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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Computing 6510

CPT5 Advanced Systems Development

Mark Scheme

2007 examination - January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Dr Michael Cresswell Director General

Instructions to examiners

The following forms of notation should be used on candidates' scripts:

- Ticks - To indicate what is accepted as correct or creditworthy, placed in the body of the answer, and on diagrams;
- Underscoring – To identify errors/irrelevance in written answers;
- Crosses – to indicate a wrong answer;
- Brief comments – placed at suitable points in the body of the text to amplify the marking;
- BOD – means benefit of the doubt and is used where the candidate's answer has been given a mark on the balance of probabilities that the candidate's answer has met the requirements of the mark scheme even though it could be interpreted differently;
- NE – means not enough and is applied to an answer that falls short of what is required;
- O/S – means outside the mark scheme. The candidate's answer is creditworthy but the answer does not match any of the answers on the mark scheme for the particular question. Nevertheless a mark is awarded;
- C/F – means carried forward. This arises when a candidate offers an answer which is not creditworthy in one question but is creditworthy in a later question. The mark is carried forward to the question which is creditworthy;
- C/B – means carried back. This is similar to a carry forward but the mark is carried back to an earlier question.
- T/O – means talked out. The candidate's answer is contradictory.
- ^ - means missing term or symbol.
- F/T – means followed through. If a candidate made a mistake in the earlier part of an answer, mar the answer using the correct method on their answer from the earlier part.

The following notation is used in the mark scheme

- ; - means a single mark;
- **A** – means acceptable creditworthy answer;
- **R** – means reject answer as not creditworthy;
- **I** – means ignore.
- / - means alternative word or sub-phrase;
- // - means alternative answer

General Rules for Marking
Ignore Abbreviations
Ignore Brand Names

1 *(a) & (b) must be different* *(c) & (d) must be different*

(a) **barcode scanner**: scan ID card to register when entering/leaving the room; **1**

(b) **fingerprint scanner:** to login at computer, can not be abused like user name and password;
to register when entering/leaving the room;
to ensure the identity of the student (can not use someone else's) entering the room/logging on;
I fingerprint to check ID card is genuine **max 1**

(c) **digital still camera:** to produce photos for ID card;
to produce photos for database to help identify students;
to take photos of student entering room; **max 1**

(d) **digital video camera:** to record/monitor activity in room;
to help identify students if there has been misuse/damage; **max 1**

(e) **programmable doorlock/turnstile:** admit only authorised persons;
admit only persons with valid ID card; automatic locking at certain times;
if used when entering and leaving, can record time in room; **max 1**

(f) **RFID tag reader**: if students are issued with a RFID tag instead, the reader will detect their presence without the student having to swipe their ID card through a reader;
faster process to log student's ID as they enter/leave the room if student is given an RFID tag;
tracking location of students with RFID tags;
tag equipment to stop it being taken out of the room;
scan RFID **BoD**; swipe RFID is **T.O**.
R references to smart card **R** tagging unauthorised people **max 1**

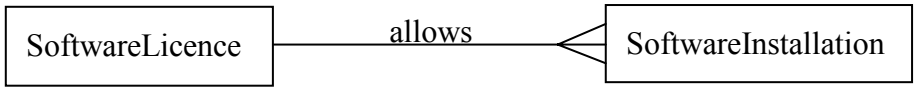
Total 6

2 any normal/typical/valid data;: 1<= Hours <=35; **A** 0<= Hours <= 48
boundary/extreme values;: eg Hours = 35, 36 & Hours = 0, 48, 49; **A** -1
test that it correctly calculates premium rate;: Hours > 35;
any erroneous/invalid data; *any negative value; any non-integer data; any value over 48*;
1 mark for test data, 1 mark for justification max 6 **6**

If justification does not match test data then 1 mark max

3 (a) Copyright, Designs and Patents Act (1998); *if other laws included* **T.O**. **1**

(b) *boxes for correct entities: SoftwareLicence SoftwareInstallation* one mark
correct degree of relationship: 1 to many one mark
suitable name for relationship: one mark **3**



(c) *any sensible field length accepted except for SoftwareID, ComputerID, StaffID*

i) SoftwareID VARCHAR(10) PRIMARY KEY (NOT NULL)

// SoftwareID VARCHAR(10) PRIMARY KEY(SoftwareID);

SoftwareName VARCHAR(30)

Version VARCHAR(10)

Supplier VARCHAR(20)

DatePurchased DATE

ExpiryDate/DateValidTo DATE

NoOfLicences INT **3**

Could appear at end of list.
It doesn't have to be with softwareID VARCHAR(10)
In fact, this would provide a syntax error

1 mark for any 3 attributes correct
P1 if extra symbols used
Ignore spaces and case in attribute names

A char/string/text/alphanumeric
Instead of VARCHAR
A Date/Time instead of Date
A Integer instead of INT
BOD any attributes which are clearly more than 1 word

ii) SoftwareID VARCHAR(10)

ComputerID VARCHAR(6)

DateInstalled DATE

StaffID VARCHAR(3)

PRIMARY KEY (SoftwareID, ComputerID);

FOREIGN KEY (SoftwareID)

REFERENCES Software Licence(SoftwareID); **4**

1 mark for any 2 attributes correct

If not DDL give 1 mark if composite key identified

Total 7

I NOT NULL

(d) SELECT ComputerID, SoftwareName, Version ;

Extra attributes: T.O.

FROM SoftwareLicence, SoftwareInstallation ;

WHERE SoftwareLicence.SoftwareID=SoftwareInstallation.SoftwareID ;

ORDER BY ComputerID; **A** ASC or DESC **4** **15**

Accept (instead of FROM WHERE):
FROM SoftwareLicence INNER JOIN SoftwareInstallation ON SoftwareLicence.SoftwareID = SoftwareInstallation.SoftwareID

P1 for other spurious punctuation inc semicolons

A LEFT JOIN

Table names prefixed with tbl, **P1**

If table name and attribute transposed, **P1**

4 (a) A Catalogue; **R** stock table

B Stock ID; **T.O.** if other data fields added

C Calculate Total (Due) ;

A calculates total; **R** charge customer // **R** calculate price // **R** calculate on its own

D Stock ID; **T.O.** if other data fields added

E Price List;

F Unit Price;

G Produce Receipt; **R** operator produces receipt

A create receipt; **R** cash desk // **R** print receipt // **R** process receipt

H re-order File; **8**

(b) Data Flow Diagram; **R** Data Flow Chart **1**

DFD **N.E.**

(c) Impact (Printer) // Dot Matrix (Printer) // daisywheel (printer) // character printer // line printer; **1**

matrix on its own **NE**

Total 10

5 (a) If you send the key with the message, anyone can decrypt the message **1**

key would need to be sent by means other than email, otherwise anyone could intercept the key and use it do decrypt the message;

(b) (i) Jill's public key; **1**

(ii) Jill's private key; **1**

Total 2

(c) (i) the message data is hashed into a message digest;

the message digest is encrypted; with the sender's private key; **3**

(ii) Jill's software decrypts the signature;
using Jack's public key; contained in digital certificate sent with message;
to verify Jack's public key;
decrypt digital certificate using Certificate Authority's (trusted third party's) public key;
Jill's software then hashes the document data into a message digest;
If recalculated message digest is the same as
the original message digest (decrypted signature);
then Jill knows that the signed data has not been changed; **max 4** **7**

Total 10

I decryption of message

6 (a) a set of rules/procedures; **1**

(b) (i) Transport (Layer); **1**

(ii) Network (Layer); **1**

(iii) telnet;
http (client) // web server // IRC Client Server;
email; internet/web browser;
FTP; snmp;
TFTP; **A** instant messaging / VoIP;
SMTP; https; **max 1** **3**

(c) a (unique) address / identifier assigned to network card
// (unique) hardware address/identifier; **A** code **R** name instead of address **1**

(d) (i) *any IP address in the range 192.168.4.1 to 192.168.4.254*
A 192.168.4.255 or 192.168.4.0

(ii) 254 **A** 256, 255, 253 **1**

(iii) change the subnet mask // get another network ID // get class A or B network ID;
split the network into subnets; **R** segments **max 1**

(iv) for security reasons; not accessible/addressable from outside the LAN;
avoids massive use of public addresses; **max 1**

Total 4

(e) use a router // use a gateway address;
assign registered IP address (222.125.105.15) to the Internet-facing NIC of router/gateway;
assign local IP address (192.168.4.1) to LAN-facing NIC of router;
local computer sends message to (LAN-facing NIC of) router/gateway;
router/gateway sends message to Internet using registered IP address (222.125.105.15);
router/gateway sends reply from Internet to local computer's private IP address; **max 2**

Total 11

7 (a) a computer program/software;
that attempts to replicate the performance of a human expert // mimics human reasoning; **max 1**
must do more than just store and retrieve data

(b) *typical application:* Language modelling/translation;
classification - insects, etc
prediction - weather forecasting, stock market forecasts, mineral ore deposits, …
face recognition // voice recognition;
diagnosis - medical problems / large computer system faults;
monitoring and control/Robotics - chemical processing plant/air traffic control / nuclear reactor;
design - electronic circuit boards;
planning systems - manufacturing capacity and inventory management;
instructional systems - evaluation of student's performance & adjustment of teaching level;
adaptive games - chess masters learn as they play; **max 1**

(c) *3 constituent parts:*
the knowledge base // facts and rules part; **A** database + rules; **R** database
the inference engine // means of making deductions; **A** the programmed logic;
R relationship between data // **R** calculations
the user/human interface // means of communication between user and computer; **3**
R input & output

(d) it explains its reasoning to the user;
it can reason with uncertain data (can respond to 'don't know' answers);
fuzzy logic - ability to state conclusions qualified by probability value;
can store rules as well as facts / rules not just data;
preserves expertise;
will try different pathways to solution whereas user on a database would have to redefine the search / uses backtracking / uses logic /adaptive / it leans; **max 2**

Total 7