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

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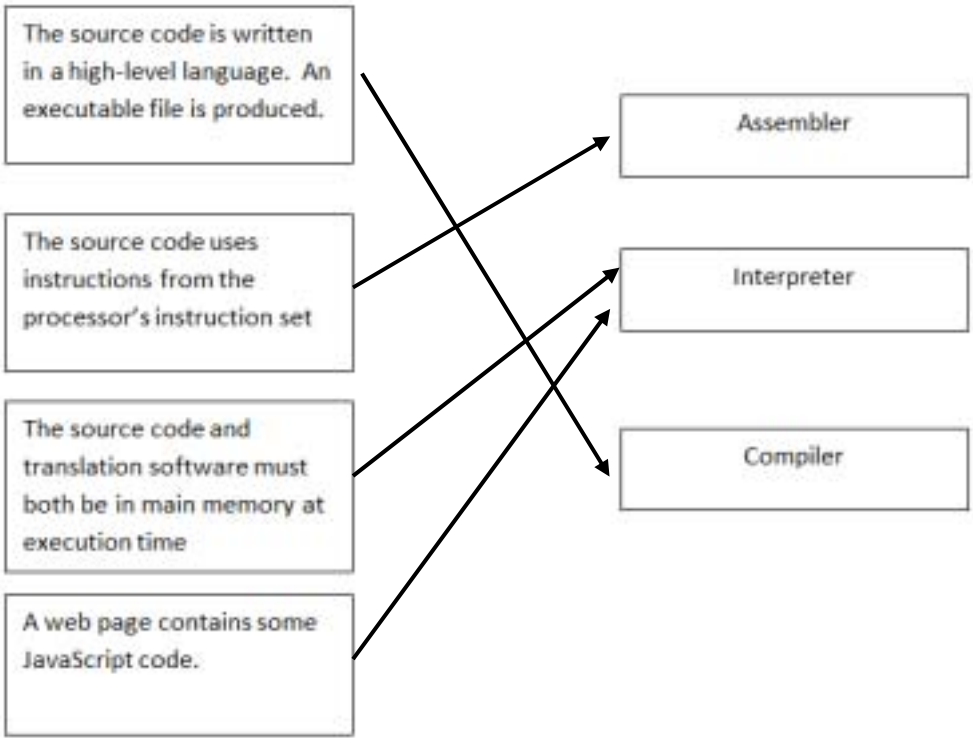
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Question	Answer	Marks
1	**1 Mark** for stating the management task **1 Mark** for a corresponding description Maximum 2 marks for each task Maximum 3 tasks **Process / Task Management** • Allocation of processor time • Scheduling of processes or tasks / 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**

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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**

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

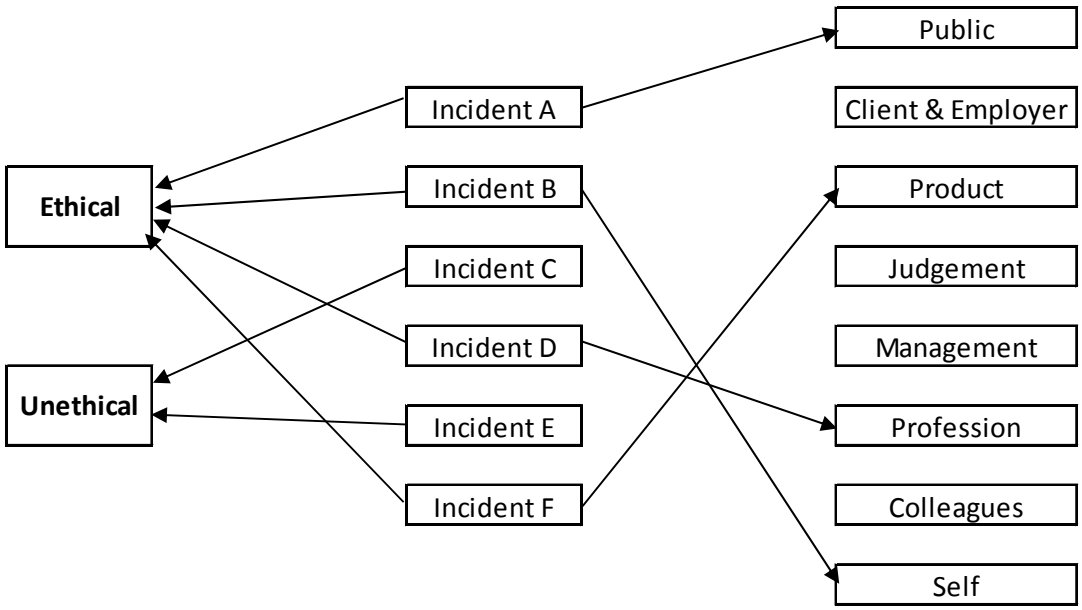
ACC	Offset	OUTPUT
	10	
50		2
10		
11	**11**	
65		
		A
11		
12	**12**	
89		**Y**
12		
13	**13**	
32		

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

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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**

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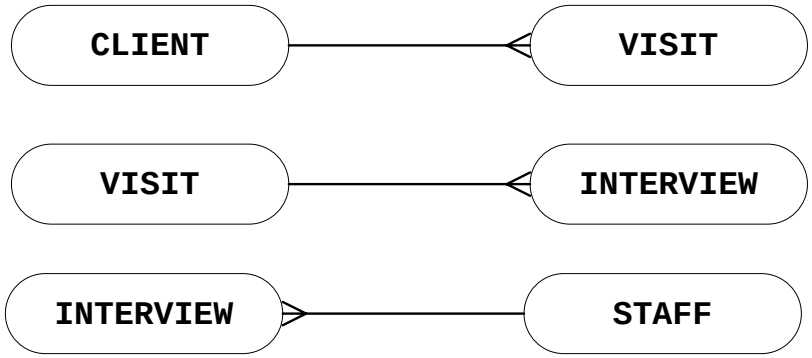
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>1 mark for each correct row

<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**

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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**