Cambridge International AS & A Level

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COMPUTER SCIENCE **9608/12**

Paper 1 Written Paper **October/November 2017**

MARK SCHEME

Maximum Mark: 75

Published

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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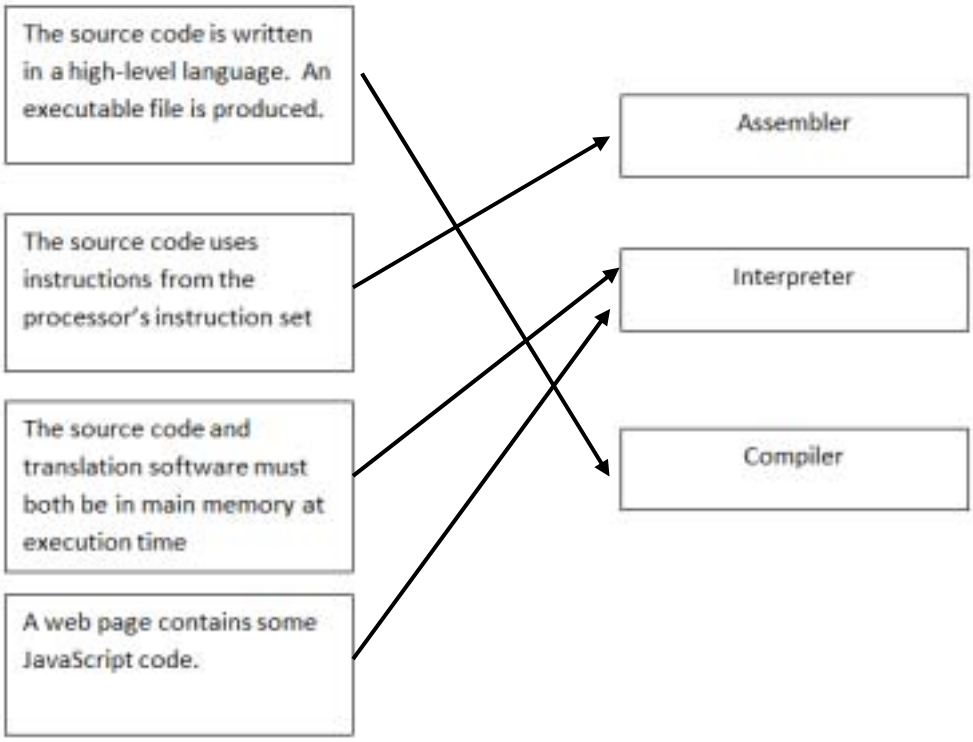
Question	Answer	Marks
1	**1 Mark** for stating the management task **1 Mark** for a corresponding description Maximum 2 marks for each task Maximum 3 tasks **Process / Task Management** • Allocation of processor time • Scheduling of processes or tasks / multi-tasking / multi-programming etc. • By example – e.g. round-robin, shortest remaining time first etc. • Resolution of conflict when two or more processes require the same resource **Secondary Storage management** • Storage space divided into file allocation units • Space allocated to particular files • OS maintains a file directory and FAT • Provides file naming conventions • Controls access. **Peripheral / Hardware / Device / Input/output Management** • Installation of appropriate driver software • Controls access to data being sent to/from hardware/peripherals • Controls access to hardware/peripherals • Manages communication between devices / hardware and software **Provision of a User interface** • Allows user interaction with the computer system// Facilitates human computer communication • Hides the complexity of the hardware from the user • Or by example – e.g. GUI, command line etc. **Interrupt Handling** • Halts the execution of the current process • Stores the values of the current process on the stack • Loads and executes the appropriate ISR code • Use of priorities for handling simultaneous interrupts • Saves data on power outage **Security Management** • Makes provision for recovery when data is lost • Provides usernames and passwords / encryption / user accounts • Prevents unauthorised access • Ensures privacy of data **Provision of a software platform / environment** • On which other programs / applications can be run	**6**

Question	Answer	Marks
2(a)	**1 Mark** for each correct connection 	**4**
2(b)(i)	**1 Mark** per bullet, max 2 • Once translated the compiler software is not needed to run the program • Compiled code should execute faster • Compiler produces an executable file • The executable file produced by a compiler can be distributed without users having sight of the source code // source code is kept secure // users are unable to make changes to the program • Cross-compilation is possible	**2**
2(b)(ii)	**1 Mark** per bullet, max 2 • Easier de-bugging • The interpreter stops when error encountered • error can be corrected in real time • The interpreter translates a statement then executes it immediately • Parts of the program can be tested, without all the program code being available.	**2**

Question	Answer	Marks
3(a)(i)	**1 Mark** per bullet, max 3 • Security is keeping the data safe • From accidental / malicious damage /loss • By example of need for security • Privacy is the need to restrict access to personal data • To avoid it being seen by unauthorised people • By example of need for privacy	**3**
3(a)(ii)	**1 Mark** for a suitable example For example: Personal data of students / staff	**1**
3(b)	**1 Mark** for stating the security measure **1 Mark** for a corresponding description Maximum 2 marks for each measure Maximum 2 measures **Physical measures** • Locked doors/keyboards etc. • Secure methods of access, keypads/ biometric scans etc. **Backup of data** • Regular copies of the data are made • If the data is corrupted it can be restored **Disk-mirroring** • All activity is duplicated to a second disk in real time so that if the first disk fails there is a complete copy available **Access rights** • Different access rights for individuals/groups of users • To stop users editing data they are not permitted to access • By example **Encryption** • If accessed, data cannot be understood by unauthorised personnel • Accessed only by those with the decryption key **Firewall** • To stop unauthorised access/hackers gaining access to the computer network **Use authentication methods such as passwords and usernames** • Passwords should be strong / biometrics • To prevent unauthorised access to data **Anti-malware program** • To detect / remove / quarantine viruses / key-loggers etc. • Carrying out regular scans **Concurrent Access Controls // Record locking** • Closes a record to second user until first update complete • To prevent simultaneous updates being lost	**4**

Question	Answer	Marks
3(c)	**1 Mark** per bullet, max 2 • Checking that the data entered matches / is consistent with that of the source. • Comparison of two versions of the data • Examples include double entry, visual checking, proof reading etc... • In the event of a mismatch – the user is forced to re-enter the data • By example, e.g. creation of a password • Does not check data is sensible/acceptable	**2**

Question	Answer	Marks
4(a)	**1 Mark** for each correct answer A – General purpose registers B – System clock C – ALU E – Control bus F – Address bus	**5**
4(b)	**1 Mark** per bullet, max 2 • The clock sends out a number of pulses in a given time interval (clock speed) • Each processor instruction takes a certain number of clock cycles to execute • The higher the clock frequency, the shorter the execution time for the instruction // Increasing the clock frequency improves performance	**2**
4(c)(i)	**1 Mark** per bullet Maximum 2 for Macro Maximum 2 for Directive Maximum 3 in total **Macro** • A group of instructions given a name // subroutine • A group of instructions that need to be executed several times within the same program • The statements are written once and called using the name whenever they need to be executed • Macro code is inserted into the source file at each place it is called • By example **Directive** • An instruction that directs the assembler to do something • A directive is not a program instruction • It is information for the assembler • By example	**3**
4(c)(ii)	**1 Mark** for a suitable example For example: State the start address for the program //tell the assembler to set aside space for variables // include an external file etc.	**1**

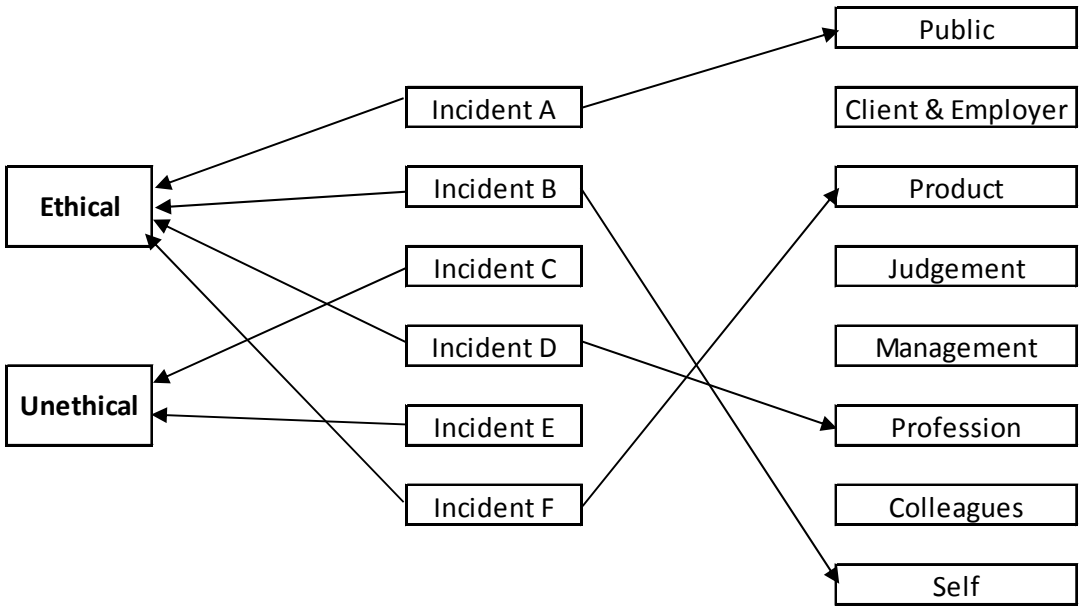
Question	Answer	Marks
4(d)	Mark as shown	**5**

ACC	Offset	OUTPUT
	10	
50		2
10		
11	**11**	
65		
		A
11		
12	**12**	
89		**Y**
12		
13	**13**	
32		

1 Mark for these two values, as first instructions
1 Mark for this value, in any row
1 Mark for this value, in any row
1 Mark for this value, after 65, nothing in between
1 Mark for the rest

Question	Answer	Marks
4(e)	Mark as follows: **Table entries:** **1 Mark** per bullet, max 4 • `EndProg` • 2 × Unknown • 9 • 14 • 8 **Numbering:** **1 Mark** per bullet, max 2 • Relative address of `Value` is numbered 6 • Number given for `EndProg` is next number in sequence to relative address of `Value` • All numbers correct – award 2 marks	**6**

Symbolic address	Relative address
StartProg	0
Offset	UNKNOWN 9 (1)
Value	UNKNOWN (6) 14 (1)
EndProg (7)	UNKNOWN (8) 8 (9)

Question	Answer	Marks
5		
5(a)	Mark as follows: **Unethical:** C and E 1 Mark **Ethical:** A,B, D and F 1 Mark	**2**
5(b)	Mark as follows: A – Public interest 1 Mark B – Self 1 Mark D – Profession 1 Mark F – Product 1 Mark	**4**

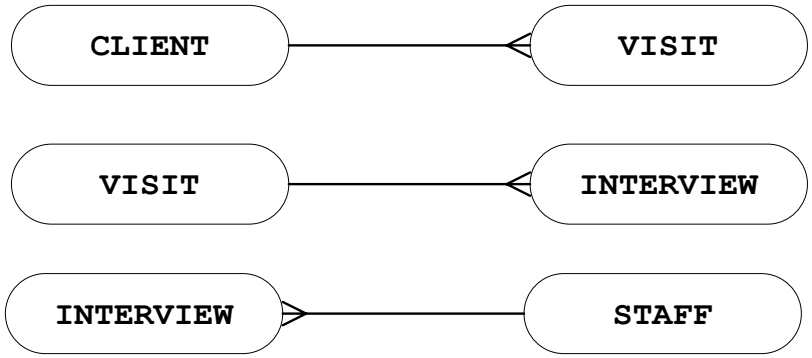
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>1 mark for each correct row

<table>
<tr><th>Application</th><th>Input device</th><th>Output device</th></tr>
<tr><td>Capture the text from a paper document, in order that the text can be word-processed</td><td>Flatbed scanner / Digital camera</td><td></td></tr>
<tr><td>Producing a replica of a small plastic component from a washing machine</td><td></td><td>3D Printer</td></tr>
<tr><td>A museum has interactive information facilities throughout the building</td><td>Touch screen / touch pad / microphone etc.</td><td>Touch screen / speakers etc.</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>6(b)</td><td>1 Mark per bullet to max 4

• The hard disk has one or more platters made of aluminium or glass
• Each surface of the platter/disk is ferrous-oxide which is capable of being magnetised
• The platters/disks are mounted on a central spindle
• The disks are rotated at high-speed
• Each surface of the disk has a read/write head mounted on an arm positioned just above the surface
• Electronic circuits control the movement of the arm and hence the heads
• The surface of the platter/disk is divided into concentric tracks and sectors
• One track in one sector is the basic unit of storage called a block
• The data is encoded as a magnetic pattern for each block
• When writing to disk, a variation in the current in the head produces a variation in magnetic field on the disk
• When reading from disk, a variation in magnetic field produces a variation in current through the head</td><td>4</td></tr>
</table>

Question	Answer	Marks

7(a)(i)	**1 Mark** for correct primary key identified in both `STAFF` and `CLIENT`
	`STAFF(StaffID, StaffName, Department)`
	`CLIENT(ClientName, Address, Town)`
	
	1 Mark for correct primary key identified in `VISIT`
	`VISIT(ClientName, VisitDate)`
	
	1 Mark for correct primary key identified in `INTERVIEW`
	`INTERVIEW(ClientName, VisitDate, StaffID, SpecialistFocus, InterviewText)`
		3

7(a)(ii)	**1 Mark** for each correct relationship 	**3**
7(b)	**1 Mark** for correct answer Add attribute `VisitReportText` to table `VISIT`	**1**

7(c)(i)	**1 Mark** for each correct line
	
	`UPDATE CLIENT`
	`SET ClientName = 'Albright Holdings'`
	`WHERE ClientName = 'ABC Holdings';`
		3

7(c)(ii)	**1 Mark** per bullet, max 2 • Referential integrity should be maintained // Referential integrity could be violated • Data becomes inconsistent • There may be records in the `VISIT` and `INTERVIEW` tables / other tables with client name ABC Holdings • The `ClientName` in the `VISIT` and `INTERVIEW` tables / other tables might not be automatically updated • Records in the `VISIT` and `INTERVIEW` tables / other tables will become orphaned	**2**

Question	Answer	Marks

7(d)	**1 Mark** for each correct line
	
	`SELECT StaffID FROM INTERVIEW`
	`WHERE ClientName = 'New Age Toys'`
	`AND VisitDate = '13/10/2016';` (Accept clauses other way round)
		3

7(e)	**1 Mark** for a correct answer Add a suitable attribute, for example, `EuropeTraveller` to the `STAFF` table // Add a suitable attribute, for example, `Country` to the `CLIENT` table	**1**