UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Level

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

9691 COMPUTING

9691/31 Paper 3 (Written Paper), maximum raw mark 90

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.

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1 **(a)** Advantages:
- Access to the correct customer information can be made from any machine/it is necessary to use the machine storing that information
-The customer details are always up-to-date/there is only one copy of the customer file.

Disadvantages:
- While one user is accessing or amending the file, others cannot use it/because it is necessary to maintain the integrity of the data held
- The data is less secure/more people can see the files so less confidential/more difficult to keep files confidential to one worker.

(2 per -, max 1 advantage and 1 disadvantage, max 4) [4]

(b) **(i)**
- All computers in the star network are connected to the switch
- The switch is capable of receiving a message and identifying where the message should go...
- the message is only sent to the correct places/reducing network traffic

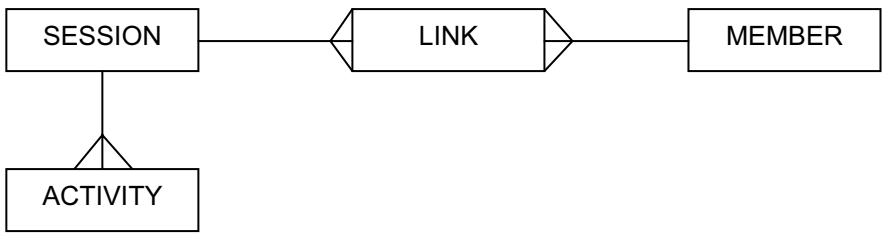
(1 per -, max 2) [2]

(ii) -Lies between the two networks
-Passes messages from one network to the other
-Converts data into the appropriate form for the receiving network
(1 per -, max 2) [2]

(iii) -Used to connect chief accountant's computer to telephone line *(not Internet)*
-Converts between digital and analogue signals
-Modulator/Demodulator
(1 per -, max 2) [2]

(c) -Information is relevant to the company/private network
-bank of company resources
-More chance of workers seeing information
-Fewer people using intranet/less information available...
-makes it easier to navigate...
-faster to access information
-Information more secure from hacking/viruses.
-less unsolicited email
(1 per -, max 4) [4]

2



Mark Points:
-All three entities represented
-Session to Activity being one-to-many
-Link entity between SESSION and MEMBER
-Session to Link is one-to-many
-Link to Member is many-to-one
(allow 1 mark for session to member is many-to-many) [5]
must be a recognisable ER diagram

3 **(a)** -Single processor/control unit
-Sequential processing
-Instructions and data indistinguishable...
-can be stored together (in same memory unit).
(1 per -, max 3) [3]

(b) **(i)** -Hold the data currently being processed
-Result of calculation is held in accumulator...
-before being passed to memory unit
(1 per -, max 2) [2]

(ii) -The address of the next instruction
-Contents incremented (after being read)
-Contents changed by a jump instruction
(1 per -, max 3) [3]

4 **(a)** -Interpreter translates one instruction and runs it before translating the next.
-Compiler translates whole program before it is executed
-Interpreter maintains source code throughout run/program execution
-Compiler creates the object code and drops the source code
-Interpreter must be present in memory during run/program execution
-Compiler removed once object code produced
-Object code larger than source code
-Compiled program runs more quickly once it is translated
-interpreter produces error diagnostics as they are met
-compiler produces a file of error diagnostics at end of compilation
-interpreter makes debugging easier
-compiler needs whole program to be syntax error free to produce object code
-interpreter can execute partial programs
-compiler needs a whole block of code to run
(1 per -, max 6) [6]

(b) -Puts each statement into form required by the syntax analyser
-Keywords are tokenised
-If keyword not in dictionary then error reported
-Programmer-defined names entered into symbol table//symbol table created.
-names not following rules create error message
-Removes unnecessary characters
(1 per -, max 5) [5]

5 **(a)** -Software interrupt...
-e.g. generated by the current program/may need to use printer/...
-I/O interrupt...
-e.g. Initiated by I/O hardware/user pressed a key/...
-Timer interrupt...
-e.g. end of time slice
-Hardware interrupt...
-e.g. power off
(1 per -, max 2 pairs, max 4) [4]

(b) -current process halted
-Interrupt given a priority
-Placed in queue with other interrupts to be done...
-according to priority
-When interrupt reaches top of queue it is processed // highest priority is handled first
-Contents of registers placed on stack
-values read from stack to registers.
(1 per -, max 5) [5]

6 Repeat
-Compare new value with root value / head
-If > root value then follow right subtree
-Else follow left subtree
-Until no subtree
-Insert new value as root of new subtree
(1 per -, max 4) [4]

7 **(a)** **(i)** Mantissa is 01001100
-Created by 9 ½ = 1001.1
-Point moved to be in front of first 1 and 0 placed in front
Exponent is 00000100
-created by number of places point is moved
$-4 = 100_2$
(1 per -, max 4) [4]

(ii) -Mantissa is 01011001
-Exponent is 00000101 [2]

(b) -Range is decreased...
-because power of two to multiply mantissa by is decreased
-Accuracy is increased...
-because more digits/bits (are represented after the binary point). [4]

8 **(a)** -Can have staff training sessions...
-without staff having to travel / thus saving time of employees
-Saves costs of transport/hotels/venue
-Meetings can be at any time/immediate
-Personnel do not have to have large amount of time off work to attend.
(1 per -, max 4) [4]

(b) -Enlarges market
-now worldwide rather than just local to stores
-Opens up richer markets where higher prices can be charged
-Sells 24/7
-No need for expensive overheads
-No need to employ more sales staff for extra sales.
-possibility of larger range of goods
(1 per -, max 4) [4]

(c) Technical:
-Designed for use by a technician/computer knowledgeable person
-Shows how the system was put together/works
-So that a technician can alter the system/correct it/maintain it

User:
-Designed for non computer literate user of system
-Provides training guides/instructions for use
-What to do when something goes wrong.
(1 per -, max 4) [4]

(d) *examples must refer to the scenario in the question*

(i) -Needed to correct bugs in the system, found in operation
-e.g. Totals over $100 are output without cents value

(ii) -Changes to the system necessary because of external factors
-e.g. Sales tax on shoes has changed

(iii) -Changes which enhance/improve performance of system
- e.g. A change to the sorting algorithm to speed up production of lists of most popular shoes. [6]

9 **(i)** -Data and methods are kept together
-Data can only be accessed using methods attached to it [2]

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

(iii) -Instructions are one-to-one with machine code/binary
-Use of mnemonics / labels
-Memory locations can be accessed directly
(1 per -, max 2) [2]

10 (a) (i) -Simultaneous use of... *(do not accept: apparently)*
-more than one processor...

(ii) -to carry out large number of calculations...
-because the calculations are simple/similar/repetitive...
-carried out in much shorter time (compared with single processor)
-Calculations are interdependent with results of one group feeding into next calculations.
(1 per -, max 3 per dotty, max 4) [4]

(b) Need for complex software/O.S. [1]