chPPM – Final exam – open questions

Chapter 5

1. Rank the key steps in information development from most to least important and justify your rankings.

1. Problem or need statement - Identifying the underlying problem or need sets the foundation for the project's direction.

2. Information gathering - Comprehensive research ensures informed decision-making and effective problem-solving.

3. Alternative analysis - Exploring different solutions provides options for addressing the problem or need.

4. Project objectives - Clearly defined objectives establish the project's goals, scope, and success criteria.

5. Constraints - Understanding time, budget, and client constraints guides project planning and execution.

2. What is a statement of work and what are the key elements it contains?

A statement of work (SOW) is a detailed description of project requirements, including objectives, work description, outcomes, and constraints. Key elements of an effective SOW include an introduction with a problem statement, technical project description, and timeline with milestones.

3. What is work authorization?

Work authorization is the formal approval given to commence a project after preparing and approving scope definition, planning documents, management plans, and contractual agreements. It often involves a formal sign-off, addressing contractual obligations for external clients.

4. What are three common elements in most work authorization contracts?

Three common elements in most work authorization contracts are contractual elements, consideration, and contracted terms.

- Contractual elements - specify promised functionality or performance criteria.
- Consideration - involves items promised in exchange for reciprocal commitments.

- Contracted terms - outline commitments agreed upon by both parties, including excusable delays, allowable costs, liquidated damages, inspection criteria, and responsibility for defect correction.

5. What is the difference between a turnkey contract and a cost-plus contract? Include in your discussion the advantages and disadvantages of each.

turnkey contract - places all responsibility on the project organization for successful performance. It works well with clear contracts and reasonable initial cost estimates, but the contractor bears all unforeseen costs.

Cost-plus contract - fixes the contractor's fee in advance, with the requesting party paying for all costs plus the fee. This shifts risk to the requesting party, as there's little incentive for the contractor to control costs.

6. You have decided to install a naturalistic outdoor pool in your backyard, replete with caves, live plants, boulders and sparkling waterfalls, capable of comfortably accommodating the party guests you occasionally. Which would better suit you, a turnkey contract or a cost-plus contract? Support your reasoning and enumerate the potential weaknesses of both approaches.

For the outdoor pool project, a turnkey contract is preferable as it ensures the contractor takes full responsibility for delivering specified features. However, risks include underestimated costs or missed elements, leading to extra expenses. A cost-plus contract provides cost transparency but shifts risk to the homeowner, potentially resulting in higher costs and uncertainty about the final project expense.

7. What is contained in scope reporting and what function does it serve?

Scope reporting involves determining the information to be regularly reported, recipients of the reports, and how the information will be acquired and shared. It typically includes cost performance, schedule status, and technical performance against plans. Recipients may include project managers, team members, clients, top management, and other relevant internal and external stakeholders.

8. The Project Management Research in Brief for Chapter 5 discusses Information Technology (IT) Project "Death Marches." What are the facts about such projects and what conclusions does the article present?

The Project Management Research in Brief for Chapter 5 highlights the challenges faced by IT projects, including significant delays and budget overruns. On average, these projects can be 6 to 12 months behind schedule and exceed budgets by 50% to 100%. This leads to wasted effort, burnout, and missed deadlines. "Death march" projects, where parameters

exceed the norm by at least 50%, are particularly problematic due to unrealistic demands. To prevent such situations, thorough assessment of project goals, budget, personnel, and schedule is essential.

9. What is a scope statement and what are the key steps in the scope statement process?

The scope statement is a crucial document that outlines important project parameters before proceeding to the development phase. The key steps in the scope statement process include: establishing project goal criteria, developing the management plan, creating a work breakdown structure, and establishing a scope baseline.

10. List any five important points to remember when defining work packages.

1. They form the lowest level in the work breakdown structure.

2. Each work package has a deliverable result.

3. Each work package has one owner.

4. Work packages may be considered as individual projects by their owners.

5. Work packages may include multiple milestones.

11. What is hierarchy among the deliverable, work package, subdeliverable, and project? Create an example starting with the most macro element, cascading through to the lowest element.

The hierarchy among project elements starts with the project itself, which encompasses all its deliverables. Within each deliverable, there are subdeliverables, and within each subdeliverable, there are work packages. For example, consider a construction project:

1. Project: Building a new office complex

- Deliverable: Construction of the main building

- Subdeliverable: Structural framework

- Work Package: Pouring concrete for foundation

12. Provide an example of work breakdown structure and indicate what purpose WBS serves.

A work breakdown structure (WBS) serves to break down a project into manageable tasks or activities, facilitating planning, scheduling, and resource allocation. For example, in planning a study tour of Mexico, the WBS might include categories like transportation, housing, business visits, recreation visits, and curriculum. Each category can then be

further divided into specific tasks, such as booking flights, arranging accommodations, scheduling site visits, and developing educational materials.

13. Provide an example of a work package and a WBS code and indicate the information they provide.

A work package represents a specific task within a project, such as designing a syllabus for an introductory course. It is the lowest level in the work breakdown structure (WBS). A WBS code, like 2.3.8, is assigned to each work package for tracking purposes, allowing for precise monitoring of costs and financial control throughout the project.

14. What is organization breakdown structure?

The Organization Breakdown Structure (OBS) involves assigning project work to specific organizational units responsible for performing those activities. It helps define the work to be accomplished and allocate it to the owners of the work packages within the company.

15. What is the purpose of controls? Describe any three types of control systems.

Control systems are crucial for managing changes to the project baseline systematically. They focus on aspects like configuration, design, trends, documents, acquisition, and specification.

Configuration control - monitors project scope against the original baseline.

Design control - oversees scope, schedule, and costs during the design stage.

Document control - ensures timely dissemination of important documentation.

16. What is configuration management and why is it important?

Configuration management involves formal documented procedures to identify, document, control, and report changes to the functional and physical characteristics of a product, service, or component. It's crucial for maintaining the baseline scope of a project and managing project changes systematically. With complex projects involving multiple teams or subcontractors, configuration management ensures all parties are informed of changes and helps maintain project alignment with requirements and objectives.

17. What are two common reasons that project or specification changes must be made?

Two common reasons for project or specification changes are initial planning errors by the design team and the emergence of new knowledge or environmental conditions during project progress. Additionally, mandates from external entities or client requests for new features can also necessitate changes.

18. What takes place at the project closeout step?

At the project closeout step, project managers prepare necessary records and reports for themselves and clients. This includes historical records, post-project analysis, and financial closeout documentation. These records serve various purposes such as resolving contractual disputes, serving as a training tool, and facilitating project auditing tasks.

19. How should the project closeout step be planned?

Project closeout planning is integral to scope management. It involves identifying the records and reports needed by both project managers and clients at the project's completion. Planning should begin early in the scope development process to ensure useful information collection throughout the project. Starting with clear goals establishes what completion entails. Effective project closeout requires proactive consideration of the information to be collected, supported by a robust tracking and filing system.

20. Provide an example of one sustainable project management practice that organizations with a commitment to sustainability may implement.

One sustainable project management practice is implementing projects that prioritize environmental and social responsibility. This includes engaging in sustainable projects, employing eco-friendly practices during project execution, developing sustainable supplier relationships, and integrating sustainability into project design.

21. Describe the triple bottom line of sustainability and describe the relationship between each of the three components.

The triple bottom line of sustainability encompasses economic, social, and environmental dimensions. These components are interrelated, with actions in one area affecting the others. For example, economic growth can impact the environment and social well-being, while social policies may influence economic outcomes. Achieving sustainability requires balancing and integrating all three dimensions in a collaborative manner.

Chapter 7

1. How does risk level vary with project life cycle stages? Where is the period of highest risk impact? Why?

Risk varies throughout the project life cycle, peaking during the concept phase and gradually decreasing during development, execution, and termination phases. The concept phase poses the highest risk due to high uncertainty about project outcomes. As the project progresses, uncertainties are resolved, reducing risk. However, during the execute and finish phases, although risk is lower, the stakes are higher, as project

completion and acceptance are critical for success. Thus, the period of highest risk impact occurs late in the project's life cycle.

2. What are the four distinct stages of systematic risk management and what takes place at each?

The four stages of systematic risk management are:

1. Risk identification - Identifying specific risk factors that may affect the project.

2. Analysis of probability and consequences - Assessing the likelihood and impact of identified risks.

3. Risk mitigation strategies - Developing plans to minimize the impact of significant risks.

4. Control and documentation - Documenting risk management activities and lessons learned for future projects.

3. What are any four common categories of risk? What is an element of each category?

1. Financial risk - Involves the exposure to financial losses, such as up-front capital expenditures.

2. Technical risk - Arises from unique technical elements or new technology, posing uncertainties in project execution.

3. Commercial risk - Pertains to uncertainties in achieving success in the marketplace despite definite commercial intent.

4. Execution risk - Encompasses unknowns and challenges associated with carrying out the project plan effectively.

4. What are the basic qualitative methods for identifying risk factors? What are the advantages and disadvantages of each method?

1. Brainstorming: Involves team collaboration to generate ideas quickly.

- Advantages - rapid idea generation.
- Disadvantages - dominance by certain members or judgmental behavior.

2. Delphi method: Collects expert opinions anonymously in rounds.

- Advantages -avoiding dominance but may lack real-time synergy.
- Disadvantages - potential inability to articulate methods or screening out valuable ideas.

3. "Experience counts" approach: Seeks input from individuals with relevant project experience.

- Advantages - richness of observations.
- Disadvantages - lack of structure may result in less knowledge transfer.

4. Past history analysis: Examines patterns from previous projects.

- Advantages - using historical data.
- Disadvantages - it may not reliably predict the future.

5. Multiple assessments: Involves diverse team members specializing in different aspects of the project.

- Advantages include comprehensive risk identification
- Disadvantages: pitfalls include challenges of group discussion.

5. Your project team is interested in determining an overall risk factor for your project to develop a personal submarine constructed entirely of Popsicle sticks and wood glue. Describe how you would develop reasonable estimates for each of the probability of failure categories and each of the consequence of failure categories.

To estimate the probability of failure for our personal submarine project, we would assess the maturity of the design, complexity of the craft, and dependency on new technologies. For consequence of failure, we'd consider cost implications, schedule delays, reliability issues, and impact on performance. A risk impact matrix could organize this information efficiently. The design's maturity, complexity, and reliance on new technology influence the probability of failure, while failure consequences are influenced by factors like cost, schedule, reliability, and performance, especially critical for an underwater vessel.

6. What are the four alternatives a project organization can adopt in deciding how to address their risks? What are the advantages and disadvantages of each? Which is best and why?

1. Accepting risks is suitable for minor issues with low likelihood or consequence.

2. Minimizing risks involves prevention or mitigation strategies.

3. Sharing risks distributes them among project members but requires clear contracts.

4. Transferring risks shifts them to another party through contractual agreements, relieving the organization but at a cost.

The best approach depends on the risk severity and available resources. Acceptance is suitable for minimal risks, while more serious risks may warrant mitigation, sharing, or transfer depending on the organization's capabilities and priorities.

7. There are four alternatives a project organization can adopt in deciding how to address their risks. Develop four different scenarios, one each for which each of the alternatives would be appropriate. Justify your selections.

1. Accept Risk - A software development company faces minor risks of project requirement changes for a mobile app. They accept the risk, focusing on timely delivery without additional measures.

2. Minimize Risk - An aerospace firm mitigates risks in a new aircraft design by extensively testing critical components to ensure reliability under various conditions, reducing potential failures.

3. Share Risk - A construction company collaborates with subcontractors on an infrastructure project, allocating responsibilities and liabilities through contracts to distribute risks and minimize impacts.

4. Transfer Risk - A pharmaceutical company partners with a contract research organization for clinical trials, transferring responsibilities and associated risks to expedite drug development while focusing on core competencies.

8. What are fixed-price contracts and liquidated damages? Which party to the contract bears the burden?

Fixed-price contracts - set a project price before work begins, with the project organization bearing the costs of any difficulties encountered.

Liquidated damages - are penalty clauses activated at project milestones, with the project organization responsible for paying these penalties.

9. What are the two types of contingency reserves and how are they handled?

Task contingency - is used to offset budget or schedule uncertainties at the individual task level.

Managerial contingency - addresses higher-level risks, such as scope changes, at the project level.

These reserves are allocated to cover unforeseen circumstances and ensure project success.

10. How do mentoring and cross-training mitigate risk?

Mentoring - pairs junior with senior project managers, helping juniors learn best practices and mitigate risks by providing guidance and support.

Cross-training - ensures team members understand their own roles as well as those of others, enabling flexibility and risk mitigation by allowing members to fill in for each other as needed.

11. What does change management accomplish and what are the components of an effective change management program?

Change management ensures that changes to the project are effectively identified, evaluated, and implemented to minimize disruption and maximize project success. An effective change management program includes components such as documentation of changes, risk assessment, reduction plans, and clear guidelines on who, what, when, why, and how changes are made to the baseline project plan.

12. What is the PRAM methodology and what are its salient features?

The PRAM (Project Risk Analysis and Management) methodology, developed by the European Association for Project Management, is an integrated program for managing project risks throughout its life cycle. It emphasizes the need for risk management to be integrated at every stage of the project and employs various risk management strategies tailored to different points in the project life cycle. PRAM combines multiple risk management approaches into a cohesive and systematic framework.

13. Pick any three steps in the PRAM methodology and explain the deliverables generated by that step.

Define—a clear unambiguous, shared understanding of all key aspects of the project documented, verified, and reported.

Identify—all key risks and responses identified; both threats and opportunities classified, characterized, documented, verified, and reported.

Evaluate —diagnosis of all important difficulties and comparative analysis of the implications of responses to these difficulties, with specific deliverables like a prioritized list of risks.

Chapter 8

1. What are four major categories of costs? Provide descriptions for each category.

1. Labor Costs - Expenses related to hiring and paying personnel involved in the project.

2. Material Costs - Costs for equipment and supplies needed to complete project tasks.

3. Subcontractor Costs - Fees for external resources and expertise provided by subcontractors.

4. Equipment and Facilities Costs - Charges for renting equipment and facilities necessary for project development.

Additionally, business travel expenses may also be included as part of the project costs.

2. Provide examples and discuss the differences between direct and indirect costs.

Direct Costs - are directly linked to specific project activities. Examples include:

- Labor directly involved in production.
- Materials used in the creation of the project.

Indirect Costs - are related to overall operations and are harder to assign to specific project activities. Examples include:

- Overhead expenses like health benefits, taxes, and insurance.
- Depreciation and repairs.

Direct costs are easier to calculate, whereas indirect costs are often estimated as a percentage of direct costs.

3. Rank the four different types of cost estimates from most to least accurate and explain what the inputs are to each type.

1. Definitive Estimates - ±5% accuracy, based on detailed design work and well-understood project scope.

2. Feasibility Estimates - ±10% accuracy, made after preliminary design work and initial scope development, using supplier and subcontractor quotes.

3. Comparative Estimates - ±15% accuracy, based on historical data from similar projects.

4. Ballpark Estimates - ±30% accuracy, created with limited information or time.

4. What are parametric cost estimates and how are they developed?

Parametric cost estimates use historical data to estimate current project costs. They apply a multiplier to past project costs to account for inflation, labor, material increases, and other factors.

6. Define learning curve theory and describe how learning curves are used in project management.

Learning curve theory posits that as a task is repeated, the time required to complete it decreases by a consistent percentage with each doubling of output. In project management, this theory is applied to tasks performed repeatedly. Instead of multiplying the number of repetitions by the time for the first task, managers use the learning curve equation Yx = aX^b to estimate the reduced time for subsequent tasks. This helps in more accurately estimating labor and time, leading to more competitive project bids.

7. What are function points and how do they work?

Function points are a standard unit of measure that represents the functional size of a software application. In one sense, they are an ABC approach to cost estimation based on the functional complexity of different program features. Total system cost is estimated based on the number and complexity of different elements needed for the software package.

8. What are the major issues with cost estimation of software projects?

Software project cost estimation faces significant challenges, with less than 9% of IT projects in large companies finishing on time and within budget, and over half exceeding their budgets by nearly 200%. Issues include inadequate budgeting for project activities and shifting focus as project complexity increases. Small projects primarily spend time on design, coding, debugging, and unit testing, while larger projects focus more on architecture, integration, and system testing. Accurate budgeting must account for project size and complexity to allocate appropriate funds for these activities.

9. Describe any three reasons that cost overruns occur in project work.

1. Low Initial Estimates - Estimates may be deliberately low to gain approval or accidentally due to carelessness, leading to inevitable cost overruns.

2. Unexpected Technical Difficulties - High-tech projects often face unforeseen challenges with new technology, increasing costs.

3. Scope Creep - Specification changes and poor initial scope development result in additional time and resources needed, driving up costs.

10. The project management research in brief titled "Delusion and Deception Taking Place in Large Infrastructure Projects," describes three reasons that cost overruns occur in large infrastructure project work. Briefly describe these three reasons

Cost overruns in large infrastructure projects often stem from:

1. Optimism Bias - Executives fall into the "planning fallacy," underestimating costs and obstacles due to delusional optimism and assuming best-case scenarios.

2. Deliberate Deception - Stakeholders may deliberately underestimate costs to get project approval, knowing the project is likely to proceed once it is started.

3. Bad Luck - Unforeseen circumstances, environmental impacts, and misfortune can disrupt and escalate project costs despite careful planning and best intentions.

11. What's the relationship between WBS, scheduling, and budgeting?

The relationship between WBS, scheduling, and budgeting is integral. The project budget, aligned with organizational goals, allocates resources based on the project schedule. The WBS defines project activities, setting the foundation for the schedule, while the budget ensures the necessary resources are available to support the schedule.

12. How are top-down and bottom-up budgets created? What advantages does each approach hold over the other?

Top-down budgeting - involves direct input from top management to estimate project costs, leveraging their experience and strategic vision. It can lead to friction among departments as they compete for budget allocations.

Bottom-up budgeting - starts from the project's work breakdown structure, assigning direct costs to activities, which are then aggregated to form the overall budget. This approach fosters detailed planning and coordination among project managers and departments, but may limit top management's control and alignment with strategic objectives.

13. What is activity-based costing and how is it performed?

Activity-Based Costing (ABC) assigns costs to activities and then to projects based on resource use. It involves four steps: identifying resource-consuming activities, determining cost drivers, computing a cost rate per driver, and allocating costs to projects based on driver usage.

14. What is a time-phased budget and how does it help a project manager control costs?

A time-phased budget allocates costs across both project activities and the anticipated time in which the budget is to be expended. The budget can be displayed as a table with one dimension representing time and the other dimension representing the major cost categories or the budget can be summarized by a time plot of dollars. A time-phased budget allows the project manager to match the project schedule with a budget baseline, identifying milestones for both schedule performance and project expense.

15. What is a budget contingency and what are three reasons it might be useful?

A budget contingency is extra funds added to cover uncertainties, ensuring project completion within the planned timeframe. It is useful because:

- Scope Changes - Covers costs due to unexpected changes in project scope.
- Unforeseen Problems - Addresses issues arising from Murphy's Law—anything that can go wrong will.
- Unexpected Conditions - Compensates for deviations from the normal operating conditions anticipated in the initial plan.

16. What are three benefits to the use of contingency funds?

1. Buffer for Uncertainties - They provide a cushion for unexpected costs, helping manage time and budget variances.

2. Preparedness for Extra Expenses - Their use alerts management to potential future budget increases.

3. Early Warning - They signal possible budget overruns, prompting proactive planning to address financial risks.

Chapter 9

1. What is the background of CPM and PERT? What are the differences between the two techniques?

PERT (Program Evaluation and Review Technique) was developed in the late 1950s by the U.S. Navy, Booz-Allen Hamilton, and Lockheed for the Polaris missile project, focusing on R&D with uncertain activity durations. CPM (Critical Path Method), created by DuPont around the same time, is widely used in construction and assumes more predictable activity durations. CPM emphasizes time/cost trade-offs, facilitating project acceleration. Over time, the distinctions between PERT and CPM have diminished, and they are often collectively referred to as PERT/CPM.

2. What does a network diagram illustrate and why are they important in project management?

A network diagram provides a schematic display of a project's work packages, showing the logical relationships and dependencies among them. It plays a vital role in coordinating resources, scheduling personnel commitment to project activities, and distinguishing critical tasks essential for maintaining project timelines and ensuring successful completion.

3. What are hammock activities and when should they be used?

Hammock activities function as summary tasks within a project network, consolidating and representing subsets of related activities. They are valuable in complex project environments with numerous tasks, aiding in better organization and resource allocation. Additionally, they streamline cost management across different departments or cost centers, improving overall project efficiency and oversight.

4. What are three methods of duration estimation for project activities and what are the advantages and disadvantages of each method?

1. Past Experience - Uses historical data for easy estimation, but assumes similar conditions, which may not always apply.

2. Expert Opinion - Relies on knowledgeable experts for accurate estimates, though they might underestimate if unfamiliar with the specific task.

3. Mathematical Derivation - Involves optimistic, most likely, and pessimistic estimates for objectivity, but is more time-consuming due to the need for multiple estimates per activity.

5. What is the underlying theory to the three time estimates approach? What data distribution should be applied in this case and what confidence should a project manager place in the calculations associated with this technique?

The three time estimates approach uses probabilistic theory to estimate activity durations. It considers optimistic, most likely, and pessimistic durations to calculate a mean and standard deviation for each activity. A normal distribution is suitable for symmetrical estimates, while a beta distribution works for asymmetrical ones. This method aims to achieve high confidence in project duration estimates by leveraging probability distributions.

6. What is laddering and what advantages can be gained from its use in project management?

Laddering is a technique that allows us to redraw the activity network to more closely sequence the project subtasks to make the overall network sequence more efficient. Complicated activities are broken down into smaller activities by virtue of identifying milestones within them. If a successor activity can begin after the attainment of one of these milestones, then project resources can be more fully employed, project duration can be reduced and the linkage and sequencing between activities can be streamlined.

7. Discuss any five approaches to reducing the critical path. Which is the most effective and which is the most difficult to achieve? Why?

1. Eliminate tasks on the critical path - Remove or reschedule tasks to non-critical paths to shorten the critical path.

2. Re-plan serial paths to be parallel - Convert sequential activities into concurrent ones to reduce project duration.

3. Overlap sequential tasks - Use laddering to overlap activities that were previously sequential.

4. Shorten the duration of critical path tasks - Adjust underestimated task durations to decrease the critical path length.

5. Shorten early tasks - Focus on reducing the duration of tasks that can be completed sooner, leveraging their certainty.

The most effective approach varies by project, but shortening critical path tasks and overlapping sequential activities are often impactful. The most challenging approach is often overlapping sequential tasks, as it requires careful coordination and resource management to avoid conflicts and ensure successful parallel execution.

Chapter 10

1. What is a Gantt chart, what information does one provide, and what are the benefits of using one?

A Gantt chart is a visual representation of project tasks displayed along a timeline, indicating their start and end dates, as well as dependencies between tasks. It helps in planning and scheduling projects, tracking progress against planned timelines, managing resources effectively, providing clear project oversight and control, and is widely appreciated for its user-friendly nature in creating, updating, and communicating project plans.

2. What is project crashing and what are three reasons why it might be important to do so?

Project crashing involves expediting a project by intensifying resource allocation to shorten its duration. This strategy is crucial when initial schedules are overly optimistic, market demand requires quicker delivery, or contractual obligations demand adherence to stringent timelines to avoid penalties or loss of opportunities.

3. What are the three principal methods for accelerating a project and under what circumstances might these methods yield little gain?

The three principal methods for accelerating a project involve enhancing resource productivity, modifying technologies or work methods, and increasing resource quantities

such as personnel or equipment. However, these strategies may yield minimal gains if current resources are already operating efficiently, technological changes disrupt project continuity, or adding more resources proves costly and disrupts team dynamics and morale.

4. What are the strengths and weaknesses of AOA and AON techniques?

Both Activity on Arrow (AOA) and Activity on Node (AON) techniques establish sequential logic for project activities. AON is simpler to learn and widely supported by project management software, facilitating easy labeling and interpretation. However, AON can become cumbersome with a large number of activities. AOA, preferred in construction for its clarity with numerous activities, visually represents activity durations with arrows. Yet, AOA can be challenging due to dummy activities and scattered data, unlike AON where all activity details are centralized within nodes.

5. How might a project manager alter a straightforward PERT network to accommodate an inordinately large and complex project?

To handle an excessively large and complex project, a project manager can simplify the PERT network by focusing on essential relationships and key subroutines rather than detailing every possible path and activity sequence. This meta-network approach streamlines the project overview while allowing detailed breakdowns of specific subroutines by responsible administrators or managers.

6. What are four criticisms and caveats to bear in mind as you develop a project activity network?

1. Networks can become overly large and complex, making it challenging to manage and forecast accurately, especially for long-duration projects.

2. Faulty reasoning in network construction may lead to oversimplification or inaccurate representations of project interdependencies.

3. Networks are sometimes used inappropriately for tasks they are not well-suited for, compromising their effectiveness.

4. PERT estimation used in network construction often leads to optimistic activity duration estimates, potentially affecting project timelines and outcomes.

Chapter 11

1. What is the waterfall planning process and when is it the ideal approach to project development?

The waterfall planning process is a linear approach to software development, where each stage (requirements gathering, system design, implementation, testing, deployment, and maintenance) must be completed before progressing to the next. It originated from the procedural nature of early programming languages, emphasizing thorough planning upfront to avoid rework later. This method is suitable when project requirements are clear, technology is well-understood, resources are available, and there's minimal expectation of changes during the project lifecycle.

2. What is Agile PM and what makes it ideal for many software development projects?

Agile project management, often associated with methodologies like Scrum, emphasizes flexibility and continuous customer involvement throughout the development process. It uses iterative cycles, known as sprints, typically lasting one to four weeks, allowing for adaptive planning and responding to evolving requirements—a key advantage in dynamic software development projects.

3. What takes place in the Scrum process?

In Scrum, a key Agile project management approach, the process begins with Sprint Planning, where the team collaboratively identifies the work for the upcoming Sprint. Daily Scrums follow, brief meetings where team members synchronize activities and plan for the day. The team then executes the development work according to the plan, culminating in a Sprint Review to assess the outcomes. Finally, a Sprint Retrospective allows for reflection and improvement for future Sprints. This iterative cycle ensures continuous adaptation to project goals and evolving requirements.

4. Compose a haiku using three or more of the key terms in Agile PM.

Product backlog, Sprint goals and daily scrums, Agile team evolves.

Chapter 12

1. What are the three types of constraints that projects face; provide examples and suggest ways to address these constraints?

1. Time constraints - Projects that must be completed by a specific deadline, such as launching a new product by a set release date.

2. Resource constraints - Projects limited by the availability of resources like manpower, equipment, or budget, which may restrict the project's pace or scale.

3. Mixed constraints - Projects that combine elements of both time and resource constraints, requiring careful balancing to meet deadlines without exceeding resource limits.

Addressing time constraints often involves increasing workforce efforts or extending work hours. Resource constraints can be managed by optimizing resource allocation or acquiring additional resources. Mixed constraints require a balanced approach, possibly leveraging both time and resource management strategies.

2. What are any four heuristics for prioritizing resource allocation to activities? Why would a project manager choose one above another?

1. Activities with the smallest amount of slack - These are prioritized to minimize schedule slippage.

2. Activities with the smallest duration - Prioritizing shorter activities can quickly reduce the number of ongoing tasks.

3. Activities with the most successor tasks - Focusing on activities that unlock subsequent tasks maximizes progress across the project.

4. Activities requiring the most resources - Addressing resource-intensive activities ensures efficient use of available resources.

Project managers choose one heuristic over another based on project-specific goals, such as minimizing delays, optimizing resource utilization, or achieving rapid progress. Each heuristic offers a practical guideline to manage resource allocation effectively amid varying project constraints and requirements.

3. Describe resource leveling; its objectives and the basic five-step technique to perform it.

Resource leveling aims to manage project constraints by smoothing out resource demands over the project's duration. Its objectives are to ensure resources are available when needed and to schedule activities to minimize peaks and valleys in resource utilization. Here are the basic steps to perform resource leveling:

1. Create a project activity network diagram - Map out all activities and their dependencies.

2. Develop a resource requirements table - Detail resource needs, activity durations, and available float for each activity.

3. Build a time-phased resource loading table - Outline resource requirements over time, considering early starts and late finishes for activities.

4. Identify resource conflicts - Detect overlaps or shortages in resource availability.

5. Smooth resource loading - Use prioritization heuristics to adjust resource assignments across activities, iterating as needed to resolve conflicts.

4. What are the trade-offs among schedule slippage, resource utilization, and in-process inventory for a project manager in a multiproject environment?

Schedule slippage is a negative consequence on time performance for a project. Resource utilization is the degree to which available resources are deployed and in-process inventory represents the amount of work waiting to be completed but delayed due to unavailable resources. Resource utilization can be increased by deploying all available resources as fully as possible.

5. What are any three common heuristics that can be used to schedule resources in a multiproject environment? Comment on their advantages and disadvantages.

1. First in line - Resources are allocated based on the order projects enter the queue. This heuristic is simple to implement but may not prioritize projects effectively based on strategic importance or resource demand.

2. Greatest resource demand - Projects with the highest resource requirements are scheduled first to address potential bottlenecks early. This heuristic ensures critical projects receive necessary resources but may overlook smaller projects with strategic importance or quicker turnaround times.

3. Greatest resource utilization - Projects utilizing the most resources are prioritized first to maximize resource efficiency. This approach ensures optimal resource utilization but may neglect projects with lower resource demands that could generate quicker returns.

6. Rank the three key parameters, schedule slippage, resource utilization, and in-process inventory, from most critical to least critical for an organization and justify your ranking.

1. Schedule slippage - Most critical. A missed schedule can lead to customer dissatisfaction, penalties, and missed business opportunities.

2. In-process inventory - Significant impact. Excessive inventory ties up resources and can lead to inefficiencies in resource allocation and increased costs.

3. Resource utilization - Least critical. While efficient resource use is important, it's preferable to prioritize timely project completion over maximizing resource utilization, which can sometimes lead to unnecessary busywork and inventory buildup.

7. What is mathematical programming, how can it be applied to resource decisions, and what are the advantages and disadvantages of doing so?

Mathematical programming is a method used to find optimal solutions for resource-constrained problems in both single and multiproject environments. It aims to minimize development time and lateness while maximizing resource utilization across projects. However, its application is limited by the complexity of the problems, the large number of variables involved, and the time required to compute solutions effectively. Despite its ability to generate optimal outcomes, these practical challenges restrict its widespread use in project management.

Chapter 13

1. What is a tracking Gantt chart and what are the benefits and drawbacks of its use?

A tracking Gantt chart is a visual tool that includes bars representing project activities, with colors indicating their current completion status from 0% to 100%. It offers real-time visibility into project progress, allowing stakeholders to quickly assess whether activities are on schedule, ahead, or behind. While easy to understand and update, tracking Gantt charts do not provide insights into the reasons for activity status or predict future project outcomes such as completion time or budget adherence.

2. Define human factors and discuss their impact on project success?

Human factors in project management pertain to how people behave and interact within the project environment. They encompass both technical and non-technical aspects that influence project success. For instance, human factors consider how individuals use systems designed for projects and how circumstances might lead to misuse or inefficiency. Understanding these dynamics is crucial for implementing effective controls and ensuring projects progress smoothly.

3. Identify a different key success driver and inhibitor for the project stages of formation, build-up, main phase, and close-out.

There is considerable overlap in many of the key success drivers and inhibitors for project success. The presence of team and personal motivation and top management support appear throughout all of the phases of successful projects. Poor leadership and an unmotivated team are equally popular in each phase of a failed project. The breakdown in its entirety appears in the table.

4. What are any four benefits to using milestones as a form of project control? What advantage do they hold over pure S-curve analysis?

Using milestones in project control offers several benefits:

- They mark the completion of significant project phases.
- Milestones motivate the project team.
- They provide points for reevaluating client needs and change requests.
- Milestones help coordinate schedules with vendors and suppliers.

Unlike pure S-curve analysis, milestones provide clearer indications of project progress and facilitate better coordination and communication among team members and stakeholders.

5. What are drawbacks to a pure S-curve analysis?

Drawbacks of pure S-curve analysis include:

- It lacks the ability to troubleshoot or interpret the reasons behind negative or positive variances.
- It doesn't provide insight into whether deviations from the expected curve are due to efficiency gains or inefficiencies.
- S-curves may not distinguish between under-budgeting with less work completed or over-spending leading to financial challenges.

6. What are the problems with milestones as a project control mechanism?

One of the primary challenges with milestones as a project control mechanism is their reactive nature. They necessitate that project activities be fully completed before evaluation, which can result in delays in detecting problems. For instance, if a milestone is missed significantly, the project manager may not receive this information until it's too late to promptly address the issue. This delay in awareness can lead to compounded problems as remedial actions are delayed, potentially causing further setbacks in the project timeline.

7. What is earned value management and how can it be used to monitor project status?

Earned Value Management (EVM) is a project tracking tool that monitors budget, time, and performance by comparing the value of work performed (earned value) with planned and actual costs. It uses a project baseline created from the work breakdown structure and budget to assess project progress and expenses at different stages of completion. EVM enables project managers to forecast future project status based on current performance against the baseline.

8. What are the inputs and the steps in applying earned value management as a project management tool?

To apply earned value management (EVM) as a project management tool, you need two key inputs: the work breakdown structure (WBS) and a time-phased project budget. The WBS details project tasks and their hierarchy, while the time-phased budget outlines when expenses are expected for each task. These inputs form the project baseline, which shows planned activities and expenditures over time. Earned value is then calculated by determining the percentage completion of activities and comparing it to actual costs against the baseline budget.

9. What is the significance of the 0/100 rule and the 50/50 rule and why would each be used?

The 0/100 rule and the 50/50 rule are methods used to assign completion values to activities in project management. The 0/100 rule considers an activity 0% complete until it is fully finished, then marks it 100% complete. The 50/50 rule assigns 50% completion once an activity starts and progresses to 100% upon completion. These rules simplify progress tracking, especially for short tasks or those dependent on vendor deliveries, by reducing the need for precise ongoing estimation of completion percentages.

10. Can earned value be used to manage a portfolio of projects? If so, how would this analysis proceed?

Earned value management can indeed be used at the portfolio level. The process involves the aggregation of all earned value measures across the firm's entire project portfolio in order to give an indication as to the efficiency with which a company is managing its projects. Each project is described by its own EVM calculations and these calculations are rolled up into an overall portfolio number that reflects schedule and cost variance and estimated completion costs.

11. Briefly describe any seven critical success factors for project success contained in the Project Implementation Profile.

Here are seven critical success factors from the Project Implementation Profile:

- Clear project mission and objectives.
- Strong top management support.
- Detailed project plans and schedules.
- Client consultation and involvement.
- Effective personnel recruitment and training.
- Technical proficiency of the project team.
- Client acceptance and feedback mechanisms.

These factors are crucial for ensuring project success by aligning objectives, securing support, planning effectively, engaging stakeholders, maintaining skilled personnel, achieving technical competency, and ensuring client satisfaction.

12. Briefly describe the important differences between Earned Value Management and Earned Schedule. Why is Earned Schedule gaining acceptance in project management circles?

Earned Value Management (EVM) uses project budget in monetary terms, while Earned Schedule focuses on time units. Earned Schedule is gaining acceptance because it directly measures schedule performance in time units, eliminating the need to translate dollar amounts into schedule delays. It utilizes data collected by EVM systems, making it a more practical and accurate option for project progress reporting, especially as projects near completion.