OCR
RECOGNISING ACHIEVEMENT

GCE

Computing

Advanced GCE **A2 7820**

Advanced Subsidiary GCE **AS 3820**

Mark Schemes for the Units

January 2007

3820/7820/MS/R/07J

CONTENTS

Advanced GCE Computing (7820)

Advanced Subsidiary GCE Computing (3820)

MARK SCHEMES FOR THE UNITS

Mark Scheme 2506
January 2007

1   **a)**   **(i)**   (A set of programs) to control the hardware/operating system/allow communication with the system/provide a platform to run the applications software/allow communication between the software and the hardware.   **[1]**

            (ii)   (A program to) allow the system to produce useful work/perform useful tasks/which would have to be done in some other way if not on a computer. **[1]**

      b)

- eg Word processor
- …to produce letters/documents
- Spreadsheet
- …to produce accounts (Not "do arithmetic")
- Database
- …to store records of customers
- DTP
- …to produce in-house magazine

(1 per bullet, max 1 pair, max 2)   **[2]**

2   **a)**   **(i)**

- Data printed using a special ink
- …which is magnetised before the characters are read
- input device can recognise characters by their magnetic (signature)
- a sensible use eg data on bank cheques

(1 per bullet, max 2)   **[2]**

            (ii)   <u>Shape</u> of character is scanned in…
- optically…
- and then compared with a bank of shapes stored in memory
- sensible use eg turnaround documents/produce editable documents.

(1 per bullet, max 2)   **[2]**

      b)   **(i)**   Multi choice exam papers/registers in schools/lottery ticket ordering.   **[1]**

            (ii)   (Reliant on an application being identified)
- Standard form of data entry…
- Allows background information to be printed on initially
- Input is in binary form/either a mark or no mark
- Application requires high standard of reliability/Removes human error
- High rate of data entry (because of time sensitivity of data)

(1 per bullet, max 3)   **[3]**

3   **a)**

- Data input is collected together
- processed as a single operation/at a particular time
- results are not time dependent

(1 per bullet, max 2)
Example: Requests for full statements   **[3]**

      b)

- Input is processed fast enough (quickly/immediately)..
- to influence the next input
- On-line to processor

(1 per bullet max 2)
Example;   Checking of PIN/Account status/card legitimacy. **[3]**

4   **a)**   Advantages:
- Share hardware
- Share software
- Share files
- Doctors can communicate using e-mail
- Automatic back-up (of records)
- Doctors can use any machine to access records

           Disadvantages:
- Files less secure
- more difficult to manage/need technician/reliance on server
- Spread of viruses.

           (1 per bullet, max 2 for advantages, max 3)   **[3]**

     b)   **(i)**
- Data on a LAN is secure/Data on a WAN is subject to corruption
- LAN is over short distance/WAN is geographically remote
- LAN may be hardwired/WAN requires more sophisticated communication media

           (accept modem/phone line)

           (I per bullet, max 2)   **[2]**

         (ii)
- Modem/gateway/terminal server/host computer/router
- Internet browser/communication software or protocol/software security measure

           (1 per bullet, max 2)   **[2]**

     c)   **(i)**   Line of communication established (for duration of message)
               Message does not need to be reordered at destination   **[2]**

         (ii)   Parts of message follow own routes to destination
               Messages cannot be intercepted/efficient use of network   **[2]**

5   **a)**   Set of rules
- to control transmission of data   **[2]**

     b)   **(i)**   The number of ones in each byte of data.
- must be predetermined as either always odd or always even
- An extra (parity) bit is added to each byte (to maintain odd or even)
- Checked after transmission
- Incorrect parity indicates an error

           (1 per bullet,max 3)   **[3]**

       (ii)
- All the bytes are treated as binary numbers which are added up
- Carry out of byte ignored
- the total(check sum) is transmitted with the data
- The data is also added after transmission
- The sum is compared with the transmitted value
- Different values indicate an error

           (1 per bullet max 3)   **[3]**

6   **a)**

- Defined areas of input/text boxes
- List of possible alternative responses/(drop down) lists/menus
- (Radio) buttons
- Check boxes/Tick boxes
- Cursor shows position of next input
- Instructions can be output on screen/Labels/Captions
- Tabs/Subforms

(1 per bullet,max 3)   **[3]**

    b)

- Clear instructions to prompt user
- Questions can be printed for user to ask customer
- Questions asked in order/Inputs are in order/Standard format
- Fixed options of drop down menus can make validation easier/fewer errors on input
- Ensures no inputs are forgotten
- Options can change according to previous inputs

(1 per bullet, max 3)   **[3]**

7   **a)**   **(i)**   10101010   **[1]**

               (ii)
- Even number of ones
- All others are odd
- Therefore odd parity used   **[2]**

    b)   11101111
           1
      (1 per nibble,1 for showing carry)   **[3]**

8   a)

- (Each customer has an account number which can be naturally) stored in logical order
- Allows for batch processing of statements/matched easily with sorted TF
- so that there are no duplications – missed customers/every customer needs to be accessed

(1 per bullet, max 2)   **[2]**

b)   (i)

- Large number of records in file…
- make access to an individual record too time consuming...
- for the satisfaction of the customer/who expects an immediate response

(1 per bullet, max 2)   **[2]**

(ii) Either:
- Indexed sequential
- Because it allows both sequential and direct access to the data
- Because it allows fast access to data while maintaining sequential nature

or
- Random
- Because it gives direct access to data/faster access to data
- because immediate access is allowed while statements may be produced serially

(1 for type, 1 for justification, max 2)   **[2]**

c)

- Serial
- because of no logical order to input of records

(1 for type, 1 for justification, max 2)   **[2]**

9 **a** **(i)** The program is produced by the programmer **[1]**

(ii) Program code after translation/executable code/intermediate code/machine code **[1]**

b) **(i)** Inappropriate/impossible use of arithmetic, eg division by zero

(ii) Error in the grammar/language of a program (Not just misspell) eg PLINT instead of PRINT **[2]**

c) **(i)** Inputs are applied to check that the expected output results

(ii) Tests the routes through a program/accept trace or dry run **[2]**

(iii)

- Links may be faulty
- Order of modules wrong
- Parameters passed may be illogical
- Clashes of variable names
- Clashes/calling of module names
- Variables declared in one module may be different data type in another.
- Endless recursion

(1 per bullet, max 3) **[3]**

10 **a)** **(i)** Stack
One pointer/pointer to head of stack/values added and removed at same end
[2]

(ii) Queue
Two pointers/queue moves through array/values added and removed at different ends of structure **[2]**
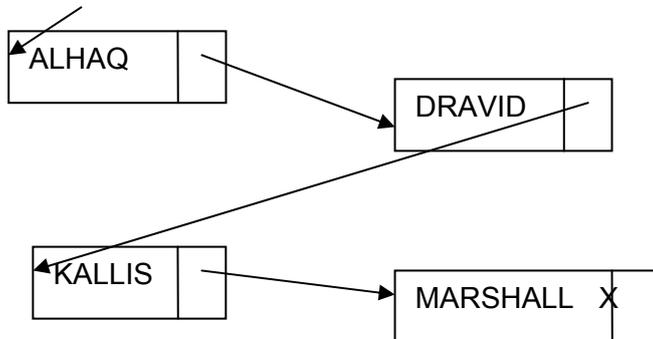
b) **(i)** Mark points:
- Start/Head of list pointer
- Pointers
- Alphabetical order
- Null pointer
- Free space list

(1 per bullet, max 4) **[4]**

(ii)
1   Follow start pointer to first data item
2   If data = required name   then   report found
      Else
3   If data > required name   then   report error, not in list
      Else
4   If pointer = null   then   report error, not in list
      Else
5   Follow pointer to next data item
6   Repeat from 2

(1 per, max 5) **[5]**

11 **a)** **(i)** A subprogram, a set of commands which is part of a larger program and can be reused without the need for rewriting **[1]**
(ii) (A procedure which) returns a single value (for each call) **[1]**
b) **(i)** 6 **[1]**
(ii)
- TEST = X + <u>TEST (X -1)</u>
- calls itself **[2]**

Total = (86+4) = 90

Mark Scheme 2508
January 2007

1   **(a)**   Any four from x 2 marks each

- Technically feasible
- Whether or not the proposition is practical
- System may require hardware that is unavailable

- Economically feasible
- Establishing whether it is cost effective
- Only feasible if the benefits outweigh the costs

- Socially/operationally feasible
- Are current work practices/procedures adequate to support new system?
- How will the users react with a new system?
- Change of job or loss of jobs

- Time/schedule feasible
- Time required for new system to be ready
- Can the system be ready for a given time scale?

- Legally feasible
- Is the proposed system in conflict with any legal requirements?
- Meeting the requirements of data protection legislation

                                                                                            [8]

   (b)   **(i)**   Any five from:

- Problem Specification/identification
- Analysis
- Design
- Coding/software development
- Testing
- Implementation/conversion
- Maintenance
- Review

                                                                                            [5]

       (ii)   Any three from x 2 marks

       Problem Identification/Specification
- Existing problems identified
- User requirements
- As outlined by the warehouse

       Analysis
- Production of a requirements specification
- Detailing inputs needed
- and outputs required
- Specify user requirements
- Hardware/software needs
- Fact finding (questionnaire/interview/record inspection/observation etc)

Design
- Specification of system
- User Interface designed
- Specification of data structures
- Prototyping
- Algorithms
- Files/file structure
- Input/form design
- Output/report design
- Validation procedures
- Security of data

Coding /software development
- Production of programs
- Tailoring software
- Modification of code
- Production of documentation

Testing
- Production and the carrying out of a suitable testing strategy
- Production of test data
- Alpha/beta testing
- Different types of testing-extreme, normal, exceptional
- Specify expected results

Implementation/conversion
- Method of conversion/changeover (parallel, pilot, direct, etc)
- Staff training
- Master file set-up (setting up data/transferring date)
- Installation of hardware
- Installation of software

Maintenance
- Debugging the system
- Modifications due to changing needs
- Improving current processes

Review
- Check against objectives stated
- Any limitations
- Any upgrades required

[6]

(c)   Any four from:

- Description of input/output
- Brief description of what the package does
- Contents/index
- Glossary
- Machine configuration
- Hardware and software requirements
- Operating instructions
- Installation guide
- Simple error messages/troubleshooting
- Tutorials
- On-line help
- Telephone help line / Contact
- Backup routines

[4]

2   Any three from x 2 marks
Give one mark for implied name, one mark for valid example

- Format/picture/character type check
- Checking that all characters are of the correct type
- Length check
- Checking to see the number of characters is five
- Presence/required field check
- Checking to ensure characters have been entered
- (File) lookup/existence check
- Check that the code is that of an existing item on the system
- Range check
- Checking that the data is within the preset limits

[6]

3   **(a)**   Any four from Description or Reason

Description
- Data is processed as quickly as possible/short time delay
- On-line
- Record locking occurs
- Output happens immediately
- System is updated before next transaction
- Confirmation of seat/ticket details are sent to the user almost immediately

Reason
- Booking needs to be processed as quickly as possible
- Need to lock record
- Need to prevent double booking

[4]

(b) Any four from Description or Reason

Description
- Customers' telephone usage are collected monthly/quarterly
- Stored as an off-line transaction file
- Input as a batch
- Processed as one run at time convenient to the computer system
- Each transaction is completed before the next one begins
- At a time when the computer is not being used interactively (such as night time)
- Batch of bills produced

Reason
- Large quantities of data
- Same processing for all
- Time of processing is not critical
- No user intervention is required during processing

[4]

4 **(a)** Any three from x 2 marks

- Automatic 3D generation
- to show the different views of the shopping centre/walkthrough
- Libraries of design objects / Templates
- to allow the architect to include pre-drawn parts of other buildings
- Create/edit save
- to allow further manipulation of the design
- Print or plot drawings
- to provide a hard copy for the builder/marketing
- Placing pictures of existing buildings along side
- to see if they fit in terms of density and shape
- Applying and calculating stresses and strains
- to the model of the building
- Interface with specialised hardware such as scanners
- to allow a previous drawing to be input
- Choosing materials to construct the design
- of various parts of the building
- Choosing colours/patterns / Textures
- to develop different designs
- Calculating amount of material required
- allowing for pricing of the shopping centre
- Rotate/zoom features
- to manipulate the finer detail of the building
- Direct link to CAM
- to realise/manufacture designs automatically

[6]

    (b) **(i)** Scanner
         Any four from:

- Passes a beam of bright light over an image
- Sensors are used to collect data about the amount of light reflected from different parts of the picture
- This can separate the light intensities and the colour
- This data is used to produce a digital image of the picture
- This image can then be saved, and edited using image editing software
- The resolution of the picture is determined by the file format, eg JPEG

                                                                          [4]

        (ii) Digital Camera
         Any four from:

- Pictures are taken by converting light passing through the lens of the camera
- Grids of tiny light sensors can convert light to binary patterns
- Each binary pattern represents a colour or shade of light
- The image captured will depend on the resolution
- Image taken is stored in the camera's memory/memory card
- The image can be viewed immediately and stored or deleted
- The image captured is in digital format
- The contents of the camera's memory can be transferred to a PC for storing, editing, etc
- Some digital cameras capture short video images   **[4]**

5 **(a)** Any two from:

- Allows the human and the computer
- To interact/communicate
- User can input/output data   **[2]**

    (b) Any five from:

- Window
- Icon
- Mouse
- Menu
- Highlighting
- Pointer
- Dialogue box
- Wizards/templates
- Help facility/tool tips
- (Action) buttons   **[5]**

(c)   Any four from:

- Common commands/the same keys/commands can be used on different packages
- Increased speed of learning
- Once the user has been trained or has mastered a package the skills are transferable
- Consistency in the content of toolbars and menus in different packages
- Such as: Dialogue boxes, customisable features and operational features are similar
- Confidence building among novice users
- Layouts of screens and the positioning of items such as icons, menus and so on should be consistent **[4]**

(d)   Any two from:

- Different kinds of voices (male/female) need to be understood
- Different kinds of accents need to be understood
- Background noise may distort student's voice
- Complex speech recognition software is required to understand different human voices
- It takes a long time to setup/train such a system for each user
- Multiple users on a computer **[2]**

6   **(a)**   Any two from:

- Piece of software
- Which manipulates large quantities of data
- To produce information
- Which is useful for managers
- Which helps in decision making **[2]**

(b)   A knowledge base
Any two from:

- Contains facts about a specified application
- Facts and relevant data about medical conditions/specified application
- Contains rules
- Contains knowledge from a wide range of experts **[2]**

An inference engine
Any two from:

- Contains the reasoning method used to search the knowledge base
- Software used is generalised so that it can be used to search a variety of knowledge bases
- Uses standard searching methods independent of the application
- For example a bottom up or top down technique **[2]**

(c)   Any two of the following uses x 2 marks each

- **Used for decision making**
- At different levels – operational, tactical, strategic
- Such as number of nurses required for patients (operational)
- Such as analysing the number of patients that were seen by a certain doctor over a period of time (tactical)
- Such as future planning for medical operations/resources (strategic)

- **Used to protect from information overload**
- Information is relevant/accurate/complete/reliable
- Information given in an appropriate format to the hospital managers

- **Used to controlling and monitoring**
- Managers in the hospital can use a MIS to monitor of areas that are working well/areas that are not
- Assist in remedial action for areas that need improvement

- **Used to co-ordinate/liaison**
- To allow contact between different departments in the hospital
- Managers can co-ordinate the activities of various departments   **[4]**

7   **(a)**   Any four from:

- Personal data should be processed fairly and lawfully with the consent of the data subject
- Personal data should be used for the specified purpose only
- Personal data should be adequate and relevant for its intended purpose
- Personal data should be accurate and up to date
- Personal data should not be kept for longer than necessary
- Personal data should be processed in accordance with the rights of the data subject
- Personal data should be held securely, with no unauthorised access
- Personal data should not be transferred to other countries that do not comply with any form of data protection laws   **[4]**

  (b)   Any four below x 1 mark

- Data Privacy
- Registration with data protection agency
- Enforcing/complying with the Data Protection law
- Use of passwords
- To prevent unauthorised access
- Use of physical measures
- Such as stripe readers
- Use of firewalls
- Use of data encryption
- Use of spying cookies
- Keep backup copies
- In case of corruption   **[4]**

(c)   Any four below x 1 mark

- Double-entry
- Data is entered twice by different operators and results compared
- Visual/screen checking
- User reads the data on the screen to confirm it is correct
- Check digit
- Extra digit is added to a number and is used to check a calculation result
- Batch total
- Total value of one or more fields in a batch of data/calculated manually and then calculated by the computer for comparison
- Control total whereby the batch total is meaningful
- Hash total whereby the batch total is meaningless   **[4]**

Total [86 + 4] = 90

Mark Scheme 2509
January 2007

Each bullet point is worth one mark, up to the maximum for that section, unless stated otherwise.

1   **a)**   • efficient use of processor time
                         • efficient use of resources
                         • maximise number of users
                         • no apparent delay for users
                         • maximise throughput of CPU.

                                                                                  [max 3]

        b) **i) ii)** • output data to disk drive/storage device
                         • for printing at another time
                         • eg when processor is not busy
                         • job references stored in a queue/buffer
                         • avoids delays
                         • as printers are relatively slow
                         • jobs can be prioritised.

                                                                                  [max 4]

        c) **i)**   • restrict data access to certain people.

                                                                                    [1]

               ii)   • passwords (accessing system; accessing files)
                         • physical protection (some data at certain terminals only)
                         • allow authorised access…
                         • …according to access rights
                         • encryption.

                                                                                  [max 3]

2   **a)**   • combines modules/library routines…
                         • …that are already compiled/in object code/in executable form
                         • copies modules into memory
                         • …from backing store
                         • …ready for execution
                         • completes address links to program.

                                                                                  [max 4]

        b) **i)**   (lexical analysis, syntax analysis, code generation)
                         marks for
                         • naming lexical analysis and syntax analysis
                         • all 3 items in correct order.

                                                                                  [max 2]

               ii)   • makes code as efficient as possible
                         • improves processing speed
                         • reduces number of instructions.

                                                                                  [max 2]

        c)   • may need to be linked to library routines
                         • may depend on language used
                         • eg library for I/O routines or for mathematical functions
                         • creates code for a virtual machine
                         • may create intermediate code.

                                                                                  [max 2]

d)
- runs quickly
- user does not need a compiler
- uses less memory
- preserves copyright…
- …as user cannot see original code.

[max 2]

3 a)
- processor is split into parts
- each part handles one of…   *Labelled diagram accepted*
- …fetch, decode, execute (reset)

fetch	decode	execute	
instruction 1			1st cycle
instruction 2	instruction 1		2nd cycle
instruction 3	instruction 2	instruction 1	3rd cycle
instruction 4	instruction 3	instruction 2	4th cycle

[max 3]

b)
- MAR contains an address in memory
- …of instruction/data
- address (of next instruction) is copied from PC to MAR
- instruction from address in MAR is copied to MDR
- instruction from MDR is copied to CIR
- MDR contains data/instruction
- …when being transferred between memory and processor.

[max 4]

4 a) i)
- binary search

[1]

ii)
- faster than serial search
- for large number of items
- as fewer items need to be checked.

[max 2]

iii)
- items must be sorted into alphabetical order.

[1]

b) i)
- last in, first out/LIFO
- data items are stored and accessed at top of stack only.

[max 1]

ii)

cherry
banana
apple

cherry — stack pointer (could be one cell higher pointing to empty cell)

- correct order for data
- stack pointer labelled (some data must be entered).

[max 2]

iii)
- overflow: attempt to store an item in a full stack
- underflow: attempt to remove an item from an empty stack.

[max 2]

5   **a)**

	Declarative	Object oriented	Procedural
Program statements may be given in any order	✓		
Encapsulation is used		✓	
Backtracking is used	✓		
Facts and rules state what to do but not how to do it	✓		
Instantiation is used		✓	
Data only accessible through methods		✓	

[1 mark per correct row, max 6]

     b)   *examples are given, but accept any correct examples relating to employees in a company*

         i)
- template
- …specifying methods and attributes/data
- objects can be defined using a class
- …with specific attributes
- eg each instance of class Employee has its own value for an attribute
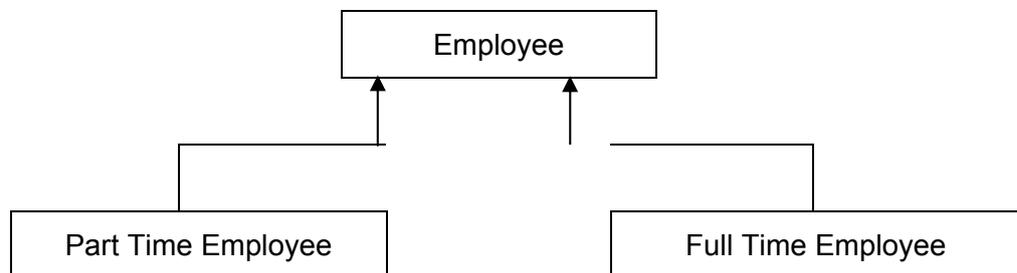
[max 2]

         ii)
- a class has its own attributes plus those from its superclass
- a class has its own methods plus those from its superclass
- eg PartTimeEmployee inherits Surname from Employee.

[max 2]

         iii)
- an instance of a class
- a real-world entity
- eg myEmployee with surname Smith etc.
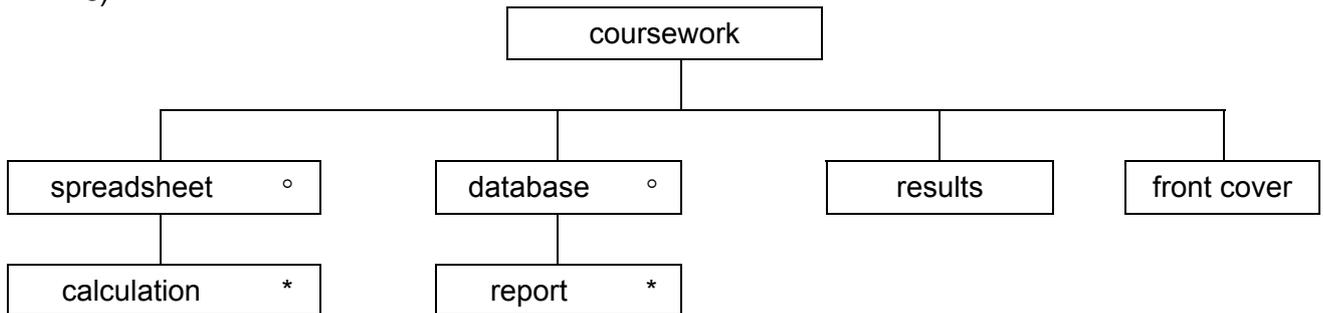
b

         iv)   *diagram as shown: marks for*
PartTimeEmployee with FulltimeEmployee at same level
superclass Employee with correct inheritance symbol

[max 2]

6   **a)**   • avoid data duplication
         • avoid inconsistent data
         • easier to change data
         • easier to change data format
         • data can be added easily
         • easier to control access to data.

                                                                                    [max 3]

   b)   • a thing (of interest to an organisation) about which data is to be held
         • eg Student/Course/Tutor.

                                                                                    [max 2]

   c)   • information stored about an entity
         • eg Surname is an attribute of Student.
         accept alternatives from this example.

                                                                                    [max 2]

   d)   form design: marks for:
         • student name & address
         • form title
         • combo box (eg for course choice or level of study)
         • instructions/messages to user
         • buttons (eg to confirm details or print form).

                                                                                    [max 4]

   e)   • high level language
         • part of DBMS
         • allows user to access data
         • eg to find a student's address
         • allows user to store data
         • eg add a new student
         • allows user to change data
         • eg change the courses studied by a student.

                                                                                    [max 3]

7   **a)**   • successively break task into simpler tasks…
         • until tasks can be programmed
         • clear program structure
         • easier to write program…
         • as a series of modules
         • identify common/standard modules
         • tasks shared between programmers…
         • according to expertise
         • easier to de-bug.

                                                                                    [max 4]

   b)   **i)**   • DE/F*G*

                                                                                    [1]

         ii)   • B or C

                                                                                    [1]

         iii)   • F/G

                                                                                    [1]

c)

```
                        ┌─────────────────┐
                        │   coursework    │
                        └─────────────────┘
                                 │
        ┌───────────────┬────────┴────────┬───────────────┐
 ┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
 │ spreadsheet ○│ │  database  ○ │ │   results    │ │ front cover  │
 └──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
        │                │
 ┌──────────────┐ ┌──────────────┐
 │ calculation *│ │   report   * │
 └──────────────┘ └──────────────┘
```

marks for
- each correct row (ignoring symbols) *(3 marks)*
- both selection symbols in correct boxes
- iteration symbol in one correct box
- iteration symbol in second correct box.

[max 4]

8   a)   i)   2

[1]

ii)   *method 1*:
- (0.101) move point 2 places to right
- 10.1
- converts to 2.5.
method 2:
- 0.101 converts to 0.5 + 0.125
- exponent is 2 so multiply by $2^2 = 4$
- 0.625 x 4 = 2.5.
(either method acceptable, using decimals or fractions, & allow FT if incorrect exponent given in (i)).

[max 2]

b)   *(01111011) marks for*
- mantissa 01111
- exponent 011.

[max 2]

c)   (answer 01110 010 – some reason must be given)
- mantissa 0.0111 move point 1 place to right
- insert 0 at right of mantissa (to keep place value)
- decrease exponent by 1.

[max 2]

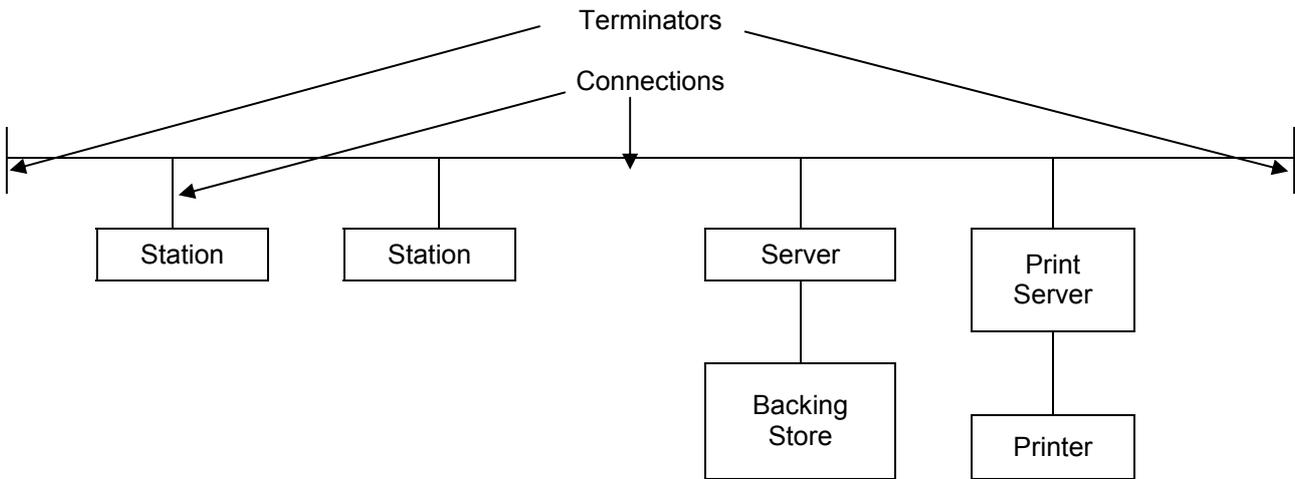**d)**   • to give single representation of any value
- to give maximum precision
- to allow multiplication to be performed more accurately.

[max 1]

Total: 90 (86+4) marks

# Mark Scheme 2511
January 2007

1 (a) Give 1 mark for the correct topology and 1 mark for each different label to a maximum of 3 and 1 mark for a reason.


Note: For connections accept cable.

Reason: Simple to wire when on a single floor/High speed system not required/Relatively cheap.

[5]

    (b) Give 1 mark for the correct topology and 1 mark for each different label to a maximum of 2 and 1 mark for a reason.
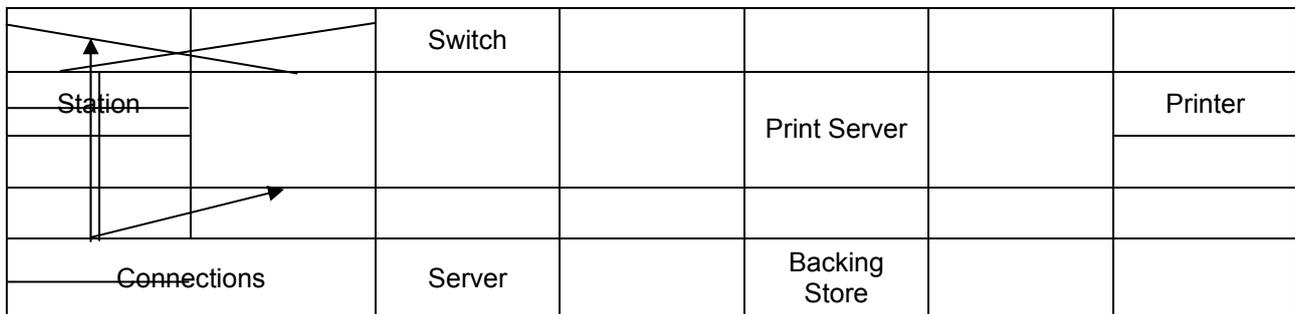
    Note: For connections accept cable.

    Reason: Need high speed network/Need to transfer large quantities of data/Can easily add new stations (even on different floors).   **[4]**

(c) Give 1 mark per point.

A hub broadcasts a message/sends a message to all stations/stations decide whether or not the message is for them
A switch is 'intelligent'/sends a message to only the station for which it is intended/builds up a map of where stations are. **[2]**

(d) **(i)** Give 1 mark for the bridge being connected to the cable on the bus network and 1 mark for it being connected to the switch of the star network.

[2]
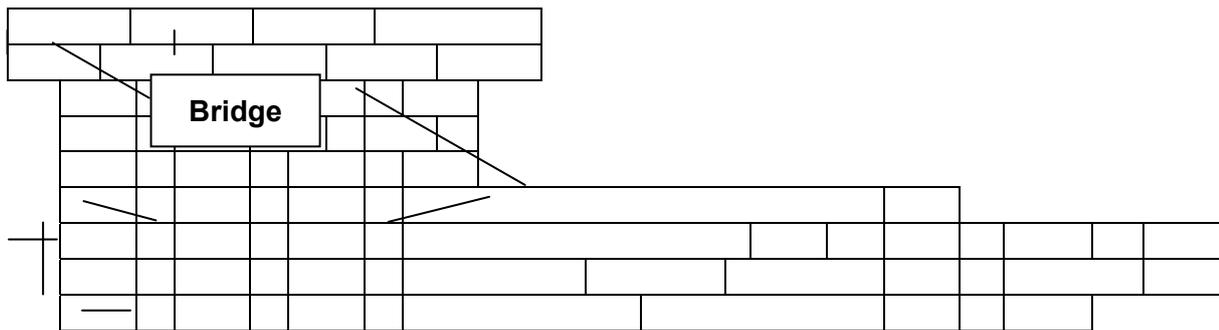
(ii) Give 1 mark per point to a maximum of 4.

Message goes direct to station if on same segment (network). Initially bridge has to find which segment station is on. If message reaches bridge but for station on same segment, bridge returns it. If on different segments, bridge passes message to other segment. Bridge builds a map of stations. **[4]**

2 Give 1 mark per point to a maximum of 5.

Use a menu
- such as 1 for a bill, 2 for enquiry
- 5 for an operator
- If a fault, request customer number
- enter fault number
- or #/* for an operator
- If paying a bill, request customer number
- to be entered using phone buttons
- the amount (in pence to be entered using phone buttons)
- credit card number/bank details
- If an enquiry, ask for product number
- or #/* for an operator
- If a complaint, connect to an operator
- or provide another menu for different types of complaint. **[5]**

3   **(a)**   Give 1 mark for the identification of the many-to-many relationships.   **[1]**

      (b)   **(i)**

		LIFT_PART		PART
LIFT				
				SUPPLIER_PART
Give 1 mark per point.				
• The entity LIFT_PART				
• The entity SUPPLIER_PART				
• The correct relationships on LIFT_PART				
• The correct relationships on SUPPLIER_PART.				SUPPLIER

                                                                   [4]

          (ii)   Give 1 mark per point.

                 • Primary key in LIFT is foreign key in LIFT_PART

                 • Primary key in PART is foreign key in LIFT_PART

                 • Primary key in PART is foreign key in SUPPLIER_PART

                 • Primary key in SUPPLIER is foreign key in SUPPLIER_PART.   **[4]**

                 NOTE:

                 Accept alternative wording such as

                 LIFT and LIFT_Part are connected by the primary key in LIFT
                 or
                 LIFT_PART contains LIFT ID.

4 **(a)** Give 1 mark for an input from

- Method of selecting floor from inside lift
- Method of selecting floor from outside lift
- Sensors on doors
- Sensor measuring load
- Method of determining number of people in lift.

Give 1 mark for the processing from

- Check weight in lift
- Check number of people in lift
- Determine where to put floor in list of floors to be visited
- Close & open doors
- Determine direction of travel and move lift
- Continually monitor all inputs.

Give 1 mark for an output from

- Display of position of lift
- Display showing direction of travel
- Voice simulation giving messages. **[3]**

(b) Give 1 mark per point to a maximum of 3.

- Display of buttons on screen for inside and outside lift
- A box to enter number of people leaving lift
- A box to enter number of people entering lift
- A box to enter load
- A display showing current floor
- A display showing floors to be visited
- A display to show direction of travel. **[3]**

(c) Give 1 mark per point to a maximum of 2.

- Expensive to build and then find errors
- Safer when testing overload
- A great variety of scenarios can be simulated quickly
- Modifications easily made. **[2]**

(d) Give 1 mark per point to a maximum of 2.

- Too many buttons to choose from
- Too many combinations possible
- Cannot be sure all possibilities tested. **[2]**

(e) **(i)** Give 1 mark per point to a maximum of 2.

- Quicker to create simulation
- Simulation can be modified easily when problems in design occur
- Can be modularised so that modules can be used easily in many simulations
- Enables OOP to be used resulting in reuse of code
- Easier to write/understand in high level. **[2]**

(ii) Give 1 mark per point to a maximum of 2.

- No restriction on number of floors in the building
- New stops can be added to the 'queue' easily in the correct position
- Next floor to be visited can always be at the start of the 'queue'. **[2]**

(iii) Diagram – Give 1 mark per point to a maximum of 3.

- Head of list
- Null pointer
- Pointers
- Data.

Head
of list

Explanation – Give 1 mark per point to a maximum of 2.

- When a floor button is pressed
- insert it in correct position in list
- If lift is ascending, and floor is above current position
- insert floor number immediately before next higher floor number in list
- If lift is ascending, and floor number is below current position
- insert floor number in the list after highest floor number in list
- and after next higher floor number in list
- If list is descending, and floor number is lower than current position
- insert floor number immediately after next higher floor number in list
- if lift is descending, and floor number is higher than current position
- insert floor number in the list after lowest floor number
- and before the next highest floor number. **[5]**

(f) Give 1 mark for stating invalid in each case and 1 mark for the reason.

%IN   Invalid
Starts with %/ %should be at end/Does not start with a letter I to N

12N%   Invalid
Digits not allowed

in%   Invalid
Lower case letters not allowed

INTO   Invalid
No % at end **[8]**

(ii) Give marks as shown below to a maximum of 5.

realVariable ::=<realLetter> | <realLetter> <realString>

<div align="center">1   1</div>

realString ::=<letter>|<digit>|<letter> <realString> | <digit><realString>

<div align="center">1   1   1</div>

digit ::= 1|2|3|4|5|6|7|8|9|0

<div align="center">1</div>

realLetter ::= A|B|C|D|E|F|G|H|O|P|Q|R|S|T|U|W|X|Y|Z

<div align="center">1</div>

[5]

Note: Accept

realString ::=<letter>|<digit>|<realString><letter> | <realString><digit>

5 **(a)** Give 1 mark per point to a maximum of 2.

- Designs involve large volumes of data
- It would take a very long time to transfer the data
- Insufficient band width **[2]**

(ii) Give 1 mark for correct answer.

Broaband/ISDN **[1]**

(b) **(i)** Give 1 mark for correct answer.

A set of rules **[1]**

(ii) Give 1 mark for correct answer.

So that sender & receiver understand the data **[1]**

(c) Give 1 mark for the name and up to 2 marks for a correct description.

Name

Checksum

Description

- Sender adds up the bytes forming a block
- and sends it at the end of the block
- Receiver adds up the bytes when received
- and checks the total is same as that received
- Report any errors/Request resending of data.

OR

Name

Parity

Description

- Odd/even parity agreed using protocol
- Sender sets parity bit in each byte
- Receiver checks parity of each byte
- Report any errors/Request resending of data. **[3]**

(d) Give 1 mark per point to a maximum of 2 per description.

Encryption

- Encoding data
- To prevent unauthorised access
- Especially during transmission
- Based on one (or more) keys.

Authorisation

- Usually used for remote computers on a network
- The right granted to an individual
- To use the system
- And the data stored on it
- Set up by a system administrator
- Verified by the computer
- Based on some form of identification
- Eg password.

Authentication

- Used in a multiuser or network OS
- System validates user's log-on information
- User's name & password
- valldated against an authorised list
- If a match is found, access is granted. **[6]**

6 **(a)** Centralised database
Give 1 mark from:

- All the data is held in a single database
- All users access the same database
- The database is held on a single computer. **[1]**

Distributed database
Give 2 marks from:

- Different parts of the database
- Are held in different locations/computers
- Only data that is frequently used at a location
- Is held at that location
- Periodically a central database is updated by the different parts. **[2]**

(b) Give 1 mark per point to a max of 6.

- Can produce a mailing list of all employees
- Can create groups of employees
- An email can be sent to a group of employees
- Can attach documents to emails
- These can be password protected
- Can request confirmation of receipt
- Can create an auto-reply
- Can include multimedia in the email
- Can tag emails as high priority
- Emails can be read at any computer terminal
- Emails can be sent at electronic speeds
- At any time
- Receiver does not have to be online
- Can forward messages
- Can reply without looking up/entering email address
- Can find emails with given content
- Can organise emails into folders. **[6]**

Total = (86+4) = 90 marks

Advanced GCE Computing (3820/7820)
January 2006 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
2506	Raw	90	61	53	46	39	32	0
	UMS	90	72	62	54	45	36	0
2507	Raw	120						0
	UMS	120						0
2508	Raw	90	64	57	50	43	36	0
	UMS	90	72	62	54	45	36	0
2509	Raw	90	65	57	49	41	33	0
	UMS	90	72	62	54	45	36	0
2510	Raw	120	98	87	76	65	54	0
	UMS	120	96	84	72	60	48	0
2511	Raw	90	66	59	52	45	39	0
	UMS	90	72	62	54	45	36	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3820	300	240	210	180	150	120	0
7820	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3820	14.3	38.1	57.1	71.4	95.2	100.0	21
7820	0.0	66.7	100.0	100.0	100.0	100.0	3

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication.