



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2025

Technology

Section B and Section C

Higher Level

Monday 23 June Afternoon 2:00 - 4:30

160 marks

Instructions

Section B 48 marks

Core - Long-answer questions.

Answer 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**.

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

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

2(a) Xylobands enhance audience experience at events, such as concerts, through the creation of dynamic light shows controlled through a combination of *pre-programming* and *live control*.

- (i) Distinguish between pre-programming and live control of Xylobands.
- (ii) Each Xyloband is powered by a lithium-ion button cell battery. Suggest why this power source was chosen for Xylobands.



2(b) Xylobands use RGB LEDs which contain three separate diodes: red, green, and blue. A range of colours can be produced by adjusting the intensity of each of these diodes.

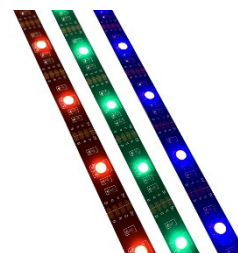
- (i) An RGB LED requires a voltage of 2.2 V (red), 3.3 V (green), and 3.3 V (blue).
If the current for each diode is set to 20 mA, calculate the **total** power consumption of one RGB LED.



- (ii) Calculate the value of the protective resistor required for a 12 V car LED light which is limited to a current of 15 mA with a voltage drop of 1.95 V.
- (iii) Describe, with an application in each case, the function of a variable resistor, an LDR, and a thermistor.

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

- 2(c) (i)** Suggest **two** measurable quality attributes of an RGB LED light strip.
- (ii)** Describe, using the RGB LED light strip as an example, **each** of the following dimensions of quality:
 - Conformance
 - Serviceability
 - Reliability.



OR

2(d) Xylobands are considered disposable electronic items to be recycled after a concert.

- (i) Describe, using annotated sketches, a suitable clasp/closing mechanism for the Xyloband wrist strap.
- (ii) Outline **two** challenges to be considered when recycling Xylobands.

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

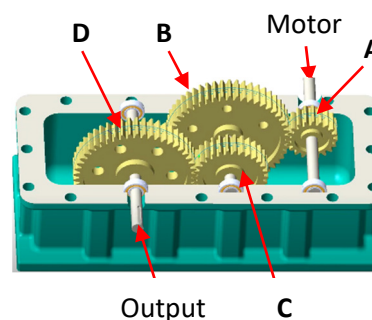
3(a) Personal transport pods are increasing in popularity as a mode of transport in urban areas.

- (i) Outline **two** advantages of using personal transport pods.
- (ii) Explain how LIDAR and GPS are utilised in autonomous transport vehicles.



3(b) A gearbox that could be used in a personal transport pod is shown in the graphic.

- (i) State **two** advantages of using a compound gear system.
- (ii) The electric motor rotates at 630 RPM and is connected to the gearbox shown.
If gear A has 20 teeth, gear B has 60 teeth, gear C has 30 teeth, and gear D has 60 teeth, calculate the output speed of the gear system.
- (iii) Describe a method of reducing friction and wear as the gears rotate in the housing of the gearbox.



Answer 3(c) or 3(d)

3(c) The rear wheels of a personal transport pod can be folded so that it takes up less space when not in use.

- (i) Suggest a suitable material for the manufacture of the body of the pod. Give **one** reason for selecting this material.
- (ii) Describe, using annotated sketches, a means of:
 - folding in the rear wheels of the pod
 - securing the wheels in place when in use.



OR

3(d) AirTags are tracking devices developed by Apple. AirTags are designed to act as a 'finder' which helps locate personal objects such as keys, bags, small electronic devices, or vehicles.

- (i) Outline **two** reasons for the use of Bluetooth technology for AirTags.
- (ii) Compare Bluetooth technology with WiFi, in terms of range and data transfer speeds.



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

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

1(a) When purchasing a drink in a plastic bottle or aluminium can with the **Re-turn** logo, a deposit is paid in addition to the cost of the drink. When the empty and undamaged drink container is returned to a reverse vending machine at participating shops and supermarkets, the deposit is repaid.

- (i) Suggest a reason for not crushing plastic bottles before returning them to a reverse vending machine.
- (ii) Give **two** advantages of recycling aluminium cans.



1(b) A reverse vending machine operates with the following sequence:

- Touch screen to start
- Place bottle or can on conveyor belt
- Barcode read to approve bottle or can
- Approved bottles are sent to servo 1 for processing
- Approved cans are sent to servo 2 for processing
- The user stops the machine by pressing 'Print Voucher'
- Deposit voucher is printed.



- (i) Draw a flowchart for the operating sequence of the reverse vending machine.
- (ii) Suggest a modification to the flowchart that will return unapproved bottles and cans.
- (iii) Suggest a method of sensing when a storage compartment in the machine is full.

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

- 1(c)**
- (i) Distinguish between the operation of a single-acting cylinder and a double-acting cylinder in a pneumatic circuit.
 - (ii) Outline **two** safety advantages of using pneumatic systems in gas exploration.

OR

1(d) Humanoid robots, such as Sophia shown, have been described as 'a fusion of AI and robotics'.

- (i) Describe **three** key characteristics of a humanoid robot.
- (ii) Outline, with appropriate examples, **two** uses for humanoid robots.



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

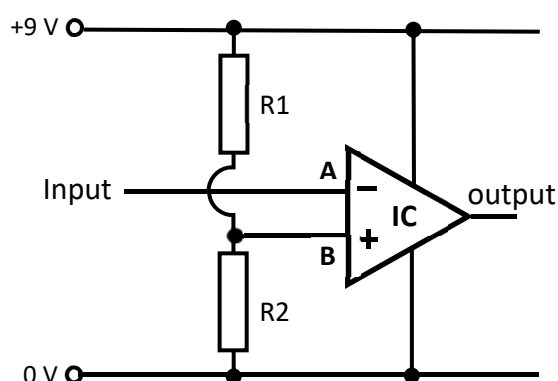
2(a) Clothing company, Zara, have smart self-checkouts which use radio frequency identification (RFID) readers to scan tags and display sales on a screen panel.

- (i) Outline **two** benefits of using RFID rather than barcodes.
- (ii) Suggest **two** other uses for RFID technology.



2(b) An adjustable LED circuit activates in low light.

- (i) Name the integrated circuit (IC) shown.
- (ii) Complete the circuit to include an appropriate input and output.
- (iii) Describe the operation of this circuit making reference to components IC, R1, and R2.



Answer 2(c) or 2(d)

2(c) A 3D printer will only operate when the power is switched on and the PLA filament is loaded into either extruder nozzle 1 or extruder nozzle 2. The printing nozzle must also reach a temperature of 400°C.

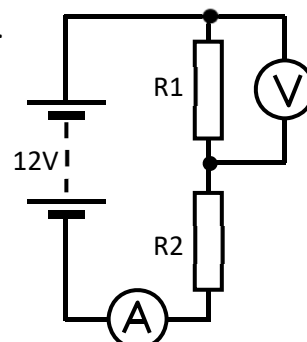
- (i) Draw a logic gate circuit to represent the operation of the 3D printer.
- (ii) Compile a truth table for this system.



OR

2(d) Resistance, voltage, and current can be measured using electronic meters.

- (i) Outline the purpose of meter A **and** the purpose of meter V in the circuit shown.
- (ii) Calculate the readings at meter A **and** meter V if R1 is 4 kΩ and R2 is 2 kΩ.



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

3(a) Most foldable screens use OLED (Organic Light Emitting Diode) technology, which allows the display to bend without breaking, unlike traditional LCD screens.

- (i) Describe **two** advantages of foldable screens.
- (ii) Outline some challenges for the manufacture of foldable screens.



3(b) Wireless communications transmit data using electromagnetic waves, without cables.

- (i) Describe the architecture of a wireless network, making reference to the devices that encode, transmit, and receive data.
Explain the role of **each** device in data transmission.
- (ii) Outline the purpose of a signal repeater in a wireless network.
- (iii) Explain the threats of wireless eavesdropping **and** Denial-of-Service (DoS).



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

- 3(c)**
- (i) Distinguish, with an example in each case, between *spreadsheet software*, *presentation software*, and *graphics software*.
 - (ii) Outline **two** advantages of using vector images and **two** advantages of using bitmap images.

OR

3(d) CrowdStrike Falcon is a *cloud-based* company that specialises in *endpoint protection*, threat intelligence, and incident response services.

- (i) State **two** advantages for a company using cloud-based services.
- (ii) Explain what is meant by endpoint protection.

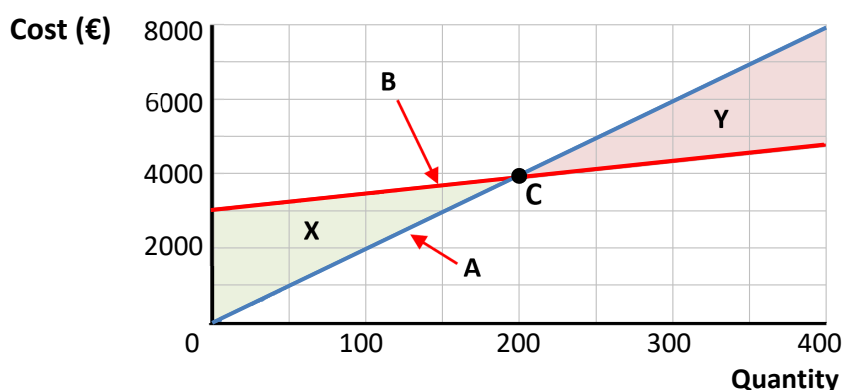


Option 4 - Manufacturing Systems - Answer 4(a) and 4(b)

4(a) Design for Environment (DfE) seeks to consider the environmental impact of a product throughout its entire lifecycle.

- (i) Outline **two** benefits of incorporating DfE in product design.
- (ii) Describe a factor to be considered at the design stage to support the following aspects of DfE:
- Material selection
 - Manufacturing processes
 - End-of-life management.

4(b) The cost of manufacturing a product by skilled labour is shown by line **A** on the graph below. The cost of automating the manufacturing process by purchasing additional computerised machinery is shown by line **B**.



- (i) Determine, from the graph, the following information:
- The cost of producing one unit by skilled labour
 - The fixed cost of computerised machinery
 - The break-even quantity (BEQ).
- (ii) Compare the profitable use of the skilled labour process with the automated process in **both** region X and region Y.
- (iii) Outline **one** marketing advantage of a manually produced item and **one** marketing advantage of a machine produced item.

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Option 4 - Manufacturing Systems -continued

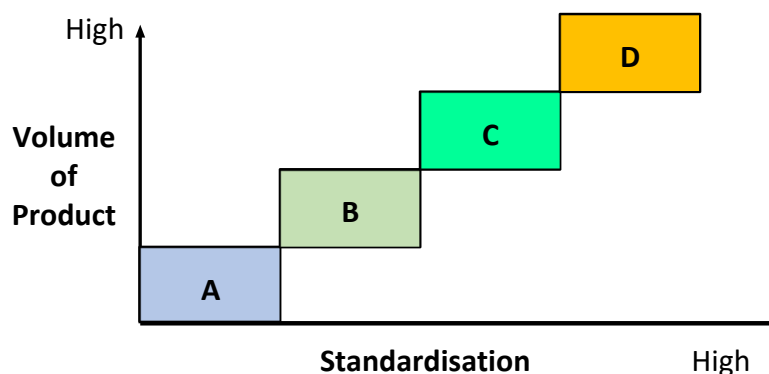
Answer 4(c) or 4(d)

- 4(c) (i) Outline, with an example, the principles of Just-in-Time (JIT) manufacturing.
- (ii) Electronic kanban systems are increasingly being used. Outline the operation of a kanban system with reference to workflow, kanban cards, and the potential advantages of electronic kanbans.



OR

- 4(d) The Product-Process Matrix is a framework used to align a product with manufacturing processes, ensuring that operations are efficient and capable of meeting production requirements.



- (i) Name the production process at **each** of the stages at **A, B, C,** and **D**.
- (ii) Select a suitable production process for the manufacture of 10,000 promotional badges for a sports club. Justify your selection.

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

5(a) 'Sculpted by Aimee' is an award-winning Irish cosmetics brand by makeup artist Aimee Connolly. The company operates a points reward scheme, ReSculpted, for the return of used containers.



- (i) Outline **two** environmental advantages of the ReSculpted scheme.
- (ii) Describe **two** factors that contribute to the degradation of plastic materials over time.

5(b) The 'Sculpted by Aimee' bottle and lid are manufactured from plastic materials in keeping with the company policy to recycle these containers.

- (i) Suggest a suitable plastic material for the bottle. Justify your selection.
- (ii) Describe, with annotated sketches, a suitable process for manufacturing the bottle in large quantities.
- (iii) Suggest a reason for using a different plastic material for the lid of the bottle.



Answer 5(c) or 5(d)

- 5(c) (i) Distinguish clearly, with an example in each case, between hardwoods, softwoods, and manufactured boards.
- (ii) Describe, with an application in each case, non-ferrous metals and alloy metals.

OR

5(d) A scroll saw, as shown in the image, is commonly used in the school workshop.



- (i) Describe how a scroll saw enables a curve to be cut in a thin material.
- (ii) Outline **two** safety precautions to be observed when using a scroll saw.

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Acknowledgements

Images

Image 1 page 2: <https://www.hillsidedesign.co.uk/news/15Xylobands>

Image 2 page 2: <https://www.lazada.vn/products>

Image 3 page 2: <https://www.amazon.co.uk/Energizer-Smart-Flexi-Strip-Light>

Image 1 page 3: <https://www.yankodesign.com/20120607/personal-pod>

Image 2 page 3: <https://www.chegg.com>

Image 3 page 3: <https://www.yankodesign.com/personal-pod>

Image 4 page 3: <https://gadgetandgear.com/product/apple-airtag>

Image 1 page 4: <https://www.citizensinformation.ie/en/whats-new/deposit-return-scheme>

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Image 1 page 5: <https://le-furet-du-retail.over-blog.com/201606/fini-les-attentes-interminables-chez-zara-qui-va-equiper-ses-magasins-de-caisses-self-checkout.html>

Image 2 page 5: <https://kinet.com.au/products/artist-d-pro-3d-printer>

Image 3 page 5: <https://aibusiness.com/responsible-ai-created-in-the-image-why-robots-need-empathy>

Image 1 page 6: <https://www.hardwarezone.com./sgtech-news-huawei-triple-foldable-multifoldable-smartphone-q2-2024-samsung>

Image 2 page 6: <https://www.lifewire.com/required-to-build-wireless-networks-816542>

Image 3 page 6: <https://www.centripetal.ai/press-releases/crowdstrike-intelligence-exchange-program>

Image 1 page 8: <https://www.neoception.com/introducing-kanban-ekanban>

Image 1 page 9: <https://www.sculptedbyaimee.com>

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