Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2015

Technology

Ordinary Level

Friday, 19 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.*

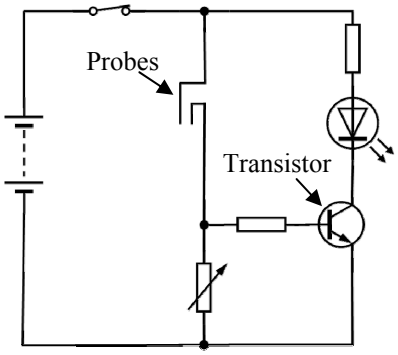
*Question 2 - Answer 2(a) **and** 2(b)*

2(a) The Irish Government intends to introduce domestic water charges for homes connected to public water systems and public wastewater services.

(i) Briefly describe **two** ways in which water usage in the home can be reduced.

(ii) Outline **two** benefits of conserving water.

2(b) The image shows the circuit diagram for a moisture sensor circuit. The circuit is used in a water tank to activate a light emitting diode (LED) when the tank is full.



(i) Name a suitable material for the *probes* and give **one** reason for selecting this material.

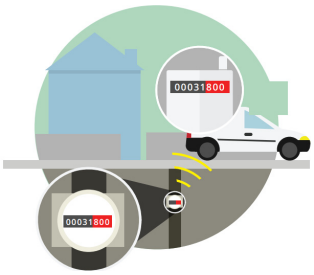
(ii) Redraw the symbol for the transistor shown and label the *base*.

(iii) Suggest, using notes and annotated sketches:

1. A suitable casing to contain the moisture sensor circuit.
2. An appropriate method of attaching the casing to the water tank.

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

2(c) The meters used by the company, Irish Water, feature *Automatic Meter Reading* (AMR) technology. This 'drive-by' technology allows for water meters to be read remotely.



(i) Give **two** advantages of using this technology to gather data.

(ii) Wireless technology is used in AMR. Using notes and sketches, briefly describe how a wireless transmission might work.

OR

2(d) The image shows a compression fitting used for joining water pipes.

(i) Suggest **two** features (*quality attributes*) of the fitting shown which would indicate that it is a product of high quality.

(ii) Give **two** costs associated with improving the quality of a public water system.

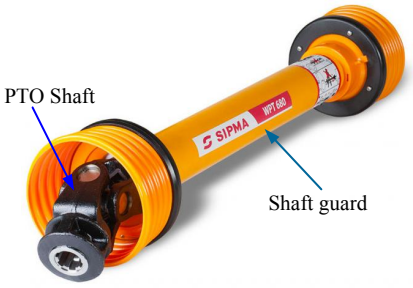
Question 3 *- Answer 3(a)* ***and*** *3(b)*

3(a) One role of the Health and Safety Authority (HSA) is to promote accident prevention through the use of *Personal Protection Equipment* (PPE) in work environments.

(i) Briefly describe any **two** safety hazards found in a Technology workshop.

(ii) Name a suitable material for the manufacture of the protective gloves shown. Give **one** reason to justify your selection.

3(b) A *Power Take Off* (PTO) is a method of taking power from a running engine and transmitting it to a separate machine or attachment. PTO shafts are commonly used with agricultural machinery.



(i) Outline the function of the plastic guard on the PTO shaft shown.

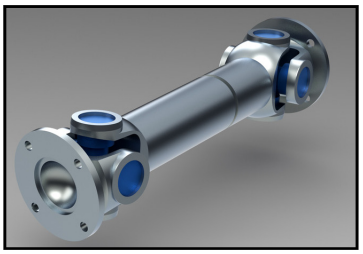
(ii) The internal metal shaft contains a *universal joint*. Briefly describe an advantage of using universal joints.

(iii) A power take off (PTO) shaft operates at 540 RPM (revolutions per minute), but a tractor engine operates at a higher RPM.

Describe, using notes and sketches, a mechanism used to achieve speed reduction.

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

3(c) The graphic shows a PTO shaft drawn using a CAD program.



(i) Give **two** reasons why CAD software is used to design components.

(ii) Explain what is meant by the term CAM.

OR

3(d) The guard of a PTO shaft is an example of a *shell structure*.

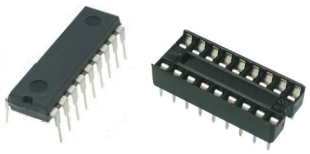
(i) Give **one** other example of a shell structure in an everyday product.

(ii) Describe, using notes and sketches, what is meant by a *beam structure*. Give **one** example of where a beam structure is used.

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

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

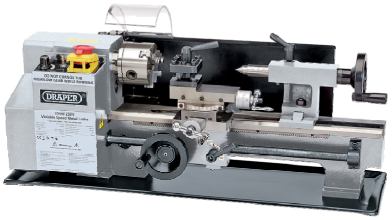
1(a) The images show a *microcontroller chip* and a *chip socket* used with printed circuit boards (PCBs).

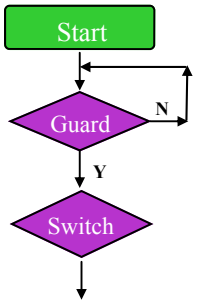


(i) Briefly describe the benefits of using an **18 pin** microcontroller in terms of the inputs and outputs available to a student.

(ii) Give **two** reasons why chip sockets are used when soldering PCBs.

1(b) A student is asked to produce a flowchart for a workshop lathe. The *safety guard* must be in place and the *switch* must be pressed before the lathe will turn on.





(i) Complete the given flowchart for the workshop lathe.

(ii) Sketch a modification to the flowchart to include a red LED which lights when the safety guard **is not** in place.

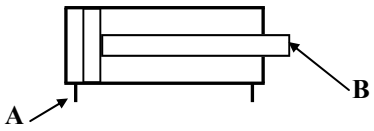
(iii) Outline **two** advantages of using PICs instead of a conventional electronic circuit.

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

1(c) The image shows a heavy duty multi-purpose spray gun for paint. The spray gun uses *pneumatic* power.

(i) Explain what is meant by pneumatic power and give **one** other example of where it is used.

(ii) Name the pneumatic component shown below. What is the function of the part labelled **A** and the part labelled **B**?



OR

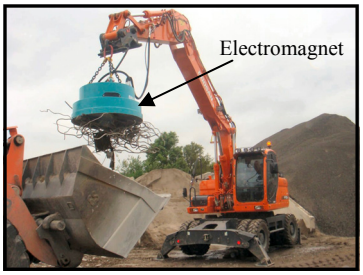
1(d) *Humanoid robots* are being designed for work in the field of medicine.

(i) Describe the main features of a humanoid robot.

(ii) List **two** advantages of using such robots in this area of work.

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

2(a) The image shows a crane using an *electromagnet* to lift scrap metal.

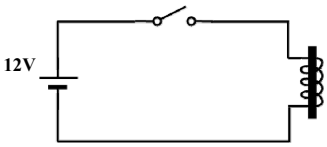


(i) Describe how an electromagnet works.

(ii) A circuit incorporating an electromagnet has a voltage of 12V and a current of 0.25 amps.

Calculate the *power* used in the electromagnet.

Note: *Power = Current (I) × Voltage (V)*



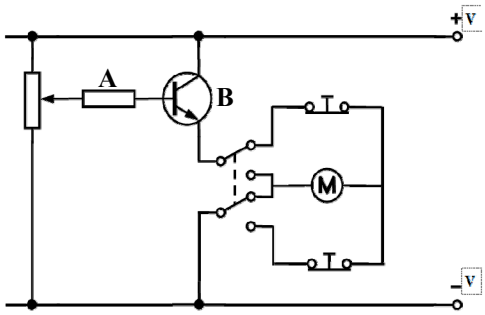
2(b) The circuit diagram shown allows forward and reverse control of a motor and also includes speed control. A student has incorporated this circuit into a model of a roller garage door.

Roller garage door

(i) Name components **A** and **B** in the circuit.

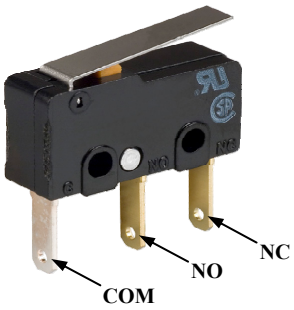
(ii) Briefly describe the operation of the circuit.

(iii) Redraw the given circuit diagram to include a master on/off *SPST switch* to activate the circuit.



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

2(c) The image shows a lever microswitch which is commonly used in electronic circuits.

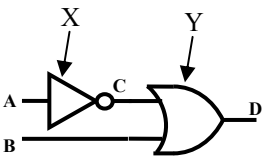


(i) Explain what is meant by the abbreviations *COM*, *NO* and *NC*.

(ii) Using notes and annotated sketches, describe the operation of a *reed switch*.

OR

2(d) The graphic shows a combination of two logic gates.



(i) Name the logic gates shown at **X** and at **Y**.

(ii) In your answerbook, draw and complete the truth table for the combination of the logic gates shown.

A	B	C	D
0	0		
0	1		
1	0		
1	1		

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

3(a) Many people have access to a range of ICT devices such as *laptops* and *tablets* in their homes.

(i) Outline **two** reasons why a tablet might be preferable to a laptop computer when performing simple ICT related tasks.

(ii) Computers generally perform more slowly over time.

Suggest **two** ways to help ensure that a computer continues to operate optimally - quickly and reliably - throughout its life cycle.

3(b) Network computer systems allow for the use of *shared folders.* These folders may be accessed by several users on a network.

(i) Give **two** advantages of using shared folders on a network.

(ii) Describe why some documents should be saved as *read only* files on a shared network.

(iii) Using notes and annotated sketches, describe how a *local area network* (LAN) could be set up for a small business.

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

3(c) In 2014 a computer bug known as 'Regin' was uncovered by a computer security company. This piece of malware had the potential to allow its creators to spy on companies and government agencies.

(i) Outline **two** reasons why malware might be created to spy on individuals or organisations.

(ii) Suggest **one** initiative that a government could introduce to protect personal or corporate data.

OR

3(d) The images **A**, **B** and **C** show cable connectors used to connect ICT devices.

A

B

C

(i) Name the connectors **A**, **B** and **C**.

(ii) Give an application for **any two** of the connectors shown above.

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

4(a) *Production lines* have been in use since the last century. They are used by companies to facilitate the large scale manufacture of products.

(i) Give **two** benefits for companies that use production lines to manufacture products.

(ii) Suggest **two** products which are suitable for large-scale manufacture using production line methods.

4(b) The image shows a food mixer commonly used in food preparation.

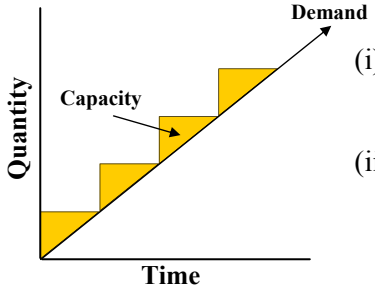
(i) Briefly describe the importance of *testing* when designing a product such as a food mixer.

(ii) Suggest **two** aspects of the food mixer shown which could be tested to ensure that it meets performance related standards.

(iii) Describe the main steps you took when testing **one** aspect of your Leaving Certificate Technology project.

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

4(c) *Capacity management* is a process where a manufacturer closely monitors the demand for a product or service it offers.



(i) Give **two** reasons why a manufacturer might increase, for a period of time, the quantity of a product it produces.

(ii) With reference to the graphic shown, briefly describe what is meant by the term '*lead capacity*'.

OR

4(d) *Just In Time (JIT)* is a manufacturing strategy used by many companies across the world. There are many benefits for a company that uses this approach when manufacturing goods.

(i) Explain what is meant by the term 'Just In Time' manufacturing.

(ii) Name **one** company that uses this manufacturing approach.
Give **one** benefit for this company of using JIT manufacturing.

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

5(a) Metals are often used in the form of *alloys*. Many people purchase alloy wheels for their cars.

(i) Explain what is meant by the term 'alloy'.
Give **one** advantage of using metals in this form.

(ii) Name the metals used to produce each of the following alloys:

1. Bronze.
2. Solder.

5(b) The image shows a garden playhouse suitable for use by children. The playhouse is made using a range of materials.

(i) Name a suitable *wood* for the manufacture of the frame of the playhouse.

(ii) Using notes and annotated sketches, describe a suitable method of fixing the slide to the frame.

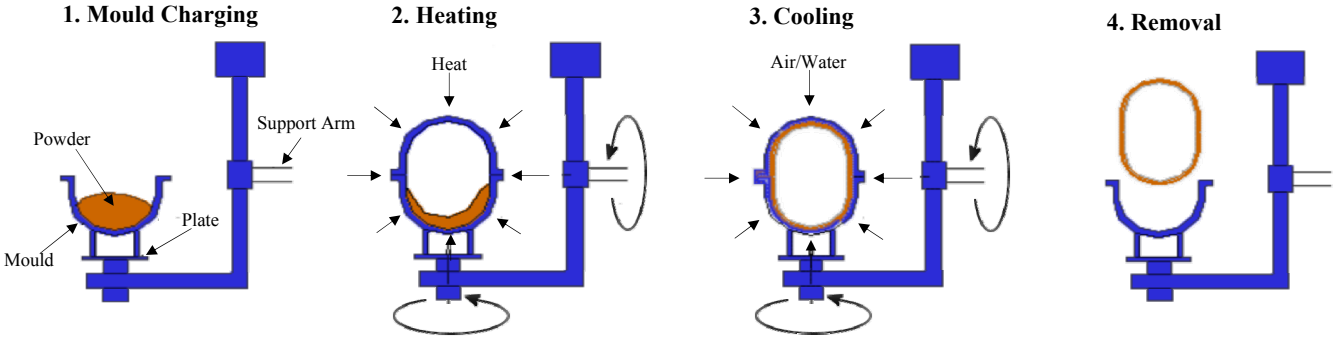
(iii) Garden products must meet stringent safety standards before they are certified as being fit for sale.
Briefly outline **two** safety features in the design of the playhouse shown.

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

5(c) The plastic slide at ***5(b)*** above could be manufactured using *rotational moulding*. The main steps of the rotational moulding process are shown in the graphics below.

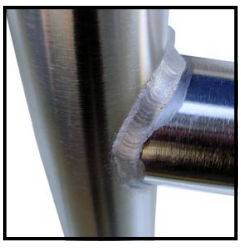
(i) Give **one** suitable thermoplastic material that could be used to manufacture the slide using rotational moulding.

(ii) Briefly describe the steps involved in rotational moulding as outlined in the graphics below.



OR

5(d) The image shows a welded joint. Welding is a means of permanently joining two pieces of metal.



(i) Name **two** other types of permanent joint.

(ii) Describe using notes and annotated sketches **one** *semi-permanent* joint.

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