System Analysis & Design
AS ICT Past Paper Questions

Scenario 3
Question 4
Mr Mustapha is the head teacher of a large school. The school currently has a computer network but he wants to have a new system which will allow the school to keep student personal records and test marks. He also wants to have a system which will let the students have the opportunity to use computers to improve their learning. He has invited Joanne Reeves, a systems analyst, to design and create the new system.

After Joanne has designed the new system she will want to develop and test it. Describe the testing strategies she could use.

(a) Three from descriptions of:
Test each module
Using live data/normal data/data which is acceptable/valid
Using data outside the range/wrong type/either end of the range
Test whole system/use students to test CAL system

Joanne will need to produce technical documentation. Describe the two types of technical documentation she will produce.

(c) Systems documentation – one mark
Two from:
Results of systems analysis
What is expected of the system
Overall design decisions
Test plan and test data
Systems flowcharts
Program documentation – one mark
Two from:
Description of the software
Purpose of the software
Input/output data formats
File structures
Program flowcharts/algorithm
Program listing
Notes to assist future modifications

Scenario 2
Questions 3 and 4
The July 23rd Hospital in Cairo is improving its existing computer system to make it more efficient. They currently have separate systems for storing:
• staff records
• payroll records.
One single database is required which will store all this data. A systems analyst is being employed to analyse the existing system and then design a new system.

Describe three different methods the systems analyst could use to collect information about the existing system and describe situations where each could be used.

Six from:
Interview employees/managers face to face
Description of situations where interviewing is used – when there is sufficient time/when it is

relatively easy to get people together/interview a small number of workers to get a snapshot of the existing system
Examining documents used in current system
Description of situation where examining the documents is necessary – where there is lots of paperwork
Observing employees and watching over the whole process
Description of situation where using observation is needed – where gaining an accurate view of what exactly goes on would be difficult otherwise/gaining a broad overview of processes would be difficult otherwise/where workers cannot be interrupted
Distributing questionnaires to employees using written questions to gather responses/where whole workforce response is required
Description of situation where using questionnaires is advisable – when it is difficult to get people together/to save time in gathering responses
Allow only three methods

After the system has been created it will need to be tested. Using examples of payroll data, describe this testing and how any needed improvements would be identified as a result.

Six from:
Testing (each module) with normal data including appropriate example
If error produced – description of improvement required
Testing (each module) with live data including description
If difference between live and actual results – description of improvement required
Testing (each module) with abnormal data including appropriate example
If error not produced – description of improvement required
Testing (each module) with extreme data including appropriate example
If error produced – description of improvement required
Testing whole system including examples of data
Description of improvements required

Scenario 3
Questions 6 and 7
Rajvinder Uppal is the manager of a book publishing company. The company uses an outdated record keeping system for storing details of the books they publish. Rajvinder wants to introduce a more modern system. She has employed the services of a systems analyst, Vikram Patel, to investigate the current system and create a new one. Vikram will use a variety of methods to collect information about the existing system.

Describe two types of diagram which Vikram could use to record information about the current system.

Four from:
Data flow diagrams
Using (two from:) terminators, processes, flow arrows and stores
Represents inputs, outputs and processing
System flowcharts
Using particular input, output, storage and processing symbols

Describe how the recording of information will help with the analysis of the current system.

Five from:
Helps identify problems with the current system
Detail of the diagrams will reveal any weaknesses in the current system
Easier to see where there is job duplication
Helps identify suitable hardware and software for a new system
Required outputs, storage and processing requirements identified using DFDs
Helps identify volume of input data

Helps identify the user and information requirements
Can see exactly what job each worker is doing
Can use DFDS to help with user requirements

Describe how Vikram will identify the information requirements for a new system.

Two from:
Interview users to find out the requirements
Will produce a requirements specification containing information requirements
Information requirements of the system will be identified from the data collected when observing existing system
Will collate interview transcripts, questionnaires and existing documents

Describe the factors which will influence Vikram when designing the input and output layouts.

Six from:
Depend on the user requirements
Needs to be easy to use
Needs to be attractive to look at
Needs to limit the potential for inaccurate input
Must have user instructions
Need to consider who will see outputs
Must match customer requirements as well as company
Screen output must be kept simple
Output screens must be consistent so that users are not confused

After the system has been developed it will need to be implemented. Discuss the different methods which could be used.

Six from:
(Parallel running)
involves running the old system alongside the new system
Is more expensive because two sets of workers have to be paid
If there is a problem with the new system still have the old system as a backup
(Phased running)
Involves running part of new system whilst old system still operates with other parts
Cheaper as you don't employ two sets of workers
If there is a problem with the new system still have bulk of old system to fall back on
(Pilot running)
Involves running new system in one office whilst old system still operates in other offices
If there is a problem with the new system still have old system in other offices
Problems are limited to one office
(Direct changeover)
Involves replacing the old system with the new system all in one go
Cheaper as you don't have to employ two sets of workers
Quicker as there is no delay waiting for bugs to be fixed
If there is a problem you don't have the old system to fall back on
1 mark for reasoned conclusion

After the system has been implemented Vikram will need to evaluate it. Describe the process of evaluation.

Five from:
Using test results
Comparisons will have been be made of the actual results with the expected results
If the results are not as expected refinements are made

Obtaining feedback from the user
Could observe users performing set tasks
Interview the users to gather their responses about what they thought of the system and how easy it was to use
Questionnaires to all the workers to ask them how easy they found it to use. The results could be analysed statistically
Identifying limitations of the system
Any extensions to the system users have said they would like
Making improvements to the system
Evaluate results of testing against the requirement specification
Evaluate the results of user testing

Scenario 4
Questions 6 and 7
Dar Es Salaam High School has recently been formed by joining together six smaller schools. The head teacher wants to have a modern ICT system to administer staff and student records. She has decided to employ a systems analyst to look at the existing systems and recommend a new system. The system will need to produce hundreds of reports in one session and should be able to find individual records very quickly. Using the results of the analysis of the current system the analyst will need to design the new system. Once the system has been designed and developed, user and technical documentation will need to be produced.

Other than observation, describe the methods that the systems analyst could use to research the current systems.

Distribute/Hand out written questionnaires to system users (to complete)
Interview current system users face to face
Examining documents used in the current system

Describe four different items that the systems analyst will need to include at the design stage. Using the scenario of Dar Es Salaam High School, explain the factors that will influence the choice of each item.

Four from each column:

Item	Factors: an example of how:
Specifying the required hardware and software	the volume of data determines the choice of output devices.
	the order that data will be output affects the choice of storage devices.
Designing data collection forms/ screen layouts	the user requirements influences the format
	the output required from system influences the design
	file structures affect the design
Designing report layouts/screen displays	the content and presentation of report layouts/screen displays depend on the requirements of the users
Designing validation routines	the form of input affects these.
	the file structure affects these.
Designing the required data/file structures/programming specifications	the data structures/programming depend on the types of processing
	the file structure depends on the input and output structures

Explain the purpose of technical documentation.

Two from:
Produced specifically for systems analysts/programmers.
Helps when the system needs further development/upgrading/improvements.
Helpful should any errors occur in the system and system needs amending to get rid of these errors.

Describe the two types of technical documentation including details of the contents of each one.

Eight from:
Systems documentation....
....provides a detailed overview of the whole system.
Test data/test plans so that systems analyst can see the results of these/test results.
Can use this data again to check if errors have been successfully removed.
The results of the systems analysis/DFD diagrams.
What is expected of the system/purpose of the system.
Overall design decisions such as the choice of hardware and software/file, input and output structures.
Systems flowcharts.
Program documentation....
....produced for program code that has been written.
Description of the software/purpose of the software.

Reasons for choosing those pieces of existing software that were used…
….. instead of the programmer having to write code.
Input and output data formats.
Program flowcharts/algorithms.
Program listing – this will be a complete copy of the code used…
…and annotation explaining what each module of code does.
Notes that will help any future programmer to make modifications to the system.

After the system has been developed it will be evaluated. Describe how test results are recorded and explain how they affect this evaluation.

Three from:
(A table) showing the type of test, test data, expected results, actual results
and a comment on the results. (One mark for three column headings, two marks for 5 column headings.)
Test results will help the systems analyst to make judgements.
Comparison will be made of the actual results with the expected results.
If the results are not as expected system will need to refined.
Comments in the comparison table contribute to the evaluation.

Scenario 4
Questions 6, 7 and 8
Dar Es Salaam High School has recently been formed by the amalgamation of six smaller schools. The head teacher wants to have a modern central ICT system to administer student records. This system will need to be ready when the students attend a single campus. She has decided to employ a systems analyst to look at the existing computer systems in the six schools and recommend a new system. She wants to keep student records on file which will include the following:
• the student id number of 12 digits
• test scores
• their form groups

The systems analysts has completed the collection of information about the existing system. After this has been done, he will use this information to complete the Analysis stage of the systems life cycle. Describe the activities he will need to carry out to do this.

Six from:
Establishing inputs, outputs and processing
usually by examining all the documents used in the current system
Recording information
using data flow diagrams/interview transcripts/questionnaire analysis
Identifying problems with the current system
using the data already recorded about the current system
Identify suitable hardware and software for the new system
making generalised recommendations using the data already recorded
about the current system such as volume of data
Identify user and information requirements
using transcripts of interviews with users/ observation [6]

At the Design stage of the systems life cycle he will need to decide on the validation checks to be used. Describe three validation checks which would be used with the student id number.

Three (with reference to student id) from:
description of check digit
description of range check
description of invalid character check
description of length check [3]

The new system has been designed and will now be tested. Explain why live data is used to test the new system.

Two from:
Live data is data that has already been used in the existing system
It is used because the outputs are already known
Test results from new system can easily be compared with outputs of existing system
Data can be chosen for when previously encountered special/unusual circumstances existed
Data can be chosen for when it was a normal day to day situation [2]

Compare and contrast different methods which can be used to implement this new system. For each method give reasons why it may, or may not, be suitable for this school.

(b) Eight from:
Parallel running – involves running the old system alongside the new system
Normally more expensive than direct changeover as two sets of workers have to be paid
If there is a problem with the new system still have the old system as a backup
It is a slower method of implementation than direct changeover
Two sets of workers would not be necessary for such a (relatively) small system/teachers would be expected to use both methods
Phased implementation – involves implementing one part of the system at a time
Normally cheaper than parallel running as you don't employ two complete sets of workers
If there is a problem with the new system still have bulk of old system to fall back on
It is a slower method of implementation than direct changeover
There is only one system required (student records) so this may not be appropriate
Pilot running – involves running new system in one area of the organization whilst old system still operates in other areas
Normally cheaper than parallel running as you don't employ two complete sets of workers
If there is a problem with the new system it only affects one school
Other schools learn from mistakes made in first area to have new system
It is a slower method of implementation than direct changeover
Probably most suitable as one small school could trial the system
If it is successful the whole school can take it on
Direct changeover – involves replacing the old system with the new system all in one go
Normally cheaper than parallel running as you don't have to employ two sets of workers
Quicker as there is no delay waiting for bugs to be fixed/benefits of the new system become apparent immediately unlike other methods
If there is a problem you don't have the old system to fall back on unlike other methods
Teachers might be unsure of moving over to a brand new system overnight/might be frightened of losing student marks [8]

After the system has been implemented it will be evaluated. Describe the methods that the systems analyst will use to evaluate how easy the system is to use.

Three from:
Observe teachers performing set tasks (record their progress using video)
Measure the time taken to complete a given task
Interview teachers to gather their responses about ease of use of the system
Hand out questionnaires to all teachers to gather their responses about ease of use of the system [3]

Scenario 2
Questions 3 and 4
Some teachers at the Nairobi International School use computers to store records of their students including examination results. The Headteacher Peter Onyango has decided that all teachers will use computers to keep their assessment records and that this information will be stored centrally. In order

to introduce this new system Peter has asked Mary, a systems analyst, to analyse the existing paper based system that a number of teachers are still using. Each student has a unique ten digit student number. After the analysis phase Mary will design the new system. Part of this process will be the design of validation checks. Mary will use presence checks and existency checks on the student number and presence checks on the examination scores, which are marks out of 100. In addition, Mary will need to decide on other validation checks. Nov 2010

Describe two methods that Mary could use to record the information about the current system.

Six from (max four for either):
Use of data flow diagrams…
…(graphical method of) recording the inputs, outputs and processing
DFD consists of terminators, processes, flow arrows and stores (at least two must be mentioned for a mark)
Somebody/somewhere outside the system is a terminator
Process box contains the processing for that part of the system
Data output from the system is called a store
Data flow is represented by arrows
Different levels 0,1,2
Systems flowchart…
…shows inputs, processing and outputs (only if not used in DFD description)
Generally a method of designing a systems solution
Not found very often in the analysis stage
Storage represented by a storage medium in a computerised system
Outputs is represented by an output box
Data flow represented by arrows
Inputs represented by input medium symbol [6]

Discuss the suitability of the additional validation checks that Mary could use on the student number and the examination scores.

Eight from:
Length check for student number...
...must be only 10 characters, (no more, no less)
Range check on student number/test scores
Student number must be between 1 000 000 000 and 9 999 999 999
Scores must be between 0 and 100
Type check on student number/test scores…
...must be digits only
Check digit for student numbers...
...each separate digit is mathematically manipulated to produce a final check digit
Format/picture check on student number...
...all 10 characters are numeric
(six maximum for descriptions)
Check digit would not be suitable for test scores as scores are not long enough
Length check would not be suitable as scores not long enough
Range check/Type check might not be suitable for student number as it will probably be stored as text
Both checks for test scores is the best recommendation.
Common error in student number would be transposing digits so check digit would trap this
None of the other checks would trap transposition errors
Common error is omission of digit which would be trapped by length check
Format/picture check on test score would be unsuitable...
...as scores could be single digit, two digits or even three digits [8]

After the system has been developed, the entry of examination results will be tested. Describe a suitable test plan with appropriate test data.

Five from:
A set of test data is selected…..
……including normal, abnormal and extreme data
Data will be accepted or rejected by system
It is expected that abnormal data will be rejected
.....such as (suitable example of abnormal data must be given)
It is expected that normal data will be accepted...
.....such as (suitable example of normal data must be given)
It is expected that extreme data will be accepted...
.....such as (suitable example of extreme data must be given)
Expected results and actual results are recorded
Actual and expected results are compared
If validation rules don't trap errors then will need to be amended
Comments on comparison are recorded/comments are made as to whether system needs to be changed or otherwise
Live data could be used
Comparison between actual results and previous system results [5]

Scenario 3
Question 5
Jaypeg is a graphics company whose workload varies from week to week. It employs a number of permanent staff and as the amount of work increases additional staff have to be employed on a temporary basis. The permanent staff are paid monthly but the temporary staff are paid weekly according to the number of hours worked. The company is to introduce a computerised payroll system which will consist of a separate system for the permanent workers and one for the temporary workers. The payroll department is the only department to be given a new computer system. Cost is important and the company do not wish to pay more than they have to for the new system. Nov 2010

Compare and contrast the methods Jaypeg could use to implement the payroll system.

Seven from:
Phased implementation involves implementing one part of the system while rest of system remains unchanged/implementing system part by part
Temporary workers system could be introduced while old system for permanent workers is retained
Phased is cheaper than parallel running as you don't employ two complete sets of workers
With phased if there is a problem with the new system still have bulk of old system to fall back on unlike direct changeover
Training can be gradual in parallel running and phased implementation unlike direct changeover
Changes can be made if problems occur with phased and parallel unlike direct changeover
Phased is a slower method of implementation than direct changeover
Parallel running involves running the old system alongside the new system
If there is a problem with the new system still have the old system as a backup unlike phased implementation/direct changeover/pilot running
Parallel unlikely to be used because of expense of paying two sets of workers
Pilot running involves running new system in one branch of the organisation whilst old system still operates in other branches
Pilot is unsuitable for this situation as there is only one department being computerised
Direct changeover – involves replacing the old system with the new system all in one go
Direct is cheaper than parallel running as you don't have to employ two sets of workers
Direct is a quicker method as there is no delay waiting for bugs to be fixed unlike other methods/benefits of the new system become apparent immediately unlike other methods
With direct changeover, if there is a problem you don't have any of the old system to fall back on unlike other methods

One mark is available for a detailed reason for a suitable recommendation [7]

Scenario 1
Questions 1, 2, 3 and 4
Asif is the headteacher of a school in Dubai. He is keen to increase the use of ICT in lessons. A is being set aside for use as a computer room to help the teaching of geography and history. He has already made sure that the room has air-conditioning which is microprocessorcontrolled. He has asked Safina, a systems analyst, to research the current facilities and recommend which hardware and software should be purchased. When she has completed the analysis and design phases of this project, Safina will need to supervise the setting up of the hardware and software for the new classroom. This will require an approach using construction project management. June 2011

Safina has to obtain information about the current system from the network manager and the teachers. Describe one advantage and one disadvantage for each of the four methods she could use to research the current system.

(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]

In her analysis of the current system, Safina identified the software and hardware required for the new system. Give detailed descriptions of three results of the analysis that enabled her to do this.

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 [6]

Scenario 3
Questions 7, 8 and 9
The Wuhan-Yangtse is one of the largest water companies in China. It operates a call centre for customers to use when they have problems with their water supply. It has just computerised its payroll system so that payslips can be produced at the end of the month for each worker. June 2011

When the new system was implemented the systems analyst would have produced some systems documentation. Describe what is included in systems documentation and explain why each item is needed.

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. [5]

Scenario 3
Questions 5, 6
Mrs Sharif is the head teacher of a large school. She has recently decided to upgrade the school's computer system so that all teachers use ICT in their lessons. In addition, the system will enable student records, including test scores, calculated as percentages, to be stored efficiently.
She has employed Jasvinder Sidhu to develop the new system. Jasvinder will examine all the existing documents which are used with the current student record system. He will need to interview Mrs Sharif as well as examine the way the current system works. He will then design the new system before developing it. After the new system has been created it will need to be tested. When the system has been implemented, Jasvinder will need to produce some program documentation. (June 2011)

Using examples from the scenario, describe how examining documents will help Jasvinder to identify the inputs, outputs and processing in the existing system.

Four from:
Can see which documents relate to input information and output information
This enables the analyst to produce documentation of the system
This can be done whilst producing a data flow diagram
The volume of data could be determined….
The format of the input and output can be determined…
Each part of the system needs to be examined to see what specific inputs, outputs and processing are required
For example:
the input would be the details of the students
the processing would be the calculation of the test scores/percentages
the output would be lists of students and their test scores. [4]

Describe five factors that Jasvinder will need to take into account when designing the input screens for the new system.

Five from:
Must meet user requirements
Will need to be set out so that it is easy to use
Will need to be attractive to look at

Will need to limit the possibility of inaccurate data being entered
Teachers should not be distracted by an over-elaborate screen design
Must contain guidelines to the worker on how to fill in any data entry forms
Must allowing them to navigate from one screen to another without any difficulty
Elements of file structure such as field length will affect the field spacing
Elements of file structure such as number of fields will affect the font size/number of screens [5]

Using examples of student exam mark data, give three descriptions of how the new system would be tested and in each description include any necessary improvements that would be identified.

Three matched pairs from:
Testing (each module) with normal data including appropriate example
If error produced – description of improvement required
Testing (each module) with live data including description and examples
If difference between live and actual results – description of improvement required
Testing (each module) with abnormal data including appropriate example
If error not produced – description of improvement required
Testing (each module) with extreme data including appropriate example
If error produced – description of improvement required
Testing whole system including examples of data
Description of improvements required [6]

Describe, in detail, the contents of the program documentation Jasvinder will produce.

Six from:
A description and purpose of the software
what the software does and its features
the reasons for choosing those pieces of existing software modules
that were used instead of the programmer having to write code.
Input and output data formats that have been used
Program flowcharts that were produced at the design stage
Program listing
a complete copy of the code used
annotation explaining what each module of code does
Notes that will help any future programmer to make modifications to the system. [6]

Scenario 2
Questions 2 and 3
The Principal of the July 23rd International School in Cairo decided that the school requires a new method of keeping records of students' test scores. He decided to employ a computer company which has now fully implemented the system and has produced documentation for the new system.
November 2011

Identify four items found in user documentation that the computer company will provide.

Four from:
Examples of how to use the system e.g. (screenshots/video tutorial of how to) print/load/
save/install etc.
The purpose of the system
The input and output formats
The hardware and software needed to run the system
Examples of sample runs of the system
What to do when errors occur/meaning of error messages
Troubleshooting (guide)/frequently asked questions [4]

Describe two ways in which the computer company would benefit from providing user documentation for the new system.

Two from:
Saves computer company time in the long run as they will not be contacted on a regular basis
Saves computer company time in the long run as they will not need to visit users to show them how to use the system
Save money as they won't need to employ as many customer support staff [2]

Scenario 3
Questions 4 to 9
ICE Refrigerators Ltd is an English company which manufactures refrigerators. It advertises the refrigerators using its website as well as selling them on line to individual customers. It used to have a number of stores in many town centres. Since the introduction of online shopping it has reduced the number of stores it owns. The company currently has two separate databases. One contains customer banking and contact details. The other database contains information about on-line sales including details of the customers who bought the refrigerators. A systems analyst has been employed to look at the current system and recommend any changes which would make it more efficient. The company also wishes to provide a help line service to its customers. It will be advertising this offer on the website but at the moment the company is undecided on whether the centre should be overseas or in the UK. November 2011

Name and describe two methods which the systems analyst could use to record the information she will collect when researching the current system.

Data flow diagrams [1]
One from:
Uses terminators, processes, flow arrows and stores
Represents inputs, outputs and processing [1]
System flowcharts [1]
One from:
Uses particular input, output, storage and processing symbols
Represents inputs, outputs and processing (only if not used for DFDs) [1]

Describe five ways in which the recording of information will help with other aspects of the analysis of the current system.

Five from:
Helps identify problems with the current system
Detail of the diagrams will reveal any weaknesses in the current system.
easier to see where there is job duplication
helps identify suitable hardware/software (for a new system)
establishing inputs, outputs and processing requirements
identifies storage requirements
helps identify volume of data.
helps identify the user/information requirements
can see exactly what job each worker is doing [5]

Scenario 3
Questions 10 and 11
Oxbridge Examination Board is a small examination board which is in the process of introducing online marking for use by its examiners. Each question paper will have a unique barcode. Centres will send question papers to a scanning unit which will scan the question paper into the system. OCR will be used to read the centre number and candidate number so that these can be matched with the bar code number of the paper. As the examiner marks the question paper, the marks for each question will be entered and the computer will calculate the total mark for the candidate. The input will be the

examiner's mark for each question and the output will be the candidate grade. The last part of the development of this system will be the creation of a database to store candidates' results. Paul, the Marking Director, has employed Joseph, a systems analyst, to investigate the current system of processing results and design the new system. After he has finished collecting information about the current system Joseph will need to record this information. He has decided to use a data flow diagram. When the system has been implemented it will need to be checked. To do this Paul and Joseph have decided to evaluate the system by inviting examiners to mark papers in the Board's offices. June 2012

Describe how a check digit would be used to test the validity of the bar code number of the examination paper.

Two from:
a calculation is performed on a long series of digits to produce another digit
This digit is then added to the end of the string.
The computer re-calculates the digit when data is entered
To check whether it gives the same result. [2]

Using examples from the scenario, name and describe, including their use, three components of a data flow diagram.

Three matched pairs from:
Terminator
When data flows from or to somebody or somewhere outside the system, that somebody or somewhere is called a terminator. Here it is the examiner.
Process box
The data from the examiners are the marks which are processed to produce the candidate's results. The processing of the marks is put in a process box.
Store
The actual data output from the system such as the candidate grades (are recorded for future use).
Data flow arrows
Each arrow is labelled to show what data is flowing at that point in the diagram whether it be marks or grades [6]

Having completed the analysis phase, Joseph needs to design the file structure. Give a reason why each of the following aspects of file structure needs to be designed.
Field name
Field type
Field length
Validation rules
Key field

One for each reason:
Field name
So that the contents of the field are easily identifiable/so that no two fields have the same name
Field type
So that validation can be more easily performed/text or Boolean can be chosen when appropriate to save storage space
Field length
So that record lengths are not too long/when chosen appropriately saves storage space
Validation rules
So that the number of errors in input data is reduced
Key field
To make it easier to sort data/to uniquely identify each record in a database/to make it easier to search databases [5]

When the new system is developed it will need to be tested. One way of doing this is to use live data. Explain what live data is and, using examples from the scenario, describe three steps in the use of live data to test this system.

Live data is data that has been used in the existing system/is data which will be used because the outputs are already known. [1]
Three from:
He will select a session where there may have been special circumstances
He will also choose another session where it was quite an average session.
He will then run this/these sets of data on the new system
He will compare the results with the grades already in existence
If there are differences between the results amendments will need to be made to the system. [3]

After the system has been tested Joseph will need to produce an evaluation of it. Describe three methods of obtaining feedback from examiners using the new system and for each give a different drawback of the method.

Three matched pairs from:
Method: Could observe examiners/users performing set tasks and record their progress using video recording/ Get an examiner/user to perform a task and measure the time it takes them to carry out the task
Drawback: Description of the Hawthorne effect
Method: Interview examiners/users to gather their responses about what they thought of the system and how easy it was to use.
Drawback: Examiners/Users have to be available at the time the analyst wants to interview them/time consuming as can only interview one user at a time/may get answers which the user thinks the analyst wants to hear
Method: Hand out questionnaires to them to ask them about their thoughts on the new system with regard to how easy they found it to use.
Drawback: They may give answers which are exaggerated as they are anonymous/question cannot be changed once they are typed up/follow up questions cannot be asked. [6]

Scenario 2
Questions 3, 4, 5 and 6
The University of Tawara Beach (UTB) is going to have a number of purpose built computer suites which will all be networked together. This will encourage the use of ICT in teaching and learning. Sean Jones, a systems analyst, has been employed by UTB to develop the new system. He has already completed the Analysis phase and collected information from teachers about what they would like the system to do. Some teachers want a system which they can use in their existing lessons. They would still be in total control of the learning. Others would prefer a system whereby the teacher just supervises the students and the computer takes over the whole learning process. Sean will need to specify the required software and additional hardware for the system allowing for the possibility that both approaches to teaching will be used. He is assuming that basic PCs will be provided with a monitor, keyboard and mouse. Sean will need to design documentation to show the teachers how to use the system. The rooms will all need to have air conditioning systems as Tawara has a very warm climate. June 2012

Describe five items of user documentation, including the reasons for their inclusion.

Five from:
Screenshots / descriptions of how to use the software to show how to save a file, perform a search, sort data, print data, add records, delete records and edit records
The purpose of the system to give an overall description of what the system does
The input and output formats so that you know how to enter data and know what the output will look like

The hardware and software needed to run the system so that the user doesn't use the wrong hardware/software
Examples of sample runs of the system so that the user can tell if they are using the system in the correct way.
Troubleshooting guide/a list of Frequently Asked Questions to know what to do when errors occur
[5]

Scenario 4
Questions 9, 10 and 11
ICE Ltd is an English company which manufactures refrigerators. Jasvir, the manager of the payroll section has decided that the current payroll system is out of date and has employed Moira, a systems analyst to investigate the current system and develop a new one. The existing computer system produces payslips but no other output. Jasvir has told Moira about the need for detailed financial reports and exception reports to be produced, in addition to the payslips. The only financial or exception reports available currently are manually produced. Jasvir and Moira will be using time management software to monitor the progress of this project. June 2012

Describe, in detail, four methods of researching the current system of producing reports. For each method give a drawback.

Four matched pairs from:
Interview employees/manager with description of how or what information is gathered
Employees/manager have to be available at the time the analyst wants to interview them/time consuming as can only interview one user at a time/may get answers which the user thinks the analyst wants to hear
Examining documents used in current system with description of what information is gathered
May not be able to take user's opinions into account/takes a long time to collate all the documents
Observing employees and watching over the whole process with description of how or what information is gathered
Description of Hawthorne effect
Distributing questionnaires to employees with description of how or what information is gathered
They are impersonal and can be anonymous so workers might exaggerate their answers as they know there is no comeback/questions cannot be amended in the light of replies [8]

Scenario 2
Questions 3 and 4
Redcar Professional Assessment is an examination board. It uses an ICT system to have examination papers marked online. Examiners use their PCs at home to mark the examinationpapers.
The board would like the reports and certificates produced by the system to be updated and better presented. Subject specialists at the board's three regional offices analyse results and deal with candidate queries. They find the current system difficult to use and need a system that can provide fast and easy access to candidate results. The board has employed Malcolm, a systems analyst, to develop a new system for storing and analysing results. He has been asked not to look at the marking of examination papers as the board is satisfied that this part of the system works very well. He has already researched the existing system for storing and analysing results. He has recorded the information using data flow diagrams. The board is aware that new examiners will need to be trained so that they can mark online. These examiners might have difficulties getting to a central venue, so the board has decided to use video conferencing for this training. Each new examiner will be expected to use their own PC including a monitor, mouse and keyboard. Other hardware will be provided by the board if necessary. Nov 2012

Describe how Malcolm will interpret components of the data flow diagram in order for him to identify suitable hardware for the new system.

Five from:
The data flow diagram shows the inputs, outputs and processes of the system

The specific hardware will not be recommended at this stage.
Recommendations/suggestions for the hardware will be made.
DFDs consist of terminators, flow arrows, processes and stores
the terminators and flow arrows in the DFD show the volume of input data…
…which leads to decisions on appropriate input devices
Terminators and flow arrows out of the system indicate the quantity/format of the output/required output…
…which leads to decisions on appropriate output devices
looking at the processes involved (in storing and analysing results)…
…the processing requirements will be known…
…will give an idea about the size and speed of the processor required
Stores in the DFD will show how much data needs to be stored…
…the storage requirements will be known
How much data needs to be stored is needed to identify the size and number of storage devices [5]

Describe, including their use, navigation aids which Malcolm will need to include when designing the screen display for the new system.

Four from:
Forward and backward buttons to go to the next/previous record/candidate
First and last buttons to go to the first/last record in the database
Drop down menus to select a file/record
Go to button so that the desired record/candidate/centre number can be typed in
Search button so that the desired candidate/centre name/number can be found [4]

The system will be developed and then tested after it has been designed. Describe, in detail, three ways that Malcolm could test the performance of the navigation aids.

Three from:
Use normal and live data for candidate numbers to test the goto/search buttons
Use abnormal and extreme data for candidate numbers to test the goto/search buttons
Click the buttons to make sure they go to the correct record
Check all the options on the drop down menus
Get users to check the ease of use of the navigation aids…
…and ask for feedback about the navigation aids [3]

The system will need to be implemented after it has been developed. Malcolm has rejected the direct changeover method. Name and describe three other methods which could be used and for each one give an advantage when compared with the direct changeover method.

Three matched pairs from:
Parallel running involves running the old system alongside the new system.
If there is a problem with the new system still have the old system as a backup/ changes can be made if problems occur/training can be gradual
Phased implementation involves implementing one part of the system while rest of system remains unchanged/implementing system part by part
If there is a problem with the new system still have bulk of old system to fall back on/changes can be made if problems occur (if not already awarded for parallel running)/ training can be gradual (if not already awarded for parallel running)
Pilot running involves running new system in one regional office whilst old system still operates in other branches
If there is a problem with the new system only one regional office is affected the other two will be able to carry on as normal/workers using the successfully implemented system could train workers in other branches [6]

Scenario 2
Questions 2, 3 and 4

Yellowcap Beverages, Nairobi, has a payroll office which is computerised for paying the weekly wages of its workers. At the moment, the payroll transaction file consists only of the hours worked by each worker together with their payroll number. The system runs the master and transaction file together once a week to produce the payslips and update pay details on the master file. Any other changes to the master file are made manually at a separate time. Yellowcap Beverages wants to computerise all aspects of the payroll system. Geno, a systems analyst, has produced some software which can be used to automatically update the master file. This will involve the use of a second transaction file separate to the payroll process. He has also produced some technical documentation for the new system. A few of the workers would like to work from home but the majority of the workers and the company prefer the work to be office based. Nov 2012

For each of the following types of technical documentation describe three items which would be present in each.
Systems
Program

Systems - Three from:
A detailed overview of the whole system
What is expected of the system/purpose of the system
Data Flow Diagrams/systems flowcharts
The results of systems analysis
What is expected of the system/purpose of the system
Test plan and test results
Overall design decisions…
…the choice of hardware and software
…file, input and output structures
Systems flowcharts
Program - Three from:
Description of the software/purpose of the software
What the software does and its features
Program listing
A complete copy of the code used
Annotation explaining what each module of code does
Reasons for choosing those pieces of existing software that were used instead of the programmer having to write code
Input and output data formats
Program flowcharts/algorithms
Program listing – a complete copy of the code used
Annotation explaining what each module of code does
Notes that will help any future programmer to make modifications to the system [6]

Scenario 4
Questions 6, 7 and 8
Brunei Computers has decided to close down some of the stores which sell computer hardware. This is because it is expecting many customers to use its online shopping website. Brunei Computers currently has separate databases for its computer sales records and its customer details. Both contain personal details of the customers. Customers are allowed to pay their bill at any point before the end of the month. If they do not then the money is automatically taken from their credit card. Each customer has a credit limit which they are not allowed to go above. No customer has a credit limit greater than $2000 or less than $500. Among the customer details kept by the company are a seven character customer ID consisting of a letter followed by six digits, 16 digit credit card number and their credit limit as well as other details. A systems analyst has been invited to look at the existing system and suggest improvements which could be made. The system already has a built in check to prevent duplication of IDs and also has existency and presence checks built in. Nov 2012

Additional validation rules would need to be designed. Using the scenario, describe three additional rules which could be used. Do not use the same rule twice.

Three matched pairs from:
Range check on credit limit
Credit limit for new customers <= $2000 and >= $500
Type/character check on credit card number
Only digits are accepted
Length check on credit card number
No more than or less than 16 characters
Check digit on credit card number
Extra digit calculated from digits in credit card number and appended to number
Length check on Customer ID
No more than or less than 7 characters
Picture/format check on Customer ID
Must be one letter followed by 6 digits [6]

After the system has been created, the validation rules will need to be tested. Using the customer's credit limit as an example, describe three testing strategies which could be used. For each strategy identify an amendment to the validation rule that could be made as a result of the testing producing unexpected results.

Use of normal/live data such as a number between 500 and 2000
This data should be accepted by the system
If it isn't the validation rule needs to be amended to ensure the acceptable value is >=500 and <=2000 [3]
Use of abnormal data such as 2001 or "two thousand"
This data should be rejected by the system
Amend rule to ensure that it uses 500 to 2000/amend rule to ensure it checks it is numeric/amend rule to make sure < hasn't been used instead of > and vice versa [3]
Use extreme data such as 500 or 2000
This data should be accepted by the system
If it isn't amend rule so it is <= and not just < / check it is >= not just > [3]