CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the May/June 2015 series

9691 COMPUTING

9691/31 Paper 3 (Written Paper), maximum raw mark 90

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1 (a) (i) The table has a repeated group of attributes **[1]**

(ii) ClassName and ClassLevel and ClassLeader is repeated for each MemberNo **[1]**

(b) (i)

MemberNo	MemberType	Trainer
510	SF	SAF
808	SS	OLO
756	J	DAV

[1]

(ii)

MemberNo	ClassName	ClassLevel	Trainer
510	Yoga B	B	OLO
808	Swimathon	A	ROG
756	Circuits	I	VAR

Any three correct rows from the original table

All 3 correct – 2 marks

2 correct – 1 mark

1 correct only scores 0

[2]

(iii) 8 **[1]**

(iv) One to many // 1-to-M **[1]**

(v) Primary key / MemberNo in the MEMBER table (1)
Links to foreign key in the MEMBERCLASSES table (1) **[2]**

(c) (i) MemberNo + ClassName **[1]**

(ii) There are a non-key attribute(s) dependant on only part of the primary key // there are partial dependencies (1)
ClassLevel/ClassLeader is dependent on ClassName (1) **[2]**

(iii) MEMBERCLASSES(MemberNo, ClassName)

CLASS(ClassName, ClassLevel, ClassLeader)

mark as follows:
MEMBERCLASSES has only MemberNo, ClassName (1)
(ignore primary key for MEMBERCLASSES)
new table CLASS (1)
CLASS has 3 attributes ClassName, ClassLevel, ClassLeader (1)
ClassName as primary key (1)

[Max 3]

(d) (i) There are non-key attributes which are dependent (may be stated as part of the attribute description) // transitive dependencies (1)
MemberTypeFee is dependent on MemberType (1)
There is no need to store the MemberTypeFee in the MEMBER table (1)

[Max 2]

(ii) MEMBER(MemberNo, MemberType, Trainer) (1)
FEES(MemberType, MemberTypeFee) (1) **[2]**

[Total: 19]

2 (a) Alternatives // OR **[1]**

(b) Rule 2 (1)
The rule is defined in terms of itself / calls itself (1) **[2]**

(c) (i) Valid (1)
All five rules are used once only (1) **[2]**

(ii) Invalid (1)
5, 3 // 3, 5 (only) (1) **[2]**

(iii) Valid (1)

Rule 1 – three times

Rule 2 – three times

Rule 3 – once

Rule 4 – once

Rule 5 – at least once (1) **[2]**

(iv)

5	`<Packet> ::= <Start><String><Stop> | <Start><HashString><Stop>`
6	`<Hash> ::= #`
7	`<HashString> ::= <Hash>|<Hash><HashString>`

Mark as follows:

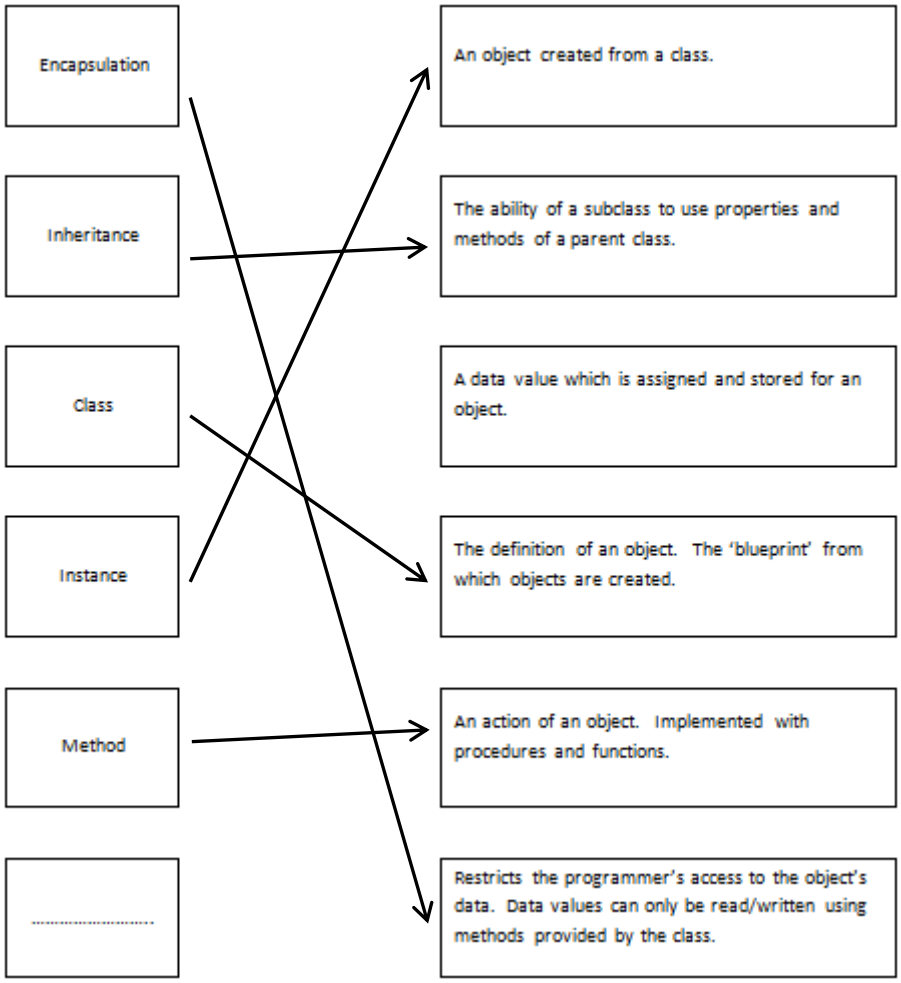
```
<Hash> ::= #                                                    (1)

<HashString> ::= <Hash>|<HashString><Hash>                      (1)

<Packet> ::= <Start><String><Stop> |
                  <Start><HashString><Stop>                     (1)  [3]
```

[Total: 12]

3 (a)



Each term matched to its correct description × 5 (5)
Missing term – Property / **A.** Attribute (1) **[6]**

(b) The class diagram includes:

`PERMANENT + CONTRACT` subclasses (1)

`PROGRAMMER + WEBDESIGNER` subclasses of `PERMANENT` and no other subclasses (1)

Note: for the two above marks – correct class names only

Recognised notation for inheritance (from `CONTRACT` and `PERMANENT` only) (1)

Note: property/group of properties cannot be repeated in any subclasses

`EMPLOYEE` class	`DateFirstJoined : DATE/STRING`	(1)
`PERMANENT` class	`SalaryGrade : STRING/INTEGER/CHAR`	
	`CourseList : STRING`	(1)
`WEBDESIGNER` class	`MarkupLanguage : STRING`	(1)
`PROGRAMMER` class	`Language : STRING`	(1)
`CONTRACT` class	`AgencyName : STRING`	
	`HourlyRate : REAL/CURRENCY`	(1)
	`JobRole : STRING`	

[8]

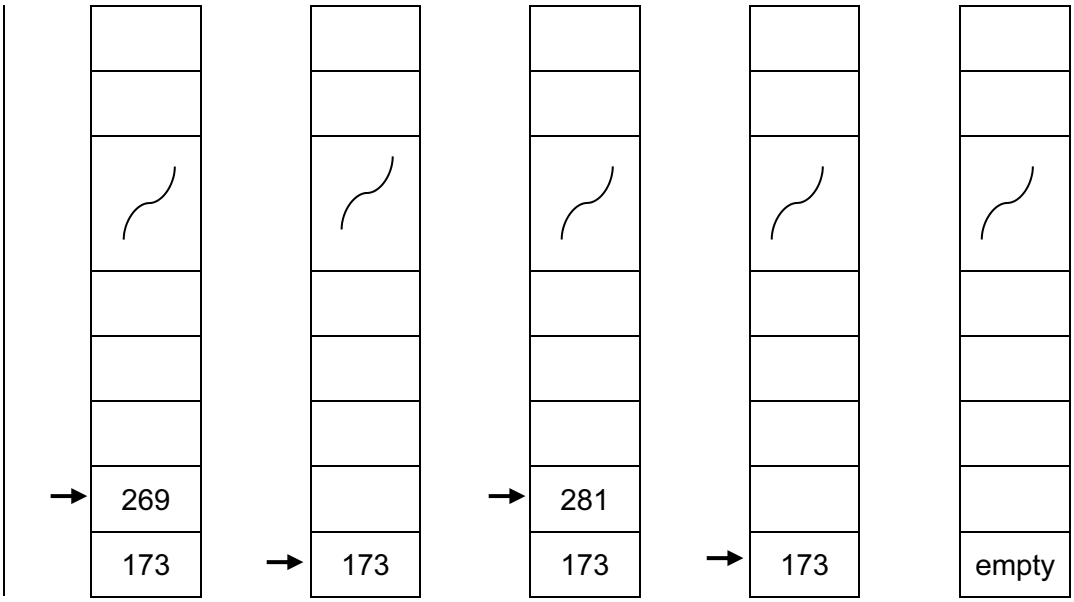
Note: accept any reasonable variations for the property identifiers

[Total: 14]

4 (a) Last item in is the first item out // First item in is the last item out **[1]**

R. LIFO

(b) (i)



Mark as follows:
1 mark per correct change × 5
Note: Final 'empty' contents is conditional on one value only in the previous stack
1 mark for consistent TOS pointing to 'their' stack contents (allow omitted from final stack)

[Max 5]

(ii)
```
PROCEDURE PushAddress
  IF TOS = 100
    THEN
      OUTPUT "Stack/memory is FULL"                    (1)
    ELSE
      INPUT NewAddress                                 (1)
      TOS ← TOS + 1                                    (1)
      Stack[TOS] ← NewAddress                          (1)
  ENDIF
ENDPROCEDURE                                           [4]
```

(c)

```
PROCEDURE PopAddress
  IF TOS = 0 // TOS < 1                                    (1)
    THEN
          OUTPUT "There are no current procedure calls"
    ELSE
      OUTPUT "Address " Stack[TOS]
      TOS ← TOS – 1                                        (1)
  ENDIF
ENDPROCEDURE
```

[2]

[Total: 12]

5 (a) (i) 111 (1)
6F (1) **[2]**

(ii) -29 (1)
E3 (1) **[2]**

(b) -128 **[1]**

(c) Fewer digits used to represent any number // long string difficult to interpret (1)

Less likely to make a mistake <u>when copying/converting</u> a digit string (1)

Easy to convert from binary/denary to hex (vice versa) (than binary to denary) (1)

[Max 1]

(d)

124	0	1	1	1	1	1	0	0
7	0	0	0	0	0	1	1	1
	1	0	0	0	0	0	1	1

+

124 and 7 correct pattern (1)
Correct addition // ft (1)

Overflow has occurred // the answer should be 131/their 'ft' value is outside the possible range // the final pattern is a negative value (1) **[3]**

(e) (i) `9837` **[1]**

(Exact – with no additional characters)

(ii) `1101` is not a valid BCD digit string // `1101` represents 13 **[1]**

[Total: 11]

6 (a) Systems flowchart **[1]**

(b)
- 1 – Source code in language XYZ
- 2 – Text editor
- 3 – Source code in assembly language
- 4 – Error report
- 5 – Program library code
- 6 – Linker
- 7 – Loader **[7]**

(c) Benefit:

Interpreter makes for easier debugging // better diagnostics (1)

Testing can be done without all the code being written (1)

(Max 1)

Drawback:

Interpreter needed/source code always present every time program execution attempted (1)

Execution will be slower (1)

(Max 1)

[2]

[Total: 10]

7 (a) • Twisted pair

Two copper wires insulated from each other and twisted together

• Coaxial cable

Central copper wire shielded from outer metal mesh

• Optical fibre

Glass strands to send light/optical signals

• Electro-magnetic / long wavelength communication

radio waves /microwave // satellite communication // mast relays
'wireless' but not in the context of WiFi

2 × (Name – 1 mark + Description – 1 mark)

[Max 4]

(b) Mark as follows:

End terminator for the LAN cable X 2	(1)
C4 computer + Laser printer connected to the cable	(1)
File server labelled Server Y connected to the cable	(1)
Firewall / Proxy server + Indication of a connection to the WAN/other shop	(1)
Router at Shop A / Shop B / Shop C's LAN to connect to the WAN/other shop	(1)
Modem + Indication of a connection to the WAN/other shop	(1)

[Max 4]

(c) (i) Web server **[1]**

(ii) (Web) browser **[1]**

(iii) Information being communicated may be sensitive/confidential/secure // needs protection from being seen by unauthorised people // content only available within the organisation
Good control of who can access/update the content
Information on system will be relevant/accurate/reliable

Should reduce paperwork

Presents information using a familiar interface/browser software // Provides web server content to client computers

Intranet uses the same communication protocols as the Internet

[Max 2]

[Total: 12]