



Leaving Certificate Examination, 2013

Technology

Ordinary Level

Friday, 21 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) Advances in technology in recent years have allowed greater use of renewable sources of energy for the heating of homes.

The graphic shows wood pellets, which are burned in wood pellet boilers.

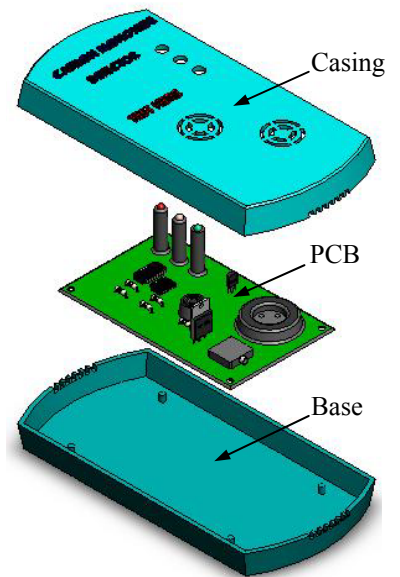


- (i) Outline **two** benefits of using renewable sources of energy to heat homes.
- (ii) Name **one** energy conversion that takes place in burning wood pellets.

2(b) *Carbon monoxide* is a highly dangerous gas sometimes referred to as ‘the silent killer’. It can arise in poorly ventilated spaces where fossil fuels are burned. For this reason it is recommended that every home should have a carbon monoxide alarm.

The image shows an exploded view of a carbon monoxide alarm.

- (i) Name a suitable material for the production of the casing.
- (ii) Describe using notes and annotated sketches a suitable method for producing the casing for this alarm.
- (iii) Suggest a suitable method of attaching the PCB to the base of the alarm. Use simple sketches to support your answer.



Answer 2(c) or 2(d)

2(c)

- (i) Draw a Work Breakdown Structure for the design and manufacture of the alarm.
- (ii) Gantt charts can play a critical role in the successful management of a project. List **two** functions of a Gantt chart.

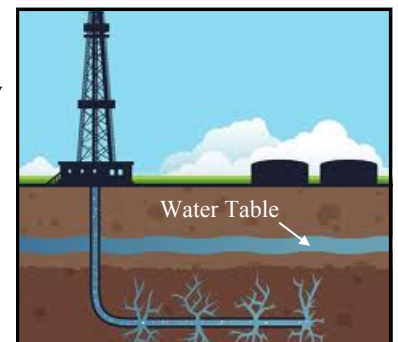
OR

2(d)

Hydraulic fracturing creates large cracks in rock formations by injecting sand, water and chemicals deep into the ground. It is done to release oil and natural gas. Hydraulic fracturing has been linked to environmental issues in other countries.

Hydraulic fracturing as a method of extracting natural gas is now being considered in parts of Ireland.

- (i) Suggest **one** advantage and **one** disadvantage of this procedure.
- (ii) Briefly describe **one** other method of energy generation currently used in Ireland.



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

3(a) Exercise and sport can be fun for participants and can also have many health benefits.

(i) Tennis rackets which were made of timber in the past are now often made of carbon fibre.
Describe **two** other items of sports equipment which have been improved through the use of modern materials.



(ii) Smartphone ‘apps’ have been developed to help individuals to plan, manage and record their training and exercise.
Describe **any two** smartphone ‘apps’.

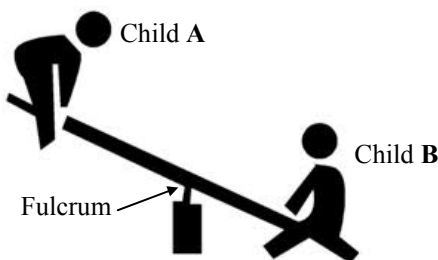
3(b) The image shows a modern exercise machine. When purchased these products often come ‘flat-packed’ and must be assembled.

- (i) Outline **two** reasons why some manufacturers do not pre-assemble their products but instead supply them flat-packed.
- (ii) Permanent and semi-permanent joints are used in the manufacture of the exercise machine. Using notes and annotated sketches, describe where **one** permanent joint and **one** semi-permanent joint could be used in the exercise machine.
- (iii) Suggest a suitable material for the production of frame A.



Answer 3(c) or 3(d)

3(c) The graphic shows two children playing on a see-saw.

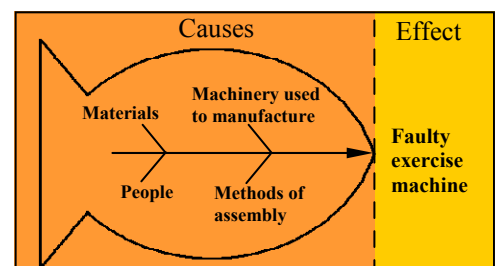


- (i) Name the class of lever shown in the graphic.
- (ii) Child A is lighter than Child B.
Describe using notes and annotated sketches how the children on the see-saw could work together to balance the lever.

OR

3(d) Cause and effect diagrams are often used to identify the root causes of quality related issues in manufactured products. The graphic identifies four possible reasons for a faulty exercise machine.

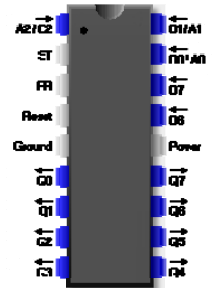
- (i) Describe how any **two** causes identified in the graphic could contribute to poorly manufactured exercise machines.
- (ii) In **each** case suggest how these problems might be resolved.



Section C - Options - Answer any two of the Options

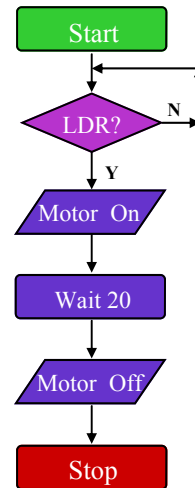
Option 1 - Applied Control Systems - Answer 1(a) and 1(b)

- 1(a) (i) The image shows an 18 pin PIC chip.
Explain using a simple sketch how to identify pin number 1.
- (ii) Pins D1/A1 and D0/A0 can be used for either digital or analogue inputs.
Give **one** example of an analogue input and **one** example of a digital input.



- 1(b) A student has produced a simple flowchart to control a motorised blind system in a bedroom.
The system uses an LDR as a sensor to activate the motor to close the blind in darkness.

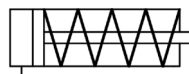
- (i) Describe in detail the operation of the motorised blind as controlled by the flowchart.
- (ii) During operation it was found that the motorised blind did not stop at the bottom of the window.
Suggest a suitable way to ensure that the blind stops accurately at the bottom of the window.
- (iii) Outline **two** advantages of using PICs in Applied Control technology.



Answer 1(c) or 1(d)

- 1(c) The image shows an air compressor as used in pneumatic systems.

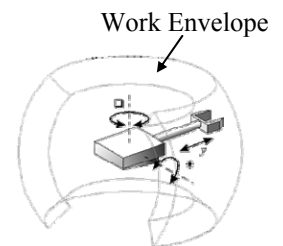
- (i) Describe the functions of the *electric motor*, *pump* and *reservoir* in a pneumatic compressor.
- (ii) Name the pneumatic component shown below.
What is the function of the spring in this component?



OR

- 1(d) The image shows a robot and its *work envelope*.

- (i) Name the type of robot shown and explain the term work envelope.



- (ii) Servo Motors are often used to power robotic joints.
Outline **two** features of servo motors that make them suitable for this purpose.

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

2(a) Graphics A, B and C show various power accessories.



A



B

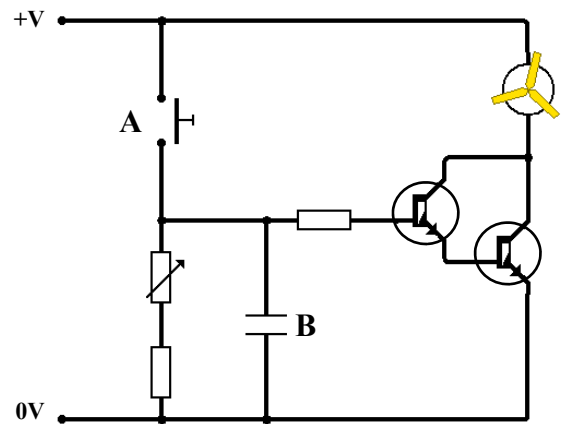


C

- (i) Name **each** of the items A, B and C.
- (ii) AC and DC electricity are commonly used as power sources in the Technology room. Using notes and annotated sketches outline the difference between AC and DC electricity.

2(b) The circuit diagram shown activates a motor inside an air freshener unit. When activated the motor runs for a set period of time.

- (i) Name component A in this circuit.
- (ii) Component B is a *non-polarised* capacitor. Explain what is meant by the term non-polarised.
- (iii) A *Darlington Pair* of transistors is used in this circuit. Suggest a reason for the use of a Darlington Pair in this circuit.



Answer 2(c) or 2(d)

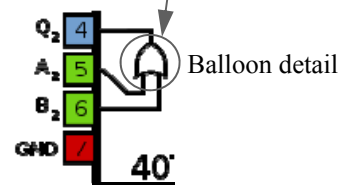
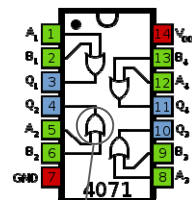
2(c) The circuit at 2(b) above can be purchased as a PCB ‘project kit’ ready to be soldered.

- (i) Outline **two** advantages of using PCB ‘project kits’ instead of designing and producing PCBs in the Technology room.
- (ii) Once the circuit has been soldered, describe **two** tests a student could carry out on it to see if it is working correctly.

OR

2(d) The image shows an integrated circuit (IC) with 4 logic gates. One of the logic gates is enlarged in the balloon detail shown below.

- (i) Name the type of logic gate used in the IC.
- (ii) What are the pin numbers for the *inputs* and *output* of this gate.



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

3(a)



WiFi hotspots are often found in public areas such as coffee-shops, hotels and airports.

Recently Irish Rail launched free WiFi to customers on train routes across Ireland.

- (i) Outline what is meant by the term 'WiFi hotspot'.
- (ii) Discuss how **work** and **leisure** time can be enhanced for individuals by access to 'WiFi hotspots'.

3(b) An advertisement for a laptop includes the following specification:

Hard Disk 640GB / 6GB RAM / Operating System Windows 7, 64 Bit / WiFi Connectivity / Multi Card Reader / 4 USB Ports / Screen Resolution 1920×1080 Pixels / Blue Ray Disc Rewritable and DVD Multi Drive

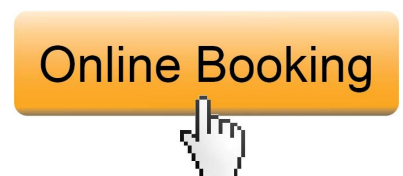


- (i) Describe **one** magnetic storage device this computer uses.
- (ii) Describe **one** optical device in this computer.
- (iii) Explain the term 'DVD-RW'.

Answer 3(c) or 3(d)

3(c) Online bookings of hotels, concert tickets and holidays have become increasingly popular in today's society.

- (i) Give **two** advantages of online booking.
- (ii) Give **two** important items of personal data other than name and address that would be stored in an online booking system.



OR

3(d) Recent developments in mobile technology have allowed *cyberbullying* to become an unfortunate and serious problem, especially among younger people.



- (i) Explain the term 'cyberbullying'.
- (ii) Describe **two** ways of protecting individuals from cyberbullying.

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

4(a) Consumers expect cars to be manufactured to the highest standards in terms of *safety* and *performance*.



- (i) Briefly describe how cars can be made **safe** and **perform** to the highest standards.
- (ii) Outline **two** financial consequences for a manufacturer who produces poor quality products.

4(b) A company developing a new range of marmalades has decided to use the 'Deming Cycle' as part of a quality management strategy. The four stages of the Deming Cycle are *Plan, Do, Study* and *Act*.



- (i) Describe any **two** stages of the cycle outlined above.
- (ii) Outline the key benefits for a manufacturer who uses the Deming Cycle.
- (iii) Products can be *Once off, Batch* or *Mass* produced. Select a suitable production process for the manufacture of the marmalades and justify your selection.

Answer 4(c) or 4(d)

4(c) (i) *Team work* is essential when a group of people work for a company.

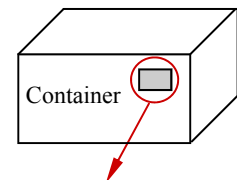
Outline **two** elements of team work that would be important when developing new products such as the range of marmalades at 4(b) above.

(ii) It is important for companies to consider *environmental impact* when manufacturing their products.

Outline **two** initiatives the marmalade producer could undertake to reduce the impact of its products on the environment.

OR

4(d) The graphic shows a simple *Kanban Card* that could be attached to a container of parts ready to be shipped. Kanban cards are used like order forms when parts are required in the production line of a product.



- (i) Outline **two** advantages of using Kanban systems in manufacturing products.
- (ii) Describe any **two** items of information contained on the Kanban card shown.

Part Description				Part Number	
Mirror-Left-Door				2542	
Qty	200	Lead Time	1 week	Order Date	11/10
Supplier	Ace Car Parts Ltd			Due Date	18/10
Planner	Mary K.		Location	Rack 2A	

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

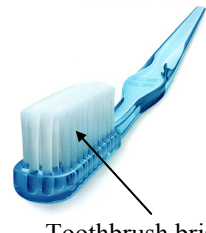
5(a) The images show a pottery vase, a rain jacket and the bristles of a toothbrush.



Pottery vase



rain jacket

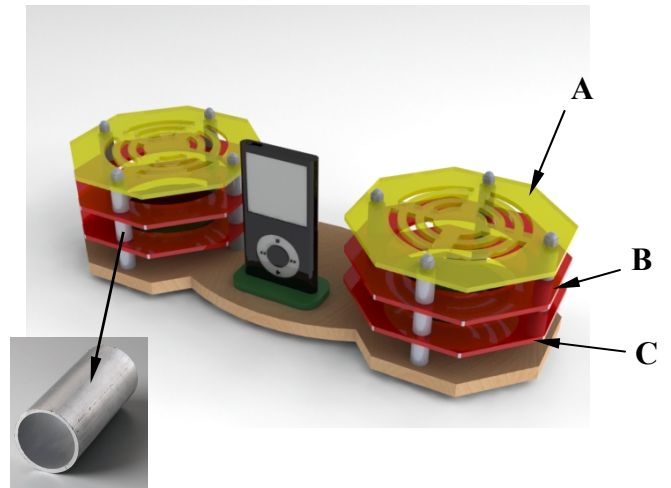


Toothbrush bristles

- (i) Name a suitable material for the manufacture of **each** item.
- (ii) For any **two** of the items, outline **one** property of the material chosen which makes it suitable for the product.

5(b) The graphic shows a docking station for an MP3 player. The main parts of the project have been assembled using M4 threaded bars which are concealed by aluminium tube inserts.

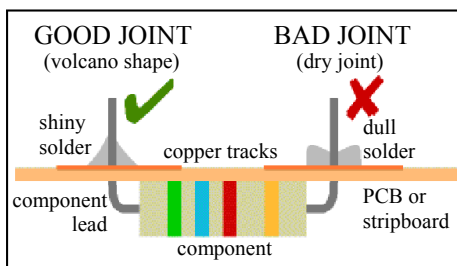
- (i) Explain what is meant by the term M4.
- (ii) Describe the key steps in manufacturing the acrylic part **A** in a Technology room.
- (iii) Give **two** reasons for using aluminium tube inserts between the acrylic parts **A**, **B** and **C**.



Aluminium tube insert

Answer 5(c) or 5(d)

5(c) The docking station at 5(b) above requires a soldered electronic circuit.



- (i) Name **two** metals typically used in the manufacture of solder wire.
- (ii) The graphic shows one good soldered joint and one bad soldered joint. Describe using notes and annotated sketches the key elements required to produce a good soldered joint.

OR

5(d) The Kindle e-book reader uses an electronic paper display. This type of display uses an *electronic ink* which carries a charge, enabling it to be updated electronically. This electronic ink is a *smart material*.

- (i) Define the term 'smart material'.
- (ii) Name **two** other smart materials and give a use for **each**.



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