Note: These guidelines are intended as an aid to the marking of this exam. The points below are the minimum of aspects that are expected, which means that candidates providing answers that **only** align with the below may not necessarily receive full-marks. Candidates are expected to provide full answers that may go beyond the minimum expected in order to achieve full-marks.

MARKS

Question 1

a) i)

A project is generally held to commence when the demand for the need for a solution to a problem has reached a sufficient level that the detriment to not providing a solution is greater than the cost of implementing a solution. The difficulty of course is that the quantification of the detriment is different to the quantification of the cost; and also that neither are easy to estimate.

ii) A project will be complete when it has satisfied all of its objectives. This may not be the same for all projects as the objectives will vary – some projects will have an objective that requires operation and maintenance (examples here would be good – the Forth Road Bridge is given in class), and some projects will require decommissioning to be considered as an overall objective. Again examples would be useful – Brent Spar was discussed in class.

iii) The answers to this part of the question will vary considerably from student to student. Marks are awarded based on how well a student has demonstrated that they understand the issues behind the question.

If a student repeats the two or three case studies provided in the lectures then marks will be reduced by approx. 50%. If the student provides a new example then higher marks will be awarded. The answers will likely contain some of the following:

- An understanding of the drivers – for instance growing populations; reduced supply of a commodity or energy; increased transport; climate change; sustainability issues.
- An understanding of the detriment that would be incurred if the project does not happen.
- An understanding of the political motivations that might drive a project, and that these may differ from economical or social drivers.
- An understanding that a project may only be possible if the technological requirements are available.

10 Marks

b)

This is a small project with usually no need to consider the decommissioning of the facility. While there may be considerations made at design stage for the eventual refurbishment, reuse or demolition; the project can be effectively held to be complete once handed over to the client.

However, as long as the student demonstrates full understanding of the nature of this project and its difference to that in part c) then any reasonable answers will be allowed.

3 Marks

c)

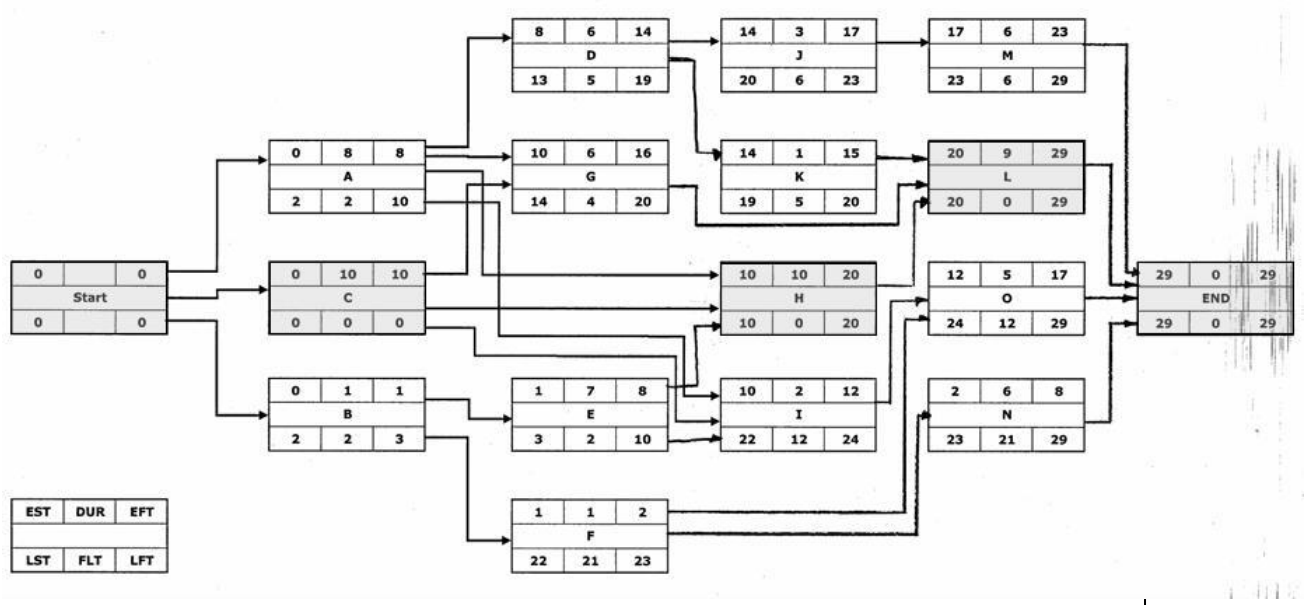
i) This project is intended to draw parallels with the Brent Spar example shown in the lectures and so the project should not be held to be complete until the Decommissioning stage is reached.

ii) The Decommissioning plan should be fully prepared for at the planning and design stage of the project. These should be an understanding of how the project might be removed both safely and without detriment to the marine biology of the Gulf of Mexico. Full details are not expected. Students should provide some possible reactions if this is not done such as those experienced by Shell with Brent Spar – i.e. adverse public reaction, protests, increased cost of actual decommissioning etc.

7 Marks

Question 2

a)



5 marks

b)

i) Critical activities are Start (essential) C, H, L and (not essential) End

ii) A critical activity must not go beyond its planned earliest finish time if it is not to affect the duration of the project. Therefore the project manager must ensure that the start time is not affected and, given if it is not, that the duration is not exceeded. Both will contribute to changes in the finish time.

iii) Many reasons might contribute to start times being affected:

- Previous activities late
- Resources not available or ready
- Site not ready
- Plans not complete
- Design not complete
- Permissions not ready

Reasons why the duration might be affected (full discussions needed):

- Insufficient resources
- Inadequate resources
- Inadequate work areas
- Low supply of materials, designs, instructions etc.

8 marks

c)

i) 50% of activity D should take 3 weeks but has taken 4 weeks, therefore duration of 100% of activity D is likely to be 8 weeks. This is within the total time available for this activity (i.e. 11 weeks) and thus the duration of the overall project will not be affected.

ii & iii) After 7 weeks still only 50% of work complete thus as the same rate duration will be 16 weeks (4+3+4). This means the delay is just within the float permissible. To prevent an affect on the overall duration the project manager will need to monitor the activity carefully to ensure the resources used are sufficient. It may be necessary to increase the resources to ensure the float is not exceeded and the consequences of this will be extra cost as well as possible detriments on quality. The better students will be able to discuss the potential detriments to the project at depth.

7 marks

Question 3

a)

i)

- determination of the appropriate control measures;
- observation, measurement and collection of control data;
- comparison of control data with the planned data.

2 marks

ii)

Cost and time (schedule) are the obvious performance parameters, but quality should also be mentioned, as well as its alternative terms such as function, scope, specification etc. Another performance parameter could be resources.

3 marks

iii)

The ideal format for this answer is tabular. An example is:

Source of Change/effect	**Performance parameter affected**
Critical tasks not started on time	Schedule
Critical tasks not finished on time	Schedule
Non-critical tasks becoming critical	Schedule
Supplier price changes	Cost
Increased overhead rates	Cost
Changes in labour supply	Resources, cost
Changes in labour productivity	Cost, schedule
Changes in labour quality	Cost, function
Delays in material supply	Cost, schedule
Changes in material quality	Cost, function, schedule
Failure of tests / non-conformance	Cost, function, schedule, resources
Delay or errors in supply of technical information	Function, cost, schedule
Design changes	Cost, schedule
Reductions in resource utilisation	Cost, schedule, resources
...	

Answers must indicate which parameters are affected.

3 marks

b) *Answers to parts b and c must contain references to risk. Students should get minimal marks if there is no such reference.*

i)

Answers must include both of the following points to get full marks:

- The contractor is fixed to the price that they have tendered at. Therefore they must ensure that the estimate that they produce is extremely accurate as that is the price that they will eventually be paid irrespective of costs.
- Should the eventual project turn out to be different to that envisaged then the risks of this remain with the contractor. For example, if the price of materials should go up during the project then the contractor will lose more money.
- In addition the very good students will comment on the fact that the contractor was Laing Construction, and they lost approx £26million through tendering errors and unforeseen design changes during construction.

4 marks

ii)
A better type of price based contract for contractors would be measure & value.

In these projects the risk of changes is transferred away from the contractor towards the promoter. In measure and value the contract price is based on a pre-estimate of project size and scope. As the contractor makes a bid based on rates rather than fixed costs the final project price is based on a re-measurement of the project scope once complete. Thus the risks arising from a change in project scope/size move towards the promoter/principal.

2 marks

c)
i) The main use for a cost reimbursement contract is where the nature, extent or quantity of the work cannot be accurately defined when negotiating the Contract. It is important the student appreciates that this therefore means an accurate estimate is not possible and thus a price based contract price is impossible.

It requires the contractor's cost accounts to be open to the promoter.
The Contractor is reimbursed the actual costs incurred in carrying out the work under the Contract plus a fee to cover overhead costs and profit. The *fee* can be one of the following:
- A fixed sum.
- A fixed sum with a profit-sharing or a bonus arrangement.
- A fixed fee with a sliding-scale adjustment.
- A percentage of the costs.

Implications of cost reimbursement are:
- allows early contractor involvement even in early design;
- Final cost to promoter depends on extent to which risks materialise;
- Efficiency of contractor will influence the cost to the promoter;
- allows promoter participation in project management;
- allows contractor input to design.

An example would be the Scottish Parliament Building where cost-reimbursement was used partly to allow the construction to commence before the design was finished.

2 marks

ii) The principal has to pay the actual costs the contractor has incurred, which means that the contractor simply allows the principal access to its accounts. The main detriment is that there is no way of providing an accurate estimate of final cost at contract negotiation stage, and also that the contractor has no incentive to control and limit their costs

2 marks

iii) An adjustment to the cost reimbursable contract is to introduce target costs. Based on the setting of a probable (or target) cost for the work. The target cost will subsequently be adjusted for major changes in the work and cost inflation. The contractor's actual costs are monitored and reimbursed as in a cost-reimbursable contract. Any difference between actual cost and target cost is shared in a specified way between the promoter and the contractor. The sharing is usually set as a percentage ratio e.g. 80:20 with different allocation for savings and excess costs.

2 marks

END OF PAPER