CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the October/November 2015 series

9691 COMPUTING

9691/32 Paper 3 (Written Paper), maximum raw mark 90

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CAMBRIDGE
International Examinations

1 (a) `MEMBER (MemberID,` – any two sensible attributes e.g. name, DOB [1]
`COURSE` – `CourseID, Instrument, StartDate, Duration, CourseTutor` [1]

(b) `COURSE-MEMBER` (`CourseID, MemberID`)
Correct two attributes 1
Correct primary key 1
If `CourseName` used – refer back to part (a) for possible FT [2]

(c) The table has a repeated attribute //
There are several Instruments for the same `TutorID` [1]

(d) (i) `TUTOR` – has primary key `TutorID` [1]
`TUTOR-INSTRUMENT` – has primary key `TutorID + Instrument` [1]

(ii) Many-to-one // M:1 // ∞ : 1 [1]

(iii)
```
SELECT TutorID
FROM TUTOR-INSTRUMENT
WHERE Instrument = 'saxophone'
```
can be reverse for 1 mark [1] [1] [1]

'saxophone' – allow mixed case / spelling must be correct
Quotes must be present

(iv)

Creates a new record in the `TUTOR-INSTRUMENT` table	FALSE
Amends an existing record in the `TUTOR-INSTRUMENT` table	TRUE
Assigns the `INSTRUMENT` attribute the value 'guitar'	FALSE
Assigns the `INSTRUMENT` attribute the value 'Piano'	FALSE
Make a change to all the existing records for all tutors	FALSE
Changes one record in the `TUTOR` table	FALSE

[1] [1] [1]

(e) (i)
```
INSERT INTO TUTOR-INSTRUMENT
(TutorID, Instrument)
VALUES (57, 'flute')
```
1
1 [2]

(ii) Attempt to add a record in `TUTOR-INSTRUMENT` table 1
But, no corresponding `TutorID` in the `TUTOR` table … 1
Or:
// Delete a record in the `TUTOR` table 1
and, matching records in `TUTOR-INSTRUMENT` table remain 1
Or:
// Allow use of the term 'update' if mentions a change to `TutorID`/foreign key attribute 1 [max 2]

2 (a) (i) (0) 101 1010 [1]

(ii) 5A [1]

(iii) 8 [1]

(b)

Register transfer notation	Description	
MAR ← [PC]	The contents of the Program Counter are copied to the Memory Address Register.	[1]
PC ← [PC] + 1	**(The Contents of) the Program Counter are incremented**	[1]
MDR ← [[MAR]]	The Memory Address Register contains an address. Copy the contents of this address to the Memory Data Register.	[1]
CIR ← [MDR]	**Copy the contents/data in/instruction in the Memory Data Register to the Current Instruction Register**	[1]

(c) (i) Sends control signals (A. commands) from/to the processor and various devices // individual lines are each dedicated to a particular signal // uses timing signals to coordinate various actions 1

Examples:
Timing signal // reset // memory write/read // I/O operation completed // interrupt 1 [2]

(ii) Data bus 1
Connects/used to transport a data value between main memory and the processor // data bus is bi-directional 1

Address bus 1
Carries the memory address about to be accessed // it connects the Memory Address Register to main memory // Address bus is uni-directional from the processor 1 [4]

3 (a)

	Register	
Instruction	**ACC**	**Index Register (IX)**
LIX 902		**2** [1]
LDD 901	**917**	[1]
LDI 901	**13**	[1]
LDX 901	**25**	[1]

(b) Use the text editor to create the assembly language program PROG.ASM
REPEAT

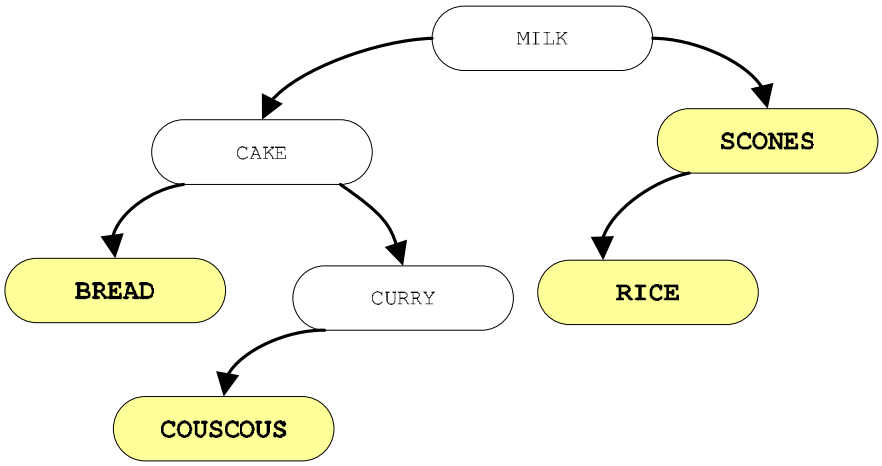
Can be reverse for 1 mark

PROG.ASM is input to the assembler software [1]
IF errors reported [1]
THEN
Amend PROG.ASM using the text editor [1]
ENDIF

UNTIL No errors reported [1]

Produce the PROG.EXE executable file [1]
Execute PROG.EXE

4 (a) (i)



[4]

(ii) Root labelled [1]
Right subtree labelled // FT for their tree [1]

(iii) 3 // FT for their tree [1]

(b)

RootPtr	0				
0	1		MELON		2
1	3		BEETROOT		
2	4		TURNIP		
3			APPLE		
4			PARSNIP		5
5	6		SWEDE		
6			QUINCE		

Mark as follows:

Root showing 0	1	
Data values in correct positions	1	
Correct left pointers	1	
Correct right pointers	1	[4]

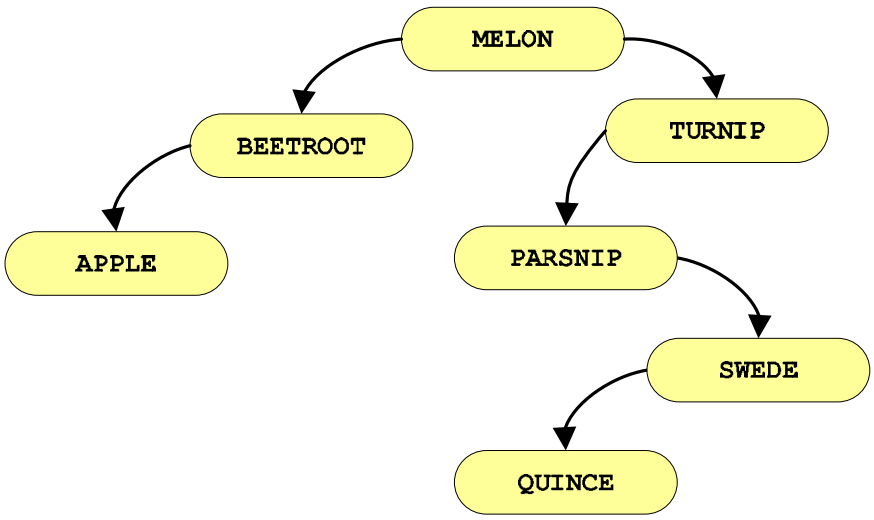
Ignore values showing any unassigned pointers

(c) (i)

```
//binary tree search
INPUT SearchFood
IsFound ← FALSE                                          [1]
Current ← RootPtr                                        [1]
   REPEAT
      IF Food[Current] = SearchFood                      [1]
         THEN
            //found
            OUTPUT "Found"
            ISFound ← TRUE                               [1]
         ELSE
            IF SearchFood < Food[Current]
               THEN
                  // move left
                  Current ← LeftPtr[Current]
               ELSE
                  Current ← RightPtr[Current]            [1]
            ENDIF
         ENDIF
      UNTIL IsFound = TRUE OR
                      Current = 0/Null/-1/Unassigned     [1]

      IF IsFound = FALSE
         THEN
            OUTPUT SearchFood, "Not Found"
      ENDIF
```

(d) (i)



Mark as follows:

Left subtree	1	
Right subtree	1	[2]

(ii) Correct conclusion is made from 'their' tree [1]

5 (a) (i) Building a model of the system/real-life situation // Models the behaviour of the system 1
R. 'imitates'
The simulation records the result of some changing parameters/conditions/ circumstances 1 [2]

(ii) A computer program can be written to build the model 1
Computer system can process results very quickly/can change the time frame // can process large volumes of data 1
Computer avoids any health and safety issues 1 [max 1]

(b) (Current) traffic flows between Town A and Town B 1
Usage of the road(s) by pedestrians 1
Number of houses to be built 1
Number of vehicles per house 1 [max 2]

(c) (i) BEWARE : NOT traffic lane changes (given in the rubric)

Width of the road 1
Time interval between traffic signal changes 1
Signal changes activated by sensors 1
Rate of arrival of vehicles // vehicle speed 1
Variation in the type of vehicle using the junction 1
Left/right filter used 1
Time of day 1
Weather conditions 1
Outside influences e.g. zebra crossings 1 [max 2]

(ii) Queue length 1
Waiting time 1
Vehicle throughput to/from Housing development to Town A/Town B 1 [max 1]

6 (a) (i) 4 [1]

(ii) 3 [1]

(iii) ERROR [1]

(iv) 0 [1]

(v) ERROR [1]

(b) (i) A – Parameter identifiers labelled 1
B – (RETURNS) INTEGER 1 [2]

(ii) `RejectCount ← CountBig` `(Rejects, 83, 'Y')`
1 mark 1 mark
or
`RejectCount ← CountBig` `(Rejects, 82, 'N')`
1 mark 1 mark [2]

(c)
```
FUNCTION StringFound (ThisArray : ARRAY OF STRING ,
                      ThisValue : STRING) : BOOLEAN
```

Mark as follows:

`FUNCTION StringFound( .....` 1
`ThisArray : ARRAY OF STRING` 1
`ThisValue : STRING` 1
`RETURNS BOOLEAN` // `: BOOLEAN` 1 [4]

7 (a) A number of connected (allow: 'linked') computers/devices … 1
Sited in a small geographical area // room/building/site 1 [2]

(b) (i) Network Interface card // NIC [1]

(ii) (Use of user IDs and) passwords // use of biometrics/by example 1
Firewall // Proxy server 1 [2]

(c) Storage/Management of all user data/files 1
Management of centrally stored software 1

Granting of access rights/permissions to various users 1
Note: refuse just mention of 'security'

Sharing of peripherals // Control of all output to a printer device 1
Management of user accounts/Log-ons 1
Recording/Monitoring the use of the network // Accounting 1 [max 3]

(d) (File) server // Network attached storage (NAS) [1]