FINAL EXAMINATION – September 17th, 2013

Duration: 2 hrs

## name:

# Contract Definition (5 points)

A multinational company, specialized in online sale of food products, is willing to develop a web marketing tool to be integrated into the existing Customer Relationship Management (CRM) system. The new tool should be designed and implemented by a sole technology vendor. The design shall be developed based on available preliminary functional specifications that the owner reserves the right to modify during the project execution. Business continuity and fast installation processes must be assured during the implementation and integration with the ERP phases.

Please suggest the most suitable payment scheme for this design-build contract and briefly motivate your answer.

# Scheduling (6 points)

You are requested to schedule the following project to launch a new hospital service. Please, plot the network schedule, identify the critical path, compute the project’s duration, and determine the criticality index of all paths.

|  |  |  |
| --- | --- | --- |
| **ACTIVITY** | **PREDECESSOR** | **DURATION (WKS)** |
| Start |  | 0 |
| 1. Select administrative staff | Start | 12 |
| 1. Select site and survey | Start | 9 |
| 1. Select medical equipment | A | 10 |
| 1. Prepare final construction plans | B | 10 |
| 1. Bring utilities to site | B | 24 |
| 1. Interview applicants for nursing staff | A | 10 |
| 1. Purchase and deliver equipment | C | 35 |
| 1. Construct hospital | D | 40 |
| 1. Develop information system | A | 15 |
| 1. Install medical equipment | E, G, H | 4 |
| 1. Train nurses and support staff | F, I, J | 6 |
| Finish | K | 0 |

# Project monitoring (6 points)

The team of SA Gold Mine was tasked to sink a 2,000 meter deep ventilation shaft, and then to excavate room for a station at the bottom of the shaft. The approved plan was to sink the shaft within 20 months at a cost of 65,000 R per meter of shaft depth (R =South Africa RAND, R1 = US $0.1244). For the station at the bottom, 30,000 cubic meter of rock would have to be excavated within 3 months at a cost of R700 per cubic meter. The plan assumed a straight line value progress over time.

After the work had begun, the scope of the project was changed to include excavation for a new station halfway down the shaft with a volume of 20,000 cubic meters (Figure below).

It was agreed that the additional work had to be done at the same excavation rate as the bottom station, but due to softer rock than the bottom one, the team agreed on the cost of R500 per cubic meter.

Because of space and resources available, the new station cannot be performed simultaneously to the other tasks. Currently, after 13 months from inception of work, the shaft has reached a depth of 1,400 m below surface and the new halfway station is completed. The actual cost at this time is R90 million.

You are requested an earned value report as well as time and cost estimates at completion by your executive management.

Ventilation shaft

Bottom station

New station

# Small Project (6 points)

Pretend to be the proposal manager charged with bidding a turn-key fixed-price tender to construct a ski cableway facility. As part of the bid documents, you are asked to provide for:

* WBS and budget plan
* Schedule
* Graph of resource “Team” assignment over time
* Price computation

Assume that Price = 1.2\*(direct cost + overhead cost + interest); where overhead daily cost is 5,000€ and annual interest rate on negative bank account balance is 10% (no interest on positive one).

No anticipated payment will be agreed upon the contract.

The plant is composed of several components:

* a departure and an arrival station;
* two piles sustained by the corresponding foundations, numbered as 1 and 2;
* the cable;
* the engine system included in the departure station.

2

1

Below are the durations of each individual task, when performed by one team. You have no more than 2 teams to be used (maximum available units). All tasks can be performed by 1 or more teams (if you make use of more than 1 team to perform a single task, please consider a no loss of productivity. For example: 1 team takes 2 months; 2 teams take 1 month).

|  |  |  |
| --- | --- | --- |
| TASK | DURATION [weeks] | DIRECT COST [k€] |
| Departure station | 3 | 150 |
| Arrival station | 6 | 200 |
| Foundation 1 | 4 | 100 |
| Pile 1 | 2 | 100 |
| Foundation 2 | 4 | 120 |
| Pile 2 | 3 | 200 |
| Engine system | 4 | 400 |
| Cable laying | 1 | 200 |