
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.

Question	Answer	Marks
1	<p>1 Mark for stating the management task 1 Mark for a corresponding description Maximum 2 marks for each task Maximum 3 tasks</p> <p>Process / Task Management</p> <ul style="list-style-type: none"> • 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 <p>Secondary Storage management</p> <ul style="list-style-type: none"> • 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. <p>Peripheral / Hardware / Device / Input/output Management</p> <ul style="list-style-type: none"> • 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 <p>Provision of a User interface</p> <ul style="list-style-type: none"> • 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. <p>Interrupt Handling</p> <ul style="list-style-type: none"> • 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 <p>Security Management</p> <ul style="list-style-type: none"> • Makes provision for recovery when data is lost • Provides usernames and passwords / encryption / user accounts • Prevents unauthorised access • Ensures privacy of data <p>Provision of a software platform / environment</p> <ul style="list-style-type: none"> • On which other programs / applications can be run 	6

Question	Answer	Marks
2(a)	<p>1 Mark for each correct connection</p>	4
2(b)(i)	<p>1 Mark per bullet, max 2</p> <ul style="list-style-type: none"> • 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)	<p>1 Mark per bullet, max 2</p> <ul style="list-style-type: none"> • 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)	<p>1 Mark per bullet, max 3</p> <ul style="list-style-type: none"> • Security is keeping the data safe • From accidental / malicious damage /loss • By example of need for security <ul style="list-style-type: none"> • 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)	<p>1 Mark for a suitable example For example: Personal data of students / staff</p>	1
3(b)	<p>1 Mark for stating the security measure 1 Mark for a corresponding description Maximum 2 marks for each measure Maximum 2 measures</p> <p>Physical measures</p> <ul style="list-style-type: none"> • Locked doors/keyboards etc. • Secure methods of access, keypads/ biometric scans etc. <p>Backup of data</p> <ul style="list-style-type: none"> • Regular copies of the data are made • If the data is corrupted it can be restored <p>Disk-mirroring</p> <ul style="list-style-type: none"> • All activity is duplicated to a second disk in real time so that if the first disk fails there is a complete copy available <p>Access rights</p> <ul style="list-style-type: none"> • Different access rights for individuals/groups of users • To stop users editing data they are not permitted to access • By example <p>Encryption</p> <ul style="list-style-type: none"> • If accessed, data cannot be understood by unauthorised personnel • Accessed only by those with the decryption key <p>Firewall</p> <ul style="list-style-type: none"> • To stop unauthorised access/hackers gaining access to the computer network <p>Use authentication methods such as passwords and usernames</p> <ul style="list-style-type: none"> • Passwords should be strong / biometrics • To prevent unauthorised access to data <p>Anti-malware program</p> <ul style="list-style-type: none"> • To detect / remove / quarantine viruses / key-loggers etc. • Carrying out regular scans <p>Concurrent Access Controls // Record locking</p> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none">• 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

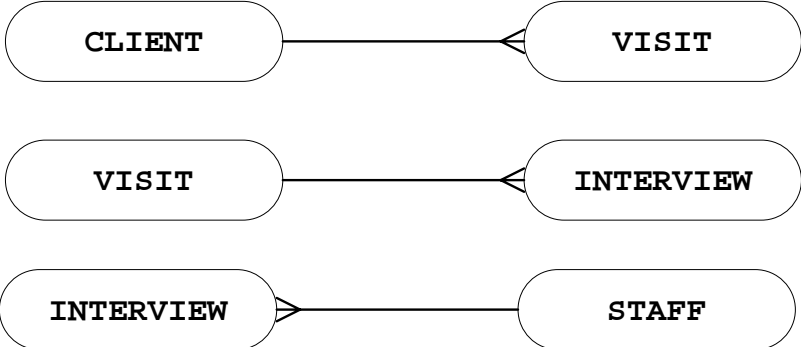
Question	Answer	Marks
4(a)	1 Mark for each correct answer A – General purpose registers B – System clock C – ALU E – Control bus F – Address bus	5
4(b)	1 Mark per bullet, max 2 <ul style="list-style-type: none"> • The clock sends out a number of pulses in a given time interval (clock speed) • Each processor 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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)	<p>Mark as shown</p> <table border="1"> <thead> <tr> <th>ACC</th> <th>Offset</th> <th>OUTPUT</th> </tr> </thead> <tbody> <tr> <td></td> <td>10</td> <td></td> </tr> <tr> <td>50</td> <td></td> <td>2</td> </tr> <tr> <td>10</td> <td></td> <td></td> </tr> <tr> <td>11</td> <td>11</td> <td></td> </tr> <tr> <td>65</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>A</td> </tr> <tr> <td>11</td> <td></td> <td></td> </tr> <tr> <td>12</td> <td>12</td> <td></td> </tr> <tr> <td>89</td> <td></td> <td>Y</td> </tr> <tr> <td>12</td> <td></td> <td></td> </tr> <tr> <td>13</td> <td>13</td> <td></td> </tr> <tr> <td>32</td> <td></td> <td></td> </tr> </tbody> </table> <p> 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 </p>	ACC	Offset	OUTPUT		10		50		2	10			11	11		65					A	11			12	12		89		Y	12			13	13		32			5
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4(e)	<p>Mark as follows:</p> <p>Table entries: 1 Mark per bullet, max 4</p> <ul style="list-style-type: none"> • EndProg • 2 × Unknown • 9 • 14 • 8 <p>Numbering: 1 Mark per bullet, max 2</p> <ul style="list-style-type: none"> • 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 <table border="1"> <thead> <tr> <th>Symbolic address</th> <th>Relative address</th> </tr> </thead> <tbody> <tr> <td><u>StartProg</u></td> <td>0</td> </tr> <tr> <td>Offset</td> <td> UNKNOWN 9 (1) </td> </tr> <tr> <td>Value</td> <td> UNKNOWN (6) 14 (1) </td> </tr> <tr> <td><u>EndProg</u> (7)</td> <td> UNKNOWN (8) 8 (9) </td> </tr> </tbody> </table>	Symbolic address	Relative address	<u>StartProg</u>	0	Offset	UNKNOWN 9 (1)	Value	UNKNOWN (6) 14 (1)	<u>EndProg</u> (7)	UNKNOWN (8) 8 (9)	6
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5	<pre> graph LR A[Incident A] --> Public[Public] B[Incident B] --> CE[Client & Employer] B --> Product[Product] C[Incident C] --> Ethical[Ethical] D[Incident D] --> Ethical[Ethical] D --> Profession[Profession] E[Incident E] --> Unethical[Unethical] F[Incident F] --> Product[Product] F --> Judgement[Judgement] F --> Self[Self] </pre>	
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

Question	Answer	Marks												
6(a)	<p>1 mark for each correct row</p> <table border="1"> <thead> <tr> <th>Application</th> <th>Input device</th> <th>Output device</th> </tr> </thead> <tbody> <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> </tbody> </table>	Application	Input device	Output device	Capture the text from a paper document, in order that the text can be word-processed	Flatbed scanner / <u>Digital</u> camera		Producing a replica of a small plastic component from a washing machine		<u>3D</u> Printer	A museum has interactive information facilities throughout the building	Touch screen / touch pad / microphone etc.	Touch screen / speakers etc.	3
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6(b)	<p>1 Mark per bullet to max 4</p> <ul style="list-style-type: none"> • 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 	4												

Question	Answer	Marks
7(a)(i)	<p>1 Mark for correct primary key identified in both STAFF and CLIENT STAFF(<u>StaffID</u>, StaffName, Department) CLIENT(<u>ClientName</u>, Address, Town)</p> <p>1 Mark for correct primary key identified in VISIT VISIT(<u>ClientName</u>, VisitDate)</p> <p>1 Mark for correct primary key identified in INTERVIEW INTERVIEW(<u>ClientName</u>, <u>VisitDate</u>, <u>StaffID</u>, SpecialistFocus, InterviewText)</p>	3
7(a)(ii)	<p>1 Mark for each correct relationship</p>  <pre> graph LR CLIENT --- VISIT VISIT --- INTERVIEW INTERVIEW --- STAFF </pre>	3
7(b)	<p>1 Mark for correct answer</p> <p>Add attribute <code>VisitReportText</code> to table <u>VISIT</u></p>	1
7(c)(i)	<p>1 Mark for each correct line</p> <pre> UPDATE CLIENT SET ClientName = 'Albright Holdings' WHERE ClientName = 'ABC Holdings'; </pre>	3
7(c)(ii)	<p>1 Mark per bullet, max 2</p> <ul style="list-style-type: none"> • 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 <u>STAFF</u> table // Add a suitable attribute, for example, Country to the <u>CLIENT</u> table	1