

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the May/June 2015 series

9691 COMPUTING

9691/32

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]

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(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]

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(iv)

5	$\langle \text{Packet} \rangle ::= \langle \text{Start} \rangle \langle \text{String} \rangle \langle \text{Stop} \rangle \mid \langle \text{Start} \rangle \langle \text{HashString} \rangle \langle \text{Stop} \rangle$
6	$\langle \text{Hash} \rangle ::= \#$
7	$\langle \text{HashString} \rangle ::= \langle \text{Hash} \rangle \mid \langle \text{Hash} \rangle \langle \text{HashString} \rangle$

Mark as follows:

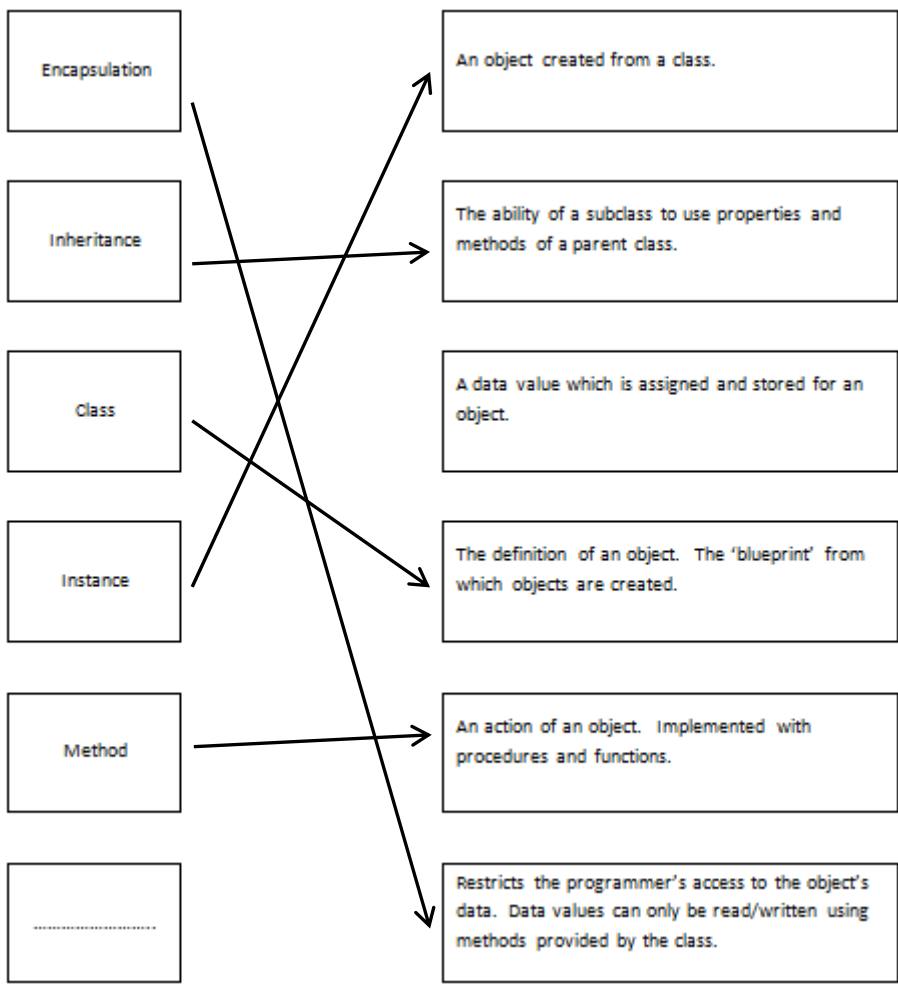
$\langle \text{Hash} \rangle ::= \#$ (1)

$\langle \text{HashString} \rangle ::= \langle \text{Hash} \rangle \mid \langle \text{HashString} \rangle \langle \text{Hash} \rangle$ (1)

$\langle \text{Packet} \rangle ::= \langle \text{Start} \rangle \langle \text{String} \rangle \langle \text{Stop} \rangle \mid \langle \text{Start} \rangle \langle \text{HashString} \rangle \langle \text{Stop} \rangle$ (1) [3]

[Total: 12]

3 (a)



Each term matched to its correct description × 5
 Missing term – Property / **A.** Attribute

(5)
 (1) **[6]**

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(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

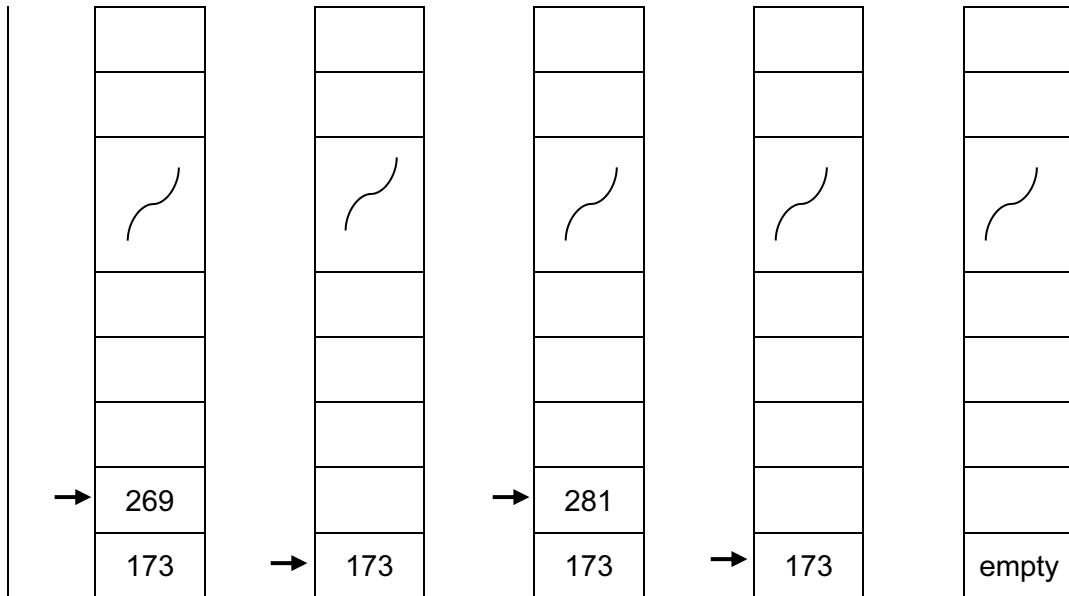
[Total: 14]

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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 \times 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 \leftarrow TOS + 1 (1)

Stack[TOS] \leftarrow NewAddress (1)

ENDIF

ENDPROCEDURE

[4]

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(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]

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- 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 when copying/converting 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]

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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]

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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]