THE BCS PROFESSIONAL EXAMINATION
Diploma

April 2007

EXAMINERS' REPORT

IT Project Management

Examiners commented, in their report for April 2006, that "candidates clearly demonstrated they had not covered the material contained in the syllabus". The examiners report for October 2006 commented candidates who sat in October were "much better prepared and the examiners were pleased to note a very significant increase in the passing rate".
However candidates who attempted the examination in April 2007 appear not to have studied the syllabus at all. A number of answers showed a complete lack of knowledge and candidates appeared to be guessing the answer.
Examiners strongly recommend candidates study the subject and attempt past questions, using the examiners comments and indicative answers, to identify the areas of the syllabus in which they lack knowledge.

An indication of the points expected by the examiners is given below, together with some comments, to assist candidates in future examinations. Any point which was valid and relevant to the question received marks.

Question 1

A business organization, XYZ, has its headquarters in a developing country. It manufactures items of clothing according to the specification of retail businesses based in the UK such as department stores. The process of manufacture involves several sub-processes each of which XYZ sub-contracts to other companies in developing countries. In addition to its headquarters, XYZ has an office in London to deal with UK clients. It also has local offices to oversee the relationships with sub-contractors. When new contracts with UK clients are being negotiated XYZ may need to consult with sub-contractors about technical matters.

XYZ has decided to implement an IT-based Supply Chain Management system to manage the flow of information and goods between sub-contractors and XYZ. Ideally, the sub-contractors should have direct access to the system.

a) Explain the activities that would need to take place at the beginning of this project before the requirements elicitation and gathering activities. **(7 marks)**

b) Draw up a preliminary plan (which can take the form of a table) of the sequence of activities needed for the elicitation, gathering and analysis of the requirements for the project outlined above. Explain the nature of the most important activities, identifying their deliverables and the staff who will be involved. **(18 marks)**

Answer pointers

a) Among the activities that could have been mentioned were ones which lead to the following:

- Feasibility study/business case
- Drafting and agreeing the project brief or terms of reference
- Appointment of the project board/steering group
- Appointment of project manager
- Overall plan of project
- Detailed plan of first stage
- Obtain staffing for first phase

Requirements elicitation could occur in more than one place. Some preliminary investigation might take place when the feasibility study is taking place. This could be followed by more detailed requirements elicitation when the project proper is embarked upon. Marking took account of this, and students who pointed this out got credit for this.

b) Below is an example of what would have been acceptable.

Description of activities	10 marks
Deliverables	5 marks
Actors	3 marks

	activity	deliverables	staff
1	Plan elicitation process	Stage plan	PM mainly, approved by board Lead business analyst (LBA)
2	Identify interviewees (at HQ, London, regional offices) and arrange interviews	appointments	LBA
3.	Plan interview questions	Interview plan	LBA, junior business analysts, interviews
4.	Conduct interviews, write up notes	Interview notes	LBA, JBAs
5.	Analysis – document current processes and flows between processes	Possibly data flow models of the current physical system	LBA, JBAs
6.	Analysis – document data used	Possibly entity relationship models	LBA, JBAs
7.	Create logical/concept model	Possibly logical DFM	LBA, JBAs
8.	Document functional requirements	Function catalogue	
9	Document non-functional requirements	Requirements catalogue	LBA, user representatives
10	Get user feedback	Agreed requirements	LBA, user representatives

Examiners' comments

a)

This question was looking for the initial steps that set up a new project. Most candidates identified the need for a feasibility study, but surprisingly few went on to discuss creating an initial plan, acquiring resources and setting up a project infrastructure. Some candidates did take account of the particular circumstances and problems of the project which gained marks.

b)
This part of the question was designed to find out whether candidates were aware of the processes that took place during requirements elicitation and analysis. This was generally not well answered. Some of the better answers obtained credit by mentioning the use of prototypes as a tool for clarifying requirements. Some candidates did not have the knowledge to answer the question properly and described the whole development life cycle and not just the first stages.

Question 2

a) Describe the main sections to be found in a business case report. Give examples of the information and issues that each section might contain based on the XYZ project scenario in Question 1. **(10 marks)**

b) Explain the concept of risk, distinguishing between project risk and business risk. **(6 marks)**

c) Assuming that XYZ decide to implement the Supply Chain Management application by acquiring an off-the-shelf application, discuss:

i) THREE business risks and THREE project risks that XYZ would need to consider, **(6 marks)**

ii) the actions that might be taken to deal with the three *project* risks. **(3 marks)**

Answer pointers

a) A business case report might contain sections for:

- Outline of the proposed development: desired outcomes; means of achieving the outcomes
- Benefits: financial, non-financial but quantifiable, non-quantifiable. Benefits for XYZ could include better and more accurate communication, faster delivery times, lower stock holdings
- Costs: Implementation; operation: cost of acquiring hardware, software, network etc
- Organizational impact: IT department would need to be expanded; working practices would need to be changed, suppliers would need to have IT equipment and application installed on their premises
- Risks: e.g. suppliers may object to additional cost of the system, London and UK may not remain location of most customers
- Recommendation and proposed next steps

One mark was given for each of the valid main sections identified (up to a maximum of 5 marks) and one for each worthwhile example of content (up to a maximum of 5 marks).

b) There are many different definitions of risk that were acceptable, such as wording like “a possible future event that could have a detrimental effect on the project outcome” or (more simply) “something that might go wrong”. (2 marks)

A project risk is one that could affect the success of project completion, usually relating to impacts on cost, duration and product quality. It would come **within the remit** of the project management team (2 marks).

With a business risk, a project could be implemented successfully, but fail to meet its **business case** due to (external) **business conditions** e.g. a B2C ecommerce application might not attract customers (2 marks).

A bonus mark was awarded for pointing out that project risks will usually also be business risks as they could affect the business case.

c) i)
Examples of business risk could include:

- Unexpected legal changes
- Adverse economic conditions
- Organizational changes e.g. changes in suppliers

Other such risks were equally valid, provided they were **outside** the control of the project team (up to 3 marks)

Examples of project risk could include:

- Inability to find a suitable COTS
- Suitable COTS too expensive for budget
- Conflicting requirements of different stakeholders

Again, other risks **within** the control of the project team were equally valid (up to 3 marks)

c) ii)
Some examples of actions (i.e. measures to be taken) that match the **project** risks above are:

- COTS not available or too expensive – a preliminary feasibility study looking at packages before commitment to the project
- Conflicting requirements – an arrangement for a fast escalation process to management; having stakeholder representative in development team and empowering them to make all decisions about requirements

Examiners' comments

a) Many candidates did not understand the purpose of a business case report (i.e. to set out the business case for a proposed new project) and several omitted this part of question 2.
Often it was taken to be a project initiation report, a progress report, or a feasibility study (which is not quite the same).
Candidates were asked for examples of report content "based on the XYZ project scenario in Question 1" – very few related their examples directly to this scenario.

b) Again, this part was often omitted. In general candidates showed a poor understanding of the concept a risk being something with a probable negative outcome.
Very few differentiated correctly between project and business risk. Most tried to class what were essentially project risks as either "project" or "business", not realising that a business risk is essentially an external event that affects the project.

Some answers demonstrated candidates complete lack of knowledge in this area and they attempted to answer the question by describing risk types and risk management methods, which was not required.

c) The required answers here depended very much on the assumption (as set out in the question) that an OTS application was to be selected. Many ignored this, though partial marks were still awarded if the candidate differentiated clearly between project and business risk, and then supplied valid actions (usually some form of probability or impact reduction) to deal specifically with a clearly identified risk.

Overall there tended to be some confusion between parts b and c and, as with part (b), some candidates discussed risk type and risk management methods instead of giving the practical examples required.

Question 3

a) The IT department of a business organization implements some projects by obtaining off-the-shelf applications. Other projects involve the in-house development of code. The manager of the IT department has some concerns about the accuracy of its estimates of effort. She hears about function points and COCOMO as possible methods that might improve effort estimation.

Write a brief memorandum to the manager:

i) explaining the two approaches in outline, **(10 marks)**

ii) describing their respective advantages and disadvantages for the IT department and making a recommendation about which approach to use. **(7 marks)**

b) Below is a table relating to five recent projects carried out by an application development team.

project	function points	Effort (weeks)
A	550	65
B	160	15
C	200	21
D	360	36
E	240	23

A new project is about to be started which is estimated as being 220 function points. Illustrate how the historical data above could be used to produce an estimate for this project using:

i) analogy, **(3 marks)**
ii) a parametric or productivity-based model. **(5 marks)**

Answer pointers

a) Among valid points that could have been made were:

Function points

- Identifies externally apparent features of the application that correlate to size e.g. number of inputs and outputs
- Allocates weightings to feature types
- Multiply counts by weightings to produce an indicator of size
- FPs used to calculate productivity for old projects (e.g. FPs per day) and predict effort for new projects (FP count/ FPs per day)

COCOMO

- Uses lines of code as the size indicator
- Use of exponentiation to take account of perceived lower productivity on larger projects
- Three different types of system recognised: organic (IS?), semi-detached, embedded
- Assesses various productivity factors such as developer productivity to generate development effort multipliers used to modify the 'nominal' estimate

10 marks

Advantages and disadvantages

Function points

- Designed for IS projects
- Can be applied earlier in project as it is based on data available after requirements analysis
- Users may be able to understand and appreciate the method
- FPs not so intuitively attractive for system amendments

COCOMO

- Lines of codes will often have to be a guess
- Not really designed for IS
- Does take account of productivity factors

7 marks

b)

i) Estimate effort using analogy

- pick closest previous project (s) C and D
- make adjustment for difference (21+23)/2 = 22 weeks

ii) Estimate effort using a parametric approach

- calculate productivity rate for old projects
- use productivity rate to calculate estimate for new project (220/9.44) i.e. 23.31 weeks

project	function points	Effort (weeks)
A	550	65
B	160	15
C	200	21
D	360	36
E	240	23

totals	1510	160
FP/week	9.44	
	FPs	estimate
new project	220	23.31

Examiners' comments

a)

This required a relatively straight-forward overview of COCOMO and Function Points and there were some good answers. The advantages and disadvantages presented for the two techniques were less convincing. Some of these suffered from being too subjective and lacked explanation to demonstrate a candidate knew the issues, e.g. a simple statement that an estimate would be 'difficult to calculate' using a particular approach.

b)

This part required the candidates to demonstrate the practical application of the analogy and productivity/parametric approaches to estimating using a very simple example. Disappointingly, very few candidates managed to do this satisfactorily, even among those who had done well in Part a. Candidates must be prepared to demonstrate they can apply their knowledge to solve simple problems.

Question 4

A large distribution company is expanding rapidly, with much larger numbers of stock items and customers. The stock system will soon become inadequate and therefore needs to be replaced. The development of the replacement system will be outsourced to a well-known software house as a separate project, and is expected to take nine months.

a) Name and explain TWO financial measures that could be used by the company management to assess the viability of this project when the business case is drawn up. **(4 marks)**

b) In addition to the two financial indicators that you have described in part *a)*, name and explain THREE other non-financial justifications for the project that could be included in this business case. **(6 marks)**

c) You are the project manager for the software house and the company management have asked you to prepare a monthly report on progress of the project.

i) List the THREE types of report that you might produce, and explain briefly the differences between them. **(5 marks)**

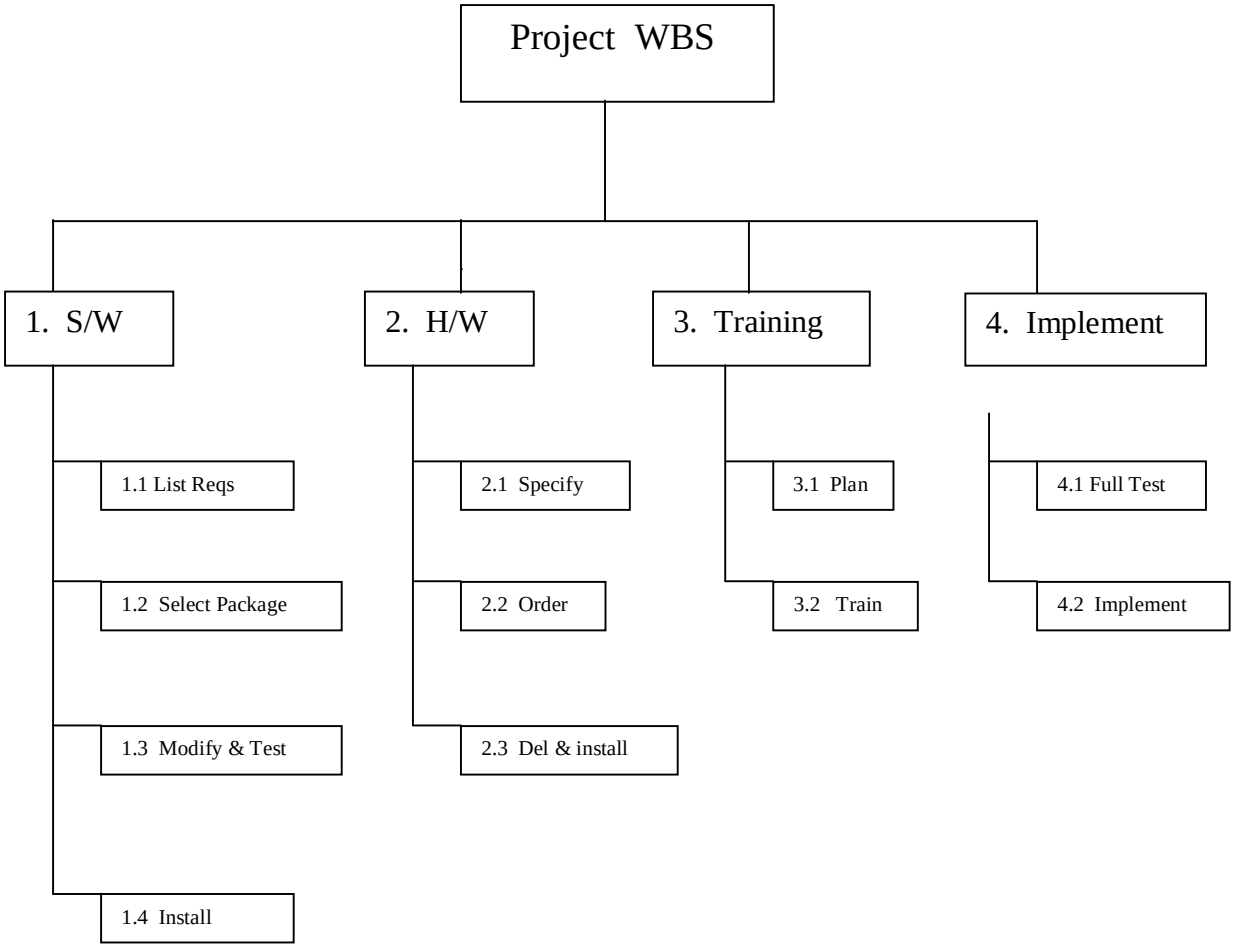
ii) Bearing in mind the four key criteria for a successful project, list NINE items of information that you consider should be included in each monthly report to the company management. **(7 marks)**

iii) Choose THREE of these items and identify the most likely source of the information that you would need. **(3 marks)**

Answer pointers

a)

A number of variations of WBS diagram were possible here. An acceptable example is:



A key point here is to group the various tasks into 2 or more general headings (eg as above) in order to demonstrate a logical top down breakdown of tasks within each category. Other logical groupings were acceptable.

(2 marks were awarded for a valid, consistent 2-level WBS structure and a further 2 for completeness, including all the listed tasks)

b)

A **WBS** sets out, in a structured diagram, the tasks to be undertaken during the project

A PBS sets out, in a structured diagram, the deliverables to be produced during the progress of the project .

An explanation, based on task A in the question, might be:

the **task** is the work required to **produce the list, whereas**

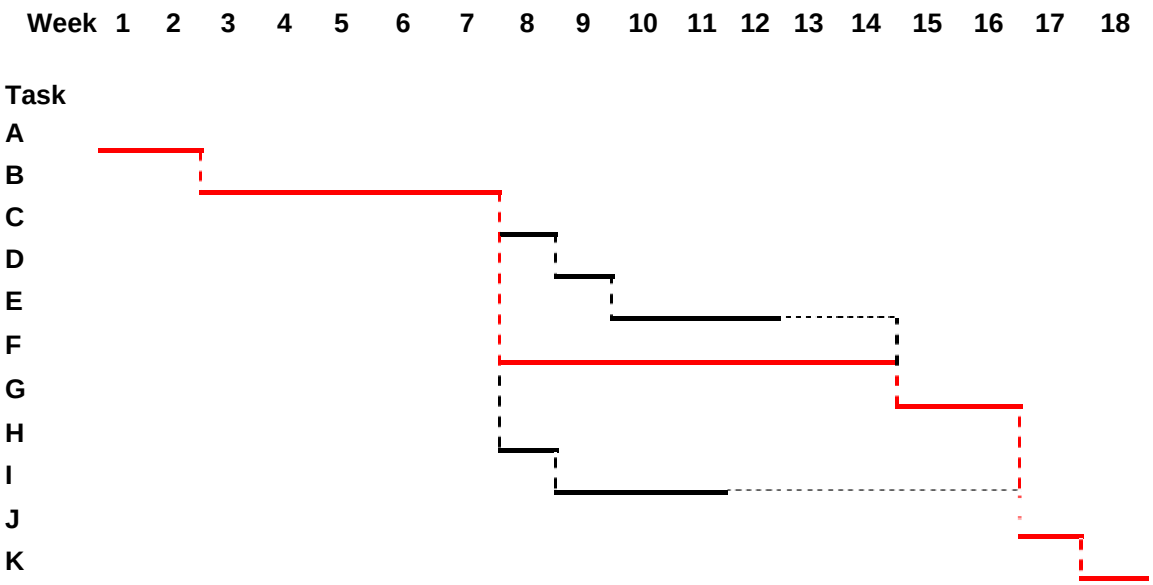
the **product** is **the list itself**.

Not every task will produce such a deliverable (eg Task G)

(1 mark per definition, plus 1 for a suitable explanation of the key differences)

c)

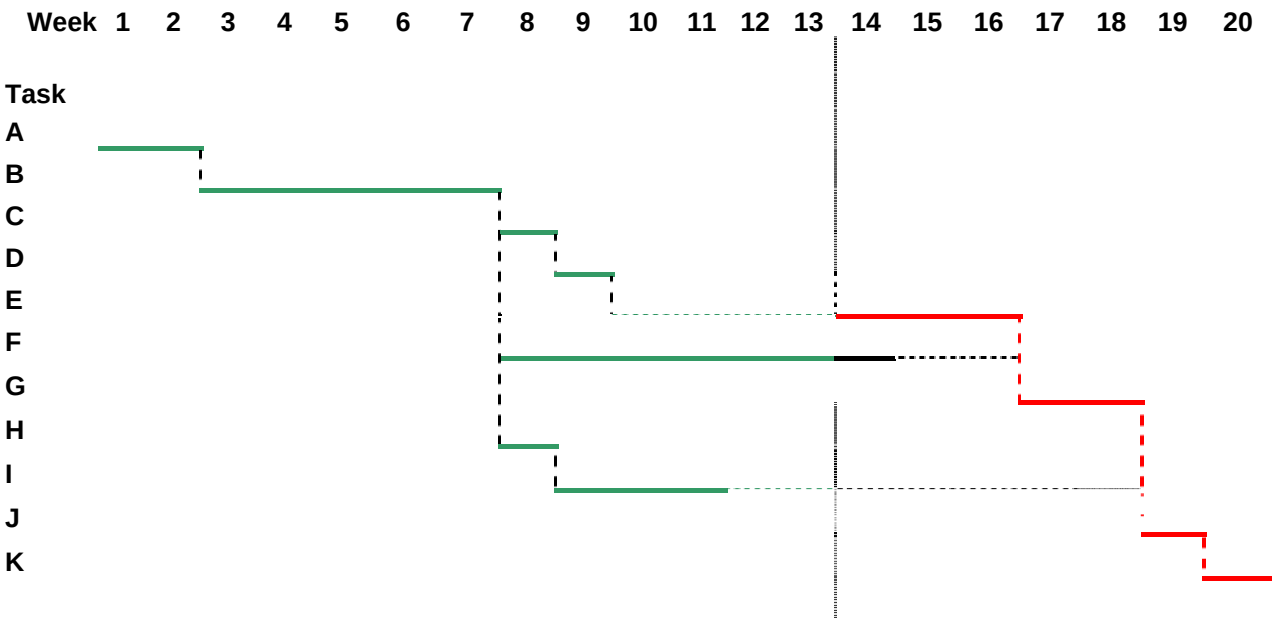
This required a Gantt chart similar to:



5 marks for correct structure and clear task dependencies, plus 3 for listing all tasks with some form of float (i.e. those in black above) and a further 2 for naming and highlighting (eg in red, as above) the critical path.

d)

This question expected an amended Gantt chart similar to:



Marks were awarded for:
correctly interpreting and showing progress to date (including a week's work remaining on task F),
changing the start date for task E and the subsequent changes to start dates of tasks G, J and K,
inserting float after the completion of task F (which is thereby removed from the critical path),
identifying the **new** critical path (in red above, **from** the progress report date),
extending the float for task I, and
indicating the date of the progress report (end of week 13).

Examiners' comments

a)
Disappointingly, many candidates omitted this part of question 5, or submitted a variety of task flow chart or resource allocation diagrams – none of which were acceptable. Some answered the question without drawing a diagram.

This implies perhaps a lack of understanding of the concept and purpose of WBS.

b) Again, where answered, few candidates were able to distinguish clearly between these two diagram types. In particular a PBS was often described as a form of task flow, or step diagram - not at all related to actual project deliverables.

c)
Most answers included the main elements of a Gantt diagram, and interpreted the tasks and relationships correctly.
Most frequent errors were:
Failing to highlight the critical path (A-B-F-G-J-K) on the diagram;
not marking the float correctly from tasks E and I to tasks G and J respectively (or the dependencies of G on E, and J on I);

confusing “critical path” with “duration”;
not showing the time scale.

Some diagrams were drawn with the tasks in date order from bottom left to top right which, though acceptable, is less usual than the top right to bottom left convention.

d)

This question was intended for candidates to show how the Gantt chart can be used as an information and planning tool during the progress of a project.

On the whole most candidates showed the consequent changes in task start dates (and thus the critical path) following the progress report correctly, but (disappointingly) none used the diagram to highlight progress to date (in green above) or the actual date of the progress check (the vertical dotted line at the END of week 13).

Otherwise the most frequent error was in starting task E at the END, not the START, of week 14 (which could indicate some confusion in the interpretation of week numbers/time frame on a Gantt chart).

Question 5

The payroll section of a small company has decided to replace its existing system with an off-the-shelf package. Each of the four staff members will have a new PC linked to a new server, and all will share a new printer, a new scanner, a new backup device and an upgraded communications link to the bank.

An outline project plan has been drawn up to include the following main tasks:

A	List the main payroll requirements	(2 weeks)
B	Assess alternative packages and select the most appropriate.	(5 weeks)
C	Specify all the required new hardware and communications.	(1 week)
D	Order all hardware and communications equipment.	(1 week)
E	Accept delivery and install all the new hardware and equipment.	(3 weeks)
F	Modify and test the package software.	(7 weeks)
G	Install the modified software.	(2 weeks)
H	Draw up a training plan.	(1 week)
I	Train the users	(3 weeks)
J	Full test	(1 week)
K	Implement the new system.	(1 week)

a) Draw a work breakdown structure (WBS) diagram for the project, showing all these tasks. This WBS should contain at least two levels. **(4 marks)**

b) Explain the main differences between this WBS and a product breakdown structure diagram for the same project. **(3 marks)**

c) The dependencies between the 11 tasks listed above are:

B depends on A
C, F and H all depend on B
D depends on C
E depends on D
G depends on E and F
I depends on H
J depends on G and I
K depends on J

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

d) At the end of week 13, tasks A, B, C, D, H and I have been completed on schedule, task F is on schedule, but task E has been delayed by 4 weeks and will now start in week 14.

Re-draw the Gantt chart to reflect and record this progress, and highlight the critical path. **(8 marks)**

Answer pointers

a) Acceptable financial measures here include**:** IRR (Internal rate of return) or ROI, payback period, NPV. (1 mark each, with another mark for each clear explanation).

b) Suitable non-financial justifications for this specific example could include:

The capacity to handle the much greater throughput volumes required now;
the reliability of support and maintenance of key software provided by a well-known software house, leading to the lack of reliance for this on internal staff (with varied skill sets);
the potential to handle rapid business growth in future.

(1 mark for each of 3 valid examples, with another 1 each for a relevant explanation).

c)

i) The 3 “standard” types of monthly project report here are:
management (or highlight), progress and exception.

(1 mark each with a further 2 for clear explanations of the key differences)

ii) Note that the key criteria to bear in mind here are: time, cost, meeting requirements and quality. Within these headings, suitable items of information for such a monthly report are:

Time/Progress/Plan:
Milestones reached
Tasks completed
Tasks ahead of/behind schedule
An annotated Gantt chart to display progress
Reasons for any delay

Cost/Budget
Actual v budget
Reasons for any variance

Requirements
- A summary of those already met (if any)

Quality
- Quality checks/tests successfully undertaken to date

Other
- Updated risk assessment
- Key decisions required now
- Any important staffing issues
- Significant requests for change

(A maximum of 7 marks for 9 well-selected distinct items).

iii) Potential sources of information for such report items could include:
Time sheets
- Accounts/financial system
- Test schedules
- Staff discussions/meetings
- Internal reports within the software house.
- Etc

(A maximum of 3 marks – 1 per relevant source)

Examiners' comments

a)
Well-answered on the whole, though many answers gave no explanation. Few mentioned that IRR and ROI are percentages. Some discussed budgets and estimating methods (which were not appropriate). Some credit was given for mentioning cost/benefit analysis, though strictly this is not a financial measure.

b)
It was important here to relate answers and examples to the specific business case described in the question preamble.
Many candidates had difficulty identifying such examples. Some mentioned generic considerations, such as "strategic fit", several tended to discuss various issues to be considered when undertaking the project or drew up a list of requirements – which were not appropriate answers here.
It was important to bear in mind that the required examples are essentially justifications for the proposed project, which could (for instance) be used to persuade others to accept or agree to it.

c) i)
Most candidates identified the 3 standard report types correctly, but explanations of the key differences (where attempted) were not often very clear.

Some failed to realise that these report were to be produced **BY** the project manager **FOR** the company management, and included reports received **BY** the project manager **FROM** project staff. Others mentioned project tools such as Gantt charts and WBS diagrams, inappropriate at this level

c) ii) Most candidates provided a sensible list of information items to be included, although there was a tendency to include (separately) a variety of very similar detailed items relating to project progress (eg tasks completed, tasks started, tasks not started, etc, etc), also information at too low a level (such as time sheets) for presentation to senior management.

c) iii) Again, this part was generally answered well, with very few significant problems or misconceptions.

Question 6

a) Explain TWO theories or models of team-building. **(7 marks)**

b) The IT department of a business organization has the responsibility for supporting IT applications. Some of the applications are off-the-shelf packages and some have been developed in-house. Support activities include user training, dealing with operational problems, fault diagnosis and correction, and dealing with requests for enhancements to systems. Enhancements to systems may need projects to be set up. A number of different business departments need to use the services of the IT department. Most applications are used by only one department.

i) Identify the job roles needed within the IT department, outlining the responsibilities of each role. **(8 marks)**

ii) The finance department has identified a new requirement caused by a new financial law. Identify the steps that you would take as the head of the IT department to deal with the abnormal temporary workload this project might need. You will need to consider both staffing and the structure of the department. **(6 marks)**

iii) Explain how you would ensure any temporary staff would work effectively with the permanent staff in the IT department. **(4 marks)**

Answer pointers

a) Two theories of team building could *for example* have been:

Tuckman-Jensen: which identifies the stages of team evolution as forming, storming, norming, performing, (adjourning)

Belbin which identifies management team roles such as co-ordinator, plant, monitor evaluator, shaper, team worker, implementer, resource investigator, completer finisher, specialist

7 marks

b) (i) A useful start was to distinguish between 'roles' and 'staff jobs' e.g. one person could carry out more than one role and a bonus mark was given for this.

Job roles could have included the following:

- user training – trainers: design and delivery of training
- operational problems
  - held-desk (1st level); record problem details; initial help perhaps by consulting known existing problems, refer to 2nd level where appropriate
  - applications support/analyst (2nd level) has expertise in the application (could combine this with a training role) May need to liaise with external software supplier.
- fault diagnosis – as for operational problems, but then software engineer to examine code who may have been involved with the original development
- IT department head

8 marks

(ii) The steps needed to deal with the abnormal workload of a new project might have included the following:

- Need to set up a project team for the project which would consist of an analyst capability and a software development capability
- Could outsource complete application development to external supplier
- Could bring in temporary contract staff

- Software developers could spend part of their time on support and part on new development, perhaps rotating roles

6 marks

(iii) Steps to ensure that temporary staff work satisfactorily with permanent staff could include:

- Involving existing staff in the staff selection process e.g. let them talk informally to applicants
- Providing a good induction for temporary staff e.g. introduce them to the different job roles in the department
- Careful job descriptions and work programme planning so that new staff and old know what their job roles are
- Having an existing member of staff mentor the new entrant

4 marks

Examiners' comments

a) Very few candidates could come up with any satisfactory models of team-building. Some mentioned motivational models, such as Maslow's hierarchy of needs, which do not really relate to team-working as such.

b)

i) Most candidates were able to make a fair attempt at identifying the roles within an IT department. Some tended to focus more on project roles, rather than the ongoing IT service roles. Some identified roles outside the IT department e.g. Finance.

ii) This question addressed the problem of dealing with an abnormal workload when an internal IT department has a major new development project. Some material on resource allocation could have been brought in here, as well as a discussion of staffing and setting up project teams. Answers tended to be rather sparse.

iii) Most candidates could come up with some ideas here.