CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the October/November 2015 series

9608 COMPUTER SCIENCE

9608/42 Paper 4 (Written Paper), maximum raw mark 75

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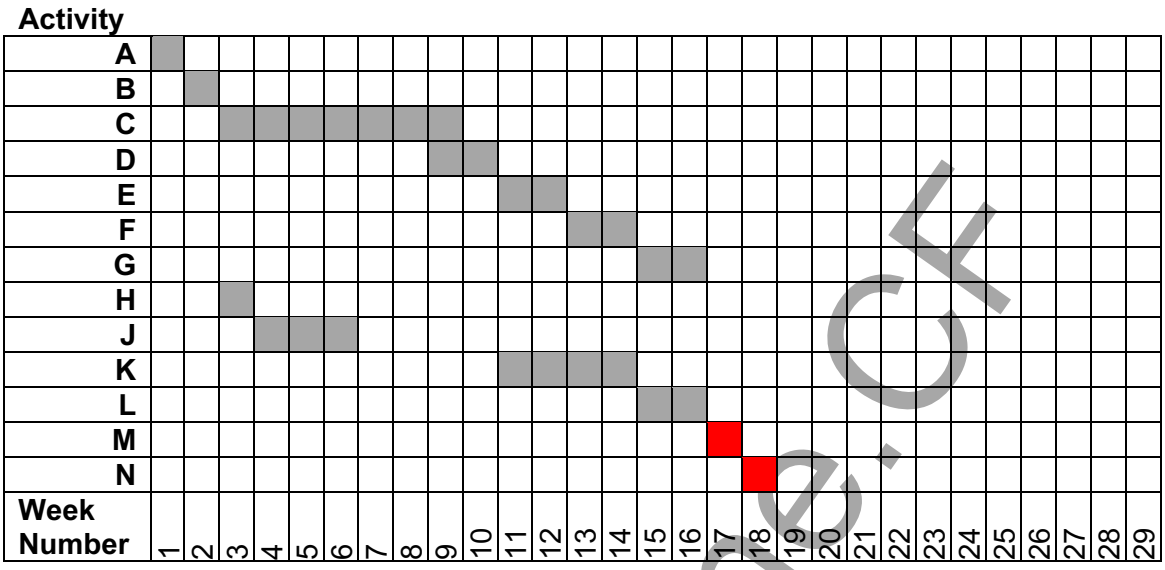
CAMBRIDGE
International Examinations

1 (a) (i)



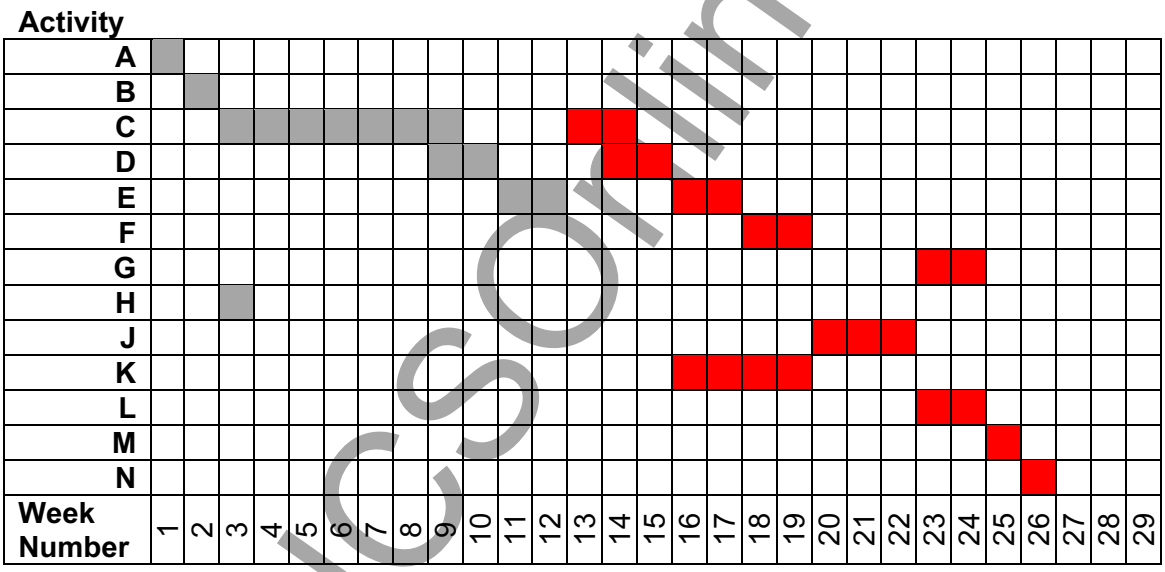
1 mark for each square [2]

(ii) week number 18

Allow follow through [1]

(b) (i)

Activity	Description	Weeks to complete
A	Write requirement specification	1
B	Produce program design	1
C	Write module code	7
D	Module testing	2
E	Integration testing	2
F	Alpha testing	2
G	Install software and carry out acceptance testing	2
H	Research and order hardware	1
J	Install delivered hardware	3
K	Write technical documentation	4
L	Write user training guide	2
M	Train users on installed hardware and software	1
N	Sign off final system	1



1 mark per activity (but 1 mark for activity M and N)
Notes:
C must be after E (1 or 2 later is ok)
D, E, F correct relative to C
J must start in week 20 (allow 21, 22)
G must come after the end of J (f.t.)
K finishes after or at same time as F
L finishes at the same time as G **and after the end of J** (or 1-2 weeks later)
M starts **when everything else has finished**. N after or at same time as M [9]

(ii) week number: 26

Allow f.t. [1]

2 **(a)**
```
parent(ali, ahmed).
parent(meena, ahmed).
```

Accept statements in either order
Wrong capitalisation minus 1 mark [2]

(b)
```
P =
ahmed
aisha
```

Ignore capitalisation
Deduct 1 mark for every extra result [2]

(c)
```
mother(M, gina).
```

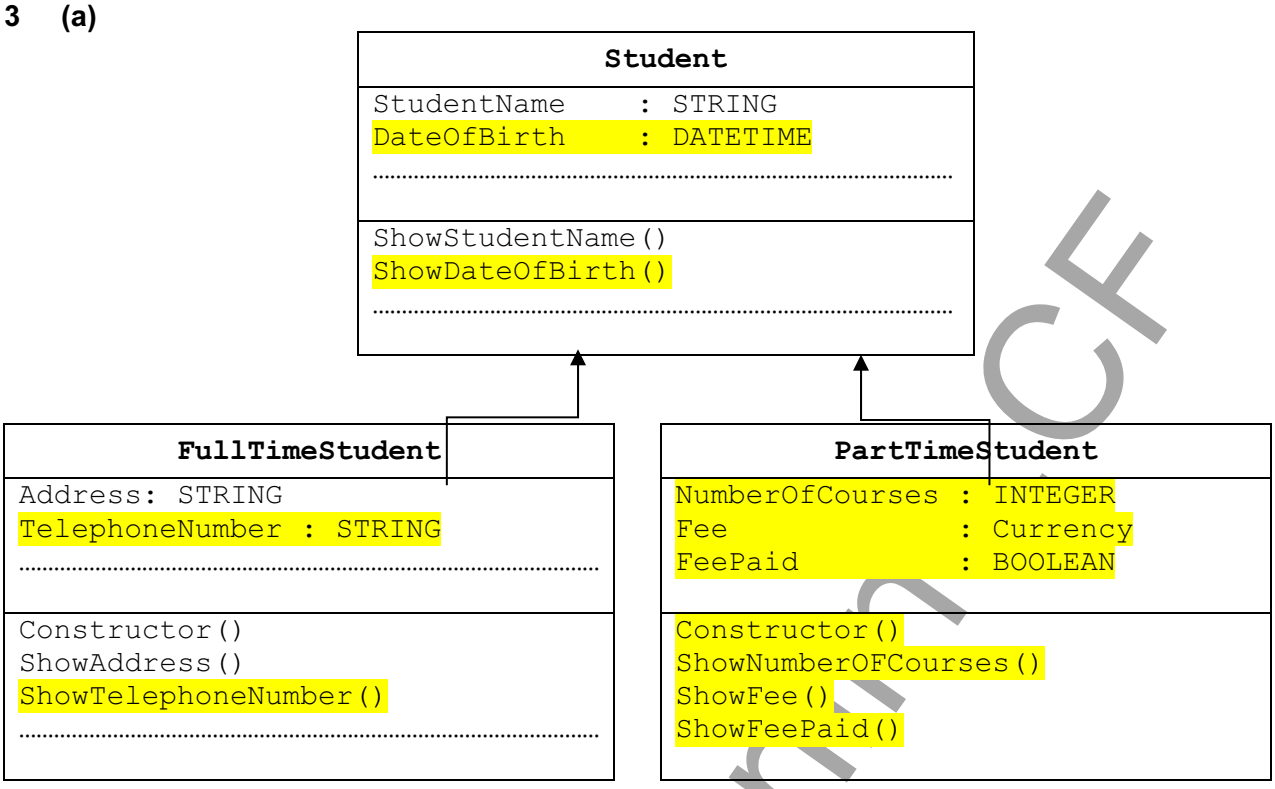
Accept `parent(M, gina) AND female(M).` Accept a comma instead of `AND`
Reject `mother(M, gina) IF female(M) AND parent(M, gina).`
Ignore capitalisation [1]

(d)
```
father(F, C)
IF
male(F) AND parent(F, C).
```
(1) (1) [2]

(e)
```
brother(X, Y)
IF
male(X)AND                    [1]
parent(A, X)  AND             [1]
parent(A, Y)                  [1]
AND NOT X=Y.                  [1]
```

Accept any variable for A, but it must be the same in both places
Accept father/mother instead of parent
Ignore capitalisation

3 (a)



Mark as follows:

Base class:
- dateOfBirth declaration and associated method in Student
- constructor

Subclasses:
- telephoneNumber declaration and associated method in FullTimeStudent
- NumberOFCourses declaration and associated method in PartTimeStudent
- fee declaration and associated method in PartTimeStudent
- feepaid declaration and associated method in PartTimeStudent
- constructor method in PartTimeStudent
- inheritance arrows

Ignore data types, ignore other methods/attributes
Ignore brackets after methods [Max 7]

(b) (i) Mark as follows (parts to be ignored in grey):

If no programming language stated, map to 1 of the 3 below (or check in Q1ai)
Class header & ending (watch out these may be squashed into the next clip)
Ignore methods
2 attributes with correct data types
No mark if subclass properties shown here
Attributes required:
StudentName
DateOfBirth (accept variations e.g. DoB)

Pascal

```
TYPE Student = CLASS
   PUBLIC
      Procedure ShowStudentName();
      Procedure ShowDateOfBirth();
   PRIVATE
      StudentName : STRING;
      DateOfBirth : TDateTime;  // accept string    reject Date
END;
```

Python

```
class Student :
    def __int__(self) :
        self.__StudentName = ""
        self.__DateOfBirth = ""  # date(1,1,2015)
    def ShowStudentName() :
        pass
    def ShowDateOfBirth() :
        pass
```

Ignore __ before attributes

VB.NET

```
Class Student
    Public Sub ShowStudentName()
    End Sub
    Public Sub ShowDateOfBirth()
    End Sub
    Private StudentName As String
    Private DateOfBirth As Date     ' accept string
End Class
```

(Ignore: must inherit)
Ignore Private/protected/public
Don't give a mark if using DIM [2]

(ii) Mark as follows:

– Class header and showing superclass
– Properties (Do not award this mark if properties from base class included here)
  Data types must be correct
– Methods (Do not award this mark if methods from base class included here)
  must show heading and ending of procedure/function declaration
  Ignore PUBLIC, PRIVATE

Pascal

```
TYPE FullTimeStudent = CLASS (Student)
   PUBLIC
      Procedure ShowAddress();
      Procedure ShowTelephoneNumber();
   PRIVATE
      Address         : STRING;
      TelephoneNumber : STRING; // reject integer
END;
```

Python

```
class FullTimeStudent(Student) :
    def __init__(self) :
        self.__Address = ""
        self.__TelephoneNumber = ""
    def ShowAddress() :
        pass
    def ShowTelephoneNumber() :
        pass
```

VB.NET

```
Class FullTimeStudent : Inherits Student
    Public Sub ShowAddress()
    End Sub
    Public Sub ShowTelephoneNumber()
    End Sub
    Private Address As String
    Private TelephoneNumber As String  ' reject integer
End Class
```

No mark if using `DIM` [3]

(iii) 1 mark per statement to max 3
Missing string delimiters: penalise once
Accept use of constructor

Pascal

```
NewStudent := FullTimeStudent.Create;
NewStudent.StudentName := 'A.Nyone';
NewStudent.DateOfBirth := EncodeDate(1990, 11,12);//:=
'11/12/1990'
NewStudent.TelephoneNumber := '099111';
```

Alternative

```
NewStudent := FullTimeStudent.Create('A.Nyone', '12/11/1990',
'099111');
```

Python

```
NewStudent = FullTimeStudent()
NewStudent.StudentName = "A.Nyone"
NewStudent.DateOfBirth = "12/11/1990"
NewStudent.TelephoneNumber = "099111"
```

Alternative

```
NewStudent = FullTimeStudent('A.Nyone', '12/11/1990', '099111')
```

VB.NET

```
Dim NewStudent As FullTimeStudent = New FullTimeStudent()
NewStudent.StudentName = "A.Nyone"
NewStudent.DateOfBirth = #11/12/1990#
NewStudent.TelephoneNumber = "099111"
```

Alternative

```
Dim NewStudent As FullTimeStudent = New
FullTimeStudent("A.Nyone", "12/11/1990", "099111")
```

[Max 3]

4 (a)

```
FUNCTION Hash(Key : STRING) RETURNS INTEGER
DECLARE Number : INTEGER
Number ← ASCII(LEFTSTRING(Key,1))
// Number ← ASCII(Key[1])
Number ← Number - 64
RETURN Number
// Result ← Number  // Hash ← Number
ENDFUNCTION
```

Accept `ASC` instead of `ASCII`
Accept `LEFT` instead of `LEFTSTRING`
Key can be a different identifier but must be the same in both places [5]

(b) (i)

Dictionary

Index	Key	Value
1		
2		
3	Computer	Rechner
4	Disk	Platte
5	Error	Fehler
6	File	Datei
7		
8		
:	:	
:	:	
1999		
2000		

Ignore spelling mistakes
1 mark for 2 correct pairs entered in correct slots [2]

(ii) Collision / synonym / space already occupied / same index in array
Overwrites previous key-value pair

reject error [Max 2]

(iii) Create an overflow area
The 'home' record has a pointer to others with the same key // linked list
OR
Store the overflow record at the next available address …
in sequence (= next available)
OR
Re-design the hash function …. // write a different/another algorithm
to generate a wider range of indexes // enlarging storage space // to create fewer collisions [2]

(iv) Mark as follows:

Check whether slot is empty:
`IF Dictionary[Index,1] <>"" // != '' // > NULL // > NONE`
If not: update index: `THEN Index ← <some value>`
…to find an empty slot (loop / follow pointer / go to overflow area) reject FOR loop
Insert code between lines 20 and 30

```
21 WHILE Dictionary[Index,1] > ""
22   Index ← Index + 1
23   IF Index > 2000
24     THEN
25       Index ← 1
26   ENDIF
27 ENDWHILE
```
[4]

5 (a) (i)

Accumulator	Memory Address 509	510	511	512
0	7	3	0	0
7				7
0				
1			1	
7				
14				14
1				
2			2	
14				
21				21
2				
3			3	
3 marks			*1 mark*	*1 mark*

If values changed in column 509 or 510 don't give marks for 511/512 [5]

(ii) stores the counter value for …./// acts as a control variable/counter
How many times the loop has been performed // control the loop

Ignore re-stating the steps [2]

(b) LDM #12 (must be instruction before storage)
STO 509 (must be final instruction)

1 mark for each instruction [2]

6 (a) 1 mark for structure header/ending
1 mark for each field correct, take away 1 mark for additional fields
Python answers will use a class

Pascal

```
TYPE StockItem = RECORD
   ProductCode     : String;   // accept integer
   Price           : Currency; // accept real
   NumberInStock   : Integer;
END;
```

Python

```
class StockItem :
    def __init__(self) :
        self.ProductCode = ""     # = 0
        self.Price = 0.0          # = 0
        self.NumberInStock = 0
```

VB.NET

```
STRUCTURE StockItem
    Dim ProductCode As String     ' accept integer
    Dim Price As Decimal          ' Double/single
    Dim NumberInStock As Integer
END STRUCTURE
```

VB6

```
Type StockItem
    ProductCode As String     ' accept integer
    Price As Currency         ' Double/single
    NumberInStock As Integer
END Type
```

[4]

(b) (i)
```
01 TRY
02    OPENFILE "StockFile" FOR READ/RANDOM   // ignore "
03 EXCEPT
04    OUTPUT "File does not exist"
05 ENDTRY
```
[2]

(ii) (Line 01) alerts system to check for possible run-time errors (exception)
(Lines 03, 04) handle the exception without the program crashing // keeps program running// provide alternative statements to execute to avoid run-time error

Accept "exception handling" for 1 mark [Max 2]

(c)
```
WHILE NOT EOF("StockFile")
   READFILE "StockFile", ThisStockItem // accept reading separate
fields
   OUTPUT ThisStockItem.ProductCode
   OUTPUT ThisStockItem.NumberInStock
ENDWHILE
```

1 mark for loop (accept REPEAT)
1 mark for EOF("StockFile") // StockFile.Peek <> -1 / NONE/"
1 mark for READ record
1 mark for OUTPUT of 2 fields

Ignore opening and closing file [4]