# Practical Examination

You are working on a project to develop Lab Management application. This application is to help students to improve their programming skills. It would include the following capabilities:

* Allow students to register for university-sponsored Lab classes such as C++ programming, Java Programming, Java Desktop Programming, Java Web Programming, .NET Programming, Python programming classes.
* Allow students to submit their work in the Lab class and to track their progress.
* Allow teacher to manage his classes and to evaluate his students submitted work, to approve or to reject the work.
* Allow teacher to generate the final report of his classes at the end of the semester.

## Request 1 - Work Breakdown Structure

Develop a WBS for the project. Break down the work to Level 3 or Level 4, as appropriate.

Assume that the Level 1 category is called Software Project, and that the Level 2 categories are Initiating, Planning, Executing, Monitoring and Controlling, and Closing. Under the Executing section, include Level 3 categories of Analysis, Design, Prototyping, Testing, Implementation, and Support. The Support category includes Level 4 items for Training, Documentation, User Support, and Enhancements

Software Project (level 1)

1. Initiating (level 2)
2. Create Project Charter (level 3)
3. Kick-off meeting (level 3)
4. Get project charter approval (level 3)
5. Create stakeholder Register (level 3)
6. Planning (level 2)
7. Create Scope Management Plan (level 3)
8. Create Time Management Plan (level 3)
9. Create Cost Management Plan (level 3)
10. Create Risk Management Plan (level 3)
11. Create Resource Management Plan (level 3)
12. Meeting with team to discuss about plans (level 3)
13. Deliver Project Management Plan (level 3)
14. Executing (level 2)
15. Analysis (level 3)
16. Create Feasibility Report (level 4)
17. Create Use-case diagram and use-case description (level 4)
18. Create use-case for module to allow students to register for university-sponsored Lab classes (module 1) (level 5)
19. Create use-case for module to allow students to submit their work in the Lab class and to track their progress (module 2) (level 5)
20. Create use-case for module to allow teacher to manage his classes and to evaluate his students submitted work, to approve or to reject the work (module 3) (level 5)
21. Create use-case for module to allow teacher to generate the final report of his classes at the end of the semester (module 4) (level 5)
22. Create Software Requirement Specification (level 4)
23. Perform Requirement validation (level 4)
24. Perform Requirement management (level 4)
25. Design (level 3)
26. Create design for module 1 (level 4)
27. Create design for module 2 (level 4)
28. Create design for module 3 (level 4)
29. Create design for module 4 (level 4)
30. Prototyping (level 3)
31. Create prototype for module 1 (level 4)
32. Review prototype for module 1 with customer (level 4)
33. Create prototype for module 2 (level 4)
34. Review prototype for module 2 with customer (level 4)
35. Create prototype for module 3 (level 4)
36. Review prototype for module 3 with customer (level 4)
37. Create prototype for module 4 (level 4)
38. Review prototype for module 4 with customer (level 4)
39. Implementing (level 3)
40. Implement module 1 (level 4)
41. Implement module 2 (level 4)
42. Implement module 3 (level 4)
43. Implement module 4 (level 4)
44. Testing (level 3)
45. Perform unit testing (level 4)
46. Perform integration testing (level 4)
47. Perform system testing (level 4)
48. Perform acceptance testing (level 4)
49. Support (level 3)
50. Training (level 4)
51. Documentation (level 4)
52. User support (level 4)
53. Enhancements (level 4)
54. Monitoring and Controlling (level 2)
55. Control scope (level 3)
56. Track progress (level 3)
57. Perform Cost control (level 3)
58. Monitor and control Risk (level 3)
59. Closing (level 2)
60. Create Lesson learn (level 3)
61. Create Project Final Report (level 3)
62. Create Project Archive (level 3)
63. Close Project Ceremony (level 3)

## Request 2 - Deliverables

Identify at least five milestones mapped to the main deliverables for the project. For each milestone, write a short explanation of how to measure its status completed or not.

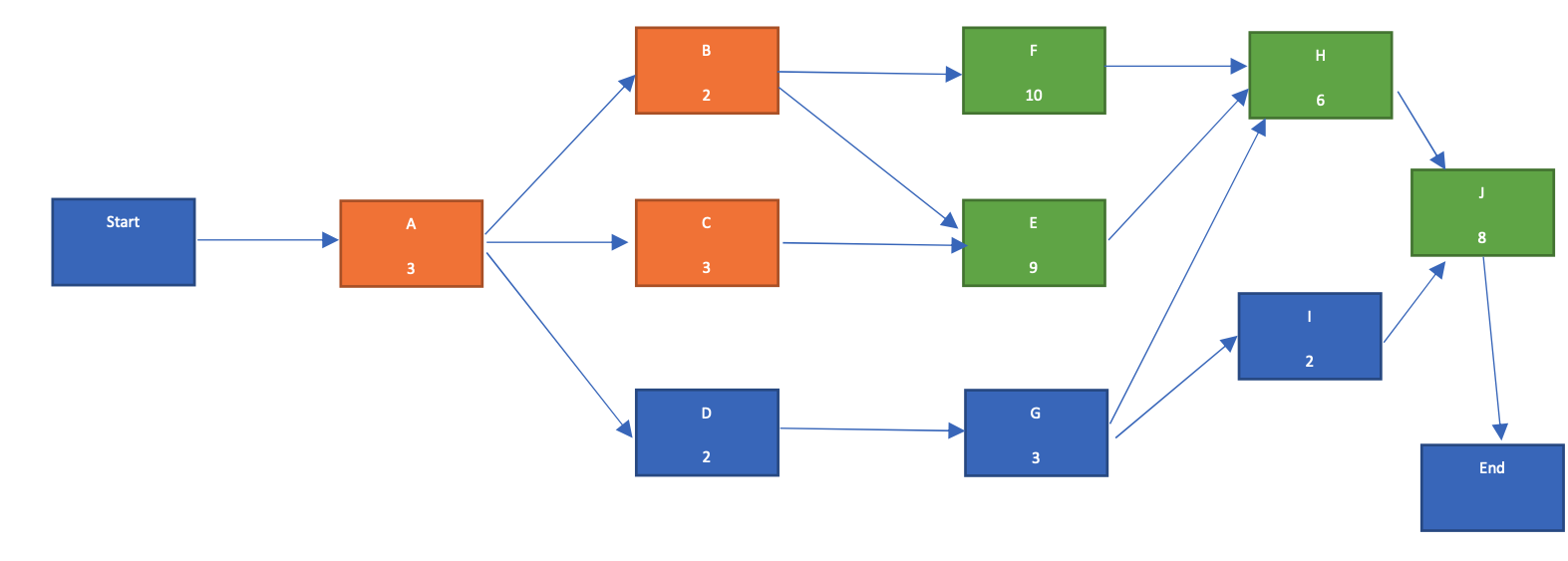
|  |  |  |  |
| --- | --- | --- | --- |
| No | Milestone | Deliverable | Explanation |
| 1 | Complete Initiating Stage | Approved Project Charter  Kick-off Meeting Minutes  Stakeholder Register | + Specific: this milestone is specified for initiating process  + Measurable: it’s measurable by tracking the completion of 3 deliverable  + Attainable: it’s attainable when 3 deliverables are completed  + Relevant: yes, it’s relevant  + Time-bound: yes, it has 1 week to complete |
| 2 | Complete Planning Stage | Project Management Plan | + Specific: this milestone is specified for planning process  + Measurable: it’s measurable by tracking the completion of project management plan  + Attainable: it’s attainable when project management plan is completed and it includes Scope, Time, Cost, Risk, Resource Management Plan and the meeting with team has been done  + Relevant: yes, it’s relevant  + Time-bound: yes, it has 1 week to complete |
| 3 | Complete analysis Stage | SRS documentation  Feasibility Report  Use-case diagram  Use-case Description | + Specific: this milestone is specified for analysis process  + Measurable: it’s measurable by tracking the completion of 4 deliverable  + Attainable: it’s attainable when 4 deliverables are completed  + Relevant: yes, it’s relevant  + Time-bound: yes, it has 2 weeks to complete |
| 4 | Complete design stage | Design for module 1  Design for module 2  Design for module 3  Design for module 4 | + Specific: this milestone is specified for design process  + Measurable: it’s measurable by tracking the completion of 4 deliverable  + Attainable: it’s attainable when 4 deliverables are completed  + Relevant: yes, it’s relevant  + Time-bound: yes, it has 2 weeks to complete |
| 5 | Complete closing Stage | Lesson Learn  Final Report  Project Archive | + Specific: this milestone is specified for closing process  + Measurable: it’s measurable by tracking the completion of 3 deliverable  + Attainable: it’s attainable when 3 deliverables are completed  + Relevant: yes, it’s relevant  + Time-bound: yes, it has 1 week to complete |

## Request 3 – Project Scheduling

Assume that you have defined and estimated project schedule with activities as below

|  |  |  |
| --- | --- | --- |
| **Activity** | **Preceding Activity** | **Duration in Weeks** |
| Start | None | 0 |
| A | Start | 3 |
| B | A | 2 |
| C | A | 3 |
| D | A | 2 |
| E | C, B | 9 |
| F | B | 10 |
| G | D | 3 |
| H | E, F, G | 6 |
| I | G | 2 |
| J | H, I | 8 |
| End | J | 0 |

Draw a network diagram and identify the project duration by applying critical path analysis



List of Paths in the network

Path 1: Start -> A -> B -> F -> H -> J -> End with duration: 3 + 2 + 10 + 6 + 8 = 29 weeks

Path 2: Start -> A -> B -> E -> H -> J -> End with duration: 3 + 2 + 9 + 6 + 8 = 28 weeks

Path 3: Start -> A -> C -> E -> H -> J -> End with duration: 3 + 3 + 9 + 6 + 8 = 29 weeks

Path 4: Start -> A -> D -> G -> H -> J -> End with duration: 3 + 2 + 3 + 6 + 8 = 22 weeks

Path 5: Start -> A -> D -> G -> I -> J -> End with duration: 3 + 2 + 3 + 2 + 8 = 18 weeks

Critical Paths are Path 1 and path 3. And project duration is 29 weeks

## Request 4 – Schedule Updating & Tracking

From the schedule on request 3, after 5 weeks, your manager/sponsor inform you that he would like to receive the product of your project earlier than your planned schedule for 2 weeks. Therefore, you have to find the solutions so that your project could finish 2 weeks sooner.

Define at least two solutions ordered by the choosing priority and include relevant explanation how it will help your project to be developed faster to accomplish on time.

Fast tracking: Arrange task H so that it overlaps over tasks E and F on 2 weeks. This may increase risk, so that require more attention to communication.

Crashing:

* Add people to join project to complete task H earlier than 2 weeks
* Force team to work overtime on task H to complete it earlier than 2 weeks
* Reward team if they can complete task H earlier than 2 weeks

Crashing will increase cost.

## Request 5 – Cost Evaluation

Your project is scheduled for 5 years. There are six different teams working on five major functional areas. Some teams are ahead of schedule while others are falling behind. There are cost overruns in some areas but you’ve also saved costs in others. Due to all this, it is difficult to understand whether you are over or under budget. At the end of the month fifteenth of the project, while the total project budget is $8,400,000, you’ve already spent $2,650,000. CPI is 0.95. Can you perform Earn Value management technique to analyze and determine the status of your project and give some prediction about schedule and cost of the project at accomplishment date. Assume that, in your baseline, you assigned the value of work to be completed each month in equal.

Your project is schedule for 5 years = 60 months

BAC = Total planned budget = $8,400,000

At the end of the month fifteenth of the project.

Planned Value (PV) = 15 \* 8,400,000 / 60 = $2,100,000

Actual cost (AC) = $2,650,000

Earned Value (EV) = CPI \* AC = $2,517,500

Schedule Performance Index (SPI) = EV/PV = 1.2 > 1

Cost Performance Index (CPI) = EV/AC = 0.95 < 1

Therefore the project is over budget, and ahead of schedule.

Estimate Budget at Completion (EAC) = BAC/CPI = $8,842,105

Estimate Schedule to complete project = 60 / 1.2 = 50 months

AC = 2650000

CPI = EV / AC = 0.95 => EV = 2517500

status of your project phụ thuộc vào SPI và CPI

**SPI = EV/PV (Schedule Performance Index)**

If the project is behind schedule the SPI < 1 (i.e. achieved less than what planned)  
If the project is on schedule the SPI = 1  
If the project is ahead of schedule the SPI > 1 (i.e. achieved more than what planned)

**Cost Performance Index (CPI)** — ratio between EV and AC, to reflect whether the project work is under / on / over **budget in relative terms**

* **CPI = EV/AC***If the project is over budget the CPI < 1 (i.e. achieved less than spent)*  
  *If the project is on budget the CPI = 1*  
  *If the project is under budget the CPI > 1 (i.e. achieved more than spent)*

**Budget at Completion (BAC)** — also known as the project/work budget, that is the total amount of money originally planned to spend on the project/work

* ***example***: the BAC for the housing project = US$1000 x 10 = US$10000
* **Estimate at completion (EAC)** — as the project goes on, there may be variations into the actual final cost from the planned final cost, EAC is a way to project/estimate the planned cost at project finish **based on the currently available data**

**EAC = BAC/CPI**

* **Planned Value (PV)** — The **budgeted value** of the work completed so far at a specific date  
  ***example:****at end of week 4, altogether 4 houses should be completed, the PV is US$4000*
* **Earned Value (EV)** — The **actual value** of the work completed so far at a specific date (refer to the “Notes on Earned Value Measurement” section below)  
  ***example:****by end of week 4, only 3 houses are completed, the EV is US$3000*
* **Actual Cost (AC)** — The total expenditure for the work so far at a specific date  
  ***example:****by end of week 4, US$4000 was spend, the AC is US$4000*