BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

IT PROJECT MANAGEMENT

Note: FOUR questions answered out of SIX. All questions carried equal marks.
Time: TWO hours

EXAMINERS' REPORT
Section A

Question A1

Syllabus Coverage

Stages of a project

1.6 Project management using a lightweight or agile approach with particular reference to incremental and iterative approaches.

The Question:

A1 Agile based projects make use of combined iterative and incremental practices.

a) Describe the process of iterative design in an agile project. **(9 marks)**

b) Describe the process of incremental builds in an agile project **(9 marks)**

c) What type of project would be most suited to agile development? **(7 marks)**

Answer Pointers

Part a)

Iterative design usually has an initial preparatory requirements and design phase, followed by a repetition of client review, re-design, re-implementation, and trialing until an agreed design is achieved. Each iteration in a Scrum agile project, for example, could be a Sprint, followed by a Sprint Review where a product owner reviews the functionality produced and any rework is identified. 5 marks for identifying the discrete stages.

A good description showed understanding of the evolution of versions (or releases) and the completion of a final version after successive iterations. Further 3 marks.

Full marks for additionally emphasising the use of testing/trialing as a means of requirements refinement in the programming cycle.

Maximum 9 marks

Part b)

An incremental build would be preceded by the establishment of global objectives and a plan for a number of incremental developments each delivering a component of usable functionality. Individual increments often have the conventional sequence of analysis, design, development (which could be executed iteratively) but functionality is delivered in series of usable increments until total product completion.

In a Scrum agile project, for example, increments could be implemented as Sprints, each of which developed different functions identified in the Product Backlog.

5 marks for identifying stages. Further 3 marks for recognising the delivered system is the result of cumulative increments. Full marks for also mentioning the ranking of increments.

Maximum 9 marks

Part c)

Projects might be suitable for agile development if they:

- don't have good estimates available at the early stages,
- don't have well stabilized plans,
- aren't amenable to the final design being specified with precision at the outset,
- are non-critical (e.g. are not command and control system development),
- need to have senior skilled developers,
- have constantly changing requirements,
- need to be carried out with cooperative and adaptive teams.

1 mark for naming each criterion plus I or 2 marks for explanation.

Maximum 7 marks.

Examiner's Guidance Notes.

This question was the second most popular of Section A and had the highest overall success rate of the section. For Part (a) on iterative design most candidates were able to provide a basic description of the iterative process. However many simply noted the standard software development lifecycle stages and made little or no attempt to link any of those stages to an outline of iterative development.

In Part (b) incremental development seemed generally well understood. However, most candidates failed to acknowledge the key point that the functionality developed by an increment was included as a component in the overall delivered system.

Part (c) caused most confusion amongst candidates as many made irrelevant observations. Surprisingly, given that many candidates had given credible (even if brief) accounts of the essential agile process, there appeared to be little idea of the types of project suitable for agile development. Agile practices clearly remain an area where candidates need more preparation.

Question A2

Syllabus Coverage

Project planning and estimating

2.7 Principles, methods, advantages and disadvantages and relative accuracy of different estimating techniques, including parametric/algorithmic models (based on the identification of size drivers and associated productivity rates), expert judgement, analogy, top down, bottom up.

The Question

A2. a) Describe the steps commonly used in estimating project effort by analogy.

(10 marks)

b) Describe any THREE disadvantages when attempting to estimate by expert judgement. **(9 marks)**

c) Describe any TWO productivity drivers you might consider when estimating the effort required to complete an IT project. **(6 marks)**

Answer Pointers

Part a)

The steps are:

- Identify the new project characteristics;
- Search for a project that has similar characteristics;
- Use past project effort as baseline for the new project estimates;
- Refine the baseline based on key differences identified between the projects;
- Adjust baseline: where no previous project matches the new project analogy can use subparts of previous projects to provide an estimate (assuming a bottom-up project approach)

1 mark only for naming each step with 2 marks for more detailed description.

Maximum 10 marks.

Part b)

Disadvantages might include:

- The expert may just use analogy;
- The expert may not be fully aware of the new project characteristics;
- Experts will have their own bias;
- Experts may not want to disclose real actual effort/costs from their experience since it might reflect badly on their own expected performance;
- quality of expert judgement is difficult to gauge;
- very large projects might need a number of experts with consequent variation in quality and confidence in the overall result.

1 mark for identifying each of three disadvantages with up to 2 further marks each for a fuller description.

Maximum 9 marks

Part c)

Productivity drivers include:

- experience of team members with the application area .e.g. Financial Systems,
- experience of team members with technologies used,
- availability of suitable (efficient) tools –e.g. integrated development environments ,automated testing tools etc.,
- communications overheads often related to project team size/distribution,
- stability of requirements,
- ease of communication
- safety criticality of final system.

3 marks for description 1 mark for naming only for each of two productivity drivers.

Maximum of 6 marks

Examiner's Guidance Notes

This was the most popular question in Section A although candidates achieved a slightly lower success rate than in Question A1.

Part a)

Many candidates simply interpreted the question as relating to the steps of the software development lifecycle and made no attempt to relate this interpretation to using analogy. Little attempt was made to link the characteristics of a known project with characteristics of the project being undertaken. Estimating by analogy is a common method of assessing potential project effort and should be considered an essential part of the estimating toolkit.

Part a)

This received good coverage and in general candidates were able to describe at least two disadvantages and some even more.

Part c)

Many were unable to correctly identify any productivity drivers and merely stated stages of project development. Some simply wrote about top down and bottom up decomposition giving reasonable answers to a question that wasn't asked thus gaining no marks.

Question A3

Syllabus Coverage

Progress monitoring, project control and reporting

4.7 Earned value analysis: planned and earned value, actual costs; cost and schedule performance indicators.

4.1 What to monitor and why: key project metrics related to…scope/size of functionality (e.g. lines of code, function points).

The Question

A3 a) Cost monitoring is used in project progress monitoring and control. In relation to project monitoring explain the following terms:

i) Planned Value (PV) **(4 marks)**

ii) Actual Cost (AC) **(4 marks)**

iii) Schedule Performance Indicator (SPI) **(4 marks)**

iv) Earned Value (EV) **(4 marks)**

b) Explain the basic approach in using any function point analysis technique for measuring development project size. **(9 marks)**

Answer Pointers

Part a)

i) Planned Value (PV) is the original planned cost of the project (or unit of work or activity). It is also called budgeted cost of work scheduled (BCWS).

ii) Actual Cost (AC) is the actual aggregate cost incurred on an activity or project during a given time frame - also called the actual cost of work performed (ACWP)

iii) Schedule Performance Indicator (SPI) reflects the amount of progress a project has made. It is the fraction of work actually completed in terms of earned value (EV) compared to the total that was scheduled (i.e. the PV) in a given time frame. SPI=EV/PV. An SPI of 1.00 or more means the project is on or ahead of schedule; less than 1.00 means it is behind schedule.

iv) EV is the earned value - also called budgeted cost of work performed (BCWP) - and is the original estimate (PV) of the cost of the work completed. EV=PVxSPI

1 mark for terse statement e.g. simply saying = BCWS or ACWP or BCWP. Up to a 3 further marks for above explanation or similar.

Maximum 16 marks

Part b)

The IFPUG approach involves the five functional components that are of benefit:

- External input types,
- Output types
- External enquiry type
- Internal file types
- External file types

An outline that simply names the components attracted a maximum of 3 marks. More marks were earned with detail about the types of functionality typically carried out by each type component (e.g. an external input file type processing user data inputs) and the counts associated with each type together with the weightings which might be assigned to the counts.

Mark II function points and COSMIC function points are valid alternative approaches which could be described.

Maximum 9 marks

Examiner's Guidance Notes

Question A3 was by far the least popular choice amongst candidates in Section A and had the lowest success rate in Section A. Candidates had in general a poor appreciation of the basic terms used in project monitoring and control.

Part (a)

This simply required basic knowledge of essential terms. Many answers displayed only a superficial appreciation of the terms and no knowledge of accurate definition. In only a few cases did candidates demonstrate a good awareness of the terms and gain the maximum marks available.

Part (b)

This was probably the most disappointing part of this question. The majority of attempts showed a lack of appreciation of function points and could not give any form of relevant description. A significant number of candidates gained nearly full marks in Part (a) but failed completely in this part.

Section B

Question B4

Syllabus Coverage

Project planning and estimating

2.1 Use of product and work breakdown structures (PBS and WBS).
2.2 Use of (activity on node) precedence plans and network analysis;
2.3 Critical path analysis
2.4 Gantt charts

The Question

B4 Your company has decided to buy in and install an off-the-shelf (O-T-S) stock control package to replace the existing manual system. This will need new computer equipment and network cabling throughout the offices. You are to manage this project. You have drawn up an outline project plan to include the following main tasks:

A	Interview stock control staff, draw up and agree a list of main requirements	6 weeks
B	Assess alternative O-T-S packages and select the most appropriate.	6 weeks
C	Specify and order all the required new hardware and communications.	3 weeks
D	Test and install all the new hardware and equipment.	9 weeks
E	Modify and test the package software.	15 weeks
F	Install the package software	1 week
G	Specify & obtain the stock data required to implement the system	6 weeks
H	Draw up a training plan.	3 week
I	Train the users	9 weeks
J	Draw up an acceptance test plan test	3 weeks
K	Acceptance testing	4 weeks
L	Load data and implement the new system.	3 week

a) Draw a work breakdown structure (WBS) diagram for the project, showing all the planned tasks. This WBS should contain at least two levels. Explain the main differences between this WBS and a product breakdown structure (PBS) diagram for the same project. **(7 marks)**

b) The dependencies between the 12 tasks listed above are:
- B depends on A
- C, E, H and J all depend on B
- D depends on C
- F depends on D and E
- G depends on E
- I depends on H
- K depends on F, I and J
- L depends on G and K

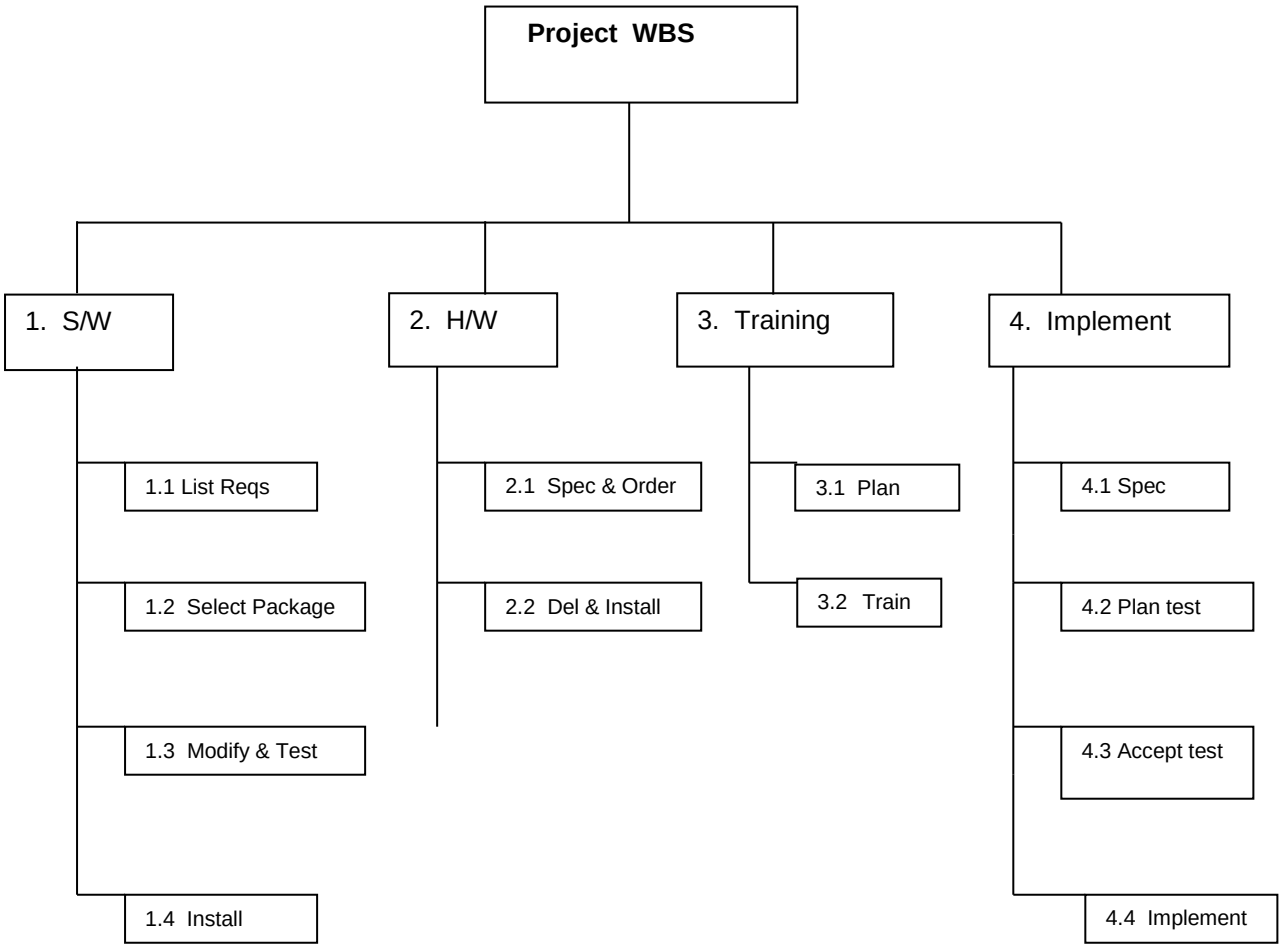
Draw a full Gantt chart for the project, to show all dependencies, free float and highlighting the critical path. **(10 marks)**

c) At the end of week 24, tasks A, B, C, D, H, I and J have been completed on schedule, and task E is continuing on schedule. However it is realised that task F will now take 4 weeks, still starting from week 28.

Re-draw the Gantt chart to reflect and display this progress to date, making any necessary changes, and highlight the critical path. **(8 marks)**

Answer pointers

Part a)



4 marks awarded (2 for a valid structure and 2 for task completeness) for a well-structured WBS diagram similar to that above, provided that all of the 12 tasks named in the question were included and they had been grouped sensibly within named topic groups (preferably, though not necessarily, with a numerical numbering structure).

2 marks for straightforward definitions of WBS and PBS, e.g.:

WBS	sets out in a structured diagram the tasks to be undertaken during the project
PBS	sets out in a structured diagram the deliverables produced by each task during the progress of the project.

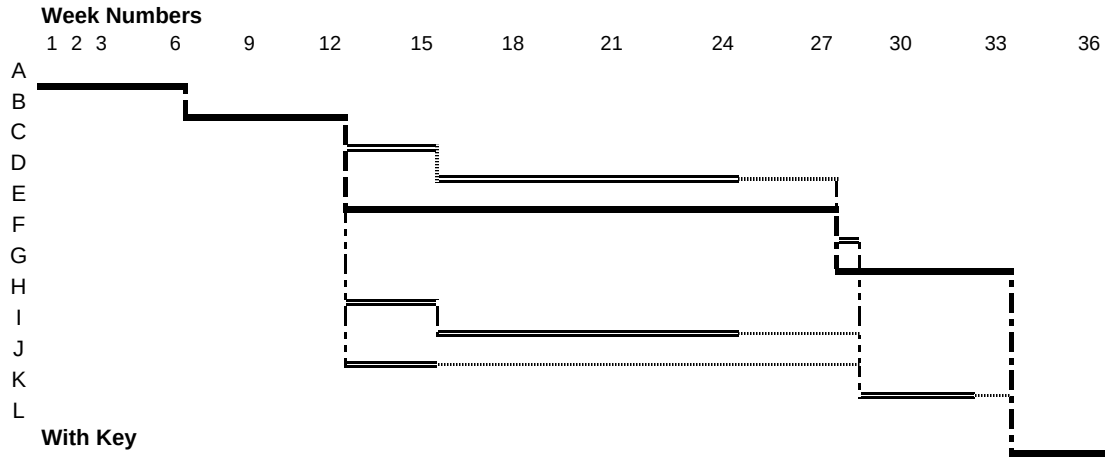
With a further 1 mark for valid comments or a specific explanation such as in task A, the task is to produce the list, whereas the product (deliverable) is the list itself, noting that not every task will result in a deliverable.

Maximum of 4 +2 + 1 = 7 marks

Part b)

10 marks were awarded here for a Gantt chart similar to the example below, with up to 5 for a correct structure (to include clear task dependencies and a sensible, marked scale) a further 2 marks for all floats being shown clearly on the chart and a further 2 for highlighting the (correct) critical path A, B, E, G, L.

Q1 b) **Gantt Chart, similar to**



With Key

Task

Float

Critical Path A, B, E, G, L Duration 36 weeks

b)	Marks for correct structure and dependencies	5
	All correct floats	3
	Correct critical path and duration	2
		10

c) Marks for re-drawing the above

All progress to date marked		3	
Change to duration of Task F		2	
3 weeks yet to complete on Task E		1	
New Critical Path	A, B, E, F, K	2	New duration 38 weeks
		8	

Part c)

Up to 8 marks for the re-drawn chart, to show clearly all progress to date as well as reflect the change to the duration of task F and its effect on the critical path (which changes to A, B, E, F, K, L and lengthens to 38 weeks)

Examiners' Guidance Notes

This question covered the understanding of three important project management diagrams and, overall, the quality of the answers was worryingly disappointing. In particular many candidates seemed unable to produce a Gantt diagram without first drawing a rough A-on-A diagram, for which no marks were available and could have wasted valuable examination time. Some also produced full tables of all the node values required for an A-on-N diagram.

Part a)

There was a noticeable lack of knowledge of the concept of work breakdown structure diagrams, and very few candidates produced a valid definition of a product breakdown structure (PBS) diagram. Many candidates produced work flow diagrams for which no marks were awarded; some produced mind maps for which some marks were awarded if the task breakdown was sensible and complete. There was also a tendency to use a standard set of task groupings which included maintenance even though none of the tasks (such as acceptance testing) could be defined as maintenance.

Part b)

The main problems here were the omission of some of the task dependencies and using an uneven time scale. It was also usually preferable to show the critical path by highlighting the tasks concerned, not the task dependencies.

Part c)

Very few candidates displayed the project progress to date, which was very straightforward in this example as all tasks were on schedule at the current date. Thus a simple vertical line at that date would have sufficed. If this was not the case then the progress could be shown by highlighting in some way the sections of the tasks completed at that date. A further problem was that some candidates did not realise that the week numbers on a Gantt diagram show the week in progress and showed task F as starting at the end (not the start) of week 28.

Question B4

Syllabus Coverage

Stages of a project

1.2 Requirements elicitation, analysis and verification: purpose and methods
6.7 Management and control of testing

The Question

B5 a) List FIVE ways in which you can find out the users' requirements for a system.

(5 marks)

b) Identify TWO situations when you should NOT involve the users in requirements gathering. Explain why you would not want to involve them.
Identify and explain TWO other situations when it IS important to involve the users.

(8 marks)

c) Explain the purpose, the role of the users and the project documentation/products that should be used in each of the testing phases of a project listed below.
i) Unit testing
ii) System Testing
iii) Acceptance Testing

(12 marks)

Answer Pointers

Part a)

Possible methods include:

- Interviews
- Observation
- Prototypes
- Focus groups
- JAD(Joint Application Development) Workshops
- Process Mapping

1 mark per method listed.

Maximum 5 marks.

Part b)

Users might not be involved in requirements gathering:

- if the project requires a headcount reduction (from the user base)

- where a radical change of process is involved
- if there are confidentiality issues
- where changes are driven by legislation
- if there are no current users
- when the project is an infrastructure project

Note that in some cases, e.g. where there are radical technological changes in processes, users might not be involved in requirements setting as these may be outside their area of expertise, but would still provide feedback about the *design* of the new system.

Users should definitely be involved:

- when requirements prototyping is used
- where knowledge of the existing system is key
- it is essential to preserve good will of users

2 marks per situation identified with a sensible explanation.

Maximum 8 marks

Part c)

(i) Unit testing

Products: unit test plan, test results, error logs,
Purpose to reveal errors
User role: doesn't involve user, just developer or peer.

(ii) System testing

Products: System specification
Purpose to test interfaces, integration, regression, stress loading
User role: undertaken by professional testers or QA/QC (though there may be some users in the QC team)

(iii) Acceptance testing:

Products System requirements specification, user manuals.
Purpose: to test functions, inputs and outputs of real data
User role reliant completely on users.

Up to four marks per testing phase.

.**Maximum 12 marks.**

Examiners' Guidance Notes

This was by far the most popular question in Section B.

Part a)

Some of the lists named generalised methods, such as "survey", for which some context was required.

Part b)

An answer to this part was often omitted or did not address the second section (*"when is it important to include users?*"). The question concerned only requirements gathering yet several answers referred to later phases of the project.

Part c)

The main failing here was a lack of any explanation of the purpose of each of the types of testing listed. With regard to the allocation of a role to the users, the first two types of testing are usually undertaken by technical staff only, as most of the issues here are technical. Users

are most usually involved in the acceptance testing. The project documentation to be referred to (or produced) during each type of testing was frequently omitted. Several candidates referred (incorrectly) to black box and white box (or alpha and beta) testing. Others assumed that acceptance testing was part of the post-project review.

Question B6

Syllabus Coverages

Risk management

5.3 Risk management tactics, including risk avoidance, risk transfer, risk reduction, risk mitigation and contingency planning
5.5 Risk registers

The Question

B6. a) Draw a template for a risk register or risk log showing the key headings across the top of the register/log. **(11 marks)**

b) Your company creates software for hospital equipment and its best-selling product is used to monitor heart patients. It is an expensive product but hospitals are always happy to pay a high price because of its quality. A new improved version is due to be rolled out in the next 12 months. This new version will save 10 lives a month. As project manager you have identified a number of risks. The key risk is that a major holiday period is due at a critical stage of the project when many staff will be requesting leave. Therefore there is a risk that shortages of staff will cause a delay.

Explain **THREE** appropriate actions that you could take to deal with this risk of possible staff shortages. **(6 marks)**

c) Identify **FIVE** standard types of risk strategy (mitigating action) that could be used to manage an individual risk.
To which of these types of strategy do each of the actions that you have described in part b belong? **(8 marks)**

Answer Pointers

Part a)

This part of the question was expecting a template based on the examples of a risk register shown in the recommended course texts. Such a register requires some basic administrative information, followed by specific information for each particular risk and extra information that may then help in managing the item in the register.

Administrative information should include: date raised, person who raised it, unique risk identifier (up to 3 marks)

Specific Information for each risk should include: description, impact, probability, action (up to 4 marks)

Extra information: what products are affected / what issues does it affect / owner / date for review / resolved date (up to 2 marks)

Marks were deducted if a list was provided rather than a template for the log/register.

Up to 2 marks for good clear template layout.

Maximum 11 marks

Part b)

The project may delayed as there are likely to be staff shortages during the critical stage of the project when it coincides with a holiday period. Actions should therefore either avoid

this risk completely or reduce as far as possible the chance of this risk arising. In no circumstances could the risk be accepted.

Possible actions include hiring extra resources or compensating existing staff for not taking leave. This will include additional costs. Other options might be to increase the staffing (and thereby reduce the time taken) for the early stages of the project such that the critical stages are completed before the holiday period. However this might not be acceptable to higher management. It might also be possible to outsource some of the key work.

2 marks for each clearly explained possible appropriate action.

Maximum 6 marks

Part c)

The five common risk strategies are:

- Accept – which means do nothing
- Prevent - sometimes called Avoid, because you are proactively stopping the risk from occurring by not carrying out the activity which contains the risk e.g. not carrying out critical work during a holiday period
- Reduce - either the impact or the probability, e.g. compensating staff for work during the holiday period.
- Contingency Plan – drawing up a formal plan to deal with the consequences of a risk that has turned into an issue
- Transfer - paying for someone else to deal with the consequences of the risk, for example outsourcing the work.

1 mark per strategy identified and described simply. 3 marks for examples of possible use of strategies in scenario.

Maximum 8 marks

Examiners' Guidance Notes

Part a)

This was standard bookwork, but this part of the question was attempted by few candidates.

Part b)

This question expected three alternative actions, not one three-phase action. Most candidates realised the need to ensure that there would not be a staff shortage during the critical stage of the project. Again several candidates supplied a list of more than the requested three actions.

Part c)

This part was largely standard bookwork, but many candidates appeared not to understand the concept of risk management, and several listed instead the steps taken to identify and manage a risk.