SPM Solution Set

[Total Marks: 75]

N. B.: Following are the only points about the given question, examiner is expected to evaluate as per the content written by the student.

1. Attempt *any three* of the following: 15

a. Define a term project and give the importance of Software Project Management

A project is an activity to meet the creation of a unique product or service and thus activities that are undertaken to accomplish routine activities cannot be considered projects.

SPM is important for following reasons :

Strategic Alignment
Leadership
Clear Focus & Objectives
Realistic Project Planning
Quality Control
Risk Management
Orderly Process
Continuous Oversight
Subject Matter Expertise
Managing and Learning from Success and Failure

b. Explain the stages involved in project management life cycle in detail.

Initiation Phase: In this phase of the project, feedback received from customers is analyzed and brainstorming is done as to develop new product or modify existing product to meet the new demands.

Project Definition Phase: In this phase of the project efforts are made to define the solution for the problem posed by customers.

Feasibility Study: In this phase, planning of the project is made and definite milestones are established.

Project Execution: In this phase all activities and milestones established in the earlier phase are executed in a timely and orderly manner. This phase utilizes maximum of all resources.

Project Conclusion: This is the last phase of the project. In this phase, final product or service is handed over to the operations team for commercial production.

c. Write a note on Project portfolio management.

Project portfolio management provides an overview of all the projects that an organization is undertaking or is considering. It prioritizes the allocation of resources to projects and decides which new projects should be accepted and which existing ones should be dropped. Three key aspects of PPM are Project portfolio definition, Project portfolio management and Project portfolio optimization

d. What is the importance to identify the scope and objectives of a project?

Objectives help to:
•Define what the project team must achieve for project success
•Outcome of project rather than tasks
•Predetermined results to which effort is directed

Scope:
•Defines the boundaries of its application
•Output+outcome+benefit+work required to produce them Steps involved in identifying project scope and objective are

dentify objectives and practical measures of the effectiveness in meeting those objectives
•Establish Project Authority
•Stakeholder analysis-Identify all stakeholders in the project and their interests

•Modify objectives in the light of stakeholder analysis
•Establish methods of communication channels amongst stake holders

e. How the resource allocation is managed in an activity of programme management?

Resource allocation helps us to choose the best available resources for our projects and manage them throughout the work, so we can avoid under or over utilization of our employees.

f. Write a note on risk evaluation and management.

Risk evaluation is a Determination of risk management priorities through establishment of qualitative and/or quantitative relationships between benefits and associated risks..

2. Attempt *any three* of the following: 15

a. Explain different approaches used for fast delivery of a project.

a. Agile
b. Scrum
c. Kanban
d. Scrumban
e. Lean
f. eXtreme Programming (XP)

b. What are the advantages and disadvantages of a Spiral model?

Spiral model is the combination of both sequential model and prototype model. The spiral model is specifically designed for projects which are huge in size and requires regular enhancements. The spiral model is somewhat similar to the incremental model but more emphasis on risk analysis, engineering, and evaluation.

Advantages

- Risk management is easy in this type of model. When you are handling expensive and complex projects, risk management is a must. Moreover, Spiral model has the ability to make any software testing project transparent.
- Customer can see and review the test and different stages
- Projects can be separated into various parts to ease the management difficulty
- Documentation control is strong in this type of methodology
- Project estimate will tend to be more realistic as it progresses.

Disadvantages

- Cannot be used for small projects as it can be expensive
- A vast amount of documentation owing to several intermediate stages
- The end date of the project cannot be calculated at the early stages of the project
- Complex process
- High expertise is required to run the model

c. Discuss the common problems faced during effort estimation?

1. Subjective nature of estimation
2. Political implications
3. Changing technology
4. Lack of homogeneity of project experience

d. State and explain Capers Jones estimating rules.

Rule 1: SLOC-function point equivalence:

One function point = 125 SLOC for C programs.

• Rule 2: Project duration estimation:
Function points raised to the power 0.4 predicts the approximate development time in calendar months.
• Rule 3: Rate of requirements creep:
User requirements creep in at an average rate of 2% per month from the design through coding phases
• Rule 4: Defect removal efficiency:
Each software review, inspection, or test step will find and remove 30% of the bugs that are present.
• Rule 5: Project manpower estimation:
The size of the software (in function points) divided by 150 predicts the approximate number of personnel required for developing the application
• Rule 6: Number of personnel for maintenance
Function points divided by 500 predicts the approximate number of personnel required for regular maintenance activities.
• Rule 7: Software development effort estimation:
The approximate number of staff months of effort required to develop a software is given by the software development time multiplied with the number of personnel required

e. Explain the top down approach associated with parametric models.

The top down approach has normally associated with parametric (or Algorithmic) models and may be explained using the analogy of estimating the cost of rebuilding a house.

The effort is calculated as **Effort= (system size) X (Productivity Rate)**

Where **Productivity = effort / size.**

f. Write a note on COCOMO II model.

COCOMO-II is the revised version of the original COCOMO (Constructive Cost Model) and is developed at University of Southern California. It is the model that allows one to estimate the cost, effort and schedule when planning a new software development activity.

Stages of COCOMO II are:

Stage-I:

It supports estimation of prototyping. For this it uses Application Composition Estimation Model. This model is used for the prototyping stage of application generator and system integration.

Stage-II:

It supports estimation in the early design stage of the project, when we less know about it. For this it uses Early Design Estimation Model. This model is used in early design stage of application generators, infrastructure, system integration.

Stage-III:

It supports estimation in the post architecture stage of a project. For this it uses Post Architecture Estimation Model. This model is used after the completion of the detailed architecture of application generator, infrastructure, system integration.

3. Attempt *any three* of the following: 15

a. What is the necessity of activity planning?

It increases the efficiency of an organization.
It reduces the risks involved in modern business activities.
It facilitates proper coordination within an organization.
It aids in organizing all available resources.
It gives a right direction to the organization.
It is important to maintain good control.
It helps to achieve the objectives of the organization.
It motivates the personnel of an organization.
It encourages managers' creativity and innovation.
It also helps in decision-making.

b. Explain a network planning model and the concept of backward pass.

It is a project scheduling technique that models the project activities and their relationships as a network. In a network, time flows from left to right. There are two ways Viz: forward pass and backward pass to estimate and schedule the time. Backward pass represents moving backward to the end result to calculate late start or to find if there is any slack in the activity.

c. Define the term risk and discuss the ways to deal with them.

Risk is defined as an uncertain event or condition that, if it occurs has a positive or negative effect on a project objectives. The key elements of a risk are: It relates to the future and It involves the cause and effect. Following are the steps to deal with a risk:

1. Identification
2. Analysis and prioritization
3. Planning
4. Monitoring.

d. Describe Monte Carlo simulation.

Monte Carlo simulations are used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It is a technique used to understand the impact of risk and uncertainty in prediction and forecasting models.

The components of Monte Carlo Simulation are:

1. Probability Distribution Function
2. Random Number Generation
3. Sampling rule
4. Scoring / Tallying
5. Error estimation
6. Parallelization

e. Explain the nature of resources and their scheduling.

Resource is any item or person required for the execution of the project. Resources will fall in following seven categories:

1. Labor
2. Equipment
3. Materials
4. Space
5. Services
6. Time
7. Money.

f. What are the factors considered while allocating tasks to the individuals?

1. Nature of software development
2. Skill and experience
3. Availability
4. Criticality
5. Risk
6. Training
7. Team building

4. Attempt *any three* of the following: **15**

a Give the benefits of review in the process of project monitoring and control.

1. Reviews help to identify any deviation from standards, including issues that might affect maintenance of the software.
2. Suggests ways to improve work product.
3. Provides learning opportunities
4. The review participant gains a good understanding of work product.

b Write a note on change control.

Change control is a process, either formal or informal used to ensure that changes to a product or system are introduced in a controlled and coordinated manner. It reduces the possibility that unnecessary changes will be introduced to a system without

forethought, introducing faults into the system or undoing changes made by other users of software. The goals of a change control procedure usually include minimal disruption to services, reduction in back-out activities, and cost-effective utilization of resources involved in implementing change.

c **Explain the advantages and disadvantages of fixed price contracts.**

Fixed price contract

•A price is fixed when the contract is signed

•If no change in contract ,this is the price they pay on completion

•Once the development is under way the customer cannot change their requirements without renegotiating the price of the contract

Advantages (to customer):

•Known customer expenditure

•Supplier motivated to be cost-effective

Disadvantages:

•supplier will increase price to meet contingencies

•Supplier absorbs the risk in the estimates

•Supplier will add a margin to price quoted

•Difficult to modify requirements

•Cost of changes likely to be higher

•Threat to system quality

d **Explain the stages in contract placement.**

1. Contract Preparation—Identify Your Needs, Establish Goals, Set Expectations, and Define Risk
2. Author the Contract
3. Negotiate the Contract
4. Get Approval Before Finalizing the Contract
5. Execute the Contract
6. Keep Up With Amendments and Revisions
7. Manage After the Signature—Obligations, Auditing, and Renewals

e **Write a note on ethical and professional concerns as a member of any organization**

Many organizations define ethical approach to their professionals. These include:

1. Honesty
2. Transparency
3. Confidentiality
4. Accountability
5. Obedience to the law
6. Objectivity
7. Respect
8. Integrity
9. Loyalty

f **Explain Taylor's model of motivation.**

Taylor put forward the idea that workers are motivated mainly by pay.

His Theory of Scientific Management argued the following:

1. Workers do not naturally enjoy work and so need close supervision and control
2. Therefore managers should break down production into a series of small tasks
3. Workers should then be given appropriate training and tools so they can work as efficiently as possible on one set task.
4. Workers are then paid according to the number of items they produce in a set period of time- piece-rate pay.
5. As a result workers are encouraged to work hard and maximize their productivity.
6. Workers given one repetitive task so they can learn to master it
7. Managers should give orders and closely control workers
8. Workers should be paid per item they produced

5. Attempt *any three* of the following: **15**

a. Describe a virtual team and the advantages of forming a virtual team.

A virtual team refers to a group of individuals who work together from different geographic locations and rely on communication technology such as email, FAX, and video or voice conferencing services in order to collaborate. The term can also refer to groups or teams that work together asynchronously or across organizational levels. It is also defined as "groups of geographically, organizationally and/or time dispersed workers brought together by information and telecommunication technologies to accomplish one or more organizational tasks."

The advantages are:

1. Affordability
2. Access to the highest caliber of employees worldwide
3. Diversity
4. Increased productivity
5. Higher retention rates

b. Write a role of different types of people needed to form a balanced team.

1. The chair
2. The plant
3. The monitor – evaluator
4. The shaper
5. Team worker
6. Resource investigator
7. Completer- finisher
8. Company worker.

c. Define the term quality. Explain McCall's quality model.

Jim McCall produced the McCall software quality model for the US Air Force in 1977. This is used to maintain harmony between the users and the developers. Successful software is developed that fulfills the user needs in consideration with the developer's point of view. Different software quality models are developed and in that only two of the models are considered in the present time for a remarkable quality attributes of the software. Three Main Perspectives of the Quality Attributes of the Software are:

1. Product Revision.
2. Product Transition.
3. Product Operations.

d. State and explain different levels of Capability Maturity Model (CMM). CMM is a reference model for appraising a software development organization into one of five process maturity levels. Describes an evolutionary improvement path for software organizations from an ad hoc immature process :

•To a mature, disciplined one.
•Provides guidance on:
•How to control the process
•How to evolve the process

CMM Level 1 (Initial)

•Organization operates Without any formalized process or project plans
•An organization at this level is characterized by Ad hoc and chaotic activities.
•Software development processes are not defined,
•Different developers follow their own process

Level 2 (Repeatable)

•Basic project management practices are followed
–Size and cost estimation techniques:
–Planning and tracking cost, schedule, and functionality
–Configuration management tools to keep the deliverable items under configuration control

•Development process is ad hoc:Not formally defined, not documented.

Level 3 (Defined)

•All management and development activities Defined and documented.
Common organization-wide understanding of activities, roles, and responsibilities
•Build up the capabilities of its employees through periodic training programs
•Systematic reviews are practiced to achieve phase containment of errors
•The process though defined: Process and product qualities are not measured.

Level 4 (Managed)

•Quantitative quality goals for products are set.
•Software process and product quality are measured:
•Detailed measures of the software process and product quality are collected
Both the software process and products are quantitatively understood and controlled

Level 5 (Optimizing)

•Statistics collected from process and product measurements are analyzed:
– Continuous process improvement based on the measurements.
•Lessons learned from specific projects incorporated into the process.

e. Explain the metrics correlated with Software reliability.

The metrics correlated with the software reliability are:

1. Mean Time to Failure (MTTF)
2. Mean Time to Repair (MTTR)
3. Mean Time Between Failure (MTBR)
4. Rate of occurrence of failure (ROCOF)
5. Probability of Failure on Demand (POFOD)

f. Discuss the reasons for project closure. Two reasons for closing a project are

1. All project goals have been successfully accomplished
2. Project is unlikely to achieve its stated objectives and has to be prematurely terminated

The reasons for prematurely terminating a project are:

1. Lack of resources Eg.Change in top management
2. Changed business need of the customer
3. Perceived benefits accruing from the project no longer remain valid Eg.Competing products
4. Changes to the regulatory policies
5. Key technologies used in the project becoming obsolete during project execution
6. Risks have become unacceptably high Eg. Unsettling company's financial soundness, inviting negative publicity.
