

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International Advanced Level

## **MARK SCHEME for the May/June 2015 series**

### **9608 COMPUTER SCIENCE**

**9608/42**

Paper 4 (Written Paper), maximum raw mark 75

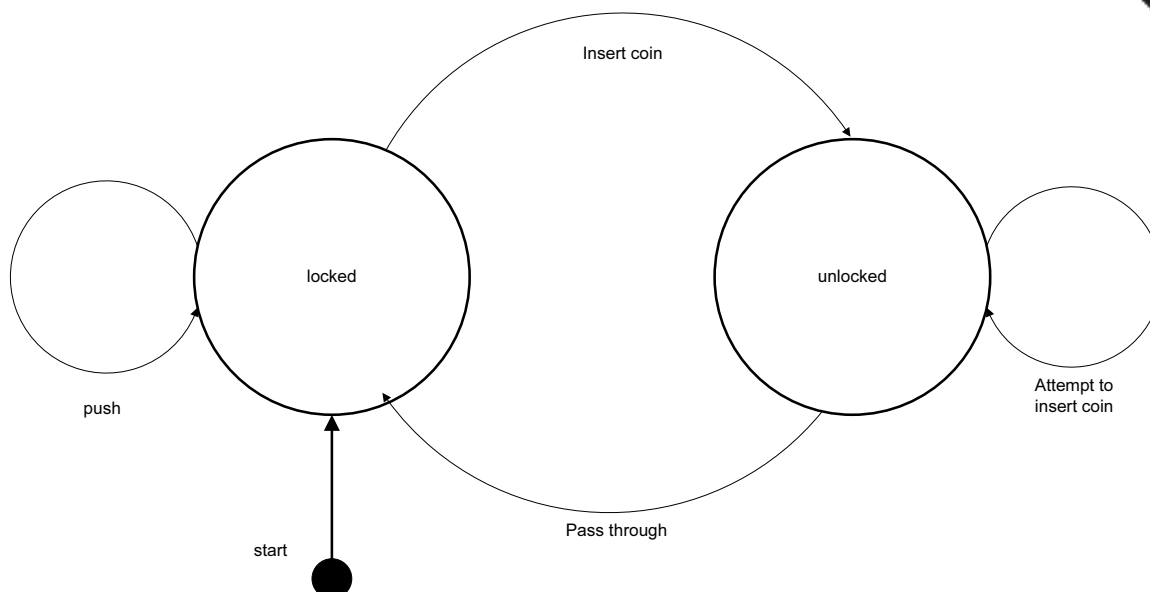
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began,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

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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)`  
`AND`  
`city_in_country(ThisCity, ThisCountry)`

1

1

2

[4]

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

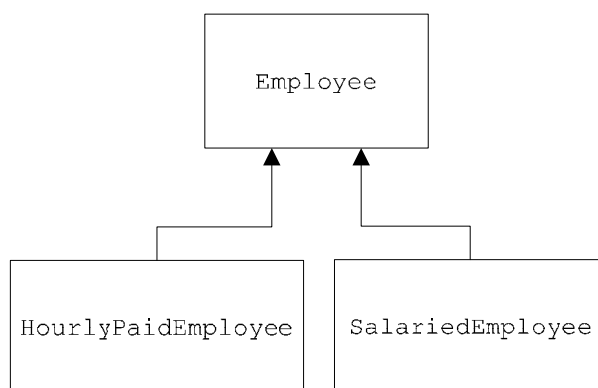
```
def Discount(GoodsTotal, HasDiscountCard) :
```

```

(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]

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

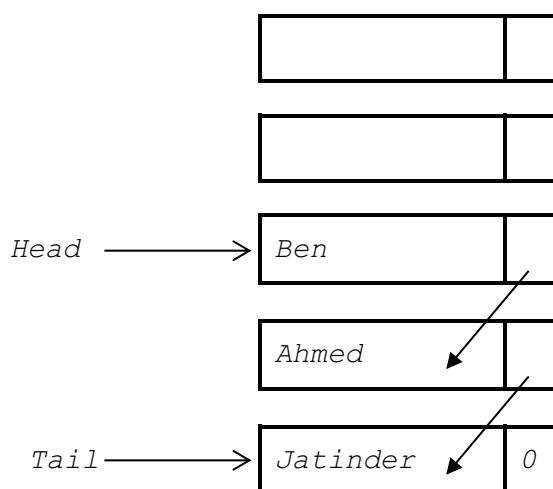
```

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]



(b) (i)

Queue		
HeadPointer	Name	Pointer
0	[1]	2
	[2]	3
	[3]	4
TailPointer	[4]	5
	[5]	6
	[6]	7
FreePointer	[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]