

## **MARK SCHEME for the October/November 2015 series**

### **9608 COMPUTER SCIENCE**

**9608/41**

Paper 4 (Written Paper), maximum raw mark 75

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

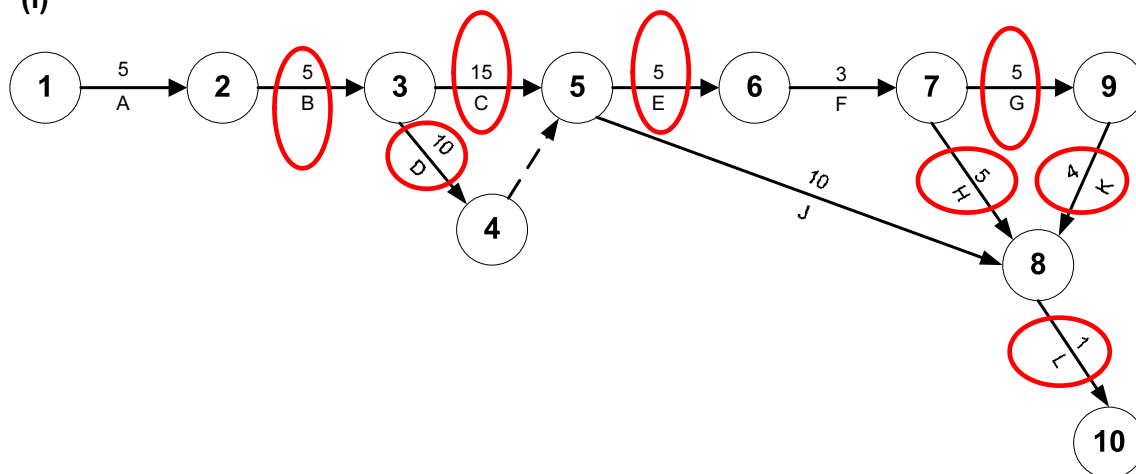
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

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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]

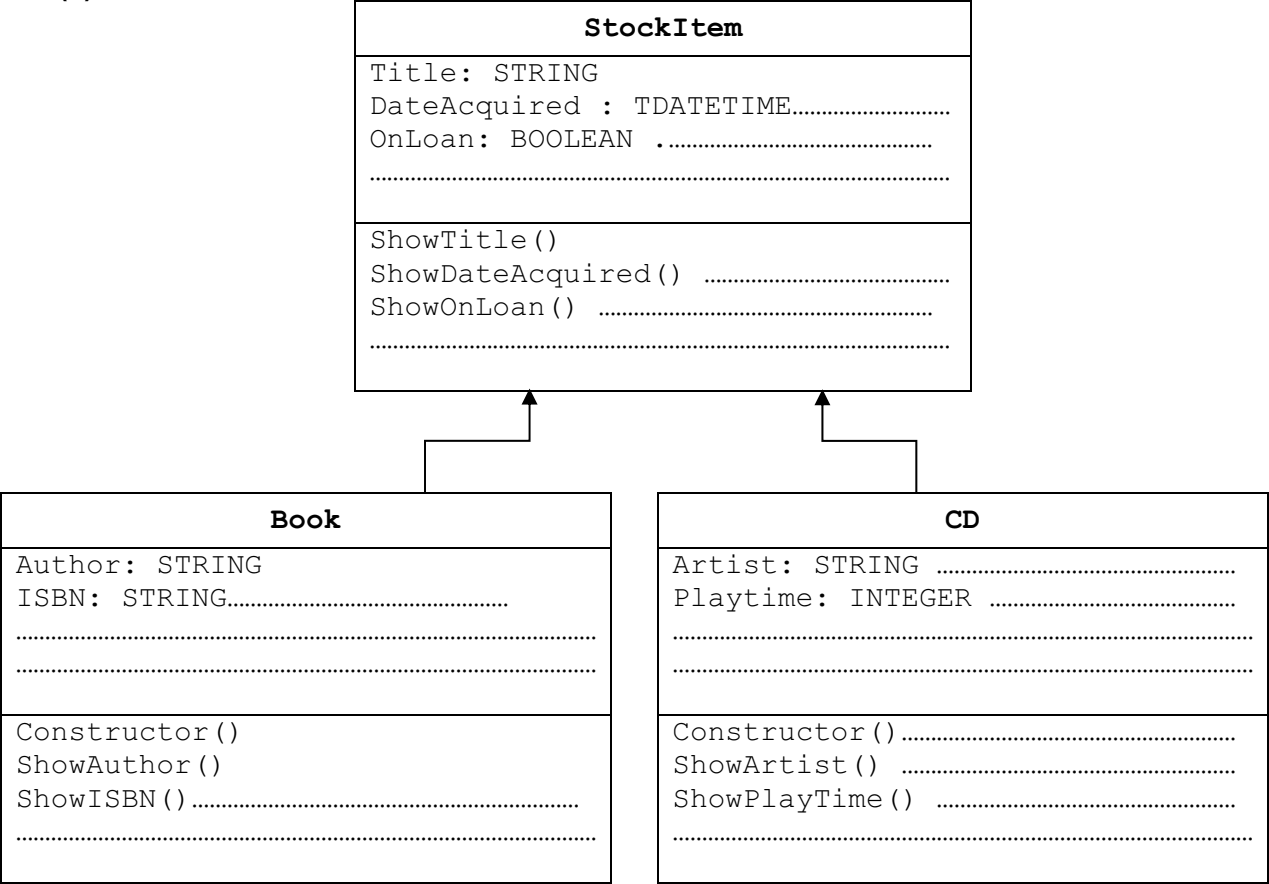
(c) To see what activities can be done in parallel // show dependencies  
To record changes to project timings

[max. 1]

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- 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]

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(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]

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- (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]

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**(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**

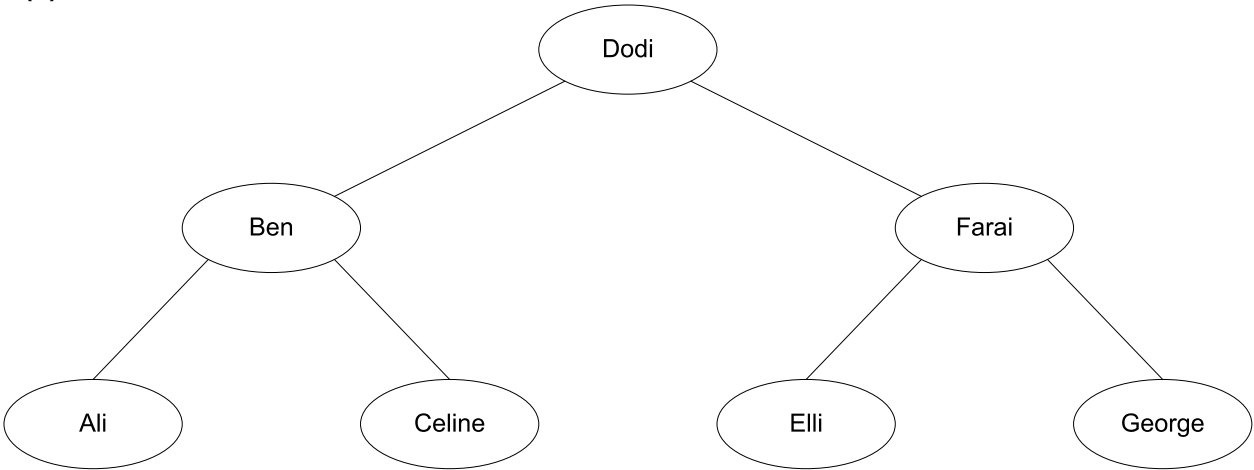
NewBook = Book()	1
NewBook.Title = "Computers"	
NewBook.Author = "A.Nyone"	
NewBook.ISBN = "099111"	1
NewBook.DateAcquired = "12/11/2001"	
NewBook.OnLoan = False	1

**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)

		Tree		
RootPointer		Name	LeftPointer	RightPointer
<div>1</div>	[1]	Dodi	5	2
	[2]	Farai	3	4
	[3]	Elli	0	0
FreePointer	[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]



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- (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]

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- (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 ← NewAddress + 1  
44 IF NewAddress > 99 THEN NewAddress ← 0  
45 SEEK NewAddress  
46 GETRECORD "MembershipFile", CurrentRecord  
47 ENDWHILE [max. 4]