BCS HIGHER EDUCATION QUALIFICATIONS
Level 5 Diploma in IT

March 2012

EXAMINERS' REPORT

IT Project Management

Section A

Question A1

a) List SIX techniques for obtaining requirements.

(6 marks)

b) Once the user requirements are known you have a choice between buying a package solution and building a new system. Describe FOUR factors you would consider when deciding which option to take. **(8 marks)**

c) Describe THREE methods of quality control that can be used at different stages of a project which implements an off-the-shelf package. Describe how they are similar or dissimilar to the quality control methods used on a project that builds an application. **(9 marks)**

Answer Pointers

a) Techniques

These might have included:

- Carry out interviews
- Conduct Joint Application Design workshops
- Review existing documents
- Analyse existing system
- Create prototypes
- Observe current working practices
- Brainstorming

b) Factors for choosing

These include:

- Time - installing a package is quicker than creating it from scratch
- Cost - in most cases a package will be cheaper than building a new system
- Uniqueness of requirements - is the requirement one which no existing packaged solution satisfies?
- Importance of the function to business
  a) Ability to own the patent or to protect the package from external risks eg the supplier ceasing to exist
  b) Does the function provide a competitive edge that you don't want to share or is it a common process?
- Support and Maintenance - do you have staff that could do this or do you want it to be provided by the package vendor?

- Resources - do you have the necessary skilled staff and infrastructure resources to develop the application?

c) Quality Control techniques

Where an off-the-shelf application is acquired, quality control moves to the earlier or later stages (before or after the acquisition of the software) as there is no construction stage.

1. Before acquisition, you contact existing users of the package or do reference site visits

2. You compare the written requirements of the project with the functions in the package before you buy it.

3. After acquisition, you treat the system as a black box and do a final User Acceptance Test (UAT), as if it were the bespoke system

4. You can test all system features, not just functionality, eg how well the users are trained

5. There will be capacity testing to make sure the infrastructure can support the application

6. There may also be interface testing if it has to link to other systems. This will be similar to a bespoke system.

Examiners' Guidance Notes

a) This was a relatively simple question asking for a list. In nearly all cases a list was provided which mentioned the items above. Some students provided very detailed descriptions but no extra marks were awarded for these. Students should look carefully at both the verb that describes the activity and the marks associated with a question. Lists often attract the fewest marks and consequently should require the least amount of time by a student to complete them. In some cases 'ethnography' was suggested and this could be used in some cases but they tend to take a very long time to do and don't lead to a formal specification but rather the starting point for a specification.

b) This question asked for a comparison of the two approaches and a description of relevant factors. Students who did both of these scored well but too many students either listed, rather than described, or talked about general development /implementation methods rather than looking at the two options stated.

c) The third part of this question was aimed at challenging the more able students and many students struggled with it. Some answers provided general information about testing but to score any marks answers should have been directly related to the unique situation of testing when implementing a package solution. The question specifically asked for areas where the two approaches were similar and different. Only students who considered this scored full marks.

Question A2.

a) Draw a template for a risk register or risk log showing the key headings across the top of the register/log.

(10 marks)

b) List FIVE types of action you could take to respond to an identified risk

(5 marks)

c) SciTech creates software for hospital equipment and its best-selling product is used to monitor heart patients. It is an expensive product but customers 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. The new version will save 10 lives a month. The project manager has identified a number of risks. The key risk is that a major holiday period is due at a key stage of the project when many staff will be requesting leave. Therefore there is a risk that shortages of staff will cause a delay.

Examine the five types of action you have listed in (b) above and explain which type would be:

i. most appropriate for dealing with this risk of possible staff shortages

ii. the least appropriate for dealing with this risk

(10 marks)

Answer Pointers

a) Any template for a log requires some basic administrative information, followed by specific information for each risk and extra information that may help managing the risks identified.

- Administrative information - date raised, person who raised it, a unique identifier,
- Specific Information for this item in the register/log - description, impact, probability action
- Extra information - what products are affected / what issues does it affect / owner / date for review / resolved date

Not more than 3 marks were awarded for each of the three sections above. Half marks were given if a list rather than a template for a log/register was used. 1 Mark awarded for good layout

b) The five common responses to a risk

- Accept - where this means do nothing
- Prevent - sometimes called Avoid, because you are proactively stopping the risk from occurring
- Reduce - either the impact or the probability (in some cases immediacy). Sometimes called mitigation but no marks were awarded where reduce and mitigate where used together or where it wasn't made clear what mitigation meant.
- Contingency - setting aside time or money 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

(5 marks)

c) Five marks for each. There is no right answer as such and a good justification was required. However, it is likely that Prevent will be the most appropriate because delays will lead to a loss of life. The preventative action is likely to involve cost, because extra resource will need to be hired or existing staff will need to be compensated for not taking leave. The least appropriate would be Accept as a delay is almost inevitable. Reduce and Transfer are likely to fall in the middle so neither are expected to appear in the answer.

(10marks)

Examiners' Guidance Notes

a) A register or log was asked for in order to prevent students simply dumping down everything they know about risk. Marks were lost when a simple list was provided rather than the format requested. Some students provided a risk prioritisation matrix and no marks were awarded for this.

b) Some student's listed Mitigate but this is too broad a term and could be applied to a number of possible risk responses. Marks were awarded where the student said that mitigation meant to reduce either the probability or the impact of a risk. Many students mixed up Avoid and Accept. Accept is also known as 'do nothing', Avoid is do whatever is necessary to stop the risk.

c) Marks were lost where a student did not clearly select one answer and instead listed many as either most appropriate or least appropriate and in one case both. Again some students provided specific actions that could be taken rather than selecting from the five identified. Some marks were given when specific actions were categorised into the five types in b).

Question A3

a) Identify FIVE key stages of the software development life cycle (SDLC).

(5 marks)

b) Explain TWO important ways in which an agile approach differs from the SDLC.

(8 marks)

c) There is a project to change an existing web based booking system for a ticketing company. The system has FIVE different screens that the user can access but the size of the business and the type of tickets and holidays it sells means that new functionality needs to be added. The company can't take the system down for any period of time as it will result in lost bookings. The knowledge of what needs to be done is well known by the users of the system but it is unlikely that these users will be able to help with requirements because they are too busy running the current system. The project must be completed before a major event in one month's time. The budget for the project is fixed.

You are the project manager. Write a memo to the project sponsor describing FOUR factors that would influence the choice of either an agile approach or the SDLC. Relate your answer to the information in the scenario above.

(12 marks)

Answer Pointers

a) SDLC stages could be:

Analysis, Design, Build/Implement, Test, Evaluate

(5 marks)

b) The key differences are

- Interactivity - between users and developers
- Iterative - approach to delivery

(8 marks)

c) A memo was asked for and lists didn't attract any marks. This question required the student to write an explanation of two different approaches. Issues that could have been raised included:

- Size - When it is small agile is better,
- Increments - When software is needed a bit at a time, increments rather than big bang
- Requirements -Where the requirements are unclear, an iterative approach is desirable
- Resource - Availability of the users is needed for agile approaches
- Cost - Not so much about the amount but whether there is room to increase costs
- Speed - How quickly a solution is required

(12 marks)

Examiners' Guidance Notes

a) A great deal of leeway was allowed on this question and items that were not strictly part of the SDLC were given marks eg Feasibility. However, only a few students achieved full marks because many answers omitted 'Evaluate' which is a key part of the process

b) Many candidates provided long lists or highly descriptive answers. The question specifically asked for the two key features. Candidates who selected the most important, and over-arching, features of Agile from a variety of possible answers achieved high marks.

c) This question was worth a lot of marks and was designed to offer the more able students a challenge. It not only required knowledge but the ability to analyse the case study and select options. To help shape an answer the candidate was asked to write a memo. Lists and diagrams didn't attract any marks. Candidates who took time to identify key parts of the brief scenario and relate them directly to facets of either the agile or SDLC approaches scored highly.

Section B

Question B4

Your company is expanding rapidly and has decided to buy in and install an off-the-shelf (O-T-S) payroll package to replace the existing in-house system. This will need

new equipment and some additional network cabling in some offices. You are to manage this project.

You first need to establish and agree a specification of requirements with the payroll manager. From this you can consider the various main O-T-S payroll packages that are available, compare them and, together with the payroll manager and project board, select and order the most appropriate package to meet the requirements of your company. Some minor modifications will be required.

You then need to specify and order the new hardware and network communications equipment that will be needed.

Plans then need to be drawn up to test all this new equipment. Separate testing plans are needed for the modified software, followed by full integration and acceptance testing, based on the agreed requirements.

The new hardware and communications will be installed and tested. Then the software can be installed, modified and tested; after which the integration testing can be undertaken.

Whilst this is continuing, user training plans need to be drawn up. The users can be trained as soon as the integration testing is completed.

Before acceptance testing you will need to specify and obtain the accounts data that will be needed to implement the replacement system.

Once acceptance testing is completed successfully the live data can be loaded and the new system implemented.

a) List the different types of products that are produced at the various stages of the project described above and draw up a product breakdown structure (PBS) diagram for the project. This should include at least 12 different distinct products. **(8 marks)**

b) List the activities described in the scenario and draw up a work breakdown structure (WBS) for the project. This should contain at least 13 different activities and least 2 breakdown levels and at least 4 work groups. **(7 marks)**

c) Explain the main differences between a WBS and a PBS, illustrating your answer with an example from this project. **(4 marks)**

d) Choose an item from your WBS and complete a full statement of work providing information about this item. **(6 marks)**

Answer Pointers

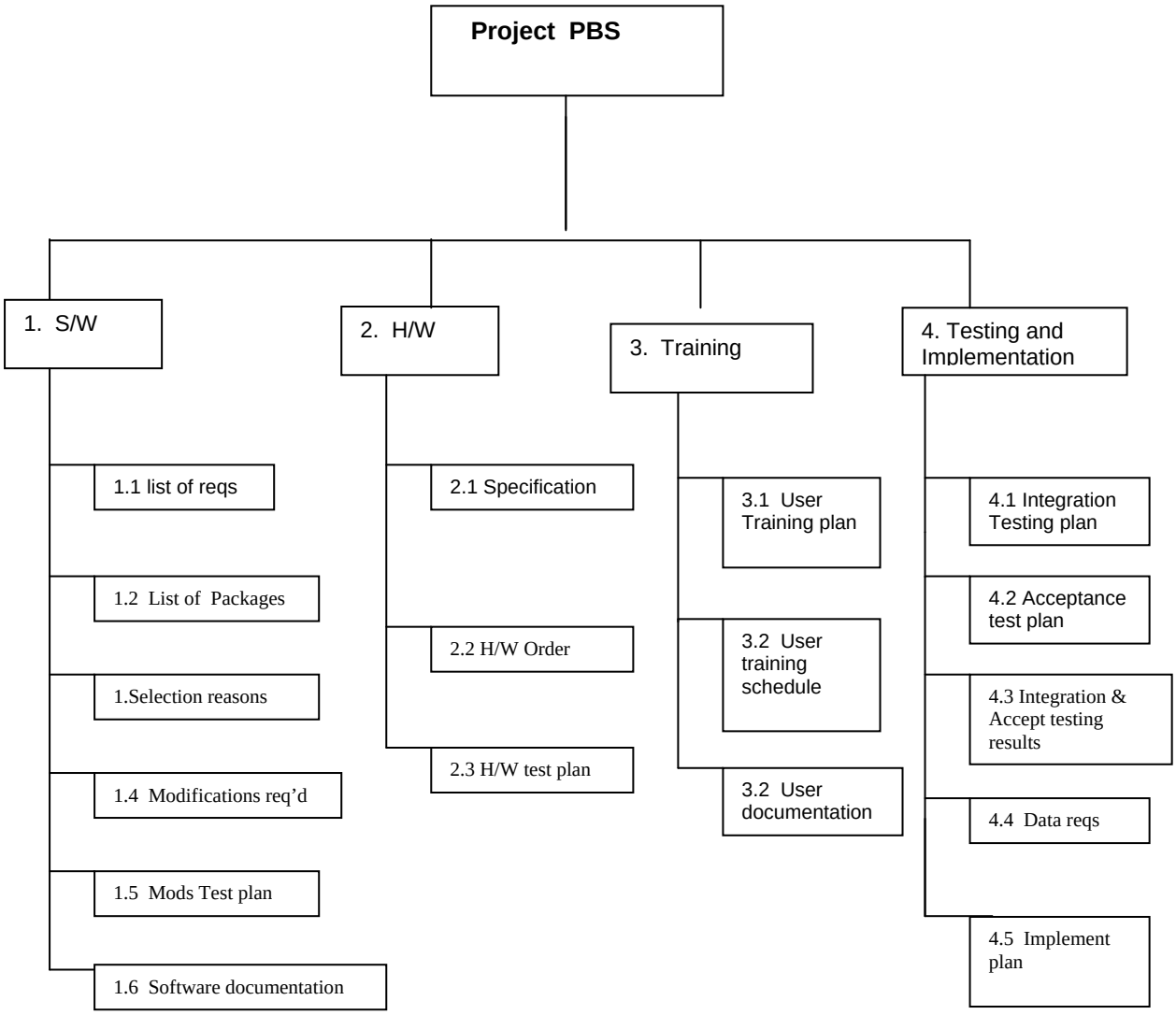
a) The list of products for this scenario could include:

- Specification of requirements
- List of possible O-T-S packages
- Comparison of these possible packages
- Justification of choice of selected package
- Modifications required to selected package
- Detailed specification of required new hardware and communications equipment.

- Hardware test plans
- Software modification test plans
- Integration test plans
- Acceptance test plans
- All test results
- User training plans
- User training schedule
- Specification of required Accounts data for go live
- All system and user documentation.

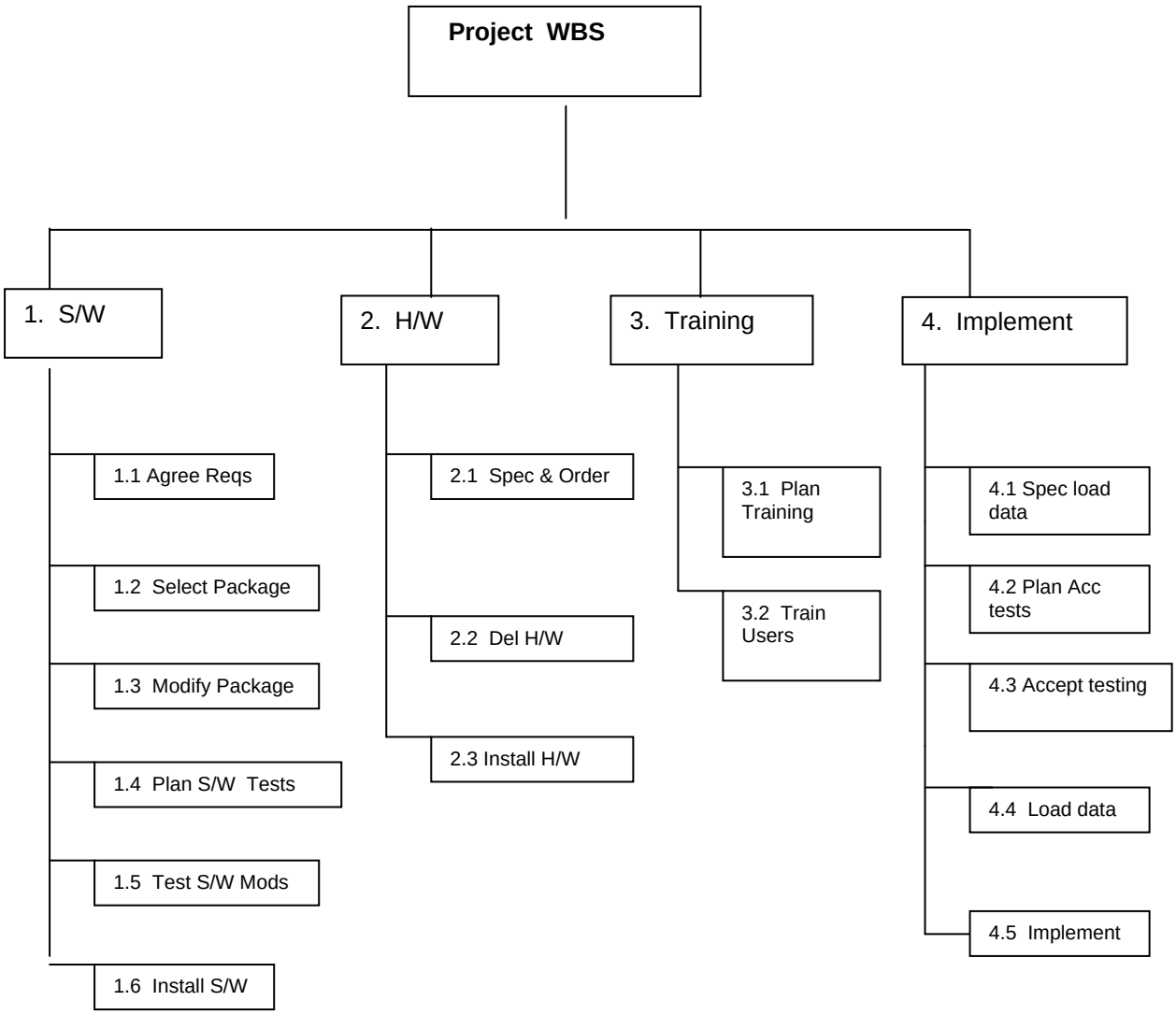
4 marks for 12 distinct activities

From which the following example PBS diagram could be drawn:



A further 4 marks awarded for a complete PBS diagram similar to the above, with a valid structure and clear, structured labelling. There should be no arrows. Many of the candidates who attempted this part of the question presented a good, clear, well-labelled diagram but omitted the initial list. In these cases some of the marks allocated for the list were transferred to the diagram.

b) The list here should comprise most or all of the activities shown in, or similar to, the WBS diagram below. Up to **3 marks** allocated for this list, **plus 4 for** a diagram similar to:



c) A **PBS** sets out in a structured diagram the deliverables **produced** during the progress of the project

A **WBS** sets out in a structured diagram the **activities to be undertaken** during the project.

2 marks for clearly distinctive definitions (similar to those above) plus a **further 2** for a good example such as:

In activity 1.1 above the activity is to produce the list of requirements, whereas the product is the list itself.

Not every activity will necessarily result in a deliverable (e.g. perhaps activity 4.4)

d) There is a good example of a statement of a full Statement of Work (SOW) on page 100 of the recommended OU text.

The standard contents should include:

Title, description, functions to be performed, estimated duration, predecessors, successors, inputs, outputs, other deliverables, standards to be used, quality issues

6 marks awarded here for a comprehensive statement for an identified work **item** (ie from the **lowest** level of the WBS diagram) and relevant to the project as described.

Some marks awarded if the answer showed some or most of the required contents of an SOW; none for a narrative answer.

Examiners' Guidance Notes

Overall many of the candidates who answered this question had a good understanding of a work breakdown structure but product breakdown structures were very much less well understood, with part a often being omitted completely. Very few understood the concept of a Statement of Work (in part d).

Some of the WBS diagrams related more to a generic systems development project than to the specific scenario and activities described for this question.

More generally, parts a and b asked for a list as well as a diagram, the list was very often omitted. Part c asked for an example from this scenario, again nearly always omitted.

a) The concept of a product in the context of a Product Breakdown Structure diagram was very poorly understood overall. Many answers listed only the specification of requirements for the required package, or gave a detailed breakdown of the hardware and/or software that would comprise the eventual new system, including in some instances the component parts of MS Office.

   The question set out quite simply the steps in the project and expected the candidate to consider each of these steps and decide what document or similar product might be produced as an outcome of each step.

b) The idea of a WBS was much better understood, though many candidates again failed to supply the list of activities, as requested clearly in the first part of this question. This list should have been a good start to allocating the activities into a small number of groups, from which the diagram could be drawn up.

   The main errors here were either omitting key parts of the project (e.g. training or testing) or introducing activities, such as unit testing, which had not been mentioned specifically in the scenario. The structure diagrams sometimes failed to display the breakdown correctly, showing activities as a downwards string, sometimes exacerbated by the (incorrect) inclusion of arrows), not a further level breakdown as shown above. The activity labelling 1.1, 1.2 etc was also often omitted.

c) The standard definitions were often stated, but (from part a answers) not always well understood and very few answers included a good example activity that distinguished clearly between the activity itself and the product produced by that activity.

d) This is standard "bookwork" but was by far the least well answered part of this question. Most candidates provided a generalised narrative description of the work required to carry out a selected activity, or higher level group of activities. The

production of a sound, well-structured complete SOW for each activity is a key part of a well-managed project.

Question B5

Your company has decided that it needs a new stock control system and that an off-the-shelf package is the best solution. The main tasks have been identified and durations assessed as follows:

A	Draw up a functional requirements specification	4 weeks
B	Consider various relevant software packages and select one	3 weeks
C	Identify and specify the necessary hardware and communications equipment	2 weeks
D	Order the hardware and equipment	1 week
E	Identify the key package modifications needed to meet the functionality required	2 weeks
F	Modify the software package as necessary	8 weeks
G	Accept delivery and install all hardware and equipment needed for the package	10 weeks
H	Design a training plan	2 weeks
I	Set up a testing plan	3 weeks
J	Unit test all the amended package modules	3 weeks
K	Train the users	2 weeks
L	Full integration and acceptance testing	3 weeks
M	Implement the new system	1 week

B cannot start until A is completed
C, E, H and I cannot start until B is completed
D cannot start until C is completed
F cannot start until E is completed
G cannot start until D is completed
J cannot start until F, G and I are completed
K cannot start until H is completed
L cannot start until J and K are completed
M cannot start until L is completed

a) Draw an activity-on-node diagram for these 13 project tasks (A to M). Calculate and display on the diagram, with a node layout key, the earliest and latest start and finish times and float of each task.

(11 marks)

b) Describe how each of the following changes to task durations (on their own) would affect the critical path and project duration.

i) Task A - reduced to 3 weeks
ii) Task E - increased to 5 weeks
iii) Task G - reduced to 8 weeks

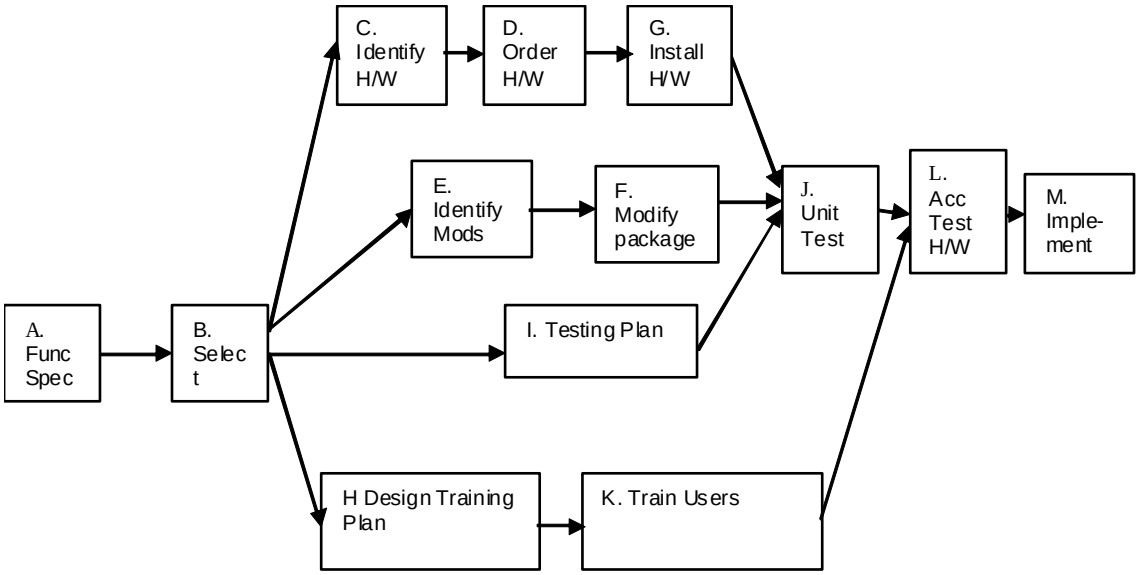
(8 marks)

c) List and explain briefly THREE advantages and THREE disadvantages of using an activity–on-node diagram for a project plan in comparison with using a Gantt chart.

(6 marks)

Answer Pointers

a) The required A-on-N diagram should be similar to the following:



with a minimum of 13 nodes (noting that start and finish nodes are not considered essential) and with all dependencies shown clearly and correctly.

The following values needed to be **shown in the diagram.** No specific node notation method was specified, but a known standard method, as shown in the course texts, was expected.

	EST	LST	EFT	LFT		Duration	Float
A	0	0	4	4		4	0
B	4	4	7	7		3	0
C	7	7	9	9		2	0
D	9	9	10	10		1	0
E	7	10	9	12		2	3
F	9	12	17	20		8	3
G	10	10	20	20		10	0
H	7	19	9	21		2	12
I	7	17	10	20		3	10
J	20	20	23	23		3	0
K	9	21	11	23		2	12
L	23	23	26	26		3	0
M	26	26	27	27		1	0

The critical path (A, B, C, D, G, J, L, M) and minimum duration (27 weeks) were not requested specifically here but would be needed for part b.

A maximum of 5 marks for a correct A-on-N diagram plus 5 marks for correct values throughout (shown **ON** the diagram within the Node design) and 1 for a Node key.
A total of **11 marks**

b) i) Reduce duration of A to 3 weeks: no change to critical path, but reduce minimum duration of project by 1 week

ii) Increase duration of E to 5 weeks: creates an additional critical path (A, B, E, F, J, L, M) but no change to minimum duration.

iii) Reduce duration of G to 8 weeks, same critical path, but minimum duration reduced by 2 weeks

2, 3 and 3 marks for each part respectively, **including** the required descriptions. A total **of 8 marks.**

Some candidates assumed (in error) that all three changes were to be made simultaneously. In this case half marks (i.e. **4 marks**) were awarded for a correct answer.

c) This is a somewhat standard question (and thus answer) comparing A-on-N and Gantt. Note that the wording required a list of 3 advantages of using A-on-N followed by 3 disadvantages of using A-on-N. It did **NOT** ask **also** for lists of advantages/disadvantages of Gantt.

Three typical advantages of using A-on-N are:

It shows clearly all the Node values
It is easier to show task dependencies
It is quicker and more straight forward to amend

Three typical disadvantages are:

- It is less easy to show against a time scale, plan holidays, etc
- It is less likely that non-technical staff (e.g. senior management) will fully understand it (and its implications)
- It is not so easy to use for resource scheduling, etc

1 mark each for a valid/correct list of advantages and disadvantages, plus 2 marks each for clear explanations. e. two sets of 3 marks. **Total 6 marks**

Examiners' Guidance Note

This was, as usual, by far the most popular question in part B of the paper.

a) Most candidates produced a clear, well-designed A-on N diagram. There were far fewer A-on-A diagrams than in the past (though still some).
The most common problems included:

- the omission of any form of node structure (or key),
- lack of understanding of float and how to calculate it (sometimes confusing total float with task float),
- not showing the dependencies flowing from left to right in the diagram
- omitting arrowheads
- not stating the time units
- providing a key that referred to, say, "es" (for "Earliest Start Date"), etc
- omitting LST, EFT , LFT.

b) This was usually a quite straightforward question for candidates who had produced a good diagram and answer for part a. However, many supplied an answer but with no description of the changes concerned. As ever, it is important to read each question precisely and then answer it fully.

A disappointing number overlooked the words “on their own” in the question, which clearly divided it into three independent parts.

Some misread “to” as “by” in each part of the question.

c) There were a number of unexpected problems with these answers and the standard of explanation was often quite poor. On several occasions the same point was made as both an advantage and a disadvantage (e.g. “easy to show dependencies”, “easy to show float”); marks were deducted for this.

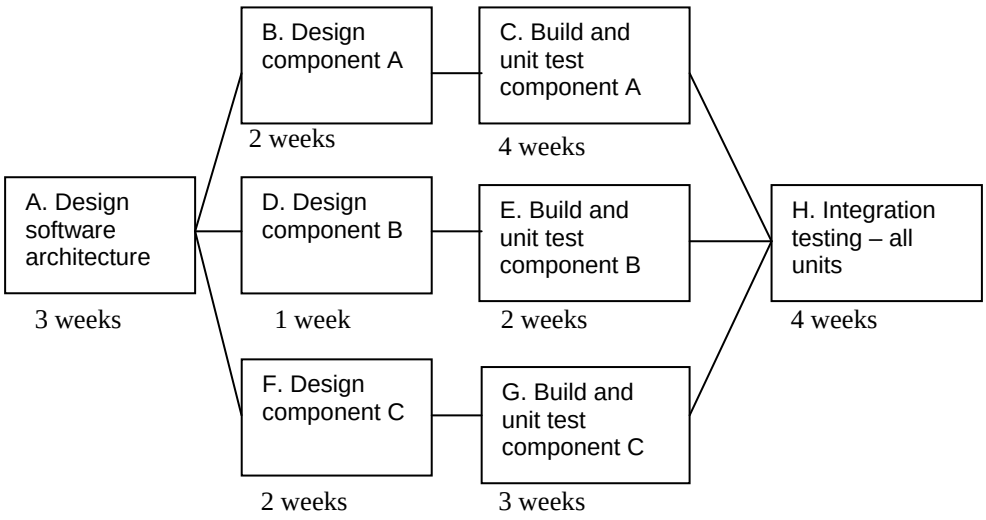
Many candidates stated (incorrectly) that dependencies, float and the critical path are difficult to show an A-on N diagram.

Several also failed to limit their answer to just THREE advantages and THREE disadvantages.

Worryingly the word “estimate” was used sometimes instead of “calculate”.

Question B6

The activity network for the development of a small IT system, which comprises three main software components, is shown below:



A lead software architect always undertakes the software architecture design.

Software developers only carry out the designing, building, and unit testing of software components.

A system tester only carries out the integration test.

The weekly rates for these staff are:

Staff type	Weekly rate
Lead software architect	£1200
Software developer 1	£800
Software developer 2	£600
System tester	£500

a) Explain the process by which staff resources are allocated to the activities identified as needed for a project. **(10 marks)**

b) Illustrate the approach described in (a) above by applying it to the project above to produce a Gantt chart or histogram showing the staff allocated to each activity, and the planned timing of the activity. Note that only two software developers are available. **(7 marks)**

c) Calculate the staff cost of the project. **(4 marks)**

d) Discuss how you might re-plan the project if the lead software architect could also carry out the designing, building, and unit testing of software components. **(4 marks)**

Answer Pointers

a) The appropriate main steps in allocating resources for an IT project in general could include:

- Identify the resource types needed (noting that people within such resource type groups should be interchangeable)
- Determine the number of people available for each resource type
- Allocate these types to project tasks
- Identify the competencies and relevant experience of all staff available for project
- Starting from the beginning of the project, calculate the number of each resource type needed in each time period (e.g. a week) – this could be shown as a resource histogram
- Compare this with the number of appropriate staff available in each time period – i.e. identify resource clashes
- Adjust the plan to remove clashes, by, for example:,
    - Allocate/obtain more staff, or
    - Delay some activities – use float, extend completion date

(see pages 34 to 38 of BCS course text)

Many other valid points were possible, and accepted, provided that they were related directly to the assignment of resources to activities, or to the project in general (e.g. team building, career progression)

Up to **10 marks** for a good answer incorporating most of the above phases.

b) One possible table/diagram here is:

Weeks >>>	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
lead s/w architect	A	A	A												
s/w developer 1				B	B	C	C	C	C						
s/w developer 2				F	F	D	G	G	G	E	E				
system tester												H	H	H	H

A Gantt chart would have been acceptable instead, provided that the staff allocated to each task were identified clearly and there were no staffing overlaps. Alternative (valid) staff allocations were also acceptable. Up **to 7 marks** for a good valid answer.

c) From the above, the cost calculation method could be displayed quite simply as:

Staff type	**weeks**	**weekly rate**	**cost**
lead s/w architect	3	1200	3600
s/w developer 1	6	800	4800
s/w developer 2	8	600	4800
system tester	4	500	2000
		Total cost	15200

Up to **4 marks** for a good, well-presented cost calculation.

d) A suitable plan here could be to reduce the duration in the following way:

Weeks>>>	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
lead s/w architect	A	A	A				E	E					
s/w developer 1				B	B	C	C	C	C				
s/w developer 2				F	F	D	G	G	G				
system tester										H	H	H	H

But this would increase the project cost quite significantly to £16,400, i.e.:

Staff type	weeks	weekly rate	cost
lead s/w architect	5	1200	6000
s/w developer 1	6	800	4800
s/w developer 2	6	600	3600
system tester	4	500	2000
		total	16400

Up **to 4 marks** here for a sound **discussion** leading to a result such as that shown above, noting both the reduction in duration **and** the inevitable cost increase.

Examiners' Guidance Notes

The underlying bookwork required for a good answer to part a appeared not to be well known or understood. Parts b and c were answered much better but the were a number of worrying issue in answers to part d.

a) This question expected an explanation and description of the standard steps in allocating staff resources to an IT project, starting with the identification of resource type (e.g. experience, qualification and perhaps potential) required for each activity. Many candidates did not describe this methodical approach at all well, concentrating

more on aspects such as “team building”, etc. Note that this was “generic” question rather than one relating specifically to the example project in this question.

b) The histogram method (shown above) proved to be much more reliable here than use of Gantt charts. Where a Gantt chart was produced there were very often staffing overlaps/clashes or the allocation of staff to each activity was not shown at all (sometimes showing the critical path instead). The better answers took into consideration the individual cost of the two developers, so that that more work was assigned to SD2 (with a lower weekly cost)

c) Most answers here were reasonably correct, although some assumed (incorrectly) that the weekly cost of all staff should be summed and multiplied by the number of weeks.

d) This answer required some discussion of tactics and priorities (e.g. total time v total cost) and, in this respect, was not often answered well. A disappointing number of candidates stated that if more activities were allocated to the (more expensive) lead architect then the overall cost of the project would be reduced – due to the decrease in overall project time.