CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the October/November 2015 series

9608 COMPUTER SCIENCE

9608/41 Paper 4 (Written Paper), maximum raw mark 75

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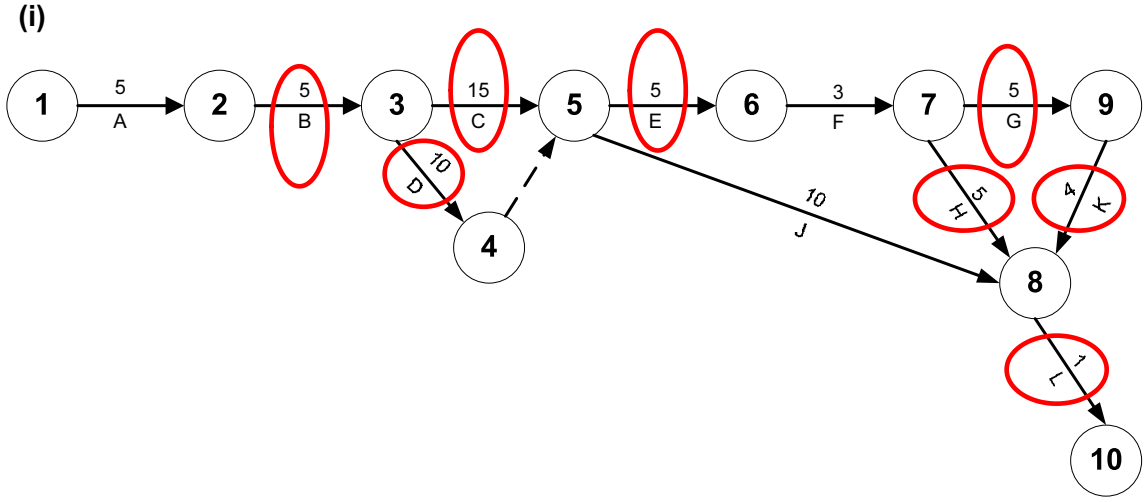
CAMBRIDGE
International Examinations

1 (a) (i)



[max. 7]

(ii) 1 – 2 – 3 – 5 – 6 – 7 – 9 – 8 – 10
1–5 scores 1
6–10 scores 1 [2]

(iii) 43 weeks [1]

(b) (i) week number 25 [1]

(ii) week number 32 [1]

(c) To see what activities can be done in parallel // show dependencies
To record changes to project timings [max. 1]

2 **(a)**
```
parent(philippe, meena).
parent(gina, meena).
```
[2]

(b) **ahmed, aisha, raul** [2]

(c)
```
father(F, ahmed).
```
[1]

(d)
```
mother(X, Y)
IF
female(X) AND parent(X, Y).
```
[2]

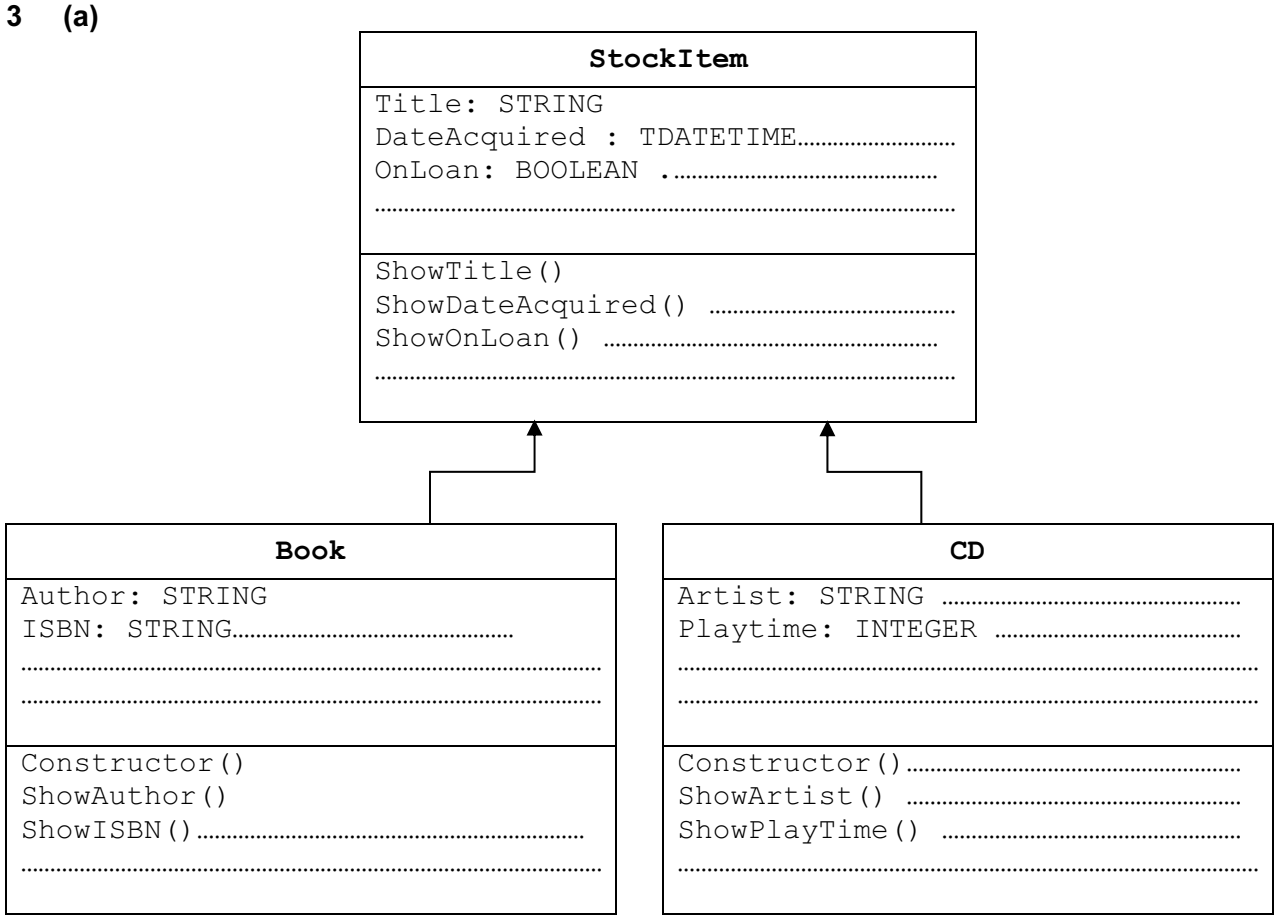
(e)
```
grandparent(W, Z)
IF
parent(W,X)
AND parent(X,Z).
```
[2]

(f)
```
grandfather(G, K)
IF
male(G) AND
grandparent(G, K).
```

alternative:

```
father(G, X) AND
parent(X, K).
```
[2]

3 (a)



[max. 7]

(b) (i) *Mark as follows:*
Class header
Methods
Properties

Pascal

```
StockItem = CLASS
   PUBLIC
      Procedure ShowTitle();
      Procedure ShowDateAcquired();
      Procedure ShowOnLoan();
   PRIVATE
      Title : STRING;
      DateAcquired : TDateTime;
      OnLoan : Boolean;
END;
```

Python

```
class StockItem :
   def __int__(self) :
      self.__Title = ""
      self.__DateAquired = ""
      self.__OnLoan = False

   def ShowTitle() :
      pass
   def ShowDateAcquired() :
      pass
   def ShowOnLoan() :
      pass
```

VB.NET

```
Class StockItem
   Public Sub ShowTitle()
   End Sub
   Public Sub ShowDateAquired()
   End Sub
   Public Sub ShowOnLoan()
   End Sub
   Private Title As String
   Private DateAquired As Date
End Class
```

[3]

(ii) *Mark as follows:*
Class header and showing superclass
Methods
Properties

Pascal

```
TYPE Book = CLASS (StockItem)
   PUBLIC
      Procedure ShowAuthor();
      Procedure ShowISBN();
   PRIVATE
      Author : STRING;
      ISBN : STRING;
END;
```

Python

```
class Book(StockItem) :
   def __init__(self) :
      self.__Author = ""
      self.__ISBN = ""
   def ShowAuthor() :
      pass
   def ShowISBN() :
      pass
```

VB.NET

```
Class Book : Inherits StockItem
   Public Sub ShowAuthor()
   End Sub
   Public Sub ShowISBN()
   End Sub
   Private Author As String
   Private ISBN As String  ' reject integer
End Class
```

[3]

(iii) Pascal

```
NewBook := Book.Create;                          1
NewBook.Title := 'Computers';
NewBook.Author := 'A.Nyone';
NewBook.ISBN := '099111';                        1
NewBook.DateAcquired := '12/11/2001';
NewBook.OnLoan := FALSE                          1
```

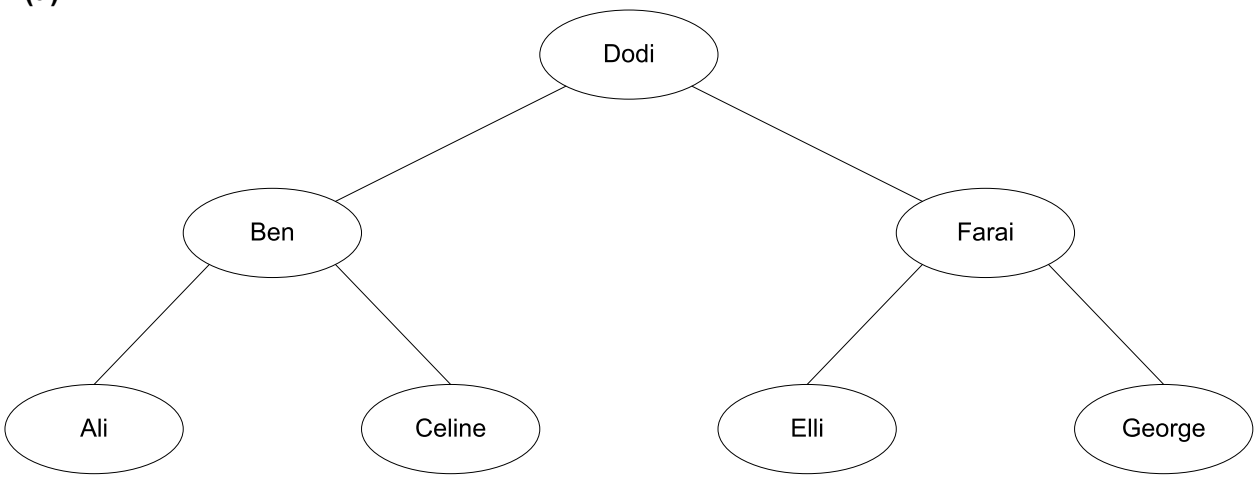
Python

```
NewBook = Book()                                 1
NewBook.Title = "Computers"
NewBook.Author = "A.Nyone"
NewBook.ISBN = "099111"                          1
NewBook.DateAcquired = "12/11/2001"
NewBook.OnLoan = False                           1
```

VB.NET

```
Dim NewBook As Book = New Book()                 1
NewBook.Title = "Computers"
NewBook.Author = "A.Nyone"
NewBook.ISBN = "099111"                          1
NewBook.DateAcquired = #12/11/2001#
NewBook.OnLoan = False                           1      [3]
```

4 (a)



[4]

(b)

RootPointer: 1

FreePointer: 8

Tree

	Name	LeftPointer	RightPointer
[1]	Dodi	5	2
[2]	Farai	3	4
[3]	Elli	0	0
[4]	George	0	0
[5]	Ben	7	6
[6]	Celine	0	0
[7]	Ali	0	0
[8]		9	0
[9]		10	0
[10]		0	0

[7]

(c) (i)

```
01 PROCEDURE TraverseTree(BYVALUE Root : INTEGER)
02     IF Tree[Root].LeftPointer < > 0
03         THEN
04             TraverseTree(Tree[Root].LeftPointer)
05     ENDIF
06     OUTPUT Tree[Root].Name
07     IF Tree[Root].RightPointer < > 0
08         THEN
09             TraverseTree(Tree[Root].RightPointer)
10     ENDIF
11 ENDPROCEDURE
```

[5]

(ii) A procedure that calls itself // is defined in terms of itself
Line number: 04/09 [2]

(iii) `TraverseTree(RootPointer)` [1]

5 (a)

`MembershipFile`

Address	`MemberID`	other member data
0	0	
1	1001	
2	7002	
3	0	
4	0	
5	3005	
6	0	
7	0	
8	0	
:	:	
:	:	
96	4096	
97	0	
98	2098	
99	0	

1001 and 7002 and 3005 1
4096 and 2098 1 [2]

(b) (i)
```
10 // generate record address
20 NewAddress ← Hash(NewMember.MemberID)
30 // move pointer to the disk address for the record
40 SEEK NewAddress
50 PUTRECORD "MembershipFile", NewMember
```
[4]

(ii)
```
01 TRY
02    OPENFILE "MembershipFile" FOR RANDOM
03 EXCEPT
04    OUTPUT "File does not exist"
05 ENDTRY
```
[2]

(iii) collisions/synonyms
The previous record will be overwritten [2]

(iv) Create an overflow area
The 'home' record has a pointer to others with the same key
OR
Store the overflow record at the next available address
in sequence
OR
Re-design the hash function ….
to generate a wider range of indexes // to create fewer collisions [2]

(v)
```
41 GETRECORD "MembershipFile", CurrentRecord
42 WHILE CurrentRecord.MemberID <> 0
43    NewAddress ← NewAdress + 1
44    IF NewAddress > 99 THEN NewAddress ← 0
45    SEEK NewAddress
46    GETRECORD "MembershipFile", CurrentRecord
47 ENDWHILE
```
[max. 4]