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Cambridge International Advanced Level

MARK SCHEME for the May/June 2015 series

9608 COMPUTER SCIENCE

9608/43 Paper 4 (Written Paper), maximum raw mark 75

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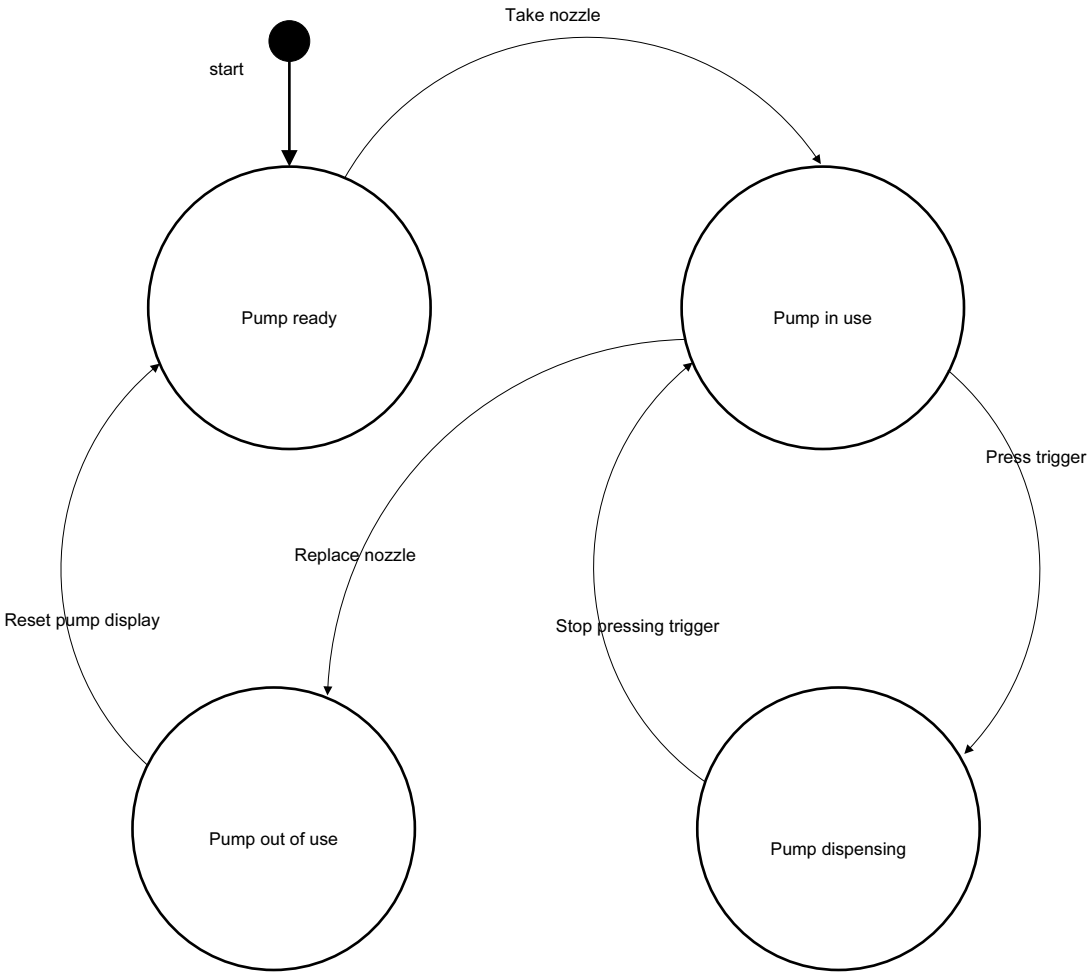
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1



[9]

2 **(a)**
```
made_with(laasi, milk).
made_with(laasi, yogurt).
dairy_product(milk).
dairy_product(yogurt).
```
[4]

(b)
```
Ingredient =
```
cheese, egg, flour **[2]**

(c)
```
contains_meat(Dish)
IF
```
made_with(Dish, X) (2 marks)
AND (1 mark)
meat(X) (1 mark) **[4]**

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3 (a)

Conditions	Age under 25	Y	Y	Y	Y	N	N	N	N
	Previous accident	Y	Y	N	N	Y	Y	N	N
	Licence held for 3 or more years	Y	N	Y	N	Y	N	Y	N
Actions	10% extra cost		X						
	No discount	X			X	X	X		
	5% discount			X				X	X
		1 mark	1 mark	1 mark	1 mark	1 mark		1 mark	

[6]

(b)

Conditions	Age under 25	Y	Y	Y	Y	N	N		
	Previous accident	Y	Y	N	N	Y	N		
	Licence held for 3 or more years	Y	N	Y	N	-	-		
Actions	10% extra cost		X						
	No discount	X			X	X			
	5% discount			X			X		
		1 mark				1 mark	1 mark		

[3]

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(c) Example Pascal

```
FUNCTION CostPercentageChange(DriverAge : INTEGER;
      HadAccident : BOOLEAN; YearsLicenceHeld : INTEGER) : INTEGER;
  BEGIN
      IF DriverAge >= 25
        THEN
          IF HadAccident = TRUE
            THEN
              CostPercentageChange := 0
            ELSE
              CostPercentageChange := -5
        ELSE
          IF HadAccident = TRUE
            THEN
              IF YearsLicenceHeld < 3
                THEN
                  CostPercentageChange := 10
                ELSE
                  CostPercentageChange := 0
            ELSE
              IF YearsLicenceHeld < 3
                THEN
                  CostPercentageChange := 0
                ELSE
                  CostPercentageChange:= -5;
  END;
```

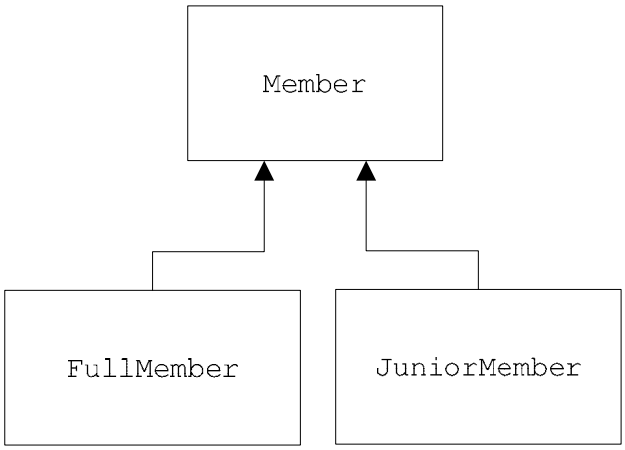
Example Python

```
def CostPercentageChange(DriverAge, HadAccident, YearsLicenceHeld) :
  if DriverAge >= 25:
    if HadAccident:
      return 0
    else:
      return -5
  else:
    if HadAccident:
      if YearsLicenceHeld < 3:
        return 10
      else:
        return 0
    else:
      if YearsLicenceHeld < 3:
        return 0
      else:
        return -5;
```

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Mark as follows:
Correct function header
Correct IF statement (1)
Correct IF statement (2)
Correct IF statement (3)
Correct IF statement (4)
Correct IF statement (5)
Correct return statement (or equivalent) **[max 6]**
OR equivalent demonstrating correct logic

4 (a)



[3]

(b) Example Pascal

```
Member = CLASS
         PUBLIC
           Procedure SetMemberName;
           Procedure SetMemberID;
           Procedure SetSubscriptionPaid;
         PRIVATE
           MemberName       : STRING;
           MemberID         : STRING;
           SubscriptionPaid : Boolean;
   END;
```

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Example Python

```
class Member() :
   def__init__(self):         PUBLIC
      self.__MemberName = ""
      self.__MemberID = ""
      self.__SubscriptionPaid = False
   def SetMemberName(self, Name):
      self.MemberName = Name
   def SetMemberID(self, ID):
      self.MemberID = ID
   def SetSubscriptionPaid(self, Paid):
      self.SubscriptioPaid = Paid
```

Mark as follows:

Class header	(1 mark)	
`Public` and `Private` used correctly	(1 mark)	
`MemberName` + `MemberID`	(1 mark)	
`SubscriptionPaid`	(1 mark)	
Methods × 3	(1 mark)	**[5]**

(c) (i) Example Pascal

```
JuniorMember = CLASS (Member)
                  PUBLIC
                    Procedure SetDateOfBirth;
                  PRIVATE
                    DateOfBirth : DateTime;
               END;
```

Example Python

```
class JuniorMember (Member):
   def__init__self:
      super().__init__()
      self.DateOfBirth = ""
   def SetDateOfBirth(self, Date):
      self.DateOfBirth = Date
   def SetMemberName(self, Name):
      super().SetMemberName(Name)
   def SetMemberID(self, ID):
      super().SetMemberID(ID)
   def SetSubscriptionPaid(self, Paid):
      super().SetSubscriptioPaid(Paid)
```

[3]

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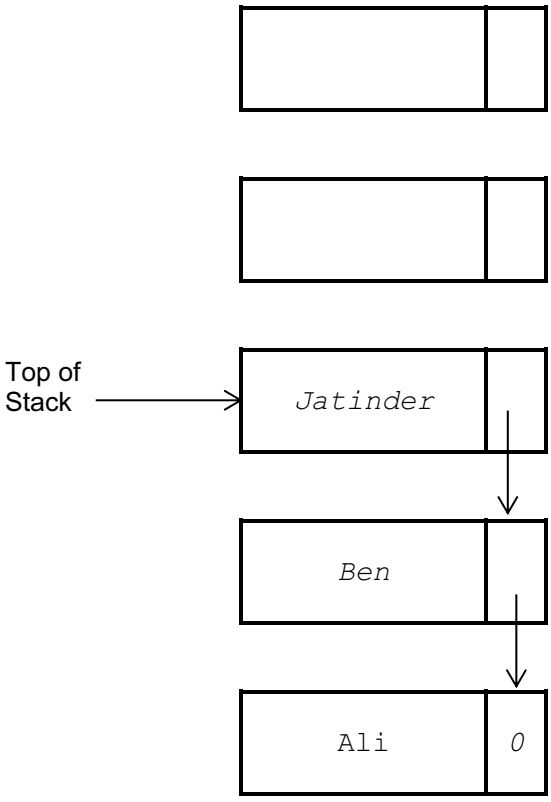
(ii) Example Pascal

```
NewMember := JuniorMember.Create;                    (1 mark)
NewMember.SetMemberName('Ahmed');
NewMember.SetMemberID('12347');                      (1 mark)
NewMember.SetSubscriptionPaid(TRUE);
NewMember.SetDateOfBirth("12/11/2001");              (1 mark)
```

Example Python

```
NewMember := JuniorMember()                          (1 mark)
NewMember.SetMemberName("Ahmed")
NewMember.SetMemberID("12347")                       (1 mark)
NewMember.SetSubscriptionPaid(TRUE)
NewMember.SetDateOfBirth("12/11/2001")               (1 mark)   [3]
```

5 (a)



1 mark for Top of Stack pointer
1 mark for 3 correct items
1 mark for correct order with null pointer in last node **[3]**

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(b) (i)

Stack

TopOfStackPointer

0

FreePointer

1

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

Mark as follows:
TopOfStackPointer
FreePointer
Pointers[1] to [9]
Pointer[10] **[4]**

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(ii)
```
PROCEDURE Pop()
    // Report error if Stack is empty
    IF TopOfStackPointer = 0
      THEN
        Error
      ELSE
        OUTPUT Stack[TopOfStackPointer].Name
        // take a copy of the current top of stack pointer
        TempPointer ← TopOfStackPointer
        // update the top of stack pointer
        TopOfStackPointer ← Stack[TempPointer].Pointer
        // link released node to free list
        Stack[TempPointer].Pointer ← FreePointer
        FreePointer ← TempPointer
    ENDIF
ENDPROCEDURE
```

1 mark for each line of code as above (first 4 lines + ENDIF for 1 mark) **[Max 5]**

6 (a) A procedure that calls itself // is defined in terms of itself **[1]**

(b) Before procedure call is executed current state of the registers/local variables is saved onto the stack
When returning from a procedure call the registers/local variables are re-instated **[2]**

(c)

Call number	n	(n=0) OR (n=1)	n DIV 2	n MOD 2
1	40	FALSE	20	0
2	20	FALSE	10	0
3	10	FALSE	5	0
4	5	FALSE	2	1
5	2	FALSE	1	0
6	1	TRUE		
		1 mark	*1 mark*	*1 mark*

OUTPUT 101000 – 1 mark for each pair of bits. **[6]**

(d) Conversion of denary number into binary **[1]**

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(e) (i) Example Pascal

```
Procedure X(n: INTEGER)
BEGIN
  IF (n = 0) OR (n = 1)
    THEN
        Write(n)
    ELSE
      BEGIN
        X(n DIV 2);
        Write(n MOD 2);
      END;
END;
```

Example Python

```
def X(n):
   if (n == 0) or (n == 1):
      print(n, end="")
   else:
      X(n // 2)
      print(n % 2, end="")
```

Mark as follows:
Procedure heading & ending
Boolean expression
correctly grouped statements within ELSE
recursive call
Using DIV and MOD correctly **[5]**

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