This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners’ meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.
1 (a)  A Valve (1)
     B Evaporating unit (1)
     C Compressor (1)
     D Condensing unit (1)  [4]

(b) Five from:
    The system controls the amount of heat being let out of the system
    The valve is controlled by microprocessor to reduce or increase the flow of refrigerant
    Microprocessor compares the pressure of the refrigerant to the preset value
    If pressure of refrigerant is above preset value microprocessor opens valve wider
    If pressure of refrigerant is below preset value microprocessor makes valve opening narrower
    Touch screen is used to input the required temperature
    Microprocessor compares the temperature of the room to the preset value
    If temperature of the room is above the pre-set value the fans remain on/are switched on by the microprocessor or microprocessor increases their speed
    If temperature of the room is below the pre-set value the fans remain/switched off by the microprocessor  [5]

2 (a) Eight from:

Observation
Advantage – observing teachers’ lessons enables the systems analyst to see the process as a whole
Disadvantage – explanation of the ‘Hawthorne effect’

Interviews
Advantage – interviewer can move away from their ‘script’ and ask a more in-depth question if a particular response is given/can interpret body language
Disadvantage – One from:
    network manager and teachers have to be available at the time the systems analyst wants to interview them/may not have the time/can take a long time to interview all the teachers
    interviewees might try and provide answers which they think the interviewer wants to hear

Questionnaire
Advantage – One from:
    can be anonymous and answers tend to be, on the whole, more accurate
    everyone can complete the questionnaire at the same time instead of one after the other (as with interviews)/can complete it at their leisure
Disadvantage – it is very difficult to ask further questions based on the response to another question

Examining documents
Advantage – helps to identify the inputs and outputs of the system/volume of data can be determined/processing can be deduced
Disadvantage – can take a long time to collate documents  [8]
(b) Three matched pairs from:

The required outputs, storage and processing requirements were known using the data flow diagrams
The requirements helped to identify the type of input and output devices

The terminators and flow arrows in the DFD showed the volume of input data
Knowing the volume of input data allowed her to decide on an appropriate method of input to the system

Observing the processes in a lesson gave her an idea about the size and speed of the processor required
Observing the processes gave her an idea of the types of software required

The results of examining documents would be recorded on DFDs
The stores in the DFD show the volume of data in the system
Knowing the volume of data would have helped identify the size and number of storage devices

Terminators and flow arrows out of the system indicate the quantity/format of the output
Knowing the volume of output will help to identify an appropriate method of output from the system

User requirements would be known using interview transcripts/completed questionnaires
Knowing the user requirements helped to identify appropriate input/output devices/software

3 Four from:

Use of computers as learning resource/teachers can use email to send resources to students/can put them on the school intranet
Does not replace the teacher
Part of an integrated approach to teaching
Learning technology is only part of whole approach
Should be integrated with text books, worksheets
Teacher is still in control/takes responsibility for where learning will go
Students investigate and research using computers
Use of DVDs/interactive whiteboards/(multimedia/overhead) projectors/televisions
Sometimes use overlay keyboards
4 Four from:

Uses critical path method/Gantt/PERT charts finding optimum time to be spent on individual stages
PERT charts specifies the order in which tasks are completed
Critical path specifies the order in which tasks must be completed
Gantt charts help to show progress of individual tasks
Software helps identify progress made in each task
Software helps with daily and weekly planning
Identifying progress/lack of progress helps with planning future tasks
Some tasks can be done in parallel such as developing software and installing hardware, installing network cabling
Other tasks must be done in sequence such as installing hardware, installing software, testing network

5 (a) Five from:

Access the website
Click on My Account/Register here
Enter email address
Confirm email address by entering it again
Enter address/postcode
Enter name
Enter in contact details
Enter your choice of username
Enter your choice of password
Enter your answer to chosen security question
Confirm password by entering it again
Activation process completed by receiving email containing link to click on/on screen recognition (i.e. ‘type in this selection of characters’) 

(b) Three detailed descriptions from:

Phishing – e-mail appear to be from customer's bank
ask for customer’s details – password, card/account number, other security details
e-mail makes up plausible reason
includes a website address for customer to go to which looks just like the actual bank’s website but is a fake website

Pharming – fraudster redirects genuine website’s traffic to own website
customer is now sending personal details to fraudster’s website

Spyware is downloaded/software used to gather user's personal details
Software detects key presses of user logging on to bank site

Hacking – to access/intercept personal information
to use personal information against the individual/to commit fraud
hacking to spread viruses
6 (a) Two from:

Offer workers to go part time
Offer workers job sharing [2]

(b) Two from:

More job opportunities
Can work from home
Could be retrained [2]

7 (a) Four from:

Type of database is chosen (flat file/relational)
If it is going to be a relational database number of tables is decided upon…
...a key field to identify each record
...relationships are designed / Entity relationship diagrams are designed

Type of access is decided on
If indexed sequential, index is chosen…
...table of indices designed

Appropriate field names are chosen…
...relating to data content of field and unique name
Field type is selected…
...such as text, number, Boolean
...appropriate to field contents
Field lengths are chosen so that space/memory is not wasted but leaves room for expansion

Validation rules…
...such as range checks, invalid character checks, check digits
...are chosen appropriate to field contents…
...error message(s) designed
Field descriptions are included…
...which adequately inform about field contents [4]

(b) Three from:

Wages so far this year
Income tax so far this year
Employer insurance contribution so far this year
Employee insurance contribution so far this year
Pay date
Pension contributions so far this year [3]
(c) Five from:

Batch processing is used
At the end of each pay period...
...transaction file is sorted into same order as master file
Sorted on employee number
First record in the transaction file is read and first record in the old master file is read
Computer calculates the pay
Using rate of pay from master file
Using hours worked from transaction file
Computer calculates the income tax/insurance/pension contributions
Computer subtracts these from pay
Processed record is written to new master file
Payslip printed (to file)
Process is repeated until end of old master file
Master file is updated
Payslips are printed

8 Five from:

A detailed overview of the whole system
Data Flow Diagrams/systems flowcharts
... to show the results of systems analysis
What is expected of the system
Overall design decisions
... to see the choice of hardware and software
... to see the file structure/input and output formats
Test plan and test results to be reused when systems analyst debugs system systems flowcharts
Gives an overall view of solution
Test data/test plans so that systems analyst can see the results of these/test results.

9 Five from:

First-party call control
Allows operator to have a direct connection between their computer and the phone set.
Allows the operator's computer to control the functions of the operator's phone.

Third-party call control
Requires a dedicated telephony server to connect the telephone network and the computer network
Operator's phone communicates directly with the server
The server controls all the phones
The server can direct a call to the appropriate operator
Any computer in the system can control any phone
Supervisors can intervene if the call proves too complex for the operator to handle
First party is only suitable for small call centres.

Third-party call control would be used by Wuhan-Yangtse as it is such a large company/first part control is only used in small scale operations.
10 (a) Three benefits from:

Don’t have to spend so much on air conditioning/heating/renting offices
Don’t have to pay travelling expenses for conferences (phone conferences will be used)
Improved motivation
Retention of key staff

Three drawbacks from:

Difficult to keep track of projects/workers/Issa
Have to subsidise manager’s computers
Some companies have management systems and cultures that are not (yet) well adapted to the flexibility
Not all tasks are best performed in a self managing environment/workers might not work as effectively without a manager directly overseeing them

(b) Four from:

Participants agree time and date of the conference
Issa books phone conference with the phone company for that date
Issa is given two PINs by the phone company
A personal PIN, the participants’ PIN
Issa contacts participants and tells them the participant PIN
Just before the conference Issa dials the phone number keys in his special PIN
Participants phone the same number
Participants join the conference by typing in the participant PIN

All participants need a touchtone phone