Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2014

Technology

Ordinary Level

Friday, 20 June
Afternoon, 2:00 - 4:00

Section B - Core *(48 marks)*

*Answer **both** questions.*
Each question in Section B carries 24 marks.

Section C - Options *(80 marks)*

*Answer **two** of the five options presented.*
All questions in Section C carry 40 marks.

Instructions:

(a) Answer these questions in the answerbook provided.

(b) Write your examination number on the answerbook.

(c) Draw all sketches in pencil.

(d) Hand up the answerbook at the end of the examination.

Section B - Core *Answer Question 2 **and** Question 3.*

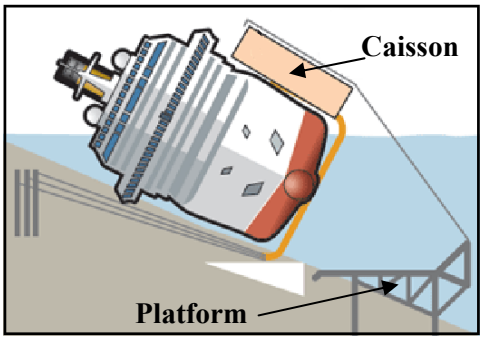
***Question 2** - Answer 2(a) **and** 2(b)*

2(a) The cruise ship *Costa Concordia* ran aground off the coast of Italy. A hydraulic pulley system was used by the rescue team when salvaging the ship.

(i) Outline **two** advantages of using a pulley system to lift very heavy objects like the Costa Concordia.

(ii) Briefly describe why it would be important for the engineers to work as a *team* in order to salvage the ship.

2(b) The graphic shows a simplified outline of the salvage operation. Before the salvage operation began 30 box-like structures called *caissons*, with a combined weight of 11,500 tonnes, were welded to the hull of the ship.



(i) Suggest **two** reasons for the use of caissons.

(ii) Name a suitable material for the manufacture of the platform. Outline **one** property of your chosen material that makes it suitable for the manufacture of the platform.

(iii) *Triangulation* is used in the construction of the platform. Discuss the importance of triangulating the platform.

*Answer 2(c) **or** 2(d)*

2(c) Technological developments such as the use of *global positioning systems* (GPS) have greatly enhanced the transport industry.

(i) Outline **two** reasons why cruise ships use GPS when navigating the seas.

(ii) Name **two** other devices in which GPS is used.

OR

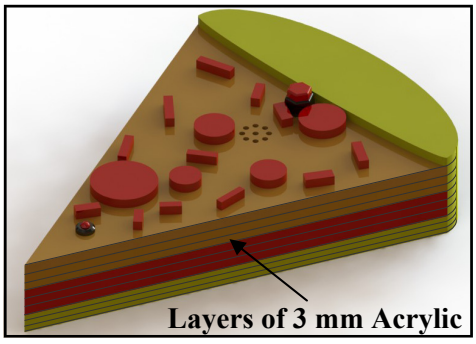
2(d) Cruise ships like the Costa Concordia can carry up to 5,000 passengers and crew.

(i) Outline **two** environmental disadvantages of cruise holidays.

(ii) Outline **one** area where technology has had a positive impact on the environment.

Question 3 *- Answer 3(a)* ***and*** *3(b)*

3(a) The graphic shows a student's timer project made from 3 mm acrylic. The student designed this project to ensure the correct timing for the cooking of pizzas.



(i) Outline **two** reasons why acrylic is suitable for the manufacture of this project.

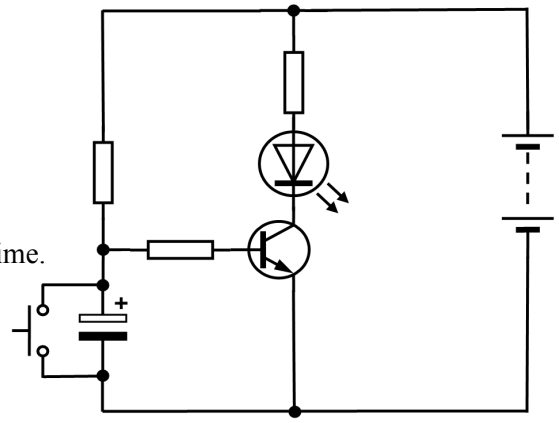
(ii) The project was designed to allow the battery be changed when necessary. Describe, using notes and sketches, a suitable method to allow access to the battery inside this project.

3(b) The circuit shown uses a *push-to-make switch*, a *transistor* and a *light emitting diode (LED).*

(i) Redraw the circuit in your answerbook and label the electronic components referred to above.

(ii) The LED is a *polarised* component. Explain what is meant by the term 'polarised'.

(iii) Show how a buzzer could be included in the circuit so that the LED and buzzer are activated at the same time.



Answer 3(c) ***or*** *3(d)*

3(c)

(i) When manufacturing the pizza timer project, all of the acrylic layers should be exactly the same size and shape. Outline how best this could be achieved.

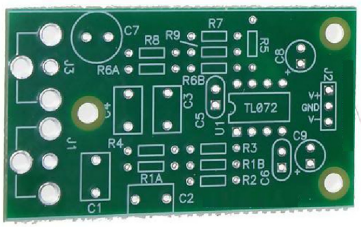
(ii) Suggest a suitable adhesive to join the acrylic layers together.

OR

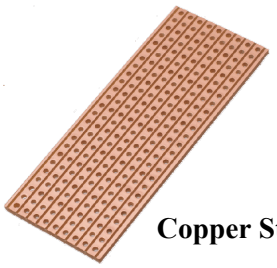
3(d) The graphics show a printed circuit board (PCB) and a copper stripboard.

(i) Outline the benefits of using a PCB rather than copper stripboard for the manufacture of the timer circuit.

(ii) State **two** safety precautions a student should observe when soldering a circuit.



PCB



Copper Stripboard

Section C - Options - *Answer **any two** of the Options*

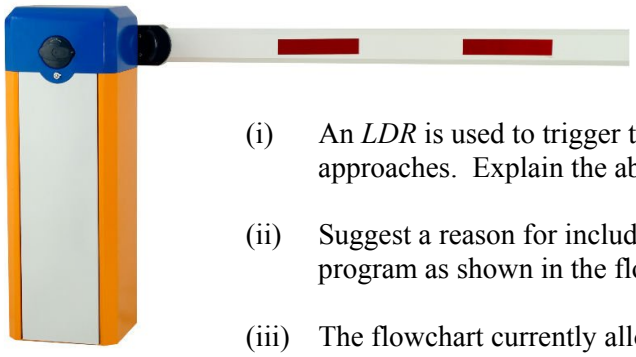
Option 1 - Applied Control Systems - *Answer 1(a) **and** 1(b)*

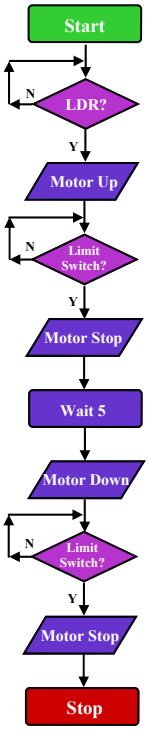
1(a) Some modern toys are both intelligent and *interactive*.

(i) Explain what is meant by the term 'interactive' in this context.

(ii) Peripheral interface control circuits (PICs) can be used to control various inputs and outputs in toys.
Suggest **three** outputs suitable for use in a toy such as the robotic dog shown.

1(b) A student has produced a simple flowchart to control an automatic vehicle barrier, similar to the one shown in the image.





(i) An *LDR* is used to trigger the barrier to raise as a vehicle approaches. Explain the abbreviation 'LDR'.

(ii) Suggest a reason for including two limit switches in the control program as shown in the flowchart.

(iii) The flowchart currently allows the barrier to open and close *once*.
Describe how a loop could be included in the flowchart to allow the barrier to reset and be used repeatedly.

*Answer 1(c) **or** 1(d)*

1(c) Unmanned aerial vehicles known as *Drones* are operated by means of an automatic programmable system or by a remote operator. There is no pilot on board.

(i) Suggest **two** possible uses of such aircraft.

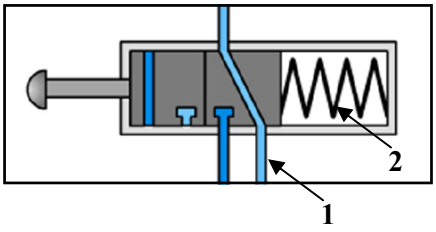
(ii) Suggest **one** advantage and **one** disadvantage of the use of such aircraft.

OR

1(d) (i) Give **one** advantage and **one** disadvantage of using pneumatics in industrial workshops.

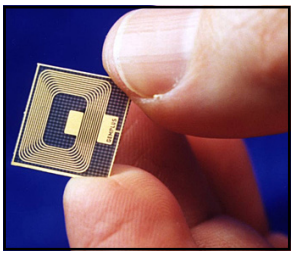
(ii) The graphic shows a 3/2 control valve used in pneumatics.

Describe the purpose of parts **1** and **2** as identified in the graphic.



Option 2 - Electronics and Control - Answer 2(a) and 2(b)

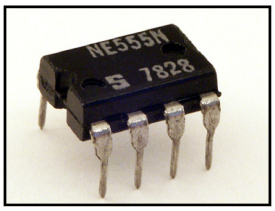
2(a) Integrated circuits (ICs) have many individual components such as transistors, diodes and capacitors etched on a tiny silicon chip. Silicon is a *semiconductor*.



(i) Explain what is meant by the term 'semiconductor'.

(ii) Outline **two** advantages of using ICs in electronic devices such as mobile phones.

2(b) The image shows a 555 timer chip. Two uses of the 555 are as a *monostable* circuit or as an *astable* circuit.



(i) Explain the terms 'monostable' and 'astable'.

(ii) Give **one** everyday use of a monostable circuit and **one** everyday use of an astable circuit.

(iii) ICs can be damaged by overheating while being soldered. Describe how this damage can be prevented.

*Answer 2(c) **or** 2(d)*

2(c) The image shows a low-cost *DC* gearbox motor widely used by students in project work.

(i) Explain what is meant by the term 'DC'.

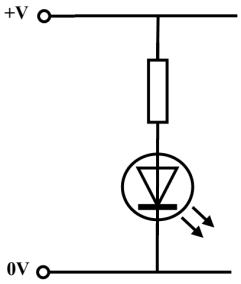
(ii) Sketch a typical motor reversal circuit that uses a double-pole double-throw (DPDT) switch to control the direction of a motor.

OR

2(d) *Multimeters* are commonly used in electronics.

(i) Outline **two** uses of a 'multimeter' in a Technology room.

(ii) The diagram shows a resistor and a light emitting diode (LED) connected in a circuit.



Using a line diagram, show how a multimeter would be connected to measure the voltage drop across the resistor in this circuit.

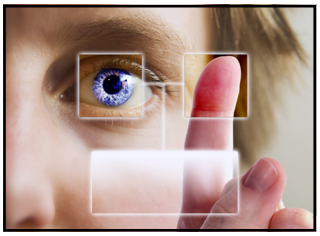
Option 3 - Information and Communications Technology - Answer 3(a) and 3(b)

3(a) The use of *computer simulation* software has many applications such as analysing weather patterns and projecting weather forecasts for the future.

(i) Explain what is meant by the term 'computer simulation'.

(ii) Suggest **two** other applications of computer simulation software in industry.

3(b) Hackers continuously try to access information about individuals and companies for their own personal gain.
One method of making personal data more secure and of limiting fraudulent activity is through the use of *biometrics,* such as fingerprint recognition when accessing this data.



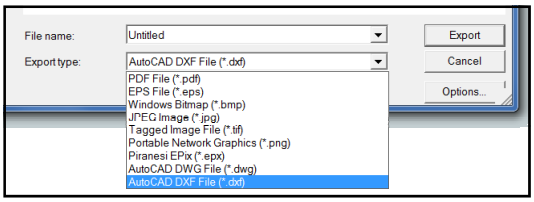
(i) Outline, using examples, what is meant by the term 'biometrics'.

(ii) Give **two** benefits for individuals or companies who use biometrics to protect their personal data.

(iii) Describe how personal data given in handwritten format could be converted to electronic format.

*Answer 3(c) **or** 3(d)*

3(c) The graphic shows the *export* command used in a computer aided design (CAD) program. This command offers users many different file formats. Some of these file formats include *.jpg* and *.dxf*.



(i) Briefly describe what is meant by the term 'export' in relation to computer files.

(ii) Give **one** example of where a '.jpg' file format and **one** example of where a '.dxf' file format could be used in project work.

OR

3(d) In recent years *wireless* technology has become increasingly popular amongst home users, allowing electronic devices to communicate with one another without the use of cables.

(i) Name **two** wireless devices commonly used in the home.

(ii) Using notes and sketches, describe how wireless devices communicate with each other in a home network.

Option 4 - Manufacturing Systems - *Answer 4(a) **and** 4(b)*

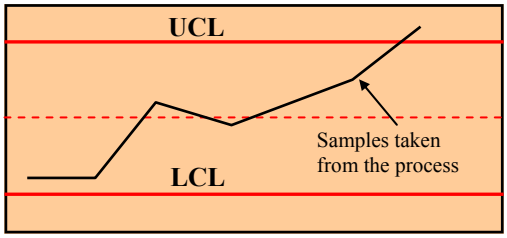
Water Sports Harness

4(a) The image shows a water sports harness. A *prototype* of the harness was made by the manufacturer prior to mass production.

(i) Explain what is meant by the term 'prototype'.

(ii) Suggest **two** benefits for a manufacturer who makes a prototype before undertaking volume production.

4(b) The graph below shows a control chart used to monitor the quality of the assembly process for a sample of water sports harnesses.



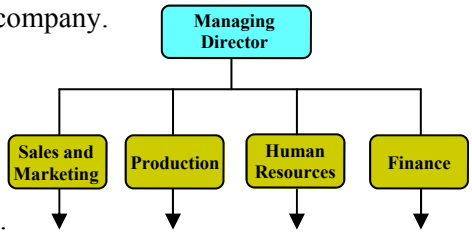
(i) Outline the role of the *upper control limit* (UCL) and the *lower control limit* (LCL) on the graph shown.

(ii) Briefly describe what the graph suggests about the quality of assembly in the harnesses sampled.

(iii) Give **one** benefit for manufacturers who collect data about the quality of their manufacturing processes.

*Answer 4(c) **or** 4(d)*

4(c) The graphic shows the organisational structure of a manufacturing company.



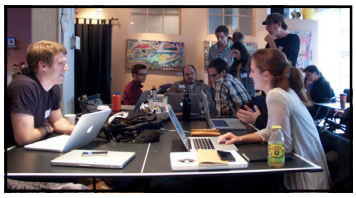
(i) Suggest **two** leadership qualities a managing director should possess to lead a company effectively.

(ii) This company has four main departments: *sales and marketing*, *production*, *human resources* and *finance*.

Briefly describe the work carried out in any **two** departments listed above.

OR

4(d) *Concurrent engineering* involves bringing a group of professionals together to work collectively on the design and manufacture of a product.



(i) Suggest **two** benefits for a company that takes this approach when designing and manufacturing a product.

(ii) Companies often use *benchmarking* when designing a new product. Outline what is meant by the term 'benchmarking'.

Option 5 - Materials Technology - *Answer 5(a) **and** 5(b)*

5(a) The graphics show various uses of *manufactured boards* produced in Ireland.

Engineered Wood - door panels

Medium Density Fibreboard - (MDF) furniture panels

Oriented Strand Board - (OSB) flooring panels

(i) Outline **two** advantages of using manufactured boards.

(ii) *Plywood* is a wood product commonly used in the making of flat-pack furniture.
Describe using notes and sketches, how 'laminates' or 'veneers' are glued together to make this board.

5(b) The image shows a child's scooter for outdoor use.

(i) Suggest a suitable material for the production of base **A** and justify your choice.

(ii) Both *permanent* and *semi-permanent* joints are used in the assembly of the scooter.
Outline why both 'permanent' and 'semi-permanent' joints are necessary in the assembly of the scooter.

(iii) Describe **one** way in which a manufacturer could minimise environmental impact at the design stage and at the manufacture stage of the scooter.

*Answer 5(c) **or** 5(d)*

5(c)

(i) The metal parts of the scooter have been *spray-painted*.
Suggest **two** reasons why this process might be carried out on the metal parts of the scooter.

(ii) Outline **two** safety precautions that should be observed when applying paint to materials.

OR

5(d) Many products on the market display the *Forest Stewardship Council* (FSC) logo as shown. The mission of this council is to manage the world's forests in a way that is appropriate to the environment and is beneficial to society.

(i) Outline **two** benefits for society arising from the proper management of the world's forests.

(ii) Explain what is meant by the term *carbon footprint.*

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