

**MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers**

9691 COMPUTING

9691/33

Paper 33 (Written Paper), maximum raw mark 90

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- 1 (a) -The lexical analysis stage is a preparation stage of the code/making it ready for translation
 -The syntax analysis stage is a checking stage to ensure that the code is suitable for translation
 -Some error reporting is carried out in both stages
 Lexical analysis:
 -Redundant characters are removed
 -Small groups of characters are tokenised
 -Keywords are given their own tokens
 -Keywords are checked for validity
 -Symbol table is created
 Syntax analysis:
 -Checks the tokens to ensure that strings of them form valid statements by...
 -seeing if the rules of the language are followed
 -An example e.g. Are brackets nested and are there the same number of left and right brackets?
 -Symbol table is filled in
 (1 per -, max 6) [6]
- (b) -Creates a machine code program...
 -which is equivalent to the high level language program
 -The code which is created will not be efficient
 -Optimisation is used...
 -to reduce the number of commands in the object code...
 -by removing redundant code/substituting one command for several (according to set rules)
 (1 per -, max 3) [3]
- (c) -Copies object code into...
 -(primary) memory ready for execution
 -Deals with addressing anomalies...
 -Particularly relocatable addresses
 (1 per -, max 2) [2]
- 2 (a) (i) -Large number of new data items to be added throughout the week
 -Serial file allows the additions to be made at the physical end of the file
 -Other methods would be too time consuming
 (1 per -, max 1) [1]
- (ii) -Makes searching for a particular employee record easier
 -Allows the file to be used to update the master employee file in one pass/produce the payroll
 -To put the file in the same order as the employee records
 (1 per -, max 1) [1]
- (b) (i) -Read record from A, Read record from B
 Repeat
 -If A<B Then copy A to T and Read next record from A
 -Else copy B to T and Read next record from B
 -Until A or B has no more records
 -If A is empty copy remaining records from B to T
 -Else copy remaining records from A to T
 (1 per -, max 5) [5]

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- (ii) -Compare centre record with 21478
 -If no match, half of remaining file is removed
 -If 21478 < centre value then remove upper half of remaining records
 -Else remove lower half of remaining records
 -Repeat until 21478 is found
 -Mention of problem if no centre value
 (1 per -, max 5) [5]

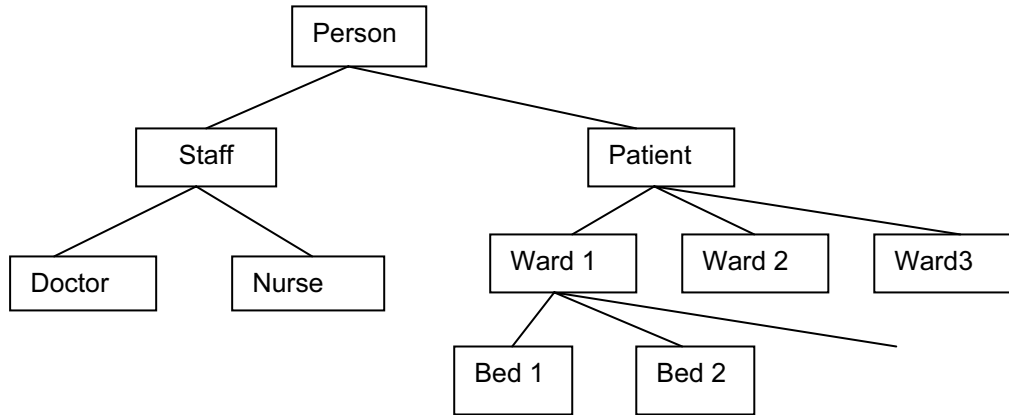
- 3 (a) -Touch/pressure/weight sensor...
 -to determine when the robot has picked up a control assembly
 -Light sensor...
 -to detect when a light beam has been broken so that the robot knows a washing machine has arrived
 -Pressure sensor to measure torque...
 -to determine when the screw has been adequately tightened
 (1 per -, max 2 pairs, max 4) [4]

- (b) -Paint sprayers
 -arm is programmed to follow a series of actions
 -in predetermined sequence
 -Welders
 -to fix body panels to each other
 -Carrying parts around the factory
 -These applications stop a human having to be in a hazardous environment
 -They ensure a high/consistent standard of work
 -Greater precision in the work
 -They work continually without breaks.
 -Comment about the effect on the human workforce
 (1 per -, max 6) [6]

- 4 (a) -Data are held in a tree structure...
 -with each level providing more detail to the data held on a higher level
 -Links to related data items at higher and sometimes lower levels
 (1 per -, max 2) [2]

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(b)



Mark points:

- 1 for root being 'person' or similar
- 1 for second level of Staff and Patient
- 1 for third level below Staff
- 1 for third level below Patient
- 1 for fourth level showing 'beds'
- 1 for indicating continued division of ward in some way

[6]

- 5
- Bus because of e.g. simplicity and speed not important
 - Ring because e.g. simple but fewer collisions than bus
 - Star because of e.g. increase in performance/more reliable/greater security
 - Cables can be used because hospital is new and can be cabled properly
 - Use of UTP/Twisted pair/Fibre optic/Coaxial (mention minimum of two types)
 - Low level of traffic may point to UTP or twisted pair
 - Length of cable points away from coaxial
 - Fibre optic is high speed
 - Use of wireless media...
 - allowing physically unrestricted access across site.
 - Need for bridge between medical and admin services to restrict transmission of some data to some machines
- (1 per -, max 6)

[6]

- 6 (a)
- Job is moved into ready queue
 - Position in queue is determined by priority of job (according to rules laid down by the scheduler)
 - Part of scheduler which loads jobs into ready queue is called the High Level Scheduler (HLS)
 - When currently running job leaves running state the job at top of ready queue is loaded into process and run
 - This is done by the low level scheduler (LLS)
 - If a job requires peripheral time it is moved to the blocked state to await servicing
 - After it has been serviced it must return to the ready queue to await its next turn to use the processor.
 - The task of moving jobs between the secondary storage and the primary memory is carried out by the medium level scheduler (MLS)
- (1 per -, max 6)

[6]

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- (b) -IO and processor bound jobs give priority to IO bound jobs
 -FCFS
 -Round robin or time share systems
 -Shortest job first
 -Shortest remaining time
 -Multi level feedback queues
 (1 per -, max 2)

[2]

7 Advantages:

- Workers can use at any time
- They can be used at home or away from work so work time is not used up
- Worker is not worried about learning with others around
- Do not have to pay for a trainer
- Workers absent for a training session would miss some of training
- Worker is able to redo parts of training that they are not happy with
- Worker can miss out sections that they are already happy about
- Training is to use technology so it is reasonable to learn on the technology

Disadvantages:

- No human to ask when you get stuck on something
 - Not all workers have access to a computer on a regular basis
 - Worker is having to train in their own time
- (1 per point, max 4 advantages, max 6)

[6]

8 (i) -The address of the next instruction

- Content is incremented after the address is read
 - Content is altered to specific address if instruction is a jump instruction
- (1 per -)

[3]

(ii) -Stores an instruction...

- while it is being decoded/executed/carried out
- Contents change when an instruction from memory has been placed in MDR, and then it is copied from MDR to CIR.

(1 per -)

[3]

(iii) -Stores an integer value

- Which is added to the base address in the instruction
- Used for the successive reading of values from memory locations e.g. in an array
- Can be incremented after use

(1 per -)

[3]

9 (a) -System1 will be batch processed/as data is collected before processing

- the system outputs are not time critical
- System 2 response time will be immediate/real time
- as the customer must wait until processing is done.

(1 per -, max 3)

[3]

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(b) Hardware:

- Either need storage device/hard disk
- System 1 may copy final details to removable storage for backup.
- System 2 needs bar code reader/keyboard for input
- System 2 needs screen/printer/sound for output

Software:

- System 2 requires file handling software/small amount of arithmetic software
- System 1 requires file sorting/merging software
- System 2 requires stock control software
- System 1 requires communications software for automatic ordering

Data Structures:

- System 2 must have direct/random access to file
- System 2 has array/list of customer purchases in order to produce receipt
- System 1 must have sequential access to file
- Transaction file must be in serial form/sorted into sequential order
- Database of products/stock

(1 per -, max 8)

[8]

10 (a) (i) D is not defined

[1]

(ii) a variable must not begin with an IDENTIFIER

[1]

(b) <MAIN VARIABLE>::=<NZDIGIT><GROUP><END>

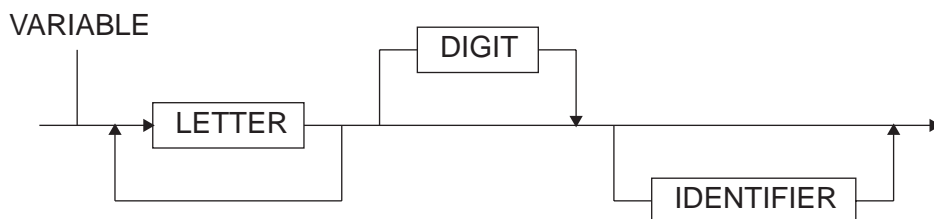
<NZDIGIT>::=1|2|3|4|5|6|7|8|9

<END>::= !|&

(1 per line of definition)

[3]

(c)



Mark Points:

- Allows single LETTER
- Allows unlimited LETTERs
- Allows single DIGIT and only after LETTERs
- Allows single IDENTIFIER but only after LETTERs (and DIGIT)

(1 per -, max 4)

[4]