Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/13**

Paper 1 Written Paper **May/June 2016**

MARK SCHEME

Maximum Mark: 75

Published

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1 **Four** from: **[4]**

- Compiler creates an executable//an interpreter does not create an executable.
- The compiled program can be independently distributed.
- Compiler reports all errors at the end of compilation//an interpreter stops when it reaches an error.
- Interpreter executes each statement immediately after decoding/checking it//a compiler checks the whole program for errors.
- The interpreter software/source code must be present in main memory every time the program is executed//the compiled program does not require compiler/source code to be present.
- Cross-compilation is possible/compile on one hardware platform to run on another.

2 **(a)** 77 **[1]**

(b) 1000 0010 **[1]**

(c) −53 **[2]**

One mark for '**53**' and **one** mark for '**–**'

(d) C6 **[2]**

One mark for the answer, <u>one</u> mark for the method

- Working e.g. 198 / 16 = 12, 198 − (12*16) = 6

3 **(a)** **Two** from: **[2]**

- The source code comes with the software.
- The user can edit the source code.
- Once edited, the software is re-distributed with the changes.

(b) **Two** from: **[2]**

- The software is purchased.
- With a **<u>licence</u>** which restricts the number of users / possible time period for use.
- The program code for the software cannot be edited.

(c) **Four** from**:** **[4]**

- Support / training is readily available so help can be accessed if needed.
- More robust software / fewer bugs as it has been tested more thoroughly/by more users.
- Forums / user groups will exist for popular software.
- Software upgrade path likely to be available (at minimal cost).
- Manufacturer develops patches that can be automatically downloaded.
- Compatibility is inbuilt for other commercial software.

4 (a) 11001110 **[1]**

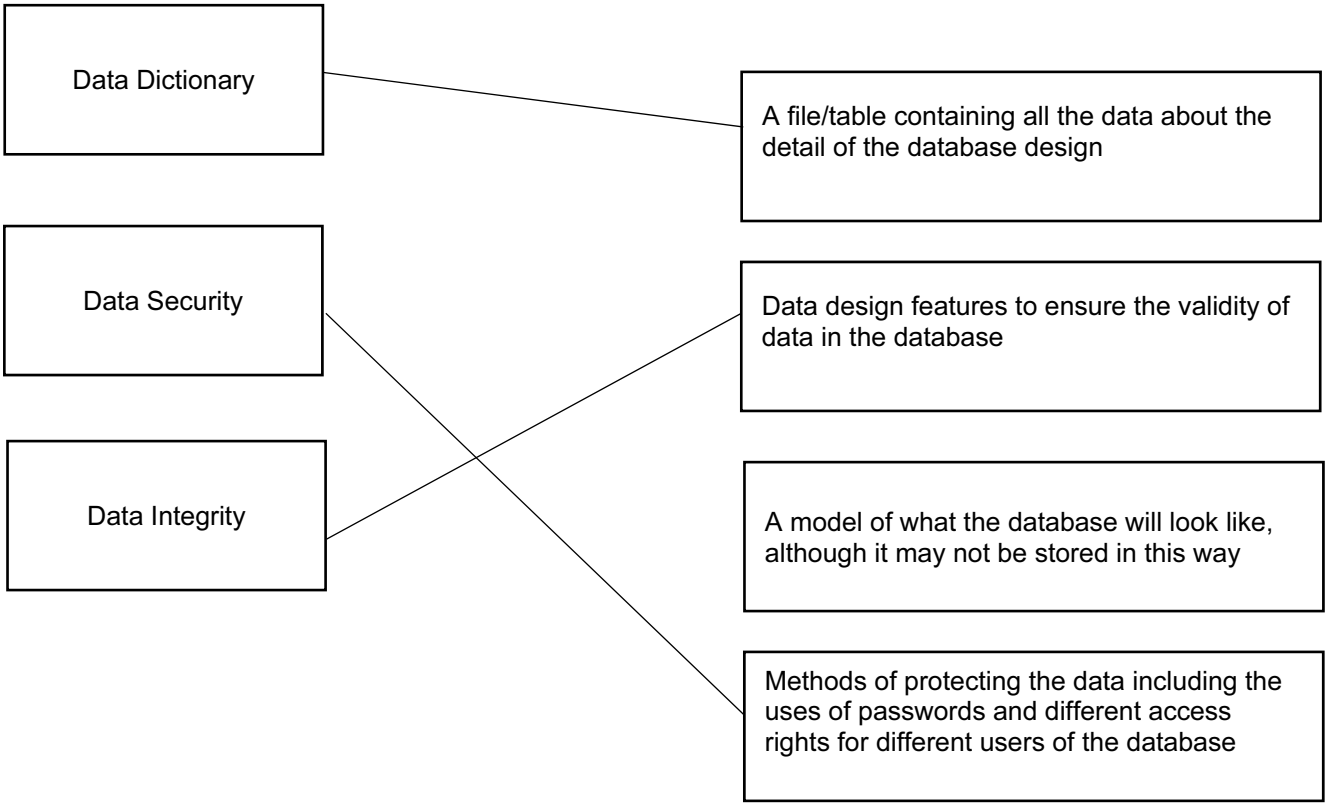
(b) **[7]**

Instruction	Working space	ACC	Memory address				IX	OUTPUT
			90	91	92	93		
			2	90	55	34	2	
20		55						
21		54						
22			54					
23							3	
24		34						
25		33						
26								
27								
28								
31		67						
32						67		
33								'C'
34								

One mark each for:

- Instruction 20
- Instructions 21 and 22
- Instruction 23
- Instructions 24 and 25
- Not executing instructions 29 and 30
- Instructions 31 and 32
- Correct output

5 (a) One mark for each correct line. **[3]**



(b) One mark for procedure point, **one mark** for justification**.** **[6]**

Maximum **three** procedures.

- How often should the data be backed up? e.g. at the end of each day
- Justification e.g. student's progress may be edited each day and should not be lost

- What medium should the data be backed up to? e.g. external hard disk drive
- Justification e.g. it has large enough capacity

- Where should the backups be stored? e.g. off-site
- Justification e.g. so if the building is damaged only the original data are lost

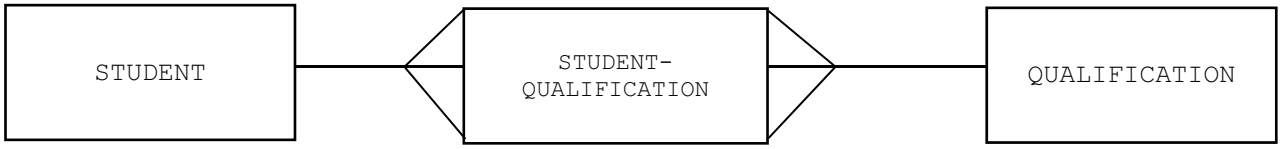
- What is backed up? e.g. only updated files ...
- Justification e.g. There are a large number of files and they are not all updated each day

- When should the backup take place? e.g. overnight
- Justification e.g. the system is not likely to be used then

- Who is responsible for performing the backup?
- Justification e.g. otherwise it may not be done

- Make sure the procedure is written down and understood by staff
- Justification e.g. otherwise some data may not be backed up

(c) (i) **One mark** for each correct relationship. **[2]**



(ii) **One-to-many** **[1]**

(iii) **Two** points from: **[2]**

- The primary key in the QUALIFICATION table is QualCode.
- The foreign key in the STUDENT-QUALIFICATION table is QualCode.
- The primary key of QUALIFICATION is also included in QualCode.

(d) (i) **One mark** per statement. Several statements may be on one line. **[2]**

```
ALTER TABLE STUDENT
ADD DateOfBirth DATE;
```

(ii) **One mark** per statement. Several statements may be on one line. **[3]**

```
SELECT StudentID, Grade, DateOfAward
FROM STUDENT-QUALIFICATION
WHERE QualCode = 'SC12';
```

(iii) **One mark** per statement. Several statements may be on one line. **[4]**

```
SELECT STUDENT.FirstName, STUDENT.LastName, STUDENT-
   QUALIFICATION.QualCode
FROM STUDENT, STUDENT-QUALIFICATION
WHERE STUDENT-QUALIFICATION.Grade = 'A'
AND STUDENT.StudentID = STUDENT-QUALIFICATION.StudentID;
```

Alternative answer:

```
SELECT FirstName, LastName, STUDENT-QUALIFICATION.QualCode
FROM STUDENT, INNER JOIN STUDENT-QUALIFICATION
ON STUDENT.StudentID = STUDENT-QUALIFICATION.StudentID
WHERE Grade = 'A';
```

6 (a) Two from: **[2]**

- WWW is a collection of interlinked, hypertext documents/webpages/multimedia resources (accessed via the Internet) //WWW is content from web servers organised as web pages
- Internet is the global connection of interconnected computer networks
- The Internet uses TCP/IP protocol / WWW uses http protocols to transmit data

(b) **[5]**

Description	Fibre-Optic cables	Copper cables	Radio waves
'Wireless' media			✓
Twisted-pair is an example		✓	
Uses light waves	✓		
WiFi			✓
Fastest transmission media	✓		

(c) One pair from: **[2]**

- Real-time - a live stream of an event that is currently taking place
- On-demand - streaming of an event/programme that has taken place in the past

- Real time – the event is captured live with a video camera connected to a computer
- On-demand – Existing media are encoded to bit streaming format and uploaded to a server

- Real-time – cannot be paused / rewound etc
- On-demand – can be paused / re-wound / fast forwarded etc

(d) Two marks for description, **one mark** for correct example. **[3]**

- Four numbers separated with '.'
- Each number is between 0 and 255 / 00 and FF in Hex / stored in one byte.
- 32 bits long
- Correct example

(e) **Four** from: **[4]**

- URL is a reference address to a resource on the Internet.
- The URL is passed to the nearest Domain Name Server (by browser software).
- DNS server stores a database / list of URLs and matching IP addresses.
- DNS (Name Resolver) looks for the URL in its database.
- Finds the matching IP address and returns it to the originator.
- Or if it cannot find it, it forwards to another Domain Name Server at a higher level.
- (Original) DNS server adds the returned IP address to its cache.
- (Original) DNS server returns the IP address to the browser.

7 **(a)** **Four** from: **[4]**

- Security is keeping the data safe.
- Integrity is making sure that the data is correct / valid.
- Security is the prevention of data loss.
- Integrity ensures that the data received is the same as the data sent / data copied is the same as the original.
- Example of ensuring security, e.g. usernames and passwords, firewalls etc...
- Example of ensuring integrity, e.g. parity checks, double entry etc...

(b) **Three pairs** from: **[6]**

- Installing a firewall and ensuring it is switched on.
- To stop unauthorised access / hackers gaining access to the bank's computer network.

- Use authentication methods such as passwords and usernames.
- Passwords should be strong / biometrics.

- Encrypt the data.
- So that if data is accessed it will be meaningless / only accessed by those with decryption key.

- Set up access rights...
- To stop users reading/editing data they are not permitted to access.

- Installing and running an up to date anti-malware program (anti-virus/anti-spyware etc.).
- To detect / remove / quarantine viruses / key-loggers etc.

- Make regular backups of the data.
- To separate device or off site to enable recovery if necessary.

- Employ measures for physical security.
- Example of a measure for physical security.