MARK SCHEME for the October/November 2010 question paper

for the guidance of teachers

9691 COMPUTING

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

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

1 (a) ⁻ Restricted to the organisation
⁻ Limited number of users
⁻ Access controlled by use of passwords
⁻ Allows for confidential/sensitive data
(1 per ⁻, max 2)   [2]

(b) ⁻ Enhancement of text by use of…
⁻ …colour/bold/font…
⁻ …by enclosing text in tags
⁻ Use of blank lines…
⁻ …to format text…
⁻ Use of head and body…
⁻ …to convey information to search programs…
⁻ …provide titles to the work produced
⁻ Hot buttons…
⁻ …to allow simple searching…
⁻ …jumps to different pages
⁻ Frames…
⁻ …to allow insertion of tables/diagrams
⁻ …to enhance understanding/make document more readable by replacing text
(1 per ⁻, max 3 features, max 6)   [6]

(c) Problems:
⁻ Hackers attack communications
⁻ Hackers attack customer data
⁻ Data being distributed leading to unsolicited communications
Techniques:
⁻ Encrypting data
⁻ Digital signatures to guarantee reliability of source
⁻ Passwords to enter user's area/database
⁻ Use of firewall to block unwanted access
⁻ Workers subject to D.P. legislation
⁻ Portable storage devices not allowed
(1 per ⁻, max 6)   [6]

2

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  ┌──────────┐         ┌──────────────┐         ┌──────────┐
  │   FIRM   │─────────<│ FIRMBUILDING │>─────────│ BUILDING │
  └──────────┘          └──────────────┘          └──────────┘
       │
       ∨
  ┌──────────┐
  │ CONTRACT │
  └──────────┘
```
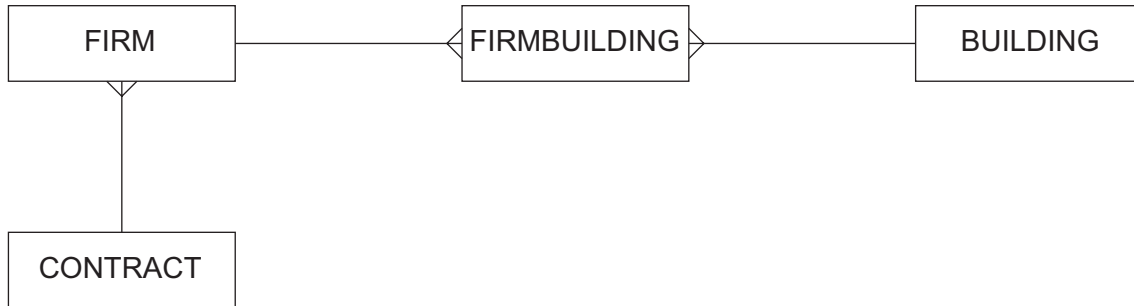
Mark points:
- 3 tables FIRM, CONTRACT, BUILDING
- Firm to contract shown as many-to-one
- Link entity with sensible name
- Firm to link is shown as one-to-many
- Link to building is shown as many-to-one (allow one mark if firm to building is shown as many to many)   [5]

3
- Value stored in PC is placed in MAR
- PC is incremented
- Memory accessed for location held in MAR
- Contents of that location placed in MDR/MBR
- Contents of MDR/MBR placed in CIR
- Operation code held in CIR is decoded
- Address held in CIR is copied from CIR to MAR
- Contents of address held in MAR are copied to MDR/MBR/sent to accumulator
- Mention of different modes of addressing altering stage in cycle/mention of IR
- Mention of use of clock pulse to control stages of the cycle

(1 per - , max 8)   [8]

4 (a)
- Whole program may not yet be written…
  - …so the code would not compile
  - Testing may need to be done during the writing of the code…
  - …tags may be provided to allow code presently complete to be tested
  - …diagnostics will be more complete/more immediate
  - Code can be run from any point to any point/individual segments can be run for testing purposes…
  - …allowing errors to be isolated
  - Running/testing will be desirable after minor changes
  - Repeated compilation of the code will be wasteful/time consuming

(1 per - , max 4)   [4]

(b) - Check on grammar of statements
- Checks the correct pairing of brackets/decides the priorities of the arithmetic and logical operators
- Error diagnostics are issued
- Jump destinations are checked for existence
- Checks that variables have been declared
- Adds information to the dictionary of variables like the data type
- Check for existence of library modules
  (1 per -, max 3) [3]

(c) - Addresses of variables calculated…
- …and stored in symbol table
- Intermediate code produced…
- …which can then be turned into executable code
- Routines called from system library…
- …for example a square root function called/embedded in code
- Code optimised...
- …which involves using rules to make code as small/efficient as possible
  (1 per -, max 2 pairs of marks, max 4) [4]

5 **(i)** - Memory is divided into variable length segments
- Programs can consist of many segments
- Segment size is determined according to logical reasons dictated by the program to be executed
- Segments normally match natural divide in program

(ii) - Memory/program is divided into fixed sized pages
- Program is allocated a number of pages according to the size of the program
- Page size is determined according to physical factors of the way storage is defined
- Pages may be discontiguous
- Index of pages kept
- Addresses can be calculated by adding the page address to base address

(iii) - A whole program does not need to be resident in memory at the same time
- When a new page is needed it is loaded into memory over a redundant page from a reserved area of storage
- Part of storage is required to act as though it were memory
- Use of cache to act as very fast transfer storage between main storage and memory
- User believes whole program is stored in memory simultaneously
- Erased page needs to be stored before being overwritten if it has been altered
- Problem of thrashing mentioned
  (1 per -, max 4 per dotty, max 9) [9]

6 **(a)** Ash, Jam, Lie, Poa, Ros, Siv
(1 mark for starting with Ash, one mark for the remainder correct) [2]

(b) Poa, Jam, Ash, Lie, Siv, Ros
(1 mark for starting with Poa, one mark for the remainder correct) [2]

7 **(a)** - Mantissa is 001101 and exponent is 000100
- 001101=1/4+1/8+1/32 = 13/32
- Exponent = 4
- Number represented = 13/32 * 2^4
- = 13/32 * 16
  = 6.5
Alternative:
- Mantissa is 001101 and exponent is 000100
- Mantissa is 0.01101
- Exponent is 000100 = 4
- Therefore number is 110.1
  = 6.5
(1 per -, max 4) [4]

(b) **(i)** 011010 000011
(1mark for mantissa, 1 mark for exponent) [2]

(ii) - Accuracy of representation is increased
- Range is decreased [2]

(c) 011011 [2]

8 **(a)** Reply
Allows user to compose response which is automatically sent to original address
Filing/Saving
Storing the message for future use in a selection of user designed files/folders
Copying/forwarding/multiple forwarding
Sending copy of message to other recipient(s) by inserting address in address line
(Automatic) deletion
Remove message from message box after it has been read to free up space
Blocking
If no further messages wanted from that source then any future messages will not be shown
Mark as read
To ensure message remains in inbox for future reference
(2 per facility, 1 for name and 1 for description, max 3 facilities, max 6) [6]

(b) **(i)** - Text-only contains only characters represented in ASCII/on keyboard
- Rich text allows addition of fonts/colours/bold/…

(ii) Advantages:
- Smaller file size/faster transmission
- More likely to be compatible with other user's software/more likely to be readable at destination [4]

(c) (i)
- Means of navigating around the contents
- How to use the system
- Sample screen displays and printouts
- Simple maintenance to facilitate operation e.g. changing of a till roll
- Simple error diagnostics

(1 per ⁻, max 4) [4]

(ii) Phased:
- One part of new system changed throughout the store
- e.g. The stock control part of the system/the loyalty card discount part of the application
- Allows for the store management to ensure that staff are well trained in one part of the application/one part is fully tested before introducing a new part/Restricts the damage if a part of the system does not work properly

Pilot:
- Whole system covering one part of the store is changed
- e.g. The fresh food department is switched to the new system while the rest of the store stays using the old system/one or two checkouts switched to the new system
- Staff can be trained fully on the new system in rotation/only one part of the store is affected by a bug in the new system/whole system can be fully tested before it is implemented across the store

(1 per ⁻, max 4) [4]

9 (a)
- One in which the steps needed to execute the program are specified
- Program statements can be grouped in self-contained blocks called procedures [2]

(b)
- Computer given facts and rules
- Required outcomes are described, not how to achieve them [2]

(c)
- Data and methods are kept together
- Data can only be accessed using methods of the object [2]

10 (a) Simultaneous use of several processors [1]

(b)
- Very large number of calculations involved in producing a weather forecast…
- …work on the interaction of fixed volumes of atmosphere reacting with adjacent volumes
- The smaller the blocks of atmosphere used the better the forecast…
- …and the larger the number of calculations to be done
- Calculations must be done in a short time because…
- …process is time sensitive

(1 per ⁻, max 4) [4]