

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**June 2003**

A AND AS LEVEL

MARKING SCHEME

MAXIMUM MARK: 90

SYLLABUS/COMPONENT: 9691/01, 5216/01

COMPUTING  
Written Paper 1



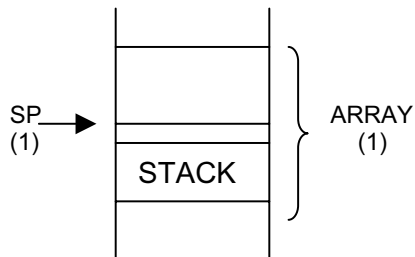
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- 1 (a)** - OS controls operation of system/hardware  
 - Applications software allows the system to do something useful (2)
- (b)** - File handling  
 - Copy/move/delete  
 - Anti virus software  
 - To protect files from attack by virus  
 - Defragmentation  
 - To keep files sensibly arranged on the hard drive  
 - Format  
 - To divide surface of drive into smaller areas to aid storage  
 (1 per -, max 6) (6)
- 2 (a)** **(i)** Jobs collected together for processing at a later time  
**(ii)** Output produced quickly enough to affect the next input  
**(iii)** User has direct contact with processor  
**(iv)** User cannot communicate directly with processor (4)
- (b)** - Real time  
 - E.g. turning the wheel must turn the car immediately  
 - On line  
 - Otherwise system cannot be real time (4)
- (c)** - Sharing of software and data files  
 - Sharing of hardware, e.g. printers  
 - Communication  
 - Security of files more of a problem  
 (1 per -, max 3) (3)
- 3 (a)** **(i)** Incorrect use of language, e.g. PLINT instead of PRINT  
**(ii)** A mistake in the structure of the solution, e.g. a jump goes to the wrong line  
**(iii)** Inappropriate arithmetic is used, e.g. division by 0 is attempted (6)
- (b)** - Translator diagnostics  
 - Produced when wrong programming used  
 - Gives position and explanation of error  
 - Cross-referencing  
 - Used when program modularised  
 - To check use of variables  
 - Trace routines  
 - Follow value of variable  
 - To give clue as to where error occurs  
 - Variable dump  
 - Prints values of all variables  
 - At given point in program  
 (1 per -, max 2 per type, max 4) (4)

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- 4 (a)** - Data enters at one end (of a stack)  
 - Leaves at the same end  
 - Hence 'last in, first out'  
 (1 per -, max 2) (2)

**(b)**



(2)

- 5 (a)** - Uses all 7 digits  
 - Creates >2000 results  
 - Highlight the danger of multiplying by zero (2)

**(b)** Any two 7 digit numbers that cause a clash (1)

- (c)** - Search serially from hash value  
 - Until vacant location found  
 - Mention of circular reference  
 - If the memory locations become full, use a bucket  
 - Use bucket to place duplicates in  
 - In serial form  
 - Pointer to bucket from hashed location  
 - Use hashed location as start of linked list  
 - Ensure end of list with null value of pointer  
 (1 per -, max 2 methods, max 4) (4)

- 6 (a) (i)** To manage the execution of instructions  
 By running a clock  
 To decode instructions
- (ii)** To store OS  
 To store those parts of applications programs currently running  
 To store data currently in use
- (iii)** Part of processor where data is processed/manipulated  
 All I/O must pass through here  
 (1 per -, max 2, 2, 2, max 6) (6)

- (b)** - Main memory transitory, secondary storage is (semi-)permanent  
 - Processor can only use data/instructions that are in main memory  
 - Main memory in processor, secondary storage not  
 (1 per - max 2) (2)

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- 7 (a)** - Serial is the transmission of data one bit at a time/through one wire  
 - Parallel is the transmission of data more than one bit at a time/many wires  
 - Simplex is the transmission of data in one direction only  
 - Duplex is the transmission of data in both directions simultaneously (4)
- (b)** - Extra bit on each data-byte that  
 - Does not transmit data  
 - Makes number of ones in a byte be always even or always odd  
 - Error in the transmission of a bit will make the even/odd wrong  
 - Problem of two errors in one byte not being found  
 - Parity block  
 (1 per -, max 4) (4)
- 8** - College authorities are the experts in the problem  
 - SA is the expert with computers  
 - The two need to pool resources to come up with a clear definition  
 - Agree the outcomes so that when the system is implemented there are a set of criteria to judge it by  
 (1 per -, max 4) (4)
- 9 (a)** - Corporate colour scheme  
 - Languages to be used  
 - What information should be on  
 - Should the site be two way/students allowed to enroll  
 - Size of the site  
 - What links should there be?  
 (1 per -, max 4) (4)
- (b)** - Presentation software  
 - Talks to large groups  
 - DTP  
 - Produce newsletter/advertising material  
 - Word processor  
 - Mail merged personal letters/junk mail  
 - Database  
 - To store lists of the recipients of the junk mail  
 (1 per -, max 4) (4)
- 10** A description of:  
 - Passwords  
 - Hierarchy  
 - Only allow some staff to access student files  
 - Only some machines able to access  
 - Physical location of these machines  
 - Physical lock on machines  
 - Encrypted data in files  
 - Firewall if connected to the Internet  
 (1 per -, max 5) (5)

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- 11** (i) Dual input of data  
Two inputs are compared by the system  
And any discrepancies reported (and not stored.)  
Data input once, either printed out or checked on screen  
Errors corrected
- (ii) Rules given to processor  
Only accept A,B,C,D,E,F,G  
Any other input rejected.  
Drop-down list/radio buttons  
Provides only valid inputs  
So no other validation required
- (1 per -, max 6) (6)

- 12** Enrolment:  
- Data input on line  
- Individual records validated  
- Speed mismatch implications  
- Indexes updated immediately
- Exam grades:  
- Data input twice  
- Off line  
- Run as a batch  
- At otherwise downtime
- (1 per -, max 6) (6)

- 13** - Day to day information supplied to teachers  
- About abilities of students  
- Class lists  
- Middle managers  
- E.g. departmental exam results  
- Strategic information  
- Supplied to Principal  
- E.g. overall exam results to compare performance of departments  
- Comparison of grades year on year
- (1 per -, max 5) (5)

**TOTAL 90**



**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**June 2003**

A AND AS LEVEL

MARKING SCHEME

MAXIMUM MARK: 60

SYLLABUS/COMPONENT: 9691/02, 5217/01

COMPUTING  
Practical Tasks



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### Practical Tasks Assessment Form

Centre Number		Centre Name	
Candidate Number		Candidate Name	

The mark points indicated on the mark scheme are listed below. Indicate with a tick where each mark has been awarded.

<b>Question 1 (a)</b>		✓
<b>Maximum 5 marks</b>		
	Membership form to include:	
	- heading	
	- consistent use of formatting	
	- instructions for filling in	
	- logical order on form	
	- indication of maximum field lengths	
	- field names, including Forename, Surname, Address, Telephone number, Team	
	- splitting address into Address 1 and Address 2	
	<b>Sub-Total 1 (a)</b>	
<b>Question 1 (b) (i)</b>		
<b>Maximum 5 marks</b>		
	Existence of table:	
	- contains all the fields	
	- sensible data types	
	- existence of team ID in record	
	- identified as link field	
	- existence of player ID	
	<b>Sub-Total 1 (b) (i)</b>	
<b>Question 1 (b) (ii)</b>		
<b>Maximum 3 marks</b>		
	Existence of table (only given once):	
	- contains all the fields	
	- including team ID	
	- identified as key field	
	<b>Sub-Total 1 (b) (ii)</b>	
<b>Question 1 (c)</b>		
<b>Maximum 9 marks</b>		
	Input screen constructed:	
	- validation routine for team name input	
	- constructed correct query	
	- selection of required data	
	- output of required data	
	- to two screens	
	- one screen for details of team	
	- one screen containing all players	
	- means of moving between output screens	
	- output of tables	
	- correct team list	
	<b>Sub-Total 1 (c)</b>	



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<b>Question 2 (a)</b>		
<b>Maximum 8 marks</b>		
	1 mark per line:	
	5 2	
	6 4	
	7 2	
	8 4	
	9 3	
	10 4	
	11 2	
	12 6	
		<b>Sub-Total 2 (a)</b>
<b>Question 2 (b)</b>		
<b>Maximum 8 marks</b>		
	- setting up array	
	- two dimensional	
	- input values into array	
	- remainder of algorithm in correct position	
	- loop to increase value of S	
	- correct condition on the loop	
	- searching the array for stated value of S (use of inner loop)	
	- correct condition statement on inner loop	
	- condition statement based on value of S	
	- printing value of N when found	
		<b>Sub-Total 2 (b)</b>
<b>Question 3 (a) (i)</b>		
<b>Maximum 5 marks</b>		
	- suitable format of form	
	Data entry boxes for:	
	- event	
	- names of each competitor (6 rows or columns)	
	- 3 details of each competitor	
	- show some distinction for each type of event	
		<b>Sub-Total 3 (a) (i)</b>
<b>Question 3 (a) (ii)</b>		
<b>Maximum 4 marks</b>		
	- screen containing sample set of results	
	- evidence of file existence	
	- contents of screen transferred to file	
	- evidence that data has been automatically transferred	
		<b>Sub-Total 3 (a) (ii)</b>

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<b>Question 3 (b)</b>		
<b>Maximum 7 marks</b>		
	Within the data there must be:	
	- one case of an event with no competitor from a certain school	
	- one case of an event with more than one competitor from a school	
	- one case where each school has one competitor	
	- have at least one sensible time/distance/height	
	- one example of a time outside acceptable limits	
	- one example of a distance outside acceptable limits	
	- one example of a height outside acceptable limits	
	- one example of a dead heat	
	<b>Sub-Total 3 (b)</b>	
<b>Question 3 (c)</b>		
<b>Maximum 6 marks</b>		
	- design of screen	
	- deciding gold, silver, bronze in an event	
	- identifying the 3 schools in order	
	- increment the correct school totals	
	- formula $3 \times \text{gold} + 2 \times \text{silver} + \text{bronze}$ for total	
	- for each school	
	- method for calling up screen	
	<b>Sub-Total 3 (c)</b>	
	<b>Total (max 60)</b>	

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A AND AS LEVEL

MARKING SCHEME

MAXIMUM MARK: 90

SYLLABUS/COMPONENT: 9691/03, 5218/01

COMPUTING  
Written Paper 3

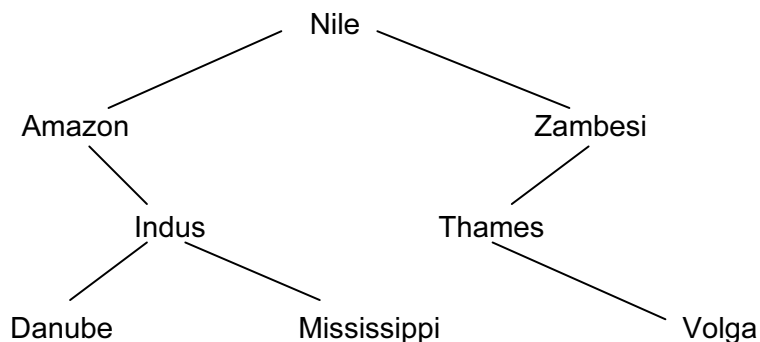


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- 1 (a) The sequence will have to be interpreted 2000 times/this will include all stages, such as checking  
Compiled version needs no further translation (2)
- (b) Removes spaces/white space/tabs  
Removes comments  
Checked validity of reserved words  
Tokenises reserved words  
Tokenises operators  
Checks validity of symbols/variable names  
Creates the symbol table  
(1 each, max 4) (4)

**Total = 6 marks**

2 (a)



(1 for the left sub-tree, 1 for the right sub-tree and 1 for the root) (3)

- (b) - compare with root  
- if < go to left sub-tree  
- else go to right sub-tree  
- repeat until no sub-tree  
- insert at node  
Accept mirror image iff used in (a)  
(max 4) (4)

**Total = 7 marks**

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- 3
- Passwords
  - Encryption
  - Firewall
  - Screen cables
  - Use fibre optics
  - Microwave links
  - Secure channels
  - Entry codes to rooms
  - Any physical check (palm, eye) – monitor personnel in building
  - Monitor system access
  - Hierarchy of passwords
  - Physical locks on computers
  - Duplicate processors/servers
  - Back ups
  - In a different place
  - RO files
  - Use of packet switching rather than circuit switching
  - Use of anti-virus software
  - Locking RW privilege to files
- (1 per point, max 9) (9)

**Total = 9 marks**

- 4
- Contents of PC copied into MAR/address of instruction in MAR
  - Contents copied from address into MDR/instruction held in MAR
  - Contents of MDR copied into CIR/instruction is put in CIR
  - Contents of CIR decoded
  - The number/25 from CIR copied into MDR
  - Contents of MDR copied into accumulator/25 is placed in accumulator
  - Incrementing PC at any stage
- max 6 (6)

**Total = 6 marks**

- 5 (a)
- Produces re-usable code
  - By creating a class library
  - Inheritance
  - To produce new objects
  - Encapsulation of data
  - To protect data integrity
  - Polymorphism
  - To use different versions of the same method (in different classes)
  - Structure of data and the code in a class may be altered
  - Without affecting programs that use the class
  - Without affecting other classes
  - Message passing between classes
- (max 6) (6)

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- (b) (i) A template for creating objects (that share a common behaviour and common structure) (1)
- (ii) A class that inherits the structure and methods of another class (1)
- (iii) A class that passes down its attributes and methods (1)

**Total = 9 marks**

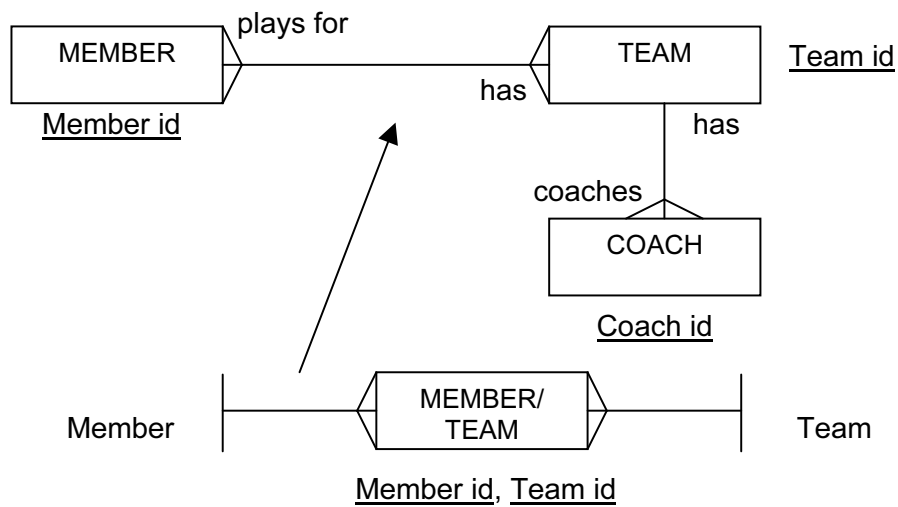
- 6 (a) - Set of rules...  
- To allow communication between devices/computers/machines (2)
- (b) - Standard file formats...  
- To allow files produced on one machine to be understood on another  
- ISDN/other communication standard  
- Standard method of communication digital  
- OSI/TCP (IP)  
- Involves layering protocol  
- To allow changes in layers  
(1 per -, max 6) (6)
- (c) - Voice mail...  
- (Using digital systems) to leave spoken messages  
- Email  
- Send and receive messages (irrespective of geographical location)  
- Digital telephone system...  
- To automate customer enquiries (and direct them)  
- Video conferencing...  
- To allow conferences between employees without the need for a physical presence  
- Electronic data interchange  
- Allows sharing of data across system while being protected  
- Send and receive attachments  
- Confirm receipt of message  
(1 per-, max 8) (8)
- 7 - Safety  
- Testing acceptable parameters in an industrial reaction  
- The effects of a test which passed safety limits in real life may put lives in danger  
- Impossibility  
- Training astronauts to work on the surface of Mars...  
- Such a task is not possible in real life because astronauts have not been to other planets  
- Time  
- Testing what will be the outcome of breeding a plant for 100 generations...  
- In real life, 100 life cycles of a plant will take 100 years to test  
- Isolation from external factors  
- Growing crystals to study behaviour...  
- Too easy for material to be contaminated in real life  
(1 per -, max 9) (9)

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- 8
- (i) - Old and new systems both used on all data  
 - Example where it is essential that no errors arise in the new system, e.g. changing the software that produces student exam grades  
 - Errors can be found in new system before it starts to operate (3)
- (ii) - One part or module of old system is changed to new while remainder stays on old  
 - Complex system with easily identified modules, e.g. control of a chemical plant may involve one reaction being switched to the new system first so that it can be monitored separately  
 - Allows tight monitoring of new system with limited resources/training of personnel (3)
- (iii) - One complete system, representative of whole system is switched while remainder remains on old/prototyping  
 - Any system comprising a number of matching systems, e.g. a college record keeping system may alter one year group to ensure it works before changing the others  
 - Allows system to be tested with/while risking a limited volume of data (3)
- 9
- Current cycle is completed  
 - Priority of interrupt compared with current job
- If higher:
- Contents of special registers saved/job placed in blocked state/in ready Q  
 - Interrupt/program for execution of interrupt, is identified/vectored interrupt used  
 - Interrupt serviced by running program  
 - On completion values of special registers from original program area replaced/original job restored
- If lower:
- Interrupt allocated position in job queue...  
 - According to priorities  
 - Current job continues with next cycle  
 (1 per -, max 6) (6)

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Mark points:

1 per correct entity      max 3  
 1 per relation            max 2  
 1 per statement          max 4

1 for attempt at link entity  
 1 for sensible name (mix of both)  
 2 for correct relationships  
 1 for id keys  
 1 for link key

(max 13)

(13)