

CS3SPM Exam Personal Study Material

Software Project Management

This material provides valuable insights to aid in your exam preparation. While it offers useful guidance, it is not meant to serve as your sole preparation resource. In addition to this material, it's essential to incorporate all the topics covered in both lectures and tutorials into your exam preparation.

The intention behind this resource is to assist you in navigating through the lecture slides efficiently, preventing the need to review a large volume of slides aimlessly. Also, remember that you have access to lecture recordings and short support videos, which can be beneficial. We trust that you will find this material helpful.

Included below are a set of questions and exercises designed to assist you as you prepare for the exam. However, please note that this is just a guide. As mentioned earlier, we encourage proactive studying and recommend using the slides provided during lectures and tutorials as a fundamental part of your preparation process.

GENERAL

- EXPLAIN WHY the objectives of a software project should be SMART? What does SMART stand for?
- EXPLAIN WHY is software project management important? Why is it needed?
- EXPLAIN WHY is software project management is different from other project management disciplines? PROVIDE three reasons.
- COMPARE routine tasks, projects, and exploration by detailing their distinct characteristics and key differences.
- CRITICALLY COMPARE the approaches building versus buying software.
- EXPLAIN the advantages and disadvantages of off-the-shelf software.
- EXPLAIN the advantages and disadvantages of prototyping.
- DESCRIBE the different types of prototyping.
- EXPLAIN WHAT are the reasons for prototyping?
- EXPLAIN the advantages and disadvantages of incremental development process.
- EXPLAIN WHAT are incremental development process and agile methods?
- EXPLAIN WHAT are the differences between incremental delivery and prototype?
- EXPLAIN WHY apply agile methods?
- EXPLAIN WHAT are the recommendable 'rules of thumb' to decide which development process should be used (How to choose a model)?
- WHAT is Project size estimation?
- NAME and EXPLAIN three techniques to improve estimation in Software Project Management. Name advantages and disadvantages of each one.

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Measurement and Estimation

- WHAT is estimation and WHY is done in Software Project Management?
- EXPLAIN HOW is the estimation by analogy approach to obtaining effort estimates done?
- NAME and DESCRIBE the limitations of measuring and/or estimating software size in SLOC? WHY do we use it anyway? What are the possible alternatives?
- WHAT units can be used to measure the Size of Software? (NAME four).
- EXPLAIN the various types of scales used for project data, providing examples for each.
- CRITICALLY COMPARE the function-point analysis of software with the analysis done using SLOC.
- EXPLAIN the difference between effort and elapsed time.

Software Project Planning

- DEFINE the objective of the PLANNING activity and DISCUSS what it enables. GIVE an EXAMPLE per each item.
- CRITICALLY COMPARE PRINCE (i.e. PRINCE 2) and Step Wise frameworks.
- NAME THREE ways in which the ACTIVITY NETWORK helps the Software Project Manager in Planning.
- DESCRIBE the approaches that can be used to identify products and activities in projects?
- DRAW an activity network from a given project specification with tasks duration estimations. APPLY the fields (activity description format) studied in lectures to describe each activity; and CALCULATE the quantitative information for each activity, you will need them to identify project critical path and project duration. DISCUSS the fields and how they contribute to the analysis of tasks dependencies during planning.
- About the Critical path: EXPLAIN WHAT is the critical path of a plan? How is it used? EXPLAIN WHAT is it useful for? Can there be more than one critical path? Can there be no critical path at all?
- EXPLAIN what a sub-critical path is and WHY it needs to be monitored. WHY is a sub-critical path important?
- EXPLAIN what objective-based software projects and product-based software projects are and their differences.

Agile: Principles and methodologies

- COMPARE “big-design-up-front” methodologies against “agile” methodologies.
- EXPLAIN the core values and principles of the Agile Manifesto.
- DEFINE the high-level structure of the Scrum Framework.
- EXPLAIN the pillars and values of Scrum.
- EXPLAIN the structure of the Scrum Team.

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- EXPLAIN the Scrum events (sprint planning, daily standups, sprint review, and sprint retrospective).
- COMPARE Product and Sprint Backlogs.
- EXPLAIN Disadvantages and Advantages of Scrum.
- EXPLAIN when to use Scrum, Kanban, or StepWise/PRINCE2.
- CRITICALLY COMPARE Scrum vs Kanban.
- PROVIDE AN EXAMPLE of applying Scrum/Kanban to your FYP or any other project SMART goals and objectives.
- WRITE a short paragraph (MAX 6-8 lines) describing the goal and context of your Final Year Project or any other project. Then: DESCRIBE at least THREE SMART objectives of this project, being careful to explain each of the 5 properties denoted by the SMART acronym but paying particular attention to the property denoted by “M” (in other words how will you check or know that you have succeeded with that objective?)
- For the same project: DESCRIBE at least FOUR project risks, classify them in terms of likelihood and impact, and list possible mitigations for these risks.

Risk Management

- EXPLAIN WHAT are the top 10 software development risks according to Barry Boehm? Also, explain the risk reduction techniques used for each of the 10 risk categories.
- NAME the benefits of risk planning.
- EXPLAIN WHY is risk planning not widely used?
- Briefly DESCRIBE 4 mitigation strategies to get a given software project back on track when the project has experienced delays due to unexpected events.
- EXPLAIN the steps to follow while planning for risk? What does each step cover?
- EXPLAIN WHAT is risk exposure? What is risk reduction leverage?
- DEFINE risk and risk management in the context of software projects.
- WHAT are the categories of risk?
- WHAT are the approaches to identify risks?
- DESCRIBE the FOUR categories of risk in software projects
- Given any software development project as an example (e.g., a final-year undergraduate project whose objective is to develop a web site for booking appointments, or your own project idea or FYP):
 - IDENTIFY FOUR risks associated.
 - ASSESS the likely probability level and impact level of EACH of these risks.
 - DRAW UP a probability-impact grid- Risk matrix (Likelihood vs Impact) – please PLACE the risks you identified in the matrix.
 - LIST two effective mitigation strategies for each identified risk that could help minimise their impact or likelihood.
- IDENTIFY TWO risks in your final year project or any other project. How have/would you deal with them? (THREE lines max per risk).

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Project Monitoring and Control

- WHY are project monitoring and control important?
- DESCRIBE 5 strategies for getting a given software project back on track when the project has experienced delays due to unexpected events.
- WHAT is exception planning?
- EXPLAIN the role of checkpoints and milestones in a software project.
- LIST the artefacts that can be used for project monitoring, including their advantages and limitations.
- Gantt charts, slip charts, any monitoring chart or tools you can exemplify.

Note: In addition to the questions above, do carefully study the tutorials questions (remember examples of solution have been published on Blackboard).

Some of the module content also have short videos as complementary resources.

Specifically, take special care while preparing exercise problems that cover the following:

- **Unit 2: Measurement and Estimation:**
 - Effort estimation - You should know the formulas effort estimation given in class, such as $\text{effort} = \text{system_size} / \text{productivity}$.
- **Unit 3: Planning:**
 - Activity planning: how to construct and use activity networks.
 - Critical path: how to identify it and make analysis based on it
 - Exercise simulation of delays in tasks and path (or possible changes in configuration) that might change project duration
- **Unit 4: Agile methodologies:**
 - Scrum and Kanban details

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- **Unit 5: Risk management**
 - Risk analysis and prioritisation techniques
 - Risk identification, Risk matrix
 - Calculation of the risk exposure factor
 - Application of the Program Evaluation and Review Technique (PERT), including the use of the table with z values.
- **Unit 6: Monitoring and Control (plus Quality)**
 - Gantt charts

Formulas and Z-score Table (provided in the exam paper):

PERT technique

Activity expected time $t_e = (L + 4M + U) / 6$

Activity variance $v = ((U - L) / 6)^2$

For a sequence/chain of activities:

$t_e = t_e(A1) + t_e(A2) + \dots + t_e(An)$ and $v = v(A1) + v(A2) + \dots + v(An)$

For activities running concurrently:

$t_e = \max(t_e(A1), t_e(A2), \dots, t_e(An))$ and $v = \max(v(A1), v(A2), \dots, v(An))$

Given a target deadline T, the z value for an activity, a set of activities or an entire project is given by $z = (T - t_e) / \sqrt{v}$, where t_e and v are the PERT expected time and variance respectively.

Measurement, estimation and data analysis

Effort = S x EpS

Effort = S/SpE

Cost = S x CpS

Cost = Effort x CpE

New Project Effort = Old Project Effort * (Rf1 * Rf2 * ...) + (Af1 + Af2 + ...)

