordination and implementation of project activities.** Its main reason is to create an environment that fosters interactions among the team members with a minimum amount of disruptions, overlaps and conflict.

##### 3. What are the 4 types of project organizational structures?

According to PMI, there are four basic types of organization:

- **Functional**
- 2. Matrix**
- 3. Projectized**
- 4. Composite.**

#### 4. What is the example of line organization?



Examples of line organizations are **small businesses in which the top manager, often the owner, is positioned at the top of the organizational structure** and has clear "lines" of distinction between him and his subordinates.

#### 5. What are the 5 project processes?



Developed by the Project Management Institute (PMI), the five phases of project management include **conception and initiation, planning, execution, performance/monitoring, and project close**.

#### 6. What is project organization and responsibilities?



Project Organization is actually **a structure that simply facilitates and motivates coordination and implementation of activities of the project**.

#### 7. What are the 4 main processes of project management?

- **Planning**
- **build-up**

- **implementation**
- **closeout.**

## 8. What is project process?

The project process means **a process as a unique action and represents the whole project implementation and the internal processes in the project.** Work instructions, procedure methods, network plans and tools are also considered.

## 9. What is software engineering evolution?



**The process of developing a software product using software engineering principles and methods** is referred to as software evolution. This includes the initial development of software and its maintenance and updates, till desired software product is developed, which satisfies the expected requirements.

## 10. What is process automation software?

Robotic Process Automation (RPA) is software technology that's **easy for anyone to use to automate digital tasks.** With RPA, software users create software robots, or “bots”, that can learn, mimic, and then execute rules-based business processes.

## 11. What is meant by automation process?

The dictionary defines automation as “**the technique of making an apparatus**, a process, or a system operate automatically.” We define automation as "the creation and application of technology to monitor and control the production and delivery of products and services.”

## 12. Why is process automation important?

**BPA improves compliance so businesses** don't run afoul of regulations and incur large penalties and fees—it also applies controls to a business to mitigate fraud and theft within a company. It can also speed up processes so that work is completed faster and with less repetition.

### 13. What are the 4 types of automation?

#### Different Types of Industrial Automation Systems

- ☐ Fixed Automation. Also referred to as hard automation, fixed automation systems carry out a single set of tasks without deviation.
- ☐ Programmable Automation.
- ☐ Flexible Automation.
- ☐ Integrated Automation.

### 14. What is project control and process instrumentation?



Process Instrumentations Measuring, positioning, recording, and controlling are **key parameters for all industrial processes.....**It provides an efficient means to increase plant efficiency and improve product quality.17-Aug-2020

### 15. What are the process and project metrics?

Software process and project metrics are **quantitative measures that enable software engineers to gain insight into the efficiency of the software process and the projects conducted using the process framework.** In software project management, we are primarily concerned with productivity and quality metrics.

### 16. What are the metrics for software quality?

#### Measuring Software Quality using Quality Metrics

- Code Quality.
- Reliability.
- Performance.
- Usability.
- Correctness.
- Maintainability.
- Integrity.
- Security.

## 17. What is process metrics in software engineering?

Process metrics are **the measures of the development process that creates a body of software**. A common example of a process metric is the length of time that the process of software creation tasks.

## 18. What is meant by management indicators?

Abstract. Software management indicators are **aids to the management of software projects**. By collecting data at all stages of development, a manager can learn to detect early warnings of problems and to control the growth of problems.

## 19. What are key performance indicators in software development?



Key performance indicators (KPIs) are **values that measure the performance of your business overall**. In the context of software development, KPIs indicate how well your development efforts are aligning with business objectives.

## 20. What are the indicators in software metrics?

Indicators are metrics in **a form suitable for assessing project behavior or process improvement**. For example, an indicator may be the behavior of a metric over time or the ratio of two metrics. Indicators may include the comparison of actual values versus the plan, project stability metrics, or quality metrics.

## 21. What are indicators and measures?

The term “measures and indicators” refers to **numerical information that quantifies input, output, and performance dimensions of processes, products, programs, projects, services, and the overall organization (outcomes)**. Measures and indicators might be simple (derived from one measurement) or composite.



## 22. What is SDLC?

**SDLC** is a systematic process for building software that ensures the quality and correctness of the software built. SDLC process aims to produce high-quality software that meets customer expectations. The system development should be complete in the pre-defined time frame and cost. SDLC consists of a detailed plan which explains how to plan, build, and maintain specific software. Every phase of the SDLC life Cycle has its own process and deliverables that feed into the next phase. SDLC stands for **Software Development Life Cycle** and is also referred to as the Application Development life-cycle.

## 23. What are the stages of software development life cycle?

What Is the Software Development Life Cycle? Software Development Life Cycle is the application of standard business practices to building software applications. It's typically divided into six to eight steps: **Planning, Requirements, Design, Build, Document, Test, Deploy, Maintain.**

## 24. What are the 5 stages in the development life cycle?

What are the 5 phases of the system development life cycle? The SDLC has five phases: **inception, design, implementation, maintenance, and audit or disposal**, which includes an assessment of the risk management plan.

## 25. What is Pragmatic Software Metrics

Measuring is useful, but it doesn't do any thinking for the decision makers. It only provides data to help them ask-the right questions, understand the context, and make objective decisions. Because of the highly dynamic nature of software projects, these measures must be available at any time, tailorable to various subsets of the evolving product (release, version, component, class), and maintained so that trends can be assessed (first and second derivatives with respect to time). This situation has been achieved in practice only in projects where the metrics were maintained on-line as an automated by-product of the development/integration environment.

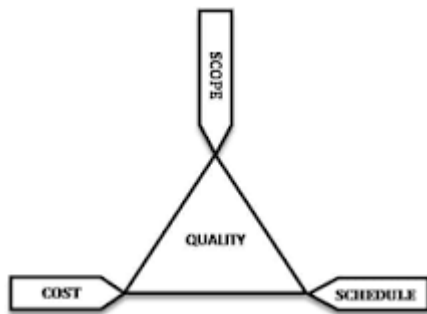
## 26. What are the 4 steps involved in metrics program?

An individual metrics performs one of four functions: Understand software process, product, services. Evaluate against established standards and goals. Control resources and processes.

## 27. What are automation metrics?

Typically, automated testing metrics quantify the performance of the implemented automated test process. These include past, present and future efforts. When we talk of KPIs and metrics, we need clearly defined goals.

## 28. What are the test metrics?



### Manual Test Metrics

- ☐ Test case execution productivity metrics.
- ☐ Test case preparation productivity metrics.
- ☐ Defect metrics.
- ☐ Defects by priority.
- ☐ Defects by severity.
- ☐ Defect slippage ratio.

## 29. How do you evaluate automation?

### 4 Simple Steps to Select the Right Test Automation tool for your.

1. Step 1: Understand your project requirements thoroughly.
2. Step 2: Consider your existing test automation tool as a benchmark.
3. Step 3: Identify the key criteria suitable for a project.
4. Step 4: Leverage Pugh Matrix Technique for Analysis.

## 30. What are metrics used for?

Metrics are measures of quantitative assessment commonly used for **assessing, comparing, and tracking performance or production.**

## **PART -B**

1. Explain about line of business organization?
2. Write about line organizational chart .Write example of line organization?
3. Explain project organization needed?
4. Write a note on 4 types of project organizational structures?
5. Explain about evolution of organizational behavior?
6. What are the first stage of evolution of an organization?
7. What is an example of process automation?
8. What are the different types of process automation?
9. Explain a project control and process instrumentation?
10. Write a note on process automation in project management?
11. What are the core metrics of management indicators?
12. How many core metrics are there?
13. Explain management indicators?
14. What are the core metrics of management indicators?
15. Explain quality indicators?
16. What are the types of quality indicators?
17. Explain life cycle expectation?
18. Write about five stages of the project life cycle?
19. What are the types of software metrics?
20. Write about core metrics of management indicators?
21. Explain about metric automation?
22. Write a note on measure automation?

## **UNIT – V**

### **UNIT TITLE**

CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

### **PART – A**

#### **1. What is CCPDS-R ?**

CCPDS-R stands for “Command Center Processing and Display System Replacement”

The Command Center Processing and Display System Replacement (CCPDS-R) is one of six Cheyenne Mountain Upgrade component programs and provides the capability to correlate and fuse missile warning information from space based and ground based sensors at the Cheyenne Mountain and Alternate Missile Warning Centers, as well as report the status of missile warning information to worldwide user locations.

#### **2. What is software project management SPM ?**

It is a proper way of planning and leading software projects. It is a part of project management in which software projects are planned, implemented, monitored and controlled.

#### **3. What is the need for SPM?**

Software is an non-physical product. Software development is a new stream in business and t there is very little experience in building software products, The most important is that the basic technology changes and advances so frequently and rapidly that experience of one product may not be applied to the other one.

#### **4. List the types of SPM.**

1. Conflict Management,
2. Risk Management,

3. Software Configuration Management,
4. release Management,
5. Risk Management and
6. Change Management.

**5. Mention the advantages of SPM.**

It helps in planning of software development,

It overall manages to save time and cost for software development,

Implementation of software development is made easy and

Monitoring and controlling are aspects of software project management.

**6. List the principles of SPM.**

Component Based Approach, Iterative

life cycle process,

Architecture first approach, Model

Based Evolution, Change

Management system, Round Trip

Engineering, Demonstration Based

approach Objective Quality Control,

Establish a configurable process and

Evolving levels of details.

**7. What is next generation software economics.**

Further technology advances in round-trip engineering are critical to making the next quantum leap in software economics reflect better economies of scale and

improved return on investment profiles. These are the real indicators of a mature industry.

**8. Define software economics.**

Software Economics in Software Engineering is mature research area that generally deals with most difficult and challenging problems and issues of valuing software and determining or estimation costs usually involved in its production.

**9. List the generations of software development.**

Conventional Development (1960s and 1970s),

Transition (1980s and 1990s) and

Modern (2000 and later).

**10. What is the principles given by Boehm to examine how to staff a software project?**

The principle of Top Talent,

The Principle of Job Matching,

The Principle of Career Progression, The

Principle of Team Balance and The

Principle of Phaseout.

**11. List the parameters of software economics.**

Size,

Process,

Personnel,

Environment and

Quality.

**12. Write down the generic process framework that is applicable to any software project /**

Relationship between work product, task, activity and system. Common process framework are,

- Process framework activities
- Umbrella activities
- Framework activities
- Task sets.

**13. How can we improve software economics.**

1.Reducing the size or complexity of what needs to be developed.

Using more-skilled personnel and better teams (not necessarily the same thing),

Using better environments (tools to automate the process), Trading off or backing off on quality thresholds and Improving the development process.

**14 List the goals of software engineering?**

Satisfy user requirements , High reliability , Low maintenance cost , Delivery on time , Low Production cost , High performance , Ease of reuse.

**15. What is the advantage of adhering to life cycle models for software?**

It helps to produce good quality software products without time and cost overruns. It encourages the development of software in a systematic & disciplined manner

**16. Is it always possible to realize win-win spiral model for software? Justify.**

Must identify stake holder and their win condition

Developing buy-in to the model is important than the model itself

Eliminating the clashes between customers is important.

### **17. What are the umbrella activities of a software process?**

Software project tracking and control. Risk management.

Software Quality Assurance.

Formal Technical Reviews.

Software Configuration Management. Work product preparation and production. Reusability management.

Measurement

### **18. What are the various categories of software?**

System software

Application software

Engineering/Scientific software

Embedded software

Web Applications

Artificial Intelligence software.

### **19. What is software process? List its activities.**

Software process is defined as the structured set of activities that are required to Develop the software system.

Activities – Specification, design & implementation, validation & evolution.



## **20. What are the two types of software products?**

1. Generic products: these are stand-alone systems that are produced by a development Organization and sold in the open market to any customer who wants to buy it.
2. Customized products: these are systems that are commissioned by a specific customer And developed specially by some contractor to meet a special need

### **PART – B**

1. Explain briefly principles of modern software management
2. Explain Important trends in improving Software economics?
3. Define Software Economics. Also explain Pragmatic s/w cost estimation?
4. Characteristics of software contrast to characteristics of hardware?
5. Explain in detail Boehm's spiral model for softwre life cycle and discuss various activities in. Each phase.