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General Certificate of Education

Computing 6510

CPT 5 Advanced Systems

Mark Scheme

2008 examination - June series

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The following annotation is used in the mark scheme:

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

Qu	Part	Sub Part	Marking Guidance	Mark
1	a		The car's RFID reader; will sense/detect/read the RFID/card (through windscreen); **R** answers that imply swiping/plugging in or use of keys **A** sending/transmitting of RFID On-board computer to check booking details; Car can be activated with a PIN (typed into a console);If someone has stolen the membership card they can't use it; **R** any answers using other devices such as barcode reader	3
1	b	(i)	member ID / user name ; password/PIN ; **A** account name instead of memberID; **A** answers to security questions;	2
1	b	(ii)	Member (MemberID, CreditCardNo, Member(Full)Name, Address, DrivingLicenceNo, EmailAddress, Mobile(Tel)No/TelNo); + attributes from b(i) **I** bars over attributes	1
1	b	(iii)	ParkingArea (LocationCode, ParkingAreaName, PostCode) ; **A** ParkingAreaID instead of LocationCode **R** ParkingArea **R** Name as attributes	1
1	b	(iv)	Car (CarRegNo, LocationCode) ; **A** RegNo/CarReg instead of CarRegNo Allow follow through on foreign key from (iii)	1
1	b	(v)	Booking (BookingRefCode, CarRegNo, MemberID, StartDateTime, EndDateTime, LocationCode) ; ; ; *1 mark for CarRegNo and MemberID;* *1 mark for StartDateTime and EndDateTime;* *1 mark for LocationCode;* *1 mark for BookingRefCode as primary key;* ***A** 2 separate attributes for DateTime* **A** BookingRef/BookingID instead of BookingRefCode Follow through on attribute names	Max 3

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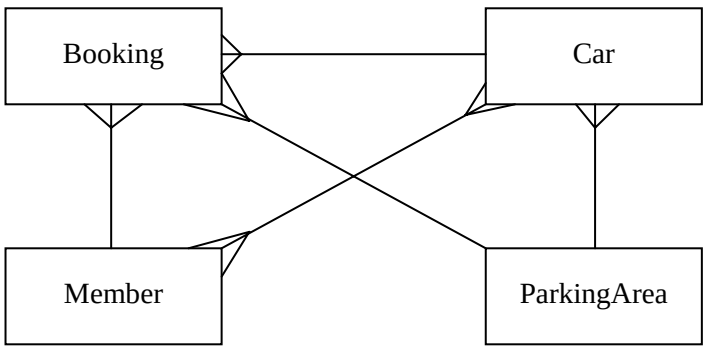
1	c		 *1 mark for each correct relationship,* *If 4 or 5 relationships given, mark as follows:* *All 4/4 or 5/5 correct: 3 marks* *3/4 or /54 correct: 2 marks* *2/4 or3/5 correct: 1 mark* *All other cases: 0 marks* **I** *relationship between Member and ParkingArea*	Max 3
1	d		SELECT MemberID, (MemberFullName,) CarRegNo, StartDateTime, (EndDateTime) FROM (Member,) Booking WHERE Member.MemberID = Booking.MemberID AND EndDateTime BETWEEN 1/12/07 AND 31/12/07 ORDER BY MemberID (ASC/DESC) A other attributes if present in candidate's booking table *Alternative Answer:* SELECT *; FROM Booking; WHERE EndDateTime LIKE "*/12/07" **A** StartDateTime instead of EndDateTime **P1** if attribute.table notaion used **P1** for extra punctuation or tbl in front of table name **I** punctuation around dates/times **I** case of keywords etc **A** other wildcard characters *Alternative Answer:* SELECT MemberID, MemberFullName, CarRegNo, StartDateTime, EndDateTime FROM Member INNER JOIN Booking ON Member.MemberID = Booking.MemberID WHERE EndDateTime >= 1/12/07 AND EndDateTime <= 31/12/07 ORDER BY MemberID	1 1 1 1 1 1 1 1 1 1 1 Max 4

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1	e							6
StartDateTime			**EndDateTime**	**Mileage**	**OverdueHours**	**Normal**	**Erroneous**	**Boundary**
01/12/07 06:00			01/12/07 15:30	15	2	1		
06/12/07 18:00			12/12/07 09:00	237	3			
04/12/07 **23:00**			04/12/07 **08:30**	5	2		1	
03/12/07 08:00			03/12/07 09:00	**0**	**0**			1
01/12/07 06:00			01/12/07 15:30	0	1**.5**		1	I
01/12/07 06:00			01/12/07 15:30	0	**-2**		1	I
04/12/07 08:30			05/12/07 23:00	57	0	1		A
01/12/07 06:00			01/12/07 15:30	15	3			

2	(a)	(i)	*encryption*: converting/transforming plain text into cyphertext / secret code
			// applying an algorithm to plain text to produce an unreadable version
			// the process of changing/enciphering/encoding information in such a way that only the computer/person with the key can decrypt/decode it;
				1

2	(a)	(ii)	*symmetric key encryption:* the same key/process/algorithm is used for encrypting and decrypting; **A** *sending/receiving instead of encrypting/decrypting* *public key encryption:* a public key and a private key // a pair of keys are used in combination; one to encrypt, the other to decrypt;	3
2	b	(i)	*when:* the symmetric key is sent (from B to A) // when establishing the initial connection; *how:* B must encrypt the symmetric key; with A's public key; so A can decrypt (the symmetric key) with A's private key; **A** A must encrypt the symmetric key; with B's public key; so B can decrypt (the symmetric key) with B's private key;	Max 3
2	b	(ii)	anyone could intercept the message with the symmetric key (and then decrypt the personal data); distributing the symmetric key securely is not possible (unless it is encrypted); **R** unspecific answers such as 'easily hacked'	1
3			*Any three points at 1 mark each:* Bugs/Errors/Mistakes in software/system/code/program/it; Problem **NE** **R** data errors (T.O.) Requirements change // adding new tasks; *or by example* Parameters change e.g. VAT rate, No of users adjusted, No of licences change; Performance needs tuning // buffer size needs adjusting // indexing needs to be switched off or on // indexes need to be rebuilt; "Efficiency …" **NE**	

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			Hardware is changed; System software is updated / upgrades; "Keeping up to date // update software" **NE** *Adaptive/Corrective/Perfective maintenance not enough without explanation*	Max 3
4	a		a computer program/software; that attempts to replicate the performance of a (human) expert; // responds like an expert; *must do more than just store and retrieve data AI not enough*	2
4	b		*typical application:* Natural Language <u>modelling/translation</u>; <u>classification</u> - insects, etc <u>prediction/forecast</u> - weather forecasting, stock market forecasts, mineral ore deposits, … face <u>recognition</u> // voice <u>recognition</u>; <u>diagnosis</u> - medical problems / large computer system faults; monitoring and <u>control/Robotics</u> - chemical processing plant/air traffic control / nuclear reactor; <u>design</u> - electronic circuit boards; <u>planning</u> systems - manufacturing capacity and inventory management; instructional systems - evaluation of student's performance & adjustment of teaching level; (*must refer to intelligent systems*) <u>adaptive</u> games - chess masters learn as they play; **R** answers that imply only data storage	Max 1
4	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; **R** input & output	3
4	d		it explains its reasoning to the user; it can reason with uncertain data (can respond <u>to</u> '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 learns;	Max 2
5			Top down testing; Bottom up testing; Black-box testing; White-box testing; Dry-run / walk-through; Mark first 3 responses only BUT beware of expansion on same line	

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			Unit/Module testing; **A** Prototyping; **R** Integration/Acceptance/Alpha/Beta/System/Performance/ Compatibility testing **R** anything clearly late in the development cycle	Max 3
6	a		A database is a pool/store/collection of data/records; **A** *collection of files // file(s) containing data;* A database management system (is a program/software that) acts as an interface between user and database // DBMS controls the structure/access // DBMS is a layer of software between database and applications; **A** manages access to data; **R** manages data	2
6	b		External / User / Local (Schema/View); **R** User Interface Conceptual / Logical (Schema); **A** The Schema; **R** Logic schema Internal / Storage / Physical (Schema);	3
6	c		CREATE TABLE // CREATE INDEX // CREATE DOMAIN // CREATE TRIGGER // CREATE VIEW // GRANT …; **R** CREATE DATABASE	1
7	a		scan head/sensory array moves slowly across the document; light illuminates document; image of document is reflected (via mirrors and lens); onto (an array of) light-sensitive cells // sensors; each cell/sensor produces an electrical signal; proportional to the strength of the reflected light that hits it; electrical signal is converted (into a binary value); binary values are stored as a matrix/bitmap *(or similar)*; binary value is stored in file; **I** pixel **I** colour scans // multiple scans *1 mark for each point*	Max 4
7	b		optical character recognition (software); OCR not enough **R** optical mark recognition **R** optical character reader	1
8	a	(i)	C – Router; **A** Brouter; **A** Gateway; E – Switch/hub ;	2

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8	a	(ii)	B – 192.168.7.1 D – 192.168.8.1 } 1 mark **A** *other numbers between 2 and 254 inclusive as last byte* (not 0 or 255)	1
8	a	(iii)	255.255.255.0 R 255.255.255 R 255.255.255.x (where x is anything else)	1
8	a	(iv)	any in the range 192.168.8.2 to 192.168.8.254 *allow 192.168.8.1 if not used in (ii)* **R** *if same as 8a(ii) for D*	1
8	b	(i)		1
8	b	(ii)		2

(i)	(ii)
253;	Because only the final byte is available for hosts;* But 0, 1 and 255 are reserved;
254;	Because only the final byte is available for hosts;* But 0 and 255 are reserved // 1 and 255 are reserved // 0 and 1 are reserved;
255;	Because only the final byte is available for hosts;* But 0/ 1 / 255 is reserved;
256;	Because only the final byte is available for hosts;

*"Because only the final byte is available for hosts" *is equivalent to* "there are 256 possible combinations"

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