
COMPUTER SCIENCE

9608/01

Paper 1 Theory Fundamentals

For Examination from 2015

SPECIMEN MARK SCHEME

1 hour 30 minutes

MAXIMUM MARK: 75

This document consists of 7 printed pages and 1 blank page.

- 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

| StudentName | TutorGroup | Tutor |
|-------------|------------|-------|
| Tom | 6 | SAN |
| Joe | 7 | MEB |
| Samir | 6 | SAN |

Table: StudentSubjectChoices

| Student Name | Subject | Level | Subject Teacher |
|--------------|------------------|-------|-----------------|
| Tom | Physics | A | SAN |
| Tom | Chemistry | A | MEB |
| Tom | General Studies | AS | DIL |
| Joe | Geography | AS | ROG |
| Joe | French | AS | HEN |
| Samir | Computer Science | A | VAR |
| Samir | Chemistry | A | MEB |
| Samir | Maths | A | COR |
| Samir | General Studies | A | DIL |

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) [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) [3]

[Total: 6]

3 (a)

LDD 105

Accumulator

0001 0001

| Main memory | |
|-------------|-----------|
| 100 | 0100 0000 |
| 101 | 0110 1011 |
| 102 | 1111 1110 |
| 103 | 1111 1010 |
| 104 | 0101 1101 |
| 105 | 0001 0001 |
| 106 | 1010 1000 |
| 107 | 1100 0001 |
| | |
| | |
| 200 | 1001 1111 |

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

| Main memory | |
|-------------|-----------|
| 100 | 0100 0000 |
| 101 | 0110 1011 |
| 102 | 1111 1110 |
| 103 | 1111 1010 |
| 104 | 0101 1101 |
| 105 | 0001 0001 |
| 106 | 1010 1000 |
| 107 | 1100 0001 |
| | |
| 200 | 1001 1111 |

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)

| Accumulator | Memory Address | | | |
|-------------|----------------|-----|-----|-----|
| | 507 | 508 | 509 | 510 |
| 22 | 22 | 170 | 0 | 0 |
| 23 | | | | |
| | | | 23 | |
| 170 | | | | |
| 171 | | | | |
| | | | | 171 |

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 [1]
- (b) (i) myWeight – myHeight – myBMI
case must be correct – any 2 of 3 [2]
- (ii) Line Number 21 – 33 [1]
- (c) (i) prompts the user for input [1]
assigns the input to the given variable [1]
- (ii) displays the text shown [1]
in a dialogue box with the alert symbol [1]
- (d) router [1]
- (e) F – G – B – A – C [5]
- (f) The browser will have an interpreter to execute the JavaScript code. [1]
- (g) The browser loads the page from the local hard drive. [1]

[Total: 16]

- 5 (a) (i) 1001 0110 [1]
- (ii) 9C [1]
- (b) height: 205 pixels [1]
width: 156 pixels [1]
- (c) (i) 1 bit [1]
- (ii) Each colour is represented by a number. [1]
1 byte makes possible 256 different numbers/colours. [1]
- (iii) the header [1]
the resolution [1]

- (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. [1]

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. [1]

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). [1]

Lossless techniques are founded on some form of replacement. [1]

Lossy techniques make a decision about what parts of the image are important and then discard certain information. [1]

[max 4]

[Total: 13]

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

3 correct = 2 marks

1 correct – 1 mark

[2]

- (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. [3]

- (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. [2]

- (iii) This is a PUBLIC interest issue. The employee has used good JUDGEMENT in bringing the issue into open discussion. [2]

[Total: 9]

7 (a)

| A | B | C | S |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

(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]

