

DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2012

Trace

FORM 4 (Option)

COMPUTING

TIME: 1h 30min

Name: _____

Class: _____

Directions to Candidates:

*Answer **ALL** questions in **Section A** and **Section B** on this paper;
The use of flow chart template is permitted;
Calculators are **NOT** allowed;
Good English and orderly presentation are important.*

For office use only:

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	Paper Total	Course Work	Final Mark
Max	5	5	5	5	5	5	5	5	5	5	5	15	15	85%	15%	100%
Mark																

Section A – Answer ALL Questions

1. **Identify** the following types of software:
(The first one has been done for you)

[5]

	Question	Answer
a.	A generic term for mass-produced application software that can be readily bought.	<i>Off-the-Shelf software</i>
b.	A generic term for software that is made to suit a user's particular needs.	
c.	Software that allows us to send and receive short messages using a computer network.	
d.	A type of software used by architects, engineers etc to design their prototypes.	
e.	A type of software that a publishing company may use to edit and enhance photos.	
f.	Software responsible for managing the computer's resources.	

2. Use the following computer applications to name the tasks listed in the table below.
(The first one has been done for you)

[5]

Simulation, CAD-CAM, medical diagnosis, e-government, CAL, robotics

a.	The use of computers and educational software in education.	<i>CAL</i>
b.	The use of computers to design and manufacture cars.	
c.	The use of web-based services to download forms required in the public service.	
d.	The use of computer software and hardware to emulate and study the effects of earthquakes.	
e.	The use of monitoring machines in hospitals to diagnose back problems.	
f.	The use of computer-controlled machines that can perform high-precision jobs in a factory.	

3. **Convert:**
(Show your working clearly in the space provided)

- a. 45 to 8-bit **unsigned binary**
Space for working

[1]

Answer _____

- b. +45 to **8-bit two's complement**
Space for working

Answer _____

- c. - 45 to **8-bit two's complement**
Space for working

[2]

Answer _____

4. This question is about the range of numbers that can be represented in an 8-bit register.

- a. What is the **smallest unsigned binary number** that can be represented in an 8-bit register? [1]

- b. Give the **decimal equivalent of the largest unsigned binary number** that can be represented in an 8-bit register. [2]

- c.

The smallest two's complement number that can be represented in n bits is given by the formula: -2^{n-1} .
--

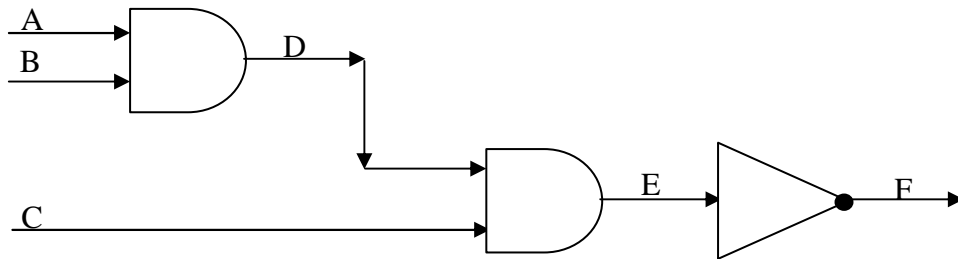
 [1]

Hence use the formula to find the **smallest two's complement** decimal number that can be represented in an 8 bit register?

- d. Explain why the largest decimal number using 8 bit register in two's complement is 127 and not 128. [1]

5. This question is about commercial applications of computers.
- Suggest **2 advantages** of e-POS (electronic point of sale).
 - _____
 - _____
 - What does **EFT** stand for? _____ [1]
 - Suggest one possible **problem** associated with EFT. _____ [1]
 - Give one more **commercial application** of computers beside e-POS. _____ [1]

6. Give the **truth table** and **Boolean expression** for the following logic circuit.



Boolean Expression _____ [2]

Truth Table

Answer: _____ [3]

A	B	C	D	E	F
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

7. The CPU is at the heart of any computer system. The speed with which it executes instructions is partly dependent on its clock speed.
- How is the **clock speed** responsible for CPU performance? _____ [1]

- b. Mention two other **CPU characteristics** that determine CPU performance and briefly describe them:

Characteristic 1	
Description	
Characteristic 2	
Description	

8. Software is tested before being distributed.

- a. One very common type of programming error is a Syntax error. [4]
Answer the following with a **True** or **False**.

		True/ False	
i.	A program that has a syntax error will run but give the wrong result.		[1]
ii.	A program that has a syntax error will not run.		[1]
iii.	A program that has a syntax error will crash while the program is running.		[1]
iv.	Forgetting a semicolon (;) at the end of a line of code generates a syntax error.		[1]

- b. **Name** the type of error that occurs when a programmer uses the wrong formula for a calculation (e.g. using the formula for area when trying to find the volume). [1]

9. A database is a structured collection of related data. [1]

- a. Suggest **one advantage** of computerizing a manual database system.

- b. Suggest four important fields in the **record structure** for a students' file in a school database. Also give their field types. [2]

Field name	Field Type

- c. Which of the above fields would you establish as the **keyfield**? Why? [2]

Field: _____

Reason: _____

10. Database files (tables) can be linked.

a. Suggest **two advantages** of linking files in databases:

- i. _____
- ii. _____

b. A DVD shop has a database system that includes the following three files (tables):

DVD File	(includes DVD details like: DVD Id, DVD name, star actor etc)
Client File	(includes Client detail like: Client Id, name, address etc)
Lending File	(includes Lending Id, DVD Id, Client Id, Date Rented, Returned)

i. Suggest **one** other field for DVD file. [1]

ii. Explain how the above three files would be **linked**. [2]

11. The following is a simple Java class that uses lejos instructions to control a robotic car.

import lejos.nxt.*;

public class roboticCar {

public static void main (String args [])

Motor.B.regulateSpeed(true);

Motor.C.regulateSpeed(true);

Motor.B.setSpeed(300);

Motor.C.setSpeed(300);

Motor.B.forward();

Motor.C.forward();

Timer.Sleep (50);

LCD.drawString("Ready", 0, 0);

Timer.Sleep (50);

}

}

a. Mention an example of the following from the above class:

i The name of this class [1]

ii. A method that is called to determine the car's speed [1]

iii. The third party class in which the sleep method is [1]

iv. A Java keyword [1]

b. How would you change the above code such that your robotic car moves forward **twice as fast**? (Correctly rewrite the line/s you would change) [1]

Section B – Answer ALL Questions

12. Below is a simple INCOMPLETE Java class that deals with the marks of a student group.

```
public class GroupMarks{
    public void enterMarks(){
        System.out.println ("ENTER MARKS");
    }
    public void viewStatistics(){
        System.out.println ("VIEW STATISTICS");
    }
    public void quitApp(){
        System.out.println ("QUITTING");
    }
    public void mainMenu(){
        int choice;
        System.out.println ("MENU");
        System.out.println ("1. Enter Marks");
        System.out.println ("2. View Statistics");
        System.out.println ("3. Quit");
        choice = Keyboard.readInt();
        switch (choice){
            case 1: {
                enterMarks();
            }
            case 2: {viewStatistics();
            }
            case 3: {quitApp();
            }
        }
    }
}
```

- a. The above switch has a shortcoming because when option 1 is chosen, options 2 and 3 are also executed, and when option 2 is chosen option 3 is executed as well. [1]

Fill in the dotted lines below to fix this problem.

```
switch (choice){
    case 1: {
        enterMarks();
        .....break;
    }
    case 2: {viewStatistics();
        .....break;
    }
    case 3: {quitApp();
    }
}
```

- b. The user may enter invalid menu options like '5' or '7'. [2]

Write down the line you would include **before** closing the switch block in order for the words 'Invalid choice' to be displayed if any number besides 1, 2 and 3 are entered by the user.

- c. The marks will be read into an array called markList. This array will be one of the properties of the class GroupMarks.

i. How would you **declare** and **assign** the array markList assuming: [2]

- marks can be whole numbers only
- the maximum number of students in a group is 25?

Space for your code

- ii. In the method enterMarks() the students' marks will be read into the array markList using a for loop. [5]

Write the code for this **loop** to enter marks into markList.

*assume any class necessary for data input is already imported
assume that if an object of this class is needed it is called input*

Space for your code

- d. **Complete** the following code such that the Menu is repeatedly displayed until the user selects 3 to exit. [2]

```
public void mainMenu(){
    int choice;

    .....

    System.out.println ("MENU");
    System.out.println ("1. Enter Marks");
    System.out.println ("2. View Statistics");
    System.out.println ("3. Quit");
    choice = (Input.nextInt());
    switch (choice){
        case 1: {
            enterMarks();
        }
        case 2: {
            viewStatistics();
        }
        case 3: {
            quitApp();
        }
    }

    .....
}
```


- e. The class below is another class in the same application. The dotted line shows incomplete instruction.

```
public class MarksApp{
    public static void main (String args[]){
        GroupMarks group1 = ..... GroupMarks();
        group1.mainMenu();
    }
}
```

- i. **Complete** the instruction so that it creates an object called group1 which is an instance of GroupMarks.

GroupMarks group1 =GroupMarks();

[1]

- ii. Explain the **function** of the following line:
group1.mainMenu();

[1]

- iii. Why is the method *main* always declared as **void**?

[1]

13. The system lifecycle is the steps involved in the development of a new computerized system.

- a. At which **steps in the system lifecycle** would you expect the following tasks to be performed? [5]

(The first one has been done for you)

	Task	Step
i.	Flowcharts for the new system are drawn up.	<i>Design of new computerized system</i>
ii.	The client's initial request is investigated to produce a report that includes the cost of the new system and the time to complete it.	
iii.	User manuals are prepared.	
iv.	Users of the old system are interviewed about its shortcomings and their expectations of a new system.	
v.	The client moves from using the old system to using the new one.	
vi.	The system is tested to make sure that invalid data is rejected without crashing the system.	

b. Answer the following:

- i. Suggest **two methods** that the system analyst uses to collect the necessary information.

Method 1

Method 2

- ii. Mention **two reasons** why system maintenance may be required

[2]

Reason 1

Reason 2

- c. Which **changeover method** would you find ideal in the following circumstances? [2]
Explain your reason for choosing that changeover method.

i.	A small school library where one librarian has to keep up with all student requests by himself.	Changeover method	
		Reason	
ii.	A banks system that deals with a lot of important transactions everyday. Here data security is a priority.	Changeover method	
		Reason	

d. **Fill in** the blanks:

[4]

Developed programs need to be very well tested for _____ before they can be distributed. The testing procedure follows a rigorous _____ that is drawn up by systems analysts.

The program is tested with _____ data – where acceptable data is input into the system to make sure it gives the correct results – and it is also tested with _____ data – which means that nonsense or unacceptable data is entered to make sure that the system gives an error statement without crashing.