Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/12**

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

MARK SCHEME

Maximum Mark: 75

Published

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This document consists of **12** printed pages.

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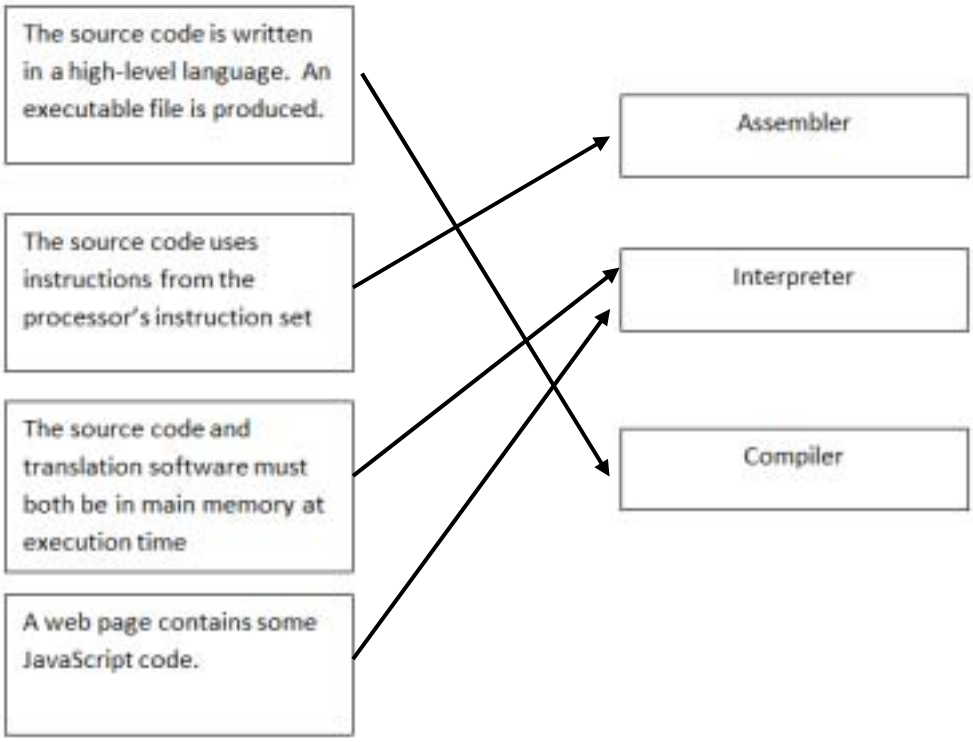
Question	Answer	Marks
1	**1 Mark** for stating the management task **1 Mark** for a corresponding description Maximum 2 marks for each task Maximum 3 tasks **Process / Task Management** Allocation of processor time Scheduling of processes or tasks / multi-tasking / multi-programming etc. By example – 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**

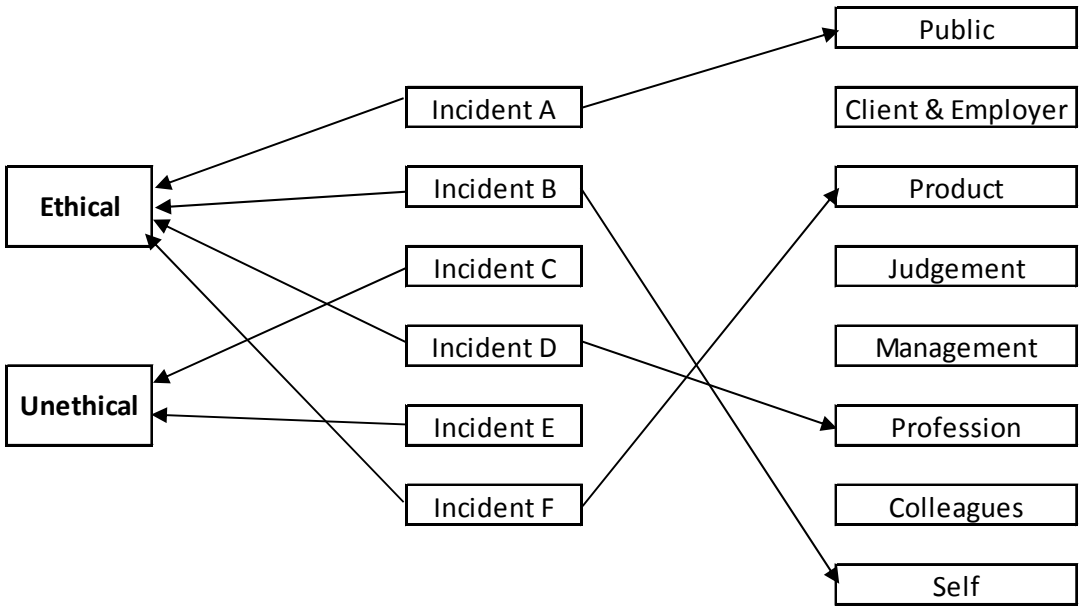
Question	Answer	Marks
3(c)	**1 Mark** per bullet, max 2 Checking that the data entered matches / is consistent with that of the source. Comparison of two versions of the data Examples include double entry, visual checking, proof reading etc... In the event of a mismatch – the user is forced to re-enter 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 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	**5**

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)

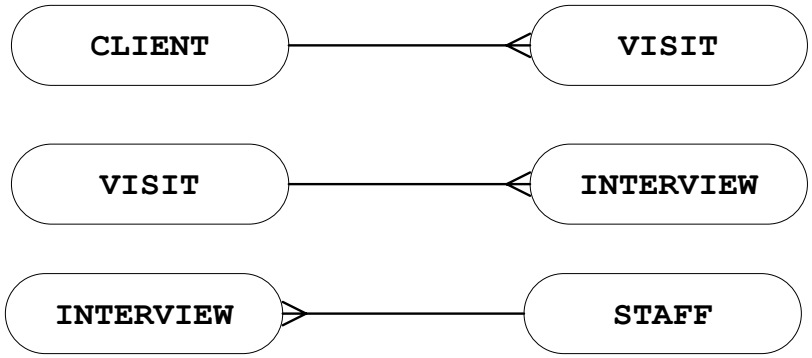
Question	Answer	Marks
5		
5(a)	Mark as follows: **Unethical:** C and E 1 Mark **Ethical:** A,B, D and F 1 Mark	**2**
5(b)	Mark as follows: A – Public interest 1 Mark B – Self 1 Mark D – Profession 1 Mark F – Product 1 Mark	**4**

<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 / <u>Digital</u> camera</td><td></td></tr>
<tr><td>Producing a replica of a small plastic component from a washing machine</td><td></td><td><u>3D</u> 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 <u>concentric</u> 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**