BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

IT PROJECT MANAGEMENT

Friday 30th September 2016 – Afternoon

Answer **any** FOUR questions out of SIX. All questions carry equal marks
Time: TWO hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Only **non-programmable** calculators are allowed in this examination.

SECTION A
Answer Section A questions in Answer Book A

Question A1 Syllabus Text References

3.1 Team building theory and practice, structures and responsibilities including Belbin's team roles and Tuckman-Jensen stages of team evolution

Question A1

a) It is suggested by Tuckman and Jensen that project teams go through a series of five identifiable stages in the life of a project. Describe EACH of the FIVE stages.

(10 marks)

b) It is important to understand the mix of different personalities within a project team. Belbin has identified nine team roles which a successful project is most likely to fill. Describe any FIVE of these team roles explaining key strengths and allowable weaknesses.

(15 marks)

Question A1 Mark scheme

a) The stages can be described in various styles. The headings will remain the same and the content should broadly follow the sentiments in the Tuckman list phrased in the candidates own way. The stages are basically (based on Tuckman's list):

- Forming. Uncertainty about roles, looking for guidance, anxiety and unsure of roles, uncertain about the group
- Storming. Gaining confidence, team members begin to resist task demands, deny task requirements, members often still uncertain about roles, although some members emerge as more certain
- Norming. Team members concerned with conforming from team agenda and needing to be seen as team players with an open exchange of views and acceptance of other team members.

- Performing. Concern with doing task, getting job done, sense of priority, allocate resources with greater efficiency
- Adjournment. Recognition of achievement, realisation of team disbandment.

2 marks for each stage description. Merely listing all headings will attract 1 mark

b) Belbin has described nine team roles (8 originally) with key strengths and allowable weaknesses:

Answers should provide five from the following list and generally follow the (not exhaustive) descriptions.

- **Resource investigator**: Provides knowledge of outside world and develops contacts. **Strengths** enthusiastic, outgoing, **Possible weaknesses**: over optimistic, can lose interest in ongoing work quickly.
- **Team worker**: Helps team to gel. **Strengths** cooperative, a listener**. Possible Weakness** indecision, avoidance of confrontation, reluctance to argue a point.
- **Coordinator:** Focus on team objectives, a delegator. **Strengths** mature, confident, good at delegation. **Possible weaknesses** manipulative, offloading work, tendency to over-delegate and avoid own effort.
- **Plant:** creative, can solve problems in unconventional ways. **Strengths** Creative, imaginative. **Possible Weaknesses** Ignores incidentals, poor communicator, can become attached to impractical notions.
- **Evaluator:** provides a logical view and impartial judgement. **Strengths**: strategic, discerning, good judge. **Possible Weaknesses:** lacks ability to inspire, overtly critical, insensitive.
- **Specialist:** In-depth knowledge of key areas. **Strengths:** Single minded, dedicated, skilled, advanced knowledge. **Possible Weaknesses:** Narrow focus, limited understanding of wider viewpoints.
- **Shaper:** provides drive to keep project going, pushing ideas forward. **Strengths**: overcomes obstacles, dynamic. **Possible Weaknesses:** can be abrasive, provocative, offensive.
- **Implementer:** needed for planning, an efficient worker**. Strengths:** practical, reliable, schedule-maker. **Possible Weaknesses**: inflexible, slow to respond to new events and ideas.
- **Finisher:** Polishes final work, maintains quality. **Strengths**: focused, conscientious, anxious to achieve milestones. **Possible Weaknesses:** over anxious, can't delegate, overly fussy.
-

1 mark for naming and identifying a role and up to another 2 marks for descriptions of key strengths/allowable weaknesses.

Examiner Remarks.

Overall this was the most popular question in section A. Over 85% of candidates attempted this question. This question had the widest range of marks of the three questions in this section.

Part a.

For this part few candidates showed any real appreciation of the basics of team building theory. Many candidates clearly had no appreciation of the Tuckman and Jensen team evolution stages. Most tended to simply read the question in terms of the software engineering view of a project lifecycle. For those candidates who had did have some appreciation of the evolutionary approach they simply added or appended an assorted list of Tuckman – Jensen stages (often incorrectly) to the standard software lifecycle descriptions, gaining few marks. Those candidates who demonstrated knowledge of the concept tended to gain high marks by giving good comprehensive descriptions, indicating that they understood the concepts well. It is evident that a large number of candidates have had no meaningful exposure to this part of the syllabus.

Part b

For this part of the question candidates who did well in part a also performed well here. Once again many candidates described the role of team participants in a software development project where very many answers gave (wrongly) a thorough description of the role of Analyst, Designer, tester etc. Obviously many candidates had no awareness of the Belbin descriptions of team roles, showing lack of knowledge for this part of the syllabus.

Question A2 Syllabus Text References

Risk management

5.1 Risk identification: types of risk, risk checklists.

5.2 Risk prioritisation: assessment of likelihood and impact of risk; qualitative and quantitative methods of assessing risk exposure

Question A2

a) List FIVE general software project risks and describe the risk reduction techniques that can be applied to them.

(20 marks)

b) Risk exposure provides a measure of relative risk.

Risk Exposure= (impact) x (likelihood)

i) Calculate the risk exposure for each hazard in table 1.0 below:

(2 marks)

hazard	likelihood	impact	Risk Exposure
A	2	9	
B	8	2	
C	10	2	
D	3	9	
E	4	7	

ii) Which TWO hazards should be prioritised?

(3 marks)

Question A2 Mark scheme

a) Any five from the generic list (based on Boehm) shown below (or similar) together with the suggested risk reduction techniques:

1 mark for identifying and naming risk with up to an additional 4 marks for relevant description of risk reducing techniques.

	Risks	**Risk reduction techniques**
1.	Personnel shortfalls	Staffing with top talent, mentoring, team-building, training
2.	Unrealistic time and cost methods	Multiple estimation methods, design to cost, incremental development, recording and analysis of past projects, standardisation of methods
3	Developing the wrong software functions	Improved software evaluation, formal specification methods, mission analysis, user surveys, prototyping, early user manuals
4.	Developing the wrong user interface	Task analysis, prototyping, scenarios, user participation
5.	Gold plating i.e. .adding features to the software that are only marginally useful	Requirements scrubbing, prototyping, cost-benefit analysis, design to cost
6.	Continuing stream of requirement changes	High change threshold, information hiding, incremental development (deferring changes to a later increment)
7.	Shortfalls in externally furnished components	Benchmarking, inspections ,reference checking, compatibility analysis
8.	Shortfalls in externally performed tasks	Reference checking, re-award audits, Award-fee contracts, Competitive design or prototyping ,teambuilding
9.	Real time performance shortfalls	Simulation, benchmarking, modelling, prototyping, instrumentation, tuning
10.	Straining computer science capabilities	Technical analysis, cost-benefit analysis, prototyping, reference checking

b) i) a=18,b=16,c=20,d=27,e=28 — 2 marks for correct.

ii) D, E — 3 marks for correctly ranking and interpreting.

Examiner Remarks

This question was the second most popular with around 80% of candidates attempting it. The range of marks was narrower than for Question A1. It had the highest average mark of all three in this section.

Part a.

For this question many candidates spent much effort on describing the techniques that could be used for identifying project risk when the question clearly asked for a list of acknowledged general project risks and asked for the subsequent risk reduction techniques. Although many candidates gave a good and convincing description of risk identification and gained a few marks, they often failed to provide the subsequent reduction techniques.

Part b.

Most candidates correctly calculated the correct answers. Some found difficulty in prioritising hazards based on exposure and focused on the likelihood score. In a few cases candidates did not know how to do the risk exposure calculation.

Question A3 Syllabus Text References

Progress monitoring, project control and reporting

4.2 Where and when to monitor; the stages of the project control lifecycle.

4.4 Reasons for reports: whom to report to and how to report; the report hierarchy

4.5 Types of report: exception, progress (checkpoint), management (highlight).

Question A3

a) The framework for controlling a project to ensure it meets the project plan is the project control lifecycle. Draw and label a project control lifecycle diagram.

(8 marks)

b) i) The project manager is often required to make a highlight report. Outline five types of information you might expect to see in a highlight report.

(5 marks)

ii) Name any other three report types that a project manager might produce, stating who gets them, for what purpose and what they typically contain.

(12 marks)

Question A3 Mark scheme

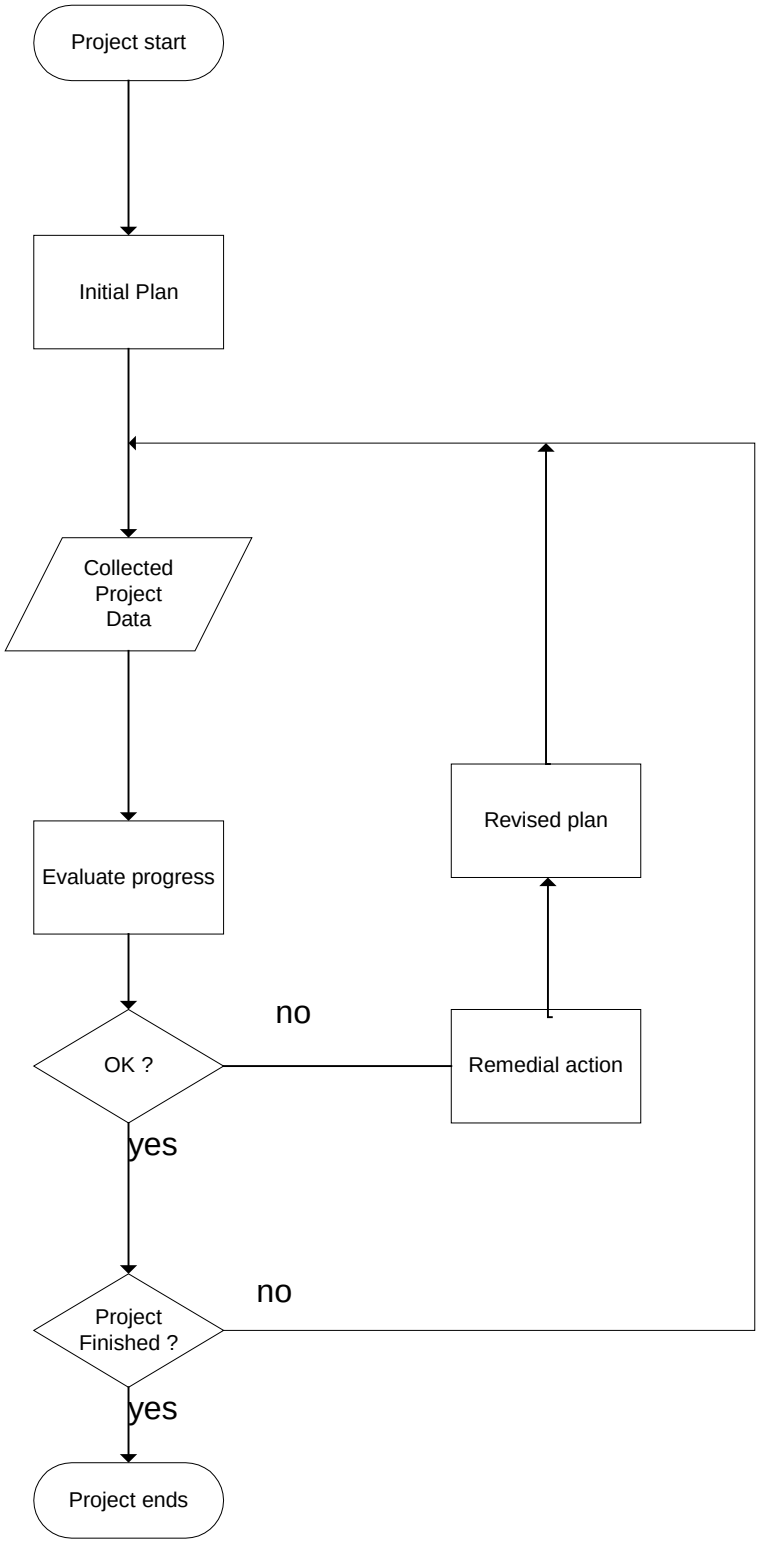
a) A suitable diagram is shown in fig 1.0. Any similar drawing will suffice, as long as it shows the cyclical behaviour. 1 mark each for identifying the cycle stages.

b) i) Either

- from PRINCE2 content: Project ID, period covered budget and schedule status, products completed, products to be completed, next stage requests for changes made, budget schedule and impacts of changes etc.
- non-PRINCE2 forms might be: details of progress against main plan, milestones achieved in period, deliverables completed etc.' it should be apparent from the selection that the report is to senior management and contains appropriate information 1 mark each

ii) Gives the candidate an opportunity to show knowledge of reports typical of either IS or product development type projects that they might be familiar with. There should be three distinct types. Examples of possible reports include: exception reports, lessons learned, requests for change (to resolve technical issues in satisfying requirements), issues, off-specifications, plans, PIDs, end of stage assessments. 4 marks for each description

Fig 1.0



Examiners Remarks.

This question was the least popular of Section A. It had the narrowest range of marks of all three questions with the lowest mean score. It also had the lowest overall pass rate of all three questions.

Part a.

In this part the requirement was for the project control lifecycle to be drawn and labelled. It was surprising that so many candidates considered the standard software development lifecycle diagram provided the same representation. Clearly many candidates had not appreciated the distinction between the control of a project and the control of software development. The confusion for some candidates was compounded by an attempt to superimpose a project control set of labels onto parts of the software development control diagram that they had produced obviously spending an inordinate amount of time (and effort) to gain few marks.

Part b.

i) The main point of the highlight report is to present to management items from the project that highlight pertinent events and provide management a synopsis of the events/impacts and resultant status. Many candidates thought this would include bug reporting, testing routines and details of language implementation for coding. Clearly those candidates did not distinguish the role of project management in the management of a project as opposed to the management of a piece of software.

ii) In this part of the question an opportunity is given for candidates to provide evidence of their knowledge about the range of possible management reports that they might need to provide. A few candidates concentrated on a single type of report template and varied the technical detail reflecting their lack of appreciation of the possible range. Overall, candidates tended to concentrate on trying to generate templates with repeated sub headings and varying titles but did not explain the purpose of the different report types.

SECTION B
Answer Section B questions in Answer Book B

Question B4 Syllabus Text References

1.1 Feasibility studies and the establishment of a business case for a project

4.2 Where and when to monitor; the stages of the project control lifecycle

Question B4

A travel agent is considering the replacement of its existing holiday booking system as this system is considered to be too restrictive in the range of options that can be offered to potential clients and users and can be difficult to use. There are also an increasing number of problems with its continuing reliability and maintenance.

a) Identify up to FIVE significant business benefits that might be included in the business case for such a project, together with TWO specific financial measures that could be used to assess its financial viability.

(10 marks)

b) The business case has been accepted and an external company has been commissioned to undertake the project at an agreed cost. The project will comprise:

i) final agreement of functional requirements;
ii) development and testing of replacement software;
iii) purchase and installation of replacement server, PCs and printers;
iv) implementation and maintenance of new system.

For EACH of these four components identify ONE potential business risk that might arise, and explain its possible effect on the original business case.

(8 marks)

c) Consider specifically items i and ii above, and identify THREE key reports that the project manager would require from their team in order to monitor and control these stages of the project and ensure that the business case is maintained. Identify a key action that the project manager should take to ensure the effectiveness of this monitoring and control.

(7 marks)

Question B4 Mark scheme

a) Business benefits arising from the replacement of the existing system could include:

- a wider range of options available to clients – leading to more potential sales
- the new one should be easier for sales staff to use – therefore quicker, and thus generating more sales
- as it is quicker to use, the same number of staff can deal with more potential clients, leading to more sales, etc
- alternatively perhaps fewer sales staff needed, for same number of sales
- fewer lost sales due to system unreliability
- the better system should improve motivation, job satisfaction of existing sales staff
- it should be easier to recruit good sales staff
- lower cost of maintenance

Up to 7 **marks** were awarded here for a sensible explanation of five good, sensible potential benefits.

Specific financial measures could include:

- payback period
- internal rate of return,
- net present value.

More generalised financial benefits, such as “increased profits (bearing in mind the overall cost of the project)”, were also acceptable if well explained.

Up to **3 marks** were awarded for 2 valid financial measures; giving an overall total **10 marks**.

b) Possible business risks in each of these 4 stages of the project could include:

i) *final agreement of functional requirements*

- Some important requirements might be omitted, with the result that the features of the delivered system could be not as wide-ranging as needed- leading to fewer sales, higher cost of sales.
- Additional essential requirements might be discovered later, as the project progresses – leading higher initial cost,

ii) *development and testing of the replacement software:*

- Misinterpretation of requirements by the development team
- A key developer leaves or is ill, which increases the development cost, and increases the time until new system can be used, thus affecting IRR and payback period

iii) *purchase and installation of replacement hardware:*

- A higher specification of hardware is required than originally anticipated – leading to a higher initial cost, which also affects IRR and payback period.

iv) *implementation and maintenance of the new system*

- The system not as easy for staff to use as anticipated; there might be some very slow features, - thus the cost per sale, etc increases
- A rival company might implement a new system with similar options – so the potential competitive advantage is lost.

Up to **8 marks** were awarded, 2 for each sensible, relevant, risk identified, to include a clear explanation of the effect on the business case.

c) Key reports (which must be from the team to the project manager) here could include:

- Time sheets – which would lead to: progress, and percentage completion, on specific tasks
- Expenditures (if any) and other uses of resources
- Anticipated holidays and other staff absences
- Test plans – based on the agreed statement of requirements
- Test logs
- Quality and other inspection reports
- Risk register updates

bearing in mind the overall need to monitor progress and control costs whilst maintaining the business case.

Up **to 5 marks** were awarded for a good choice, and brief explanation, of three different reports.

Possible actions that the project manager might take **"***to ensure the effectiveness of this monitoring and control***"** include:

- Ensuring that the statement of requirements is fully understood and agreed by the client against the business case
- Setting up regular team meetings to confirm progress and identify any concerns at an early stage
- Cross checking the test plans against the statement of requirements
- Identifying key checkpoints and milestones within the project plan
- Ensuring that Project Board members are quickly aware of any impending situation that might need their immediate action.

Up to **2 marks** for a well-chosen relevant action, with explanation; giving an overall total of **7 marks**.

Examiners' Remarks

Overall many answers to this question were affected adversely by assumptions that the existing system would be modified, not replaced (despite the clear wording in the question), or that many more specific options could be added to the system, such as online or remote access by clients via the cloud, which were not mentioned in the question. Others assumed that the replacement system would be a package, which is not the scenario described in the question.

Part a

The concept of business benefit was not always clearly understood and many answers discussed needs or requirements rather than business benefits. The requested financial measures were often omitted, sometimes candidates discussed financial problems that might arise during the project instead.

Part b

This specified "business risk". In good answers there were some good clear answers (often involving changes in government policy or taxation) but many answers tended towards project risk. Discussion of the effect of the identified risk on the business case was often poor, with a tendency to discuss the likely effects of the risk on the project management.

Sometimes the answer concentrated, wrongly, on the business of the external company undertaking the project, not the travel agent.

Part c was often not well-answered. The important issue here was to consider only reports FROM the team that would help the project manager to monitor (usually progress) and control (usually costs) within these two named stages of the project in the context of the business case. Often the reports identified were those that the project manager might submit to the project board. The second part of part c (identifying a key action) was very often not answered at all

Question B5 Syllabus Text References

1.7 Installation issues, including methods of going live

1.8 Project closure and post implementation activities

Question B5

a) Identify THREE types of Go-Live strategy that could be used to make a project operational and discuss the advantages and disadvantages of each strategy.

(**12 marks)**

b) Documentation is often overlooked at installation. Identify FOUR important documents that are handed over at Go-Live, explaining the importance of each one.

(8 marks)

c) Describe THREE ways in which the success of a system can be measured after it has become operational.

(5 marks)

Question B5 Mark scheme

a) Acceptable types of 'Go Live' strategy include: Big Bang, Phased Functionality, Incremental (or Pilot) site roll-out, Parallel running.

2 marks were awarded for each clearly-identified strategy, with a further 2 marks each for the discussion of advantages/disadvantages. **Total 12 marks**

b) **Important** documents that are to be handed over at go-live could include:

- Sign-off document, SLA
- Implementation backout plans
- System back-up and recovery plans
- Support manuals, including user manual
- Test plans
- Configuration Plans

Note that these documents are specific to Go-Live. Some other documents, such as programming standards or training materials, may be handed over at this point but they should really be handed over well in advance of Go-Live.
1 mark awarded for each document type listed with a further 1 mark each for a sensible explanation of importance of this document at, and after, Go-Live.
Total 8 marks

c) Valid measures of system success here could include:

- number of faults recorded – which could be measured from day 1
- number of user related errors – which may be as a result of training issues
- at Post Implementation Review, business benefits can be reviewed.
- did the system have a negative effect on the infrastructure and/or other systems?
- is the system running in accordance with SLA performance criteria?

Note that these refer to **system** success **NOT project** success (for example, meeting time, cost, quality objectives).
1 point awarded per valid measure, with a further 2 marks for sensible descriptions
Total 5 marks

Examiners' Remarks

This question was, fractionally, the least popular in Section B.

Many candidates answered Part a (on Go-Live strategies) well, but there was sometimes confusion between phased and pilot implementations. Some listed more than the required three strategies, and sometimes there was no description or explanation. There was also some uncertainty as to when system testing, staff training and acceptance testing might take place. Several candidates assumed this was part of the go-live stage, and (worryingly) many implied that staff training should take place after implementation. Usually all three should all have been completed well before go-live. This uncertainty then impinged on the discussion of advantages and disadvantages.

In Part b there was a tendency to list the various documents developed during the life of the project (such as the feasibility study and the statement of requirements – sometimes time sheets) instead of concentrating on those that would be handed over to user management and others at Go-Live. Explanations of the **importance** of these documents to the implementation of the new system were often omitted. Many just described the documents concerned.

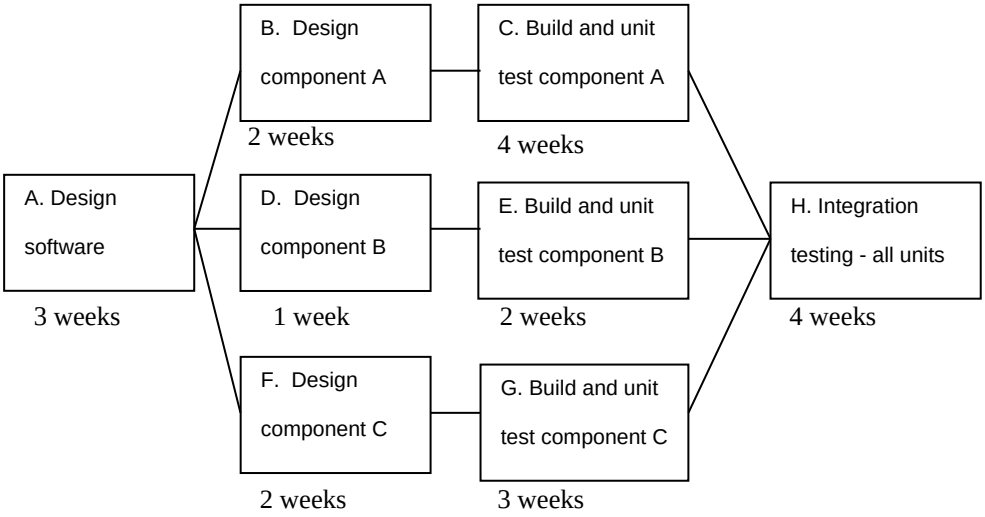
Answers to Part c tended to be quite vague, such as general opinions or surveys, whereas the question asked specifically for ways in which success could be *measured*. Many candidates considered measures of *project* success – not those of system success.

Question B6 Syllabus Text References

2.5 Resource allocation, including the identification of resource types and the resolution of resource clashes

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 table, 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.

Calculate the staff cost of the project.

(**11 marks)**

c) 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 staff 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 staff clashes, by, for example:
    - Allocating/obtaining more staff, or
    - Delaying some activities (using float where possible), thereby extending the completion date (see pages 44-49 of main BCS course text, pages 34-38 of 1st edition.)

Other valid points are possible, and were accepted here, provided that they are 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** were awarded for a good answer incorporating most of the above resource allocation phases.

b) One possible table/diagram 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 is also acceptable, provided that the staff allocated to each task *are identified clearly and there are no staffing overlaps.*
Up **to 7 marks** were awarded for a good valid answer, including a clear table, Gantt chart or histogram.

From the above, the cost calculation method could 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	£15,200

Up to **4 marks** for a good, well-presented cost calculation, giving a total of **11 marks**.

c) A suitable plan here could be to reduce the project 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	£16,400

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

Examiners' Guidance Notes

This question was marginally the most popular in Section B, but overall answers were not good, often showing a very limited understanding of the resource allocation and, more importantly, resolving resource clashes.

As indicated above, Part a required candidates to consider the process for allocating staff resources for an IT project in general – NOT just this project**.** Several answers overlooked this and concentrated instead on allocating the named staff to the named tasks in this project. Some marks were awarded for this if some of the standard steps were included in the explanation, particularly if resource clashes (and appropriate methods for their resolution) were considered.

Some of the more generalised answers tended to focus on staff recruitment rather than resource allocation.

In Part b, the key factor was that there ARE resource clashes (for tasks B to G) in this project. Many answers overlooked this completely. The question required a table, a Gantt chart or a histogram to show the proposed allocation of staff to tasks. Worryingly, many of the diagrams produced omitted any reference at all to the staff involved – concentrating solely on the critical path for tasks alone.

Some candidates assumed that both software developers could be allocated to a single task (from B to G) thereby halving the task duration. This is rarely legitimate, for instance in task E which is likely to comprise 1 week build followed by 1 week unit test.

Part c was often not answered, but there were some good answers noting that if the lead architect was assigned some of the software development tasks B to G (thus resolving the resource clashes) then the saving in project time would increase project cost. It was therefore legitimate to decide not to re-plan.