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Cambridge International Advanced Level

MARK SCHEME for the May/June 2015 series

9608 COMPUTER SCIENCE

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

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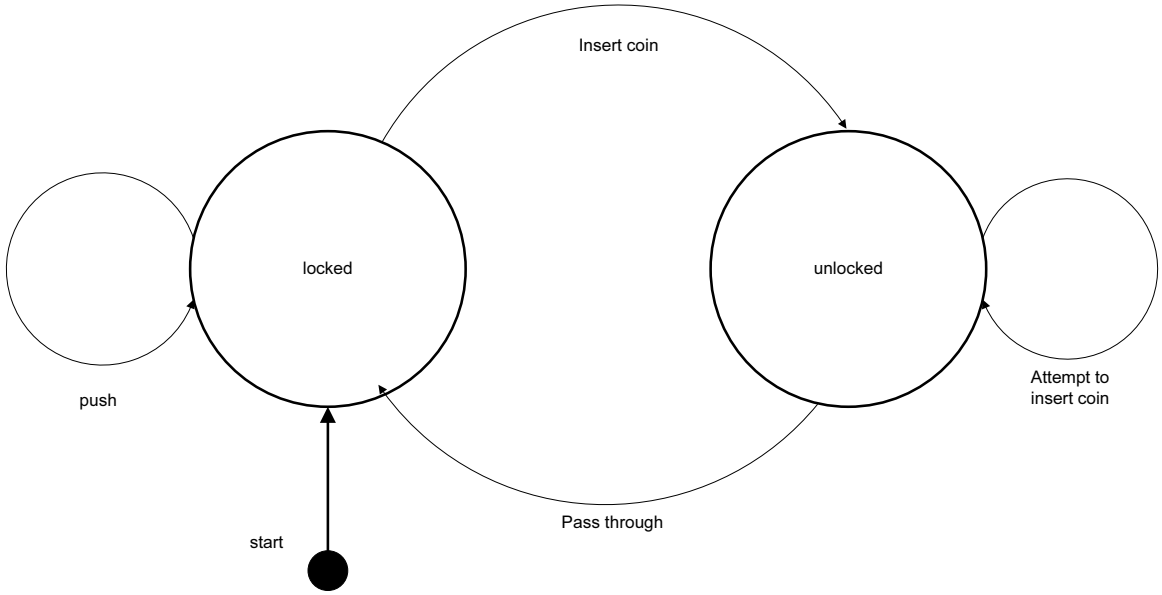
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1



Mark as follows:
1 mark for both states correct
1 mark for each further label **[5]**

2 **(a)**
```
capital_city(santiago).
city_in_country(santiago, chile).
country_in_continent(chile,south_america).
city_visited(santiago).
```

accept in any order **[4]**

(b) `ThisCity =`
`manchester`
`london` **[2]**

(c)
```
countries_visited(ThisCountry)
IF
city_visited(ThisCity)                          1
AND                                             1
city_in_country(ThisCity, ThisCountry)          2
```
[4]

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3 (a)

Conditions	goods totalling more than $20	Y	Y	Y	Y	N	N	N	N
	goods totalling more than $100	Y	Y	N	N	Y	Y	N	N
	have discount card	Y	N	Y	N	Y	N	Y	N
Actions	No discount				X	X	X	X	X
	5% discount		X	X					
	10% discount	X							
		1 mark	1 mark	1 mark	1 mark				

[4]

(b)

Conditions	goods totalling more than $20	Y	Y	Y	Y	N			
	goods totalling more than $100	Y	Y	N	N	-			
	have discount card	Y	N	Y	N	-			
Actions	No discount				X	X			
	5% discount		X	X					
	10% discount	X							

1 mark per column **[5]**

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(c) Example Pascal

```
      FUNCTION Discount(GoodsTotal: INTEGER; HasDiscountCard: BOOLEAN) :
INTEGER;

            BEGIN
      (1)       IF GoodsTotal > 20
      (1)       THEN
      (2)          IF GoodsTotal > 100
      (2)             THEN
      (3)                IF HasDiscountCard = TRUE
      (3)                   THEN
      (3)                      Discount := 10
      (3)                   ELSE
      (3)                      Discount := 5
      (2)             ELSE
      (4)                IF HasDiscountCard = TRUE
      (4)                   THEN
      (4)                      Discount := 5
      (4)                   ELSE
      (4)                      Discount := 0
      (1)             ELSE
      (1)                Discount := 0;
            END;
```

Example Python

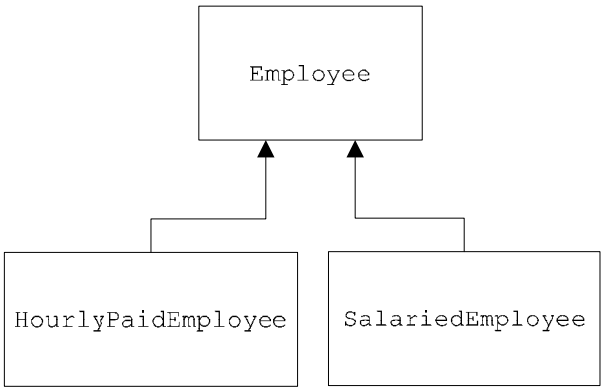
```
def Discount(GoodsTotal, HasDiscountCard) :

(1)   if GoodsTotal > 20:
(2)      if GoodsTotal > 100:
(3)         if HasDiscountCard == True:
(3)            return 10
(3)         else:
(3)            return 5
(2)      else:
(4)         if HasDiscountCard == TRUE:
(4)            return 5
(4)         else:
(4)            return 0
(1)   else:
(1)      return 0
```

[6]

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4 (a)



[3]

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(b) Example Pascal

```
Type
Employee = CLASS
      PUBLIC
         procedure SetEmployeeName
         Procedure SetEmployeeID
         Procedure CalculatePay
      PRIVATE
         EmployeeName : STRING
         EmployeeID : STRING
         AmountPaidThisMonth : Currency
   END;
```

Mark as follows:

Class header	(1 mark)
`PUBLIC` and `PRIVATE` used correctly	(1 mark)
`EmployeeName` + `EmployeeID`	(1 mark)
`AmountPaidThisMonth`	(1 mark)
Methods x 3	(1 mark)

Example VB

```
Class Employee
   Private EmployeeName As String
   Private EmployeeID As String
   Private AmountPaidThisMonth As Decimal
Public Sub SetEmployeeName()
End Sub
Public Sub SetEmployeeID()
End Sub
Public Sub CalculatePay()
End Sub
```

Example Python

```
Class Employee():
   def __init__(self):
      self.__EmployeeName = ""
      self.__EmployeeID = ""
      self.__AmountPaidThisMonth = 0
   def SetEmployeeName(self, Name):
      self.__EmployeeName = Name
   def SetEmployeeID(self, ID):
      self.__EmployeeID = ID
   def SetAmountPaidThisMonth(self, Paid):
      self.__AmountPaidThisMonth = Paid
```

[max 5]

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(c) (i)

`HoursWorked`	1	
`HourlyPayRate`	1	
`SetHoursWorked`	1	
`CalculatePay : Override`	1 + 1	
`SetPayRate`	1	**[max 4]**

(ii)

`AnnualSalary`	1	
`SetSalary`	1	
`CalculatePay : Override`	1	**[max 2]**

(d) Polymorphism **[1]**

5 (a) (i)

```
FOR ThisPointer ← 2 TO 10
    // use a temporary variable to store item which is to
    // be inserted into its correct location
    Temp ← NameList[ThisPointer]
    Pointer ← ThisPointer – 1

    WHILE (NameList[Pointer] > Temp) AND (Pointer > 0)
        // move list item to next location
        NameList[Pointer + 1] ← NameList[Pointer]
        Pointer ← Pointer - 1
    ENDWHILE

    // insert value of Temp in correct location
    NameList[Pointer + 1] Temp←
ENDFOR
```

1 mark for each gap filled correctly **[7]**

(ii)

The outer loop (`FOR` loop) is executed 9 times	(1 mark)	
it is not dependant on the dataset	(1 mark)	
The Inner loop (WHILE loop) is not entered	(1 mark)	
as the condition is already false at the first encounter	(1 mark)	**[max 3]**

(b) (i)

outer loop is executed 9 times	(1 mark)	
inner loop is executed 9 times (for each iteration of the outer loop)	(1 mark)	
not dependant on the dataset	(1 mark)	**[max 2]**

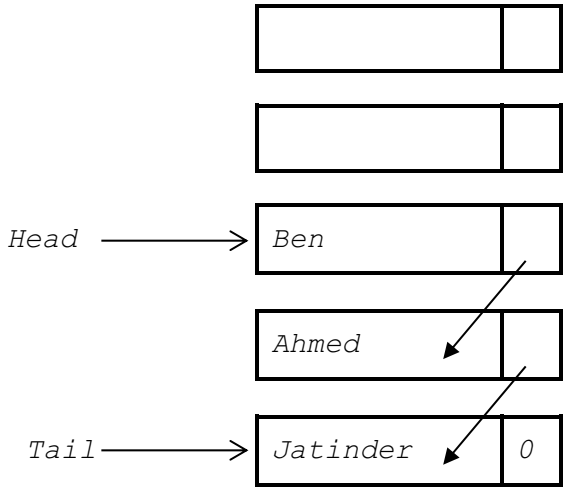
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(ii)
```
NumberOfItems ← 10
REPEAT
   NoMoreSwaps    ← TRUE

   FOR Pointer ← 1 TO NumberOfItems - 1
      IF NameList[Pointer] > NameList[Pointer + 1]
         THEN
            NoMoreSwaps ← FALSE
            Temp ← NameList[Pointer]
            NameList[Pointer] ← NameList[Pointer + 1]
            NameList[Pointer + 1] ← Temp
         ENDIF
      ENDFOR
      NumberOfItems ← NumberOfItems - 1
   UNTIL NoMoreSwaps = TRUE
```

Mark as follows:
- change outer loop to a REPEAT/WHILE loop (1 mark)
- FOR loop has variable used for final value (1 mark)
- Initialise Boolean variable to TRUE (1 mark)
- set Boolean variable to FALSE in correct place (1 mark)
- number of items to consider on each pass decrements (1 mark)
- Correct stopping condition for REPEAT loop (1 mark) **[max 5]**

6 (a)



1 mark for Head and Tail pointers
1 mark for 3 correct items – linked as shown
1 mark for correct order with null pointer in last nod **[3]**

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(b) (i)

Queue

HeadPointer		Name	Pointer
0	[1]		2
	[2]		3
TailPointer	[3]		4
0	[4]		5
	[5]		6
FreePointer	[6]		7
1	[7]		8
	[8]		9
	[9]		10
	[10]		0

Mark as follows:

HeadPointer =0 & *TailPointer = 0*
FreePointer *assigned a value*
Pointers[1] to *[9]* *links the nodes together*
Pointer[10] = 'Null' **[4]**

(ii)

```
PROCEDURE RemoveName()
   // Report error if Queue is empty
   IF HeadPointer = 0
      THEN
         Error
      ELSE
         OUTPUT Queue[HeadPointer].Name
         // current node is head of queue
         CurrentPointer ← HeadPointer
         // update head pointer
         HeadPointer ← Queue[CurrentPointer].Pointer
         //if only one element in queue,then update tail pointer
         IF HeadPointer = 0
            THEN
               TailPointer ← 0
         ENDIF
            // link released node to free list
            Queue[CurrentPointer].Pointer ← FreePointer
         FreePointer ← CurrentPointer
   ENDIF
ENDPROCEDURE
```

[max 6]

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