



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Applied 2015

Marking Scheme

Technology

Common Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.



Coimisiún na Scrúduithe Stáit

State Examinations Commission

Leaving Certificate Applied, 2015

Vocational Specialism - Technology

(240 Marks)

Marking Scheme

General Directions:

- Write your examination number in this box:
- There are two sections in this paper.
Section 1– Answer **all three** questions. - 90 marks

Q1. - Short answer questions

Q2. - Graphical Communication

Q3. - Health and Safety

Section 2– Five questions, answer **any three** - 150 marks

Q1. - Introducing Technology

Q2. - Design and Manufacture

Q3. - Water Technology

Q4. - Electrical Understanding and Basic Electronics

Q5. - Tools and Equipment

- Write your answers in the spaces provided and include sketches (in pencil) where appropriate.

1.	Total of end of page totals	
2.	Aggregate total of all disallowed question(s)	
3.	Total mark awarded (1 minus 2)	
4.	Bonus mark for answering through Irish (if applicable)	
5.	Total mark awarded if Irish Bonus (3 plus 4)	
	<u>Note:</u> The mark in row 3 (or row 5 if Irish bonus is awarded) must equal the mark in the Total mark box on the script.	

Centre Stamp

Section	No.	Mark
Section 1	1	
	2	
	3	
Section 2	1	
	2	
	3	
	4	
	5	
Total		

Compulsory

1. Answer **any Ten** of the following fifteen short questions.

- (a) Aluminium alloys are often used in the manufacture of car wheels. Give a reason for using aluminium alloy and explain the term alloy.

Reason Any valid reason

Alloy An alloy is a mixture of two or more metals.



Alloy Wheel

- (b) The Maglite designed by Anthony Maglica and patented in 1979 has stood the test of time and is still a popular choice of torch. Suggest **two** good design features of this torch.

Feature 1 Valid design feature

Feature 2 Valid Design Feature



Maglite

- (c) A new product called the Tag Ring is soon to come on the market. It uses GPS to track the wearer of the ring. Explain the term GPS and suggest **one** use for the ring.

GPS Global Positioning System

Use Any valid use such as tracking the whereabouts of a person who may have Alzheimer's disease.



GPS 'Tag Ring'

2 + 2

- (d) Name the type of shaft shown and suggest an appropriate use.

Name Camshaft

Use To open and close the valves in an engine in the correct sequence.

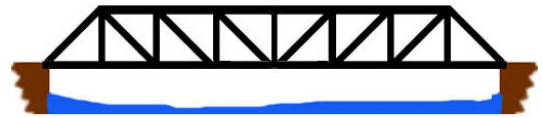


2 + 2

- (e) A bridge in the form of a Pratt Truss is shown. Name the structural feature that gives this bridge rigidity and suggest another use for this type of truss.

Structural Feature Triangulation

Other use Jib of a crane, roadside gantry or any other valid use.



Pratt Truss

4 x 1

- (f) Complete the table by naming the quantity measured by the unit in each case.

Unit	Joule	Kilowatt-hour (kWh)	Newton	Volt
Quantity	Energy	Unit of Electrical consumption	Force	Voltage/Potential Difference/EMF

4 x 1

- (g) A wooden chopping board is cut from a flat rectangular piece of wood. List **four** stages in its manufacture.

1 Four valid stages

2 _____

3 _____

4 _____



Chopping Board

2 + 2

- (h) Headphones have become a fashion accessory. Suggest **two** recent improvements to the design of modern headphones.

- 1 Any valid improvement
- 2 Any valid improvement



2 + 2

- (i) Outline **two** uses for a stop valve in a domestic plumbing system.

- 1 To switch off the supply at the Rising main or any other valid use.
- 2 To switch off the supply to the hot water cylinder or any other valid use.



Stop Valve

2 + 2

- (j) Name **two** fittings needed to connect the sink shown to the water supply and waste water systems.

- Fitting 1 Compression straight joiner, flexible hose,
Fitting 2 S Trap, P Trap, bottle trap, pedestal trap etc.



2 + 2

- (k) The Information Superhighway (Internet) consists of a global network of computers. Suggest **two** ways that this superhighway has improved in recent times.

- 1 Faster, greater band width, improved software, etc.
- 2 Wireless access via WiFi technology.



4

- (l) Calculate the cost of running a 0.5 kW paper shredder for half an hour when a unit of electricity costs 21 cent (€0.21).

Solution

Cost = Power (kW) x Time (hrs) x Unit cost

$$= 0.5 \times 0.5 \times 0.21$$

$$= €0.0525$$

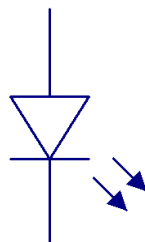
Or 5.25 cent



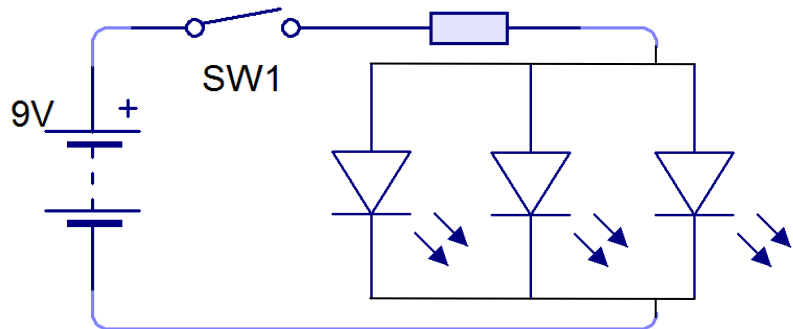
Paper Shredder

2 + 1 + 1

- (m) A simple circuit used to power 3 LEDs is shown without the LEDs in place. Using the symbol for an LED add the three LEDs into the diagram. The three LEDs must be connected in parallel.



LED Symbol



LED Circuit

2 + 2

- (n) List **two** things that you can do personally to reduce your Carbon Footprint.

1 Any valid action

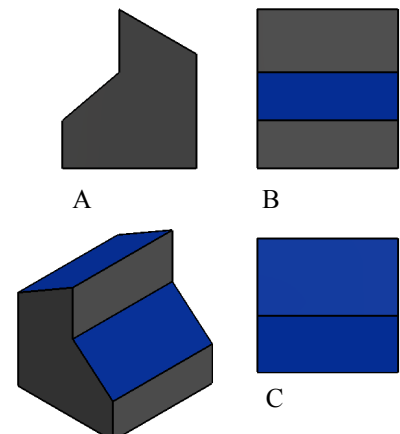
2 Any valid action



2 + 1 + 1

- (o) Name the three orthographic projections of the building shown opposite.

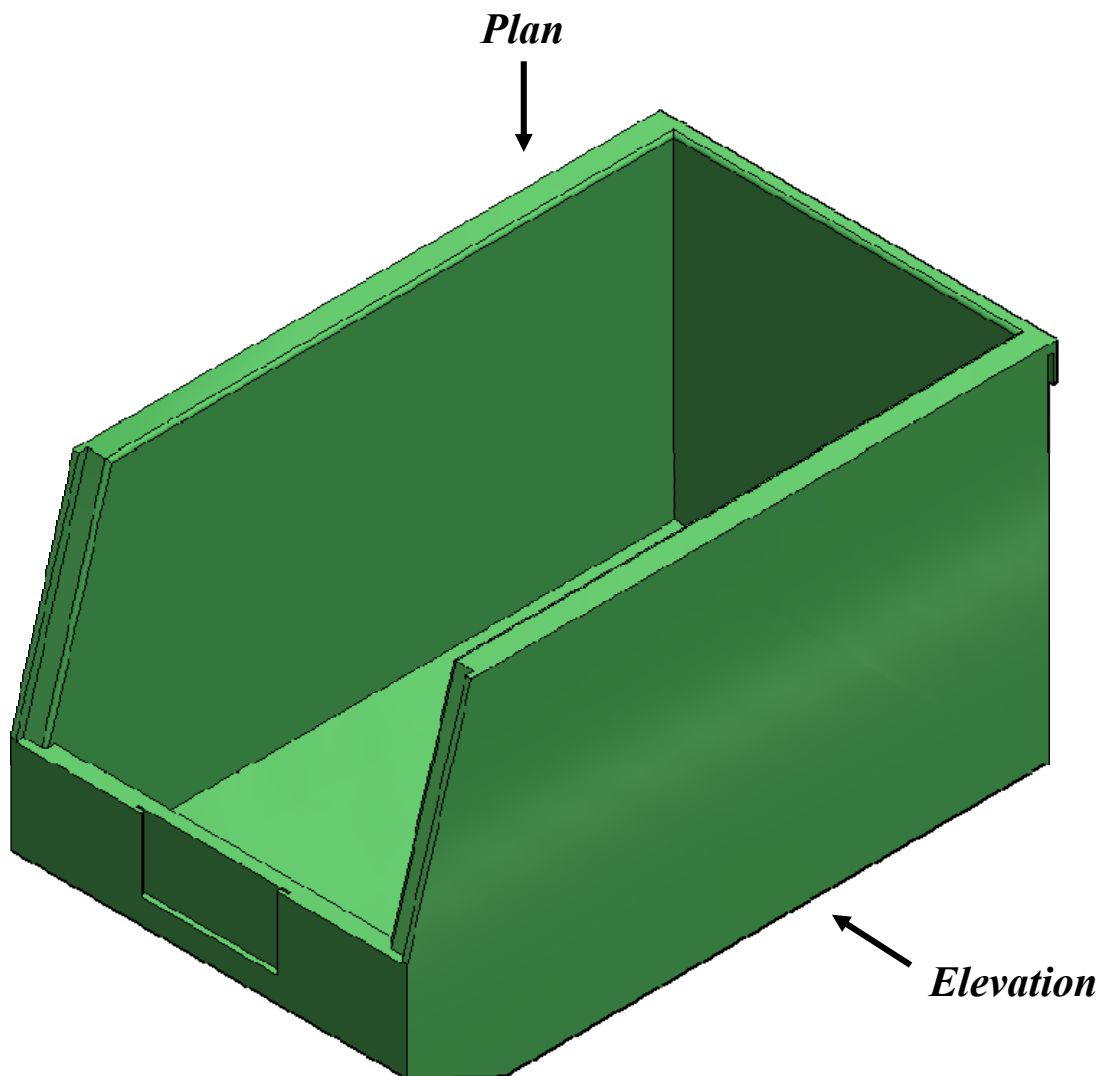
A	End Elevation/End View
B	Elevation/Front View
C	Plan/Plan View/Top View



Compulsory

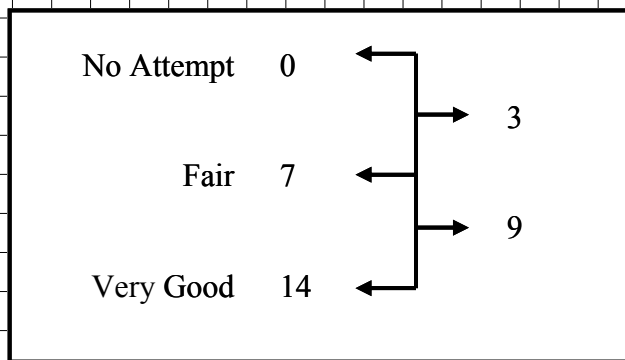
2. Graphical Communication

- (a) A CAD solid model of a rack mountable storage box is shown below. In the space opposite draw a well proportioned Elevation and Plan of the storage box.
- (b) Estimate 4 dimensions and include them on your completed drawing.



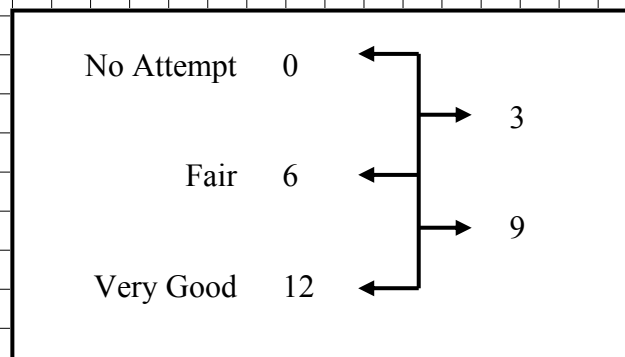
Rack mountable Storage Box

14



ELEVATION

12



PLAN

Estimate 4 dimensions and include them on your completed drawing.

Section 1 - continued Question 3

Compulsory

(20 marks)

3. Health and Safety

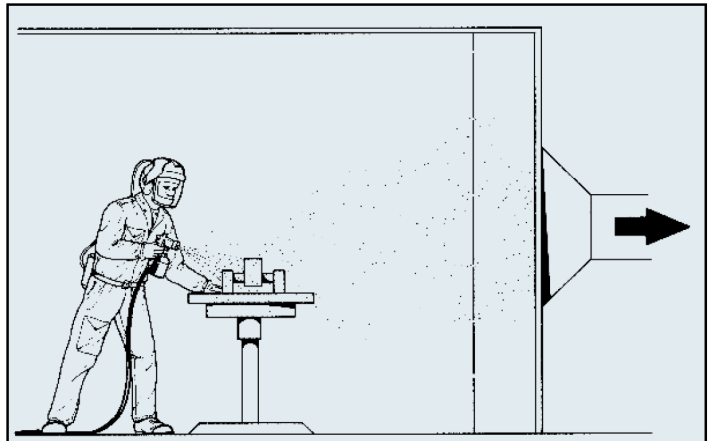
- (a) (i) An illustration of a person spray painting an artefact on a swivel table is shown. An extraction fan is also shown to the right in the illustration. Outline good health and safety practices shown in this illustration.

Answer Use of an air-fed visor with fine particle filtration.

Use of a swivel table for more even and accurate spraying.

Use of an extraction system to minimise the load on the mask.

Wearing of protective suit etc.



- (ii) When using an extension cable to power electrical equipment, what precaution should be taken to prevent the cable itself from overheating?

Answer Always unwind the lead fully when in use.



- (iii) Some examples of PPE are shown here. What do the letters PPE stand for?

Answer Personal Protective Equipment



PPE

2 + 2

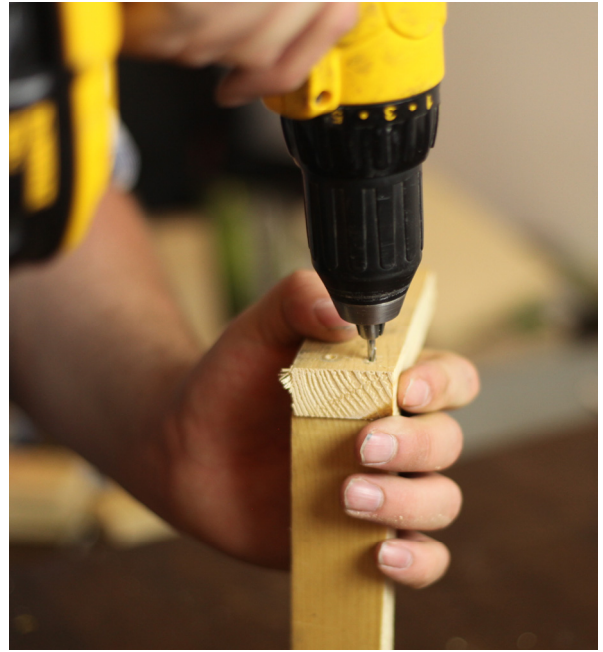
- (b) Shown is a person drilling two pieces of wood. Identify a health and safety risk illustrated in the given image.

Risk Unsafe clamping method and hence risk of drill bit coming into direct contact with the hand.

Suggest a suitable safe method of drilling these two pieces of wood.

Safe Method

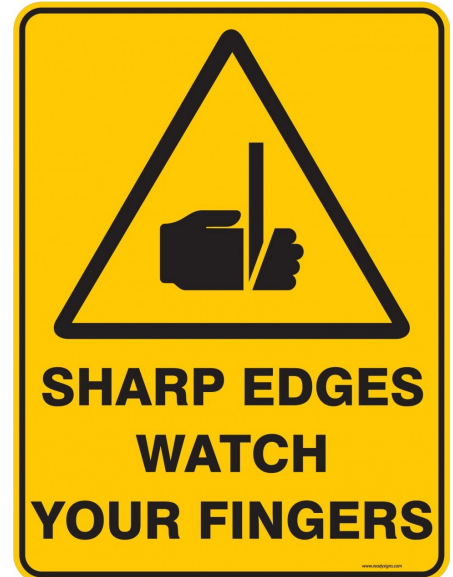
Clamp the wood in a wood vice so that both are securely held in place.



3 x 1

- (c) (i) Outline **three** situations in the workshop where there is a danger of a person coming into contact with sharp edges.

- 1 Using a firmer or bevel edge chisel to shape wood.
- 2 Using a hand Plane to plane wood.
- 3 Using a “Stanley” knife to cut thin plastic sheeting or any other valid answer.



- (ii) Outline **two** situations in the workshop where there is a danger of being exposed to harmful fumes.

- 1 Use of liquid solvent cement when bonding plastics such as acrylic.
- 2 Using glues such as synthetic rubber adhesives (eg. Evo Impact/Contact Adhesive).

Or any other valid answer.



DANGER
Harmful fumes

2 + 2

Section 2 (150 marks)

Answer ANY THREE Questions from this section.

1. Introducing Technology

(50 marks)

- (a) An image of a cantilever chair is shown. In the space below make a 3D sketch of the chair and apply appropriate shading.

3D Sketch

No Attempt	0	←			
			→	3	
Fair	6	←			
			→	9	
Very Good	12	←			



Cantilever Chair

- (b) A nightlight candle holder made from walnut, brass and glass is shown. Give your opinion on the choice of the materials used for this design.

Walnut Any valid opinion

Brass Any valid opinion

Glass Any valid opinion



Nightlight Candle Holder

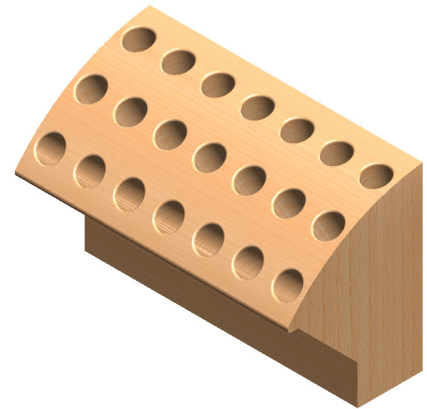
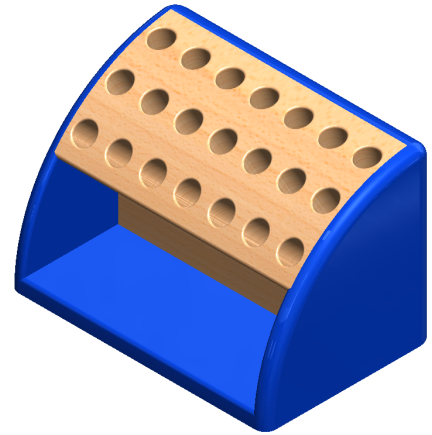
(c) A design for a desk tidy to hold up to 21 pens/pencils is shown. It is made from beech and ABS plastic.

- (i) The plastic body is injection moulded.
What does this mean?

Answer Molten plastic is injected into a mould, the mould is cooled and pulled apart to reveal the moulded plastic part.

- (ii) The holes must be accurately drilled. How could you ensure that each line of holes is drilled at the correct angle?

Answer Place the material in a drill vice and set the wood at the correct angle relative to the drill bit.



(d) CAD-CAM plays a key role in industry.

- (i) Explain the term CAD-CAM.

CAD-CAM Computer Aided Design/Drawing/Drafting - Computer Aided Manufacture

- (ii) What role does a software like SolidWorks fulfil in CAD-CAM?

Answer SolidWorks can be used to model the part in 3D and then convert the model to a suitable file type for Computer Aided Manufacture.



- (iii) Explain the term 3D Printing.

Answer 3D printing is the process whereby a computer generated model of a part is printed using a method involving the extrusion of layer upon layer of molten plastic, a method referred to as SLS (Selective Laser Sintering technology) or other appropriate method.

Any explanation in the candidates own words, which explains the process, will be accepted.

2. Design and Manufacture

(50 marks)

- (a) A speaker unit for an iPod is shown. The front and back panels are made from ash and the middle sections from plastic.

- (i) Name a suitable plastic and give a reason for your choice.

Answer Acrylic, as it possible to shape/machine it accurately and to a good finish. It also comes in a variety of colours and is suitable for this type of construction.



- (ii) Name a suitable machine used to cut out the slots on the front wooden panel and describe the process of using this machine to form the slots.

Machine Laser Cutter, Scroll Saw, CAD-CAM router.

Process Valid explanation of the process selected.

- (b) The unit is assembled using four aluminium rods with cap nuts at the back and front of the unit. The rods are threaded at each end.

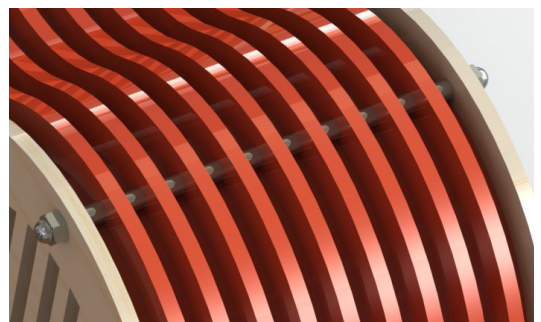
- (i) Name the tool used to thread the ends of the rods and briefly describe the process.

Name of tool Stock and Die

Process Taper slightly the ends of the rod. Place the rod in the vice. Place the die on the rod end and twist down onto the rod with even pressure and holding the stock square to the rod. Use a clockwise and anti-clockwise motion to keep the thread clean. Use a light oil if necessary.

- (ii) Suggest a reason for using cap nuts.

Answer To achieve a better overall appearance.

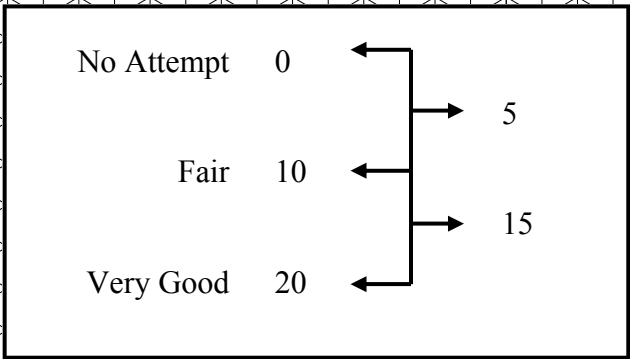


2

18

- (c) (i) In the *Design and Manufacture* module you designed and manufactured a product. Name the product you made and make an isometric sketch of it on the grid below.

Product Name _____



- (ii) Outline two main objectives you identified before you designed the product.

Objective 1 Valid objective

Objective 2 Valid objective

2

2

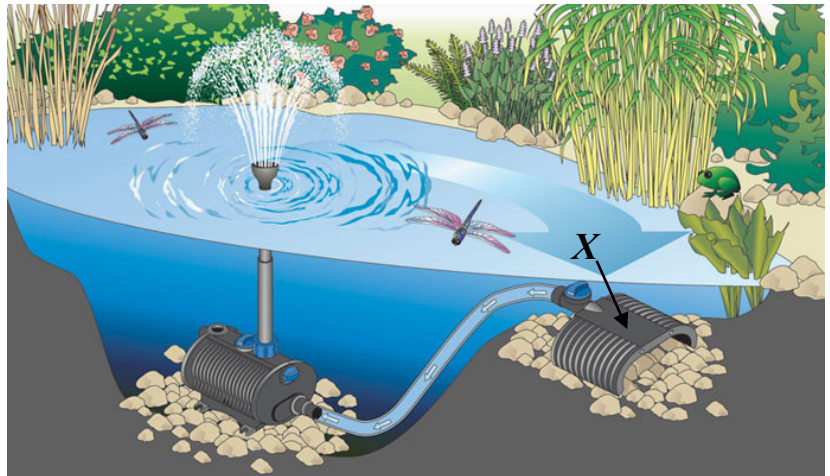
3. Water Technology

(50 marks)

- (a) The graphic shows a section through a garden pond with a fountain pump in place.

- (i) What is the function of part X in the system?

Answer This is a filter to remove any particles or dirt that could damage or block the pump.



- (ii) Suggest **two** reasons why part X is placed at a higher level than the pump itself.

- 1 Ease of access for cleaning and general observation.
- 2 Easier to keep the environs of the filter clean when at a higher level in the pond.

- (iii) The spray from the fountain has beneficial effects for the pond. Suggest **one** such effect.

Answer Excellent for aerating the pond with oxygen providing aeration for fish and preventing growth of harmful algae. It also helps release carbon dioxide from the pond from the decomposition of plant life.

- (iv) The pump system for the pond includes the impeller, the motor and the filter. Explain the function of each of these parts..

Impeller This rotates and is shaped to draw in the water much like a propeller is shaped.

Motor The motor drives the impeller and as such is key to the operation of the pump.

Filter The filter keeps the system clean by filtering out any particles or dirt that could otherwise clog up the system.

- (b) The materials required to make a straight connection in plastic plumbing pipe are shown. Explain fully the process of making the straight connection.

Answer

- Insert the brass insert into the pipe end.
- Place the nut and then the olive down along the pipe.
- Insert the straight joiner over the end of the pipe.
- Wrap thread tape clockwise around the straight joiner threads (2 to 3 revs).
- Slide the olive and nut upward to the joiner and proceed to thread the nut onto the joiner.
- With two wrenches/spanners, tighten the nut onto the straight joiner using a wrench to hold the joiner and another to twist the nut.
- Stop when the connection is suitably tightened.



- (c) Outline **four** ways in which you can conserve water both inside and outside your home.

1 Any four valid initiatives.

2 _____

3 _____

4 _____



4. Electrical Understanding and Electronics

(50 marks)

- (a) A picture of a domestic electrical consumer unit (fuse-box) is shown.

- (i) What is the purpose of this unit?

Answer To house the circuit breakers necessary for the safe use of electricity in the home for all the circuits such as lighting and power circuits for sockets, cookers etc.

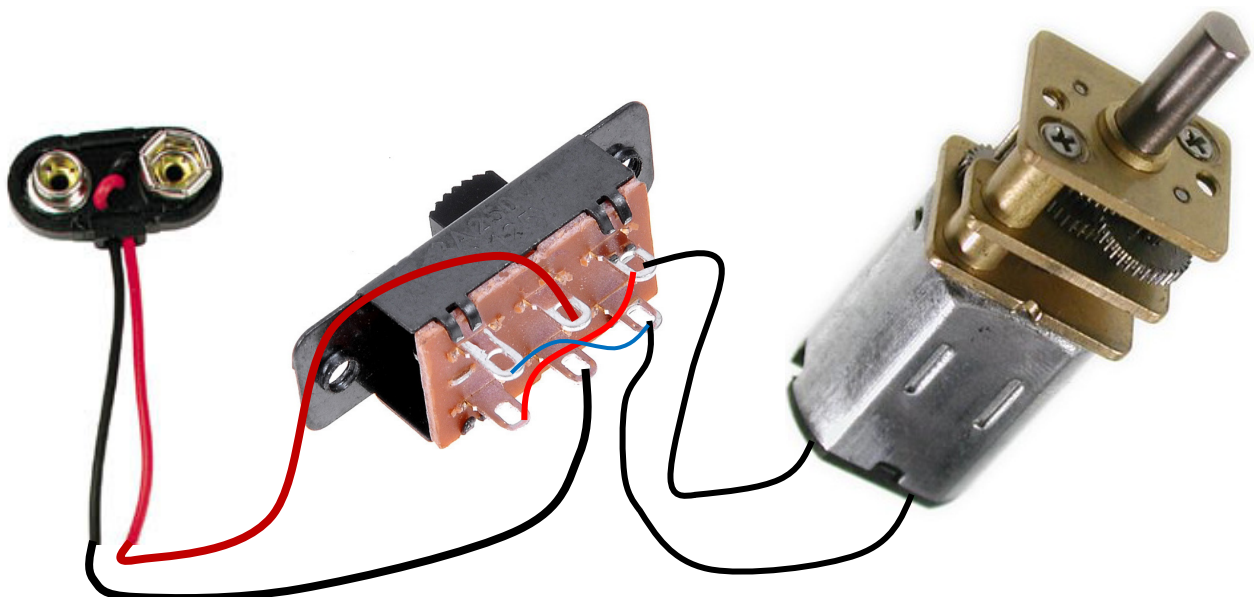
- (ii) An RCD is a very important component in the consumer unit. Explain the meaning of the term RCD and outline its purpose.

RCD Residual Current Device

Purpose To “trip out” the main power supply if a leakage of electricity to earth is detected (ie. if there is an imbalance between the amount of electricity running in the neutral circuit compared to that running in the live circuit).
It is therefore a safety feature of a properly constructed electrical circuit.



- (b) Draw in the wires to connect the components shown so that the gearbox motor can be controlled in both forward and reverse directions (clockwise and anti-clockwise).



(c) A 7.5 Watt LED light bulb is shown.

(i) Convert 7.5 Watts to kilowatts.

Answer 0.0075kW

(ii) Calculate the operating cost of this bulb for 10,000 hours where the cost of a unit of electricity is 21 cent (€0.21).



Calculation:

$$\begin{aligned}\text{Cost} &= 10,000 \times .0075 \times 0.21 \\ &= 75 \times 0.21 \\ &= \text{€}15.75\end{aligned}$$

(d) Domestic Photovoltaic panels (cells) are becoming popular for generating electrical power for the home. To use this power in the home it must be converted from DC to AC using an inverter.

(i) Explain the terms AC and DC

AC Alternating Current

DC Direct Current

(ii) Photovoltaic cells mainly convert the UV part of sunlight into electricity. Explain the meaning of UV.

UV Ultra Violet

(iii) Outline **two** problems associated with generating power for the home from PV panels (cells).

1 Lack of sunshine in climates like Ireland's

2 High Installation costs or other valid reasons



Photovoltaic Panels



Inverter

5. Tools & Equipment

(50 marks)

(a) A range of workshop equipment is shown.



Name each piece of equipment and give its use.

No.	Name	Use
1	Height adjustable roller stand	To support planks of wood as they are passed through a table saw or planer/thicknesser.
2	Router	For producing mouldings in wood.
3	Nail Gun	For general nailing and professional carpentry work.
4	Industrial Fan space heater	For heating industrial work spaces such as mechanics workshops.

4 x (3 + 3)



- 

4x2

- 4x3

A wooden lounge chair with a slatted design, adjustable backrest, and a small table with a glass of blue liquid. The chair is made of light-colored wood and features a reclining mechanism. A small table attached to the side holds a glass of blue liquid. The chair is positioned on a white background.

- 1 Any four valid steps

2	
3	
4	

- 4x3

Strip Heater	Spirit Level	Spanner	Wood Chisel	G Clamp

Blank Page