www.PapaCambridge.com

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced/Advanced Subsidiary Level

MARK SCHEME for the November 2005 question paper

9691 COMPUTING

9691/03 Paper 3 (Written)

Maximum raw mark 90

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the Report on the Examination for this session.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

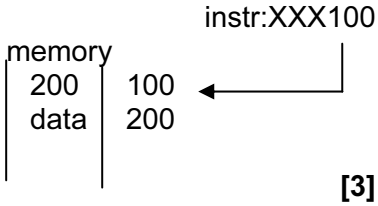
CIE is publishing the mark schemes for the November 2005 question papers for most IGCSE and GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

www.PapaCambridge.com

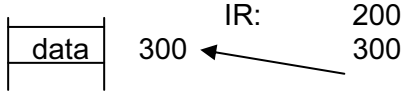
1 (a) -All the data is held in a single file
-which is two dimensional
-rows for records/columns for fields
(1 per -, max 2) **[2]**

(b) -Less duplication of data held
-because data does not have to be in every file/table
-Greater data integrity
-because limited data duplication means less chance of one copy of data altered when another is not
-Data is available to all
-because overcomes problems of file compatibility with software
-Creation of user views of data
-within the DBMS
-Ease of access to data
-because data accessible through relations/queries
(1 per -, max 3 x 2 pairs, max 6) **[6]**

2 (a) (i) -The address given as part of the instruction
-is the address of the address
-of the data
-for diagram
(1 per -, max 3) **[3]**



(ii) -The address given as part of the instruction is added to the contents of
-the index register (IR)
-to give the address of the data
-Index register is then incremented
-for diagram
(1 per -, max 3) **[3]**



(b) (i) -Where memory larger than can be accessed by address in instruction
-allows full size of register to be used for address
-Typically if memory locations are 32 bit then 2^32 locations can be addressed
-Allowing more memory to be accessed

(ii) -Where a number of contiguous locations
-need to be accessed in order
-e.g. contents of array
-address in instruction does not change, only contents of IR
(1 per -, max 3 per dotty, max 4) **[4]**

www.PapaCambridge.com

3 (a) -People may be in the way
-Items may be put down on what should be an empty part of the floor
-Workers may change the position of 'fixed' items like chairs, benches
(1 per -, max 2) **[2]**

(b) -Sensor to detect objects in path…
-touch/radar/…
-Sensor on wheels to count revolutions
-to decide how far moved
-Some means of telling direction facing
-relative to fixed signals/calculation based on movement so far
-Alarm signals
-sound/light, activated when obstruction sensed
-Control of motors on wheels
-to move at safe speed/ in right direction
(1 per -, 2 per pair, max 6) **[6]**

4 -Address of instruction in PC
-copied to MAR
-Contents of address in MAR
-copied to MDR
-Contents of MDR copied to CIR
-Decode instruction in CIR
-Load address in CIR into MAR
-Load contents of address in MAR into MDR
-Add contents of MDR to accumulator
-Increment PC (at any stage)
(1 per -, max 8) **[8]**

5 (a) Signal indicating that a device/program requires attention/seeks attention of CPU/processor/OS **[1]**

(b)(i) -Interrupt generated at fixed intervals…
-to allow for display refresh
-to control access to processor in multi access system

(ii) -Interrupt generated by request of hardware…
-(at extreme) to close down safely in the event of power failure
-to pass message for servicing request/printer out of paper
(1 per -, max 2 per dotty, max 4) **[4]**

(c) -Programs may be in modular form

(i) -Calculates the address of the individual module
-Ensures jump instruction from module to module properly addressed

(ii) -Decides whereabouts to place program/modules in memory
-Adjusts memory addresses according to where placed
-Copies program from store to memory
(1 per -, max 4) **[4]**

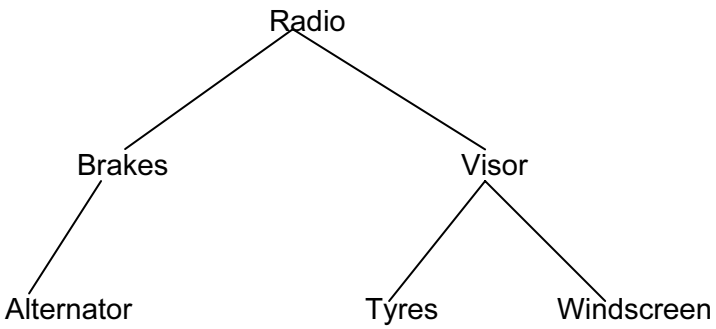
www.PapaCambridge.com

6 (a) -Static data structures do not change size while the program is running
-Dynamic data structures can change size according to the requirements of the program

(b)(i) -Array
-Compiler can allocate memory space during compilation
-Easy to program
-Easy to check for overflow
-Allows random access

(ii) -Linked list/stack/queue/tree
-Only uses space necessary at any given time
-Does not produce overflow
(1 per -, max 2 per example, max 2 advantages, max 4) **[4]**

(c)(i)



(1 for root, 1 for each subtree) **[3]**

(ii) -Read root
-Compare with clutch
-Clutch<Radio therefore traverse left subtree
-Read root (Brakes)
-Compare with Clutch
-Clutch>brakes, therefore traverse right subtree
-Root empty
-Insert Clutch
(1 per -, max 5. Completed tree worth 3) **[5]**

(iii) -Traverse left subtree
-Read/output the root
-Traverse right subtree
Route shown clearly on diagram is acceptable
-Route
-Indication of when nodes are read
-Description of diagrammatic representation **[3]**

www.PapaCambridge.com

7 (a)(i) - Makes messages unintelligible
-Provides security for data by making it impossible to understand
-Key used to encrypt data and another to decrypt it
-Use of public and private keys

(ii)- Method of ensuring that message is from the person it claims to be from
-Use of digital signature created using
-private key which can only be done by owner of key
-Digital certificate from authority to authenticate author of message
(1 per -, max 6) **[6]**

(b)(i) I Part of the data in the database held locally because/important to the use made of that particular machine
II Copy of entire database sent to and used by other machines **[2]**

(ii)-Many copies means that database is always backed up
-Increased speed of response to user requests
-Centralised database is rarely up to date
-Data is less secure because of multiple copies
-Heavy responsibility on managers to ensure data consistency
(1 per -, max 4) **[4]**

8 (a) -Shows individual components of task
-Earliest start times
-latest end times
-Shows relationship between components
-Shows shortest time to finish
-All diagrammatic
-means simple to follow
-Review milestones
-Percentage of chart finished
-Assign resources to task
-Generate reports on costs
(1 per -, max 4) **[4]**

(b) -Critical path analysis/PERT
-Different paths/tasks of project represented by different lines
-of different value according to length of component
-Direction of arrows shows the necessary order of completion
-Longest journey along arrows shows shortest time for completion
-Resources can be allocated at correct times
-Deadlines/bottlenecks can be predicted
-Modelling tool
-Produces DFDs/ER diagrams
-Library of standard shapes
-Appropriate constraints/connections can be imposed
-Completed diagrams can be checked according to rules imposed
-Data dictionary automatically generated
-Tables can be automatically generated
(1 type, 1 per -, max 4) **[4]**

www.PapaCambridge.com

9 -Company advertises on the internet
-Enquiries come in immediately from the internet
-Sales rep has electronic diary
-All details of visits downloaded at home/no need for travel
-Kitchen designed during first visit using CAD software
-Kitchen views printed out for householder to study
-Design costed using suitable software
-Requirements sent direct to manufactory and…
-details to accounts…
-via laptop and mobile phone
-Invoice printed there and then
-Stock levels automatically maintained according to…
-likely requirements and orders taken
-Orders placed to suppliers automatically/immediately
-so should not run out of materials
-Customer can pay electronically using card
-Need for training of staff
(1 per -, max 10) **[10]**

TOTAL [90]