CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE 9608/01
Paper 1 Theory Fundamentals
SPECIMEN MARK SCHEME

For Examination from 2015

1 hour 30 minutes

MAXIMUM MARK: 75
1 (a) (i) The table/each student has a repeated group of attributes. // Each student has a number of subjects. [1]

(ii) StudentName, TutorGroup and Tutor would need to be repeated for each record. [1]

(b) Table: Student

<table>
<thead>
<tr>
<th>StudentName</th>
<th>TutorGroup</th>
<th>Tutor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom</td>
<td>6</td>
<td>SAN</td>
</tr>
<tr>
<td>Joe</td>
<td>7</td>
<td>MEB</td>
</tr>
<tr>
<td>Samir</td>
<td>6</td>
<td>SAN</td>
</tr>
</tbody>
</table>

Table: StudentSubjectChoices

<table>
<thead>
<tr>
<th>Student Name</th>
<th>Subject</th>
<th>Level</th>
<th>Subject Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom</td>
<td>Physics</td>
<td>A</td>
<td>SAN</td>
</tr>
<tr>
<td>Tom</td>
<td>Chemistry</td>
<td>A</td>
<td>MEB</td>
</tr>
<tr>
<td>Tom</td>
<td>General Studies</td>
<td>AS</td>
<td>DIL</td>
</tr>
<tr>
<td>Joe</td>
<td>Geography</td>
<td>AS</td>
<td>ROG</td>
</tr>
<tr>
<td>Joe</td>
<td>French</td>
<td>AS</td>
<td>HEN</td>
</tr>
<tr>
<td>Samir</td>
<td>Computer Science</td>
<td>A</td>
<td>VAR</td>
</tr>
<tr>
<td>Samir</td>
<td>Chemistry</td>
<td>A</td>
<td>MEB</td>
</tr>
<tr>
<td>Samir</td>
<td>Maths</td>
<td>A</td>
<td>COR</td>
</tr>
<tr>
<td>Samir</td>
<td>General Studies</td>
<td>A</td>
<td>DIL</td>
</tr>
</tbody>
</table>

Mark as follows:
- complete Student table [1]
- repetition of StudentName in StudentSubjectChoices table [1]
- complete columns 2, 3, and 4 [1]

(c) (i) primary key...
- an attribute/combination of attributes
- chosen to ensure that the records in a table are unique // used to identify a record/tuple [2]

(ii) StudentName + Subject (This is the only correct answer.) [1]

(iii) There is a one-to-many relationship. // Student is the ‘one side’ table – StudentSubjectChoices is the ‘many side’ table.
- the primary key (attribute StudentName) in Student
- links to StudentName in the StudentSubjectChoices table
- (StudentName in the) StudentSubjectChoices table is the foreign key. // StudentName is the foreign key that links the two tables. [max 2]

(d) there are non-key attributes...
- SubjectTeacher ...
- dependent only on part of the primary key (i.e. Subject) // partial dependency [max 2]

(e) there are dependent non-key attributes // there are non-key dependencies
- TutorGroup is dependent on Tutor // Tutor is dependent on TutorGroup [2]

[Total: 14]
2 (a) - type of parity (odd or even) is agreed by both devices concerned with the communication
- transmitting device counts number of 1 bits in the byte
- one bit is reserved for parity bit
- this parity bit is set to 1 or 0 in order to make the number of 1s in the byte an odd or even number dependent on what type of parity is used
- receiving device on receipt of byte counts number of 1s
- …odd number of 1s in even parity gives an error
  /even number of 1s in odd parity gives error
(1 mark per -, max 3)

(b) - odd parity is used
- byte number 5 has an even number of 1s therefore an error
- column 4 has an even number of 1s
- therefore the 0 in row 5, column 4 needs to be changed to 1
(1 mark per -, max 3)

[Total: 6]

3 (a) 

<table>
<thead>
<tr>
<th>LDD 105</th>
<th>Main memory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 0100 0000</td>
</tr>
<tr>
<td></td>
<td>101 0110 1011</td>
</tr>
<tr>
<td></td>
<td>102 1111 1110</td>
</tr>
<tr>
<td></td>
<td>103 1111 1010</td>
</tr>
<tr>
<td></td>
<td>104 0101 1101</td>
</tr>
<tr>
<td></td>
<td>105 0001 0001</td>
</tr>
<tr>
<td></td>
<td>106 1010 1000</td>
</tr>
<tr>
<td></td>
<td>107 1100 0001</td>
</tr>
<tr>
<td></td>
<td>200 1001 1111</td>
</tr>
</tbody>
</table>

Mark as follows:
- sensible annotation which makes clear 105 is the address used
- final value in Accumulator

[2]
(b) LDX 101

Accumulator

0101 1101

Index Register

0000 0011

Mark as follows:
- IR contents converted to 3
- computed address of 101 + 3 = 104
  // explanation: add contents of IR to address part of instruction
- then, ‘direct addressing’ to 104
- final value in Accumulator [max 4]

(c)

<table>
<thead>
<tr>
<th>Accumulator</th>
<th>Memory Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>507 508 509 510</td>
</tr>
<tr>
<td>23</td>
<td></td>
</tr>
<tr>
<td>170</td>
<td></td>
</tr>
<tr>
<td>171</td>
<td></td>
</tr>
</tbody>
</table>

Mark as follows:
- 22 to Accumulator
- incremented to 23
- 23 copied to address 509
- 170 copied to Accumulator and incremented to 171
- 171 in address 510 [5]

[Total: 11]
4  (a)  lines 10 – 35

(b)  (i)  myWeight – myHeight – myBMI
    case must be correct – any 2 of 3
    (ii)  Line Number 21 – 33

(c)  (i)  prompts the user for input
    assigns the input to the given variable
    (ii)  displays the text shown
    in a dialogue box with the alert symbol

(d)  router

(e)  F – G – B – A – C

(f)  The browser will have an interpreter to execute the JavaScript code.

(g)  The browser loads the page from the local hard drive.

[Total: 16]

5  (a)  (i)  1001 0110
    (ii)  9C

(b)  height: 205 pixels
    width: 156 pixels

(c)  (i)  1 bit
    (ii)  Each colour is represented by a number.
    1 byte makes possible 256 different numbers/colours.
    (iii)  the header
    the resolution

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[Turn over
(iv) A bitmap may contain the same sequence of pixels (i.e. a pattern) repeated many times / may contain the same pixel in a long sequence.

A lossless technique is designed to lose none of the original detail. / Lossless allows the original file to be re-created exactly. / Lossy may result in a loss of detail.

One lossless technique is 'run-length encoding/store the colour and the number of consecutive pixels of that colour'. JPEG and GIF file formats use RLE (i.e. a lossless technique).

Lossless techniques are founded on some form of replacement.

Lossy techniques make a decision about what parts of the image are important and then discard certain information.

[Total: 13]

6 (a) product – 3
management – 1
self – 2

3 correct = 2 marks
1 correct – 1 mark

(b) (i) Management at fault need to keep whole project staff fully informed – i.e. a MANAGEMENT issue

This could impact on the whole project – i.e. a PRODUCT issue.

JUDGEMENT of the project leader is poor.

(ii) A SELF issue – staff should be expected to keep their skills up to date. It could be the EMPLOYER is not able to move quickly into new areas of work.

(iii) This is a PUBLIC interest issue. The employee has used good JUDGEMENT in bringing the issue into open discussion.

[Total: 9]
7 (a) 

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

(1 mark for C column and 4 marks for S column) [5]

(b) It adds together two single bits/a half adder. [1]

[Total: 6]