



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2022

Technology

Section B and Section C

Ordinary Level

Monday 27 June Afternoon 2:00 - 4:00

136 marks

Instructions

Section B 24 marks

Core- Long-answer questions.

Answer **one** of the two core questions presented.

Each question in Section B carries 24 marks.

Section C 40 marks

Options- Long-answer questions.

Answer **one** of the five optional questions presented.

Each question in Section C carries 40 marks.

THESE QUESTIONS ARE TO BE ANSWERED IN THE ANSWERBOOK ATTACHED TO **SECTION A**.

Do not hand this up.

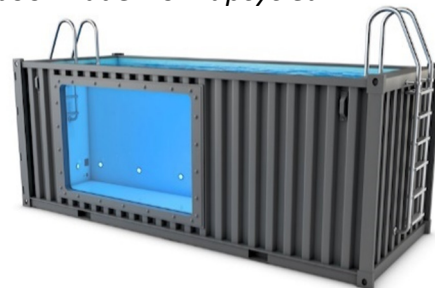
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Section B - Core - Answer Question 2 **OR** Question 3

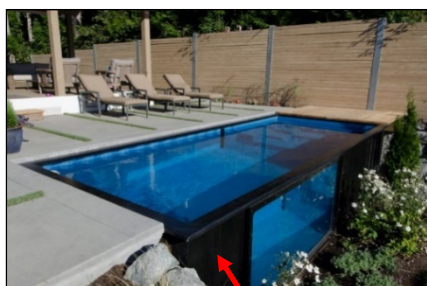
Question 2 - Answer 2(a) **and** 2(b)

2(a) The image shows a 'Modpool', which is a portable swimming pool made from *upcycled* shipping containers.

- (i) Explain what is meant by the term *upcycling*.
- (ii) Customers who purchase a product such as a Modpool expect that the product is of high quality.
Suggest **two** ways in which the manufacturer could ensure that each Modpool produced is of a high quality.



2(b) A Modpool has been installed at a home, as shown below. The shipping container used to make the Modpool is manufactured from *steel*.



Modpool

- (i) Give **two** reasons why *steel* is a suitable material for the manufacture of shipping containers.
- (ii) Suggest **two** ways the safety of this Modpool could be enhanced for users.
- (iii) An electronic circuit is required to activate a siren (buzzer) when the water level in the swimming pool is too high.
Draw a labelled diagram of a suitable circuit to activate the siren.

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

2(c) The manufacturers of the Modpool allow their customers to design their perfect swimming pool using Computer-Aided Design (CAD) software.

- (i) Briefly outline **two** constraints when designing a suitable Modpool for a home.
- (ii) Give **two** benefits of using CAD when designing products.

OR

2(d) The heater, jets and lights of a swimming pool can all be controlled from a phone using an app.

- (i) Outline **two** advantages of being able to use a phone to control these features.
- (ii) Suggest **one** additional feature, other than those listed above, that could be controlled using the app.



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

3(a) Swytch are a London-based company who convert standard bicycles into E-Bikes using a *high-torque* brushless motor.

- (i) Give **two** benefits of converting a standard bicycle into an E-bike.
- (ii) Briefly describe what is meant by the term *torque* when referring to motors.



3(b) The 1.5 kg battery pack can power the modified bicycle for up to 50 km and is usually stored in a holder at the front of the bicycle.

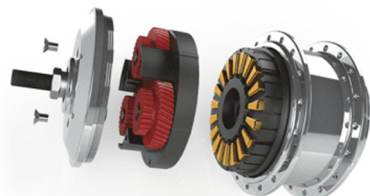
- (i) Name a suitable material for the manufacture of the battery pack holder, shown.
- (ii) Suggest **two** reasons why your chosen material is suitable for the manufacture of the battery pack holder.
- (iii) Describe, using notes and sketches, how the battery pack holder could be attached to the front of the bicycle.



Battery pack holder

Answer 3(c) or 3(d)

3(c) The graphic shows an exploded view of the *DC* motor used in the Swytch converter pack.



- (i) Explain what is meant by the abbreviation *DC*.
- (ii) If the E-bike has an operating voltage of 48 V and an output power of 240 watts, calculate the current drawn by the E-Bike.

Note: $\text{Power} = \text{Voltage (V)} \times \text{Current (I)}$

OR

3(d) Most modern bicycle frames, such as the one shown, are made from lightweight aluminium alloys.

- (i) Describe what is meant by the term *alloy* when referring to materials.
- (ii) Outline **one** structural feature that strengthens the bicycle frame shown.



Section C - Options - Answer **any one** of the five optional questions.

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

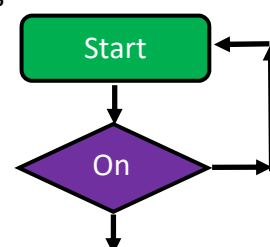
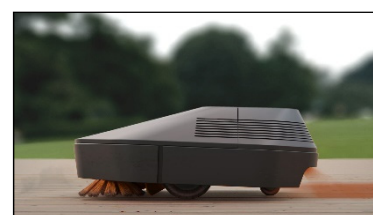
1(a) Robo-Deck is a device that can be used to clean and protect outdoor decking. It can be programmed to carry out preventative maintenance every few weeks, keeping the deck in pristine condition all year round.

- (i) Suggest **two** advantages of using an automated deck cleaning device.
- (ii) Briefly describe one other household device that operates like the Robo-Deck.



1(b) The image shows Robo-Deck cleaning a deck. As the brushes at the front clean the deck, a wood stain is sprayed from the back to protect the deck.

- (i) Complete the flowchart, shown, to operate the Robo-Deck in the following sequence:
 - The system is powered on
 - The motor activates, moving the Robo-Deck forward for 15 seconds
 - At the same time, the stain sprayer comes on for 15 seconds
 - The motor and the sprayer stop.
- (ii) Suggest a modification of the flowchart to alert the user when the stain is running low.
- (iii) Name a suitable sensor that could be used to detect an object in the path of the Robo-Deck.



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

1(c) The image shows a pneumatic paint sprayer which can be used to paint decks.

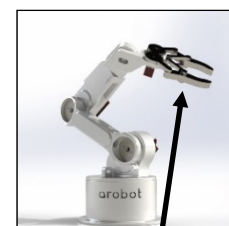
- (i) Give **one** advantage and **one** disadvantage of using a pneumatic paint sprayer.
- (ii) Draw the pneumatic symbol for a single-acting actuator and explain how it operates in a pneumatic circuit.



OR

1(d) Robots have become increasingly popular in industry in recent years. The mechanical gripper, shown, grabs an object using a *compressive* force.

- (i) Describe what is meant by a *compressive* force.
- (ii) Describe, using notes and annotated sketches, what is meant by 'degrees of freedom' with reference to robotic devices.



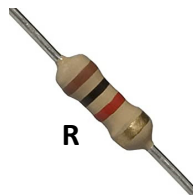
Mechanical Gripper

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

2(a) A resistor **R**, the resistor colour and tolerance code tables, are shown.

- (i) The colour band sequence of **R** is *brown, black, red and gold*.
State the value of the resistor **R**.

- (ii) Outline the function of the gold band on the resistor shown.

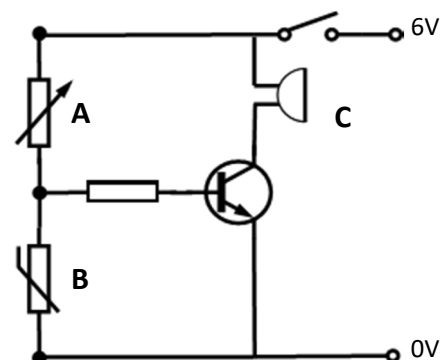


Colour code		Tolerance code	
0	Black	1%	Brown
1	Brown	2%	Red
2	Red	5%	Gold
3	Orange	10%	Silver
4	Yellow		
5	Green		
6	Blue		
7	Violet		
8	Grey		
9	White		

2(b) The circuit diagram shown is a temperature sensing circuit which is often used in project work.

- (i) Using the *Formulae and Tables* booklet, or otherwise, name components **A** and **B** in the circuit.
- (ii) Briefly describe the operation of the circuit.
- (iii) Multimeters are commonly used in electronics.

Redraw the given circuit diagram to show how the probes of a multimeter would be connected to measure the voltage drop across the buzzer **C**.



Answer 2(c) or 2(d)

2(c) The image shows an electrolytic capacitor.

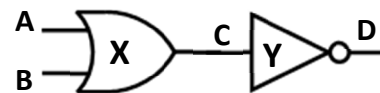


- (i) State the unit of measurement of capacitance.
- (ii) An electrolytic capacitor is a *polarised* component.
Explain what is meant by the term *polarised* when referring to electronic components.

OR

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

- (i) Name the logic gates **X** and **Y**.
- (ii) In your answerbook, draw and complete the truth table for the combination of logic gates shown.



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

Truth Table

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

3(a) Internet streaming services are widely used by individuals when watching movies and television shows.

- (i) Suggest **two** advantages of streaming movies and television shows.
- (ii) Describe **two** precautions that should be taken by the end-user when accessing streaming services.



3(b) A computer network is essential for both business and school systems to run efficiently.



- (i) Suggest **two** advantages of using a computer network system in a school setting.
- (ii) Name **two** hardware devices that could be connected wirelessly to a computer network.
- (iii) Describe **two** measures a business could take to ensure that they have high quality wireless connectivity in their workplace.

Answer 3(c) or 3(d)

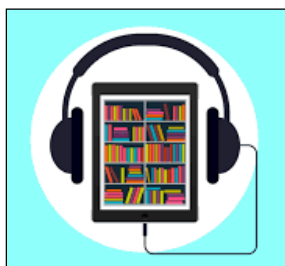
3(c) Many people prefer to use *Open-Source* software when installing programmes on a computer.

- (i) Describe what is meant by the term *Open-Source* when referring to computer software.
- (ii) Outline **two** items of personal data you might be required to submit when downloading software.



OR

3(d) Reading, as an experience, has evolved with the emergence of *eBooks* and *Audiobooks*.



- (i) Outline the main differences between an *eBook* and an *Audiobook*.
- (ii) Name a file extension commonly used when creating Audiobooks.

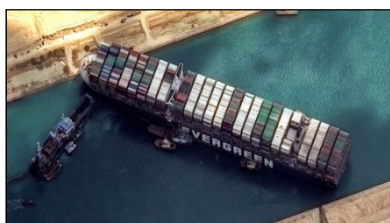
Option 4 - Manufacturing Systems - Answer 4(a) and 4(b)

4(a) When a company produces a product, it must be packaged securely for distribution, storage, and sale.



- (i) The packaging, as shown in the image, has been *mass-produced*. Describe what is meant by the term mass-produced.
- (ii) Suggest **two** ways in which a company could be more environmentally conscious when considering the choice of packaging for their product.

4(b) The blockage of the Suez Canal by the grounded container vessel, the Ever Given, had a significant impact on the global supply of products in 2021. It particularly affected companies which use a *Just-In-Time* (JIT) system when sourcing materials and components for their products.



- (i) Explain the manufacturing term *Just-In-Time*.
- (ii) Suggest **one** advantage and **one** disadvantage of using a *Just-In-Time* system of manufacturing.
- (iii) Briefly describe **three** unintended costs for manufacturers as a result of the disruption to the supply chain of products in 2021.

Answer 4(c) or 4(d)

4(c) The image shows colleagues in an organisation engaging in conversation during a meeting.

- (i) Briefly describe **two** important roles of a 'managing director' in an organisation.
- (ii) Outline **two** ways of promoting good teamwork within an organisation.



OR

4(d) Market research allows a company to discover a target market and to gather feedback from consumers about their interest in a product.



- (i) Outline **two** ways in which a company might carry out market research for a new product.
- (ii) Suggest **two** negative consequences for a company that does not carry out effective market research.

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

5(a) Cross-laminated timber (CLT) is a large-scale, prefabricated, solid engineered wood product. The Mjøstårnet in Norway is the tallest timber building in the world, and is constructed using CLT.

- (i) Explain what is meant by the term *laminated* when referring to wood products.
- (ii) State **one** advantage and **one** disadvantage of using laminated wood products in the construction of buildings such as the Mjøstårnet.



5(b) CLT is used in the construction of the exterior panels of the building shown.

- (i) Name a suitable timber for the manufacture of the panels shown. Justify your selection.
- (ii) Using notes and annotated sketches, describe how the exterior panel **A** could be attached to the concrete floor **B**.
- (iii) Briefly outline **two** safety precautions to be observed by workers when installing the exterior panel shown.



Answer 5(c) or 5(d)

5(c) Anodised aluminium is commonly used in the manufacture of drinking bottles.



- (i) Describe **two** properties of aluminium that make it a useful material for the manufacture of drinking bottles.
- (ii) Briefly outline **one** reason for anodising the external surface of a drinking bottle.

OR

5(d) The image shows coffee cups that contain a thermochromic *smart material*. The cups change colour when a hot liquid is poured into them.

- (i) Describe what is meant by the term *smart material*.
- (ii) Briefly outline **one** other possible use for a thermochromic material.



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Acknowledgements

Images

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