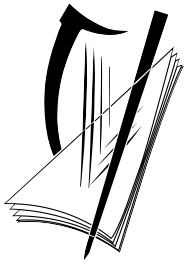


Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2018

Marking Scheme

Technology

Higher 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 Examination, 2018

Technology

Higher Level

Marking Scheme

Section A - Core *(72 marks)*

Section A. *Answer **any twelve** questions. All questions carry 6 marks.*

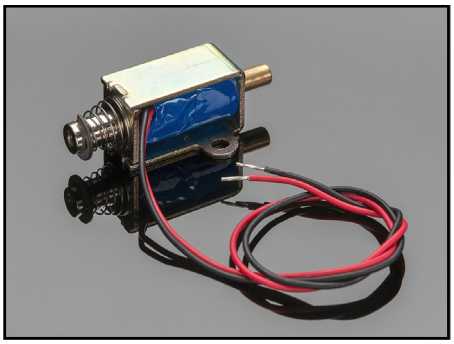
1. The impact of technological development over the past century has revoluntionised the ways in which we work. Outline **one** impact of **each** of the following developments:

(i) Assembly line production.
Faster production, standardised products, use of robots, etc.

(ii) Computer aided manufacture.
Improved accuracy of components, reduced skill level, reduced workforce, improved production speed of intricate shapes, etc.

(3+3 marks)

2. (i) State **one** energy conversion that takes place when a solenoid activates.
Electrical to magnetic to kinetic energy.



(ii) Describe the operation of a solenoid.
An electric current through the coil creates a magnetic field. The magnetic field exerts a force on the piston which moves the piston.

(3+3 marks)

3. Biometric software systems, such as facial recognition, are used in a range of modern applications. Suggest **one** use for facial recognition in **each** of the following:

(i) Retail marketing.
Targeting of individuals for shopping products/offers/trends.

(ii) Security.
Access control, identification of individuals, etc.

(iii) Authentication.
Police can scan crowds for identification, passport control systems, automated access to controlled buildings, etc.

(2+2+2 marks)

4. Calculate the output power of a solar motor on start-up, drawing a current of 30 mA when operated on a 12V DC supply.

Calculation:

Power = V x I = 12V x 0.03A = 0.36W

(Correct formula– 3 marks)

(6 marks)

5. State **two** safety features integrated into power tools such as the bandsaw shown.

Emergency stop button, dust collection system, 110V supply, adjustable guard on blade, etc.

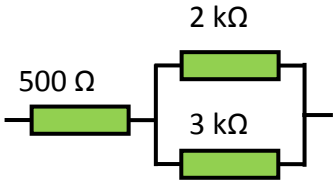
(3+3 marks)

6. Calculate the total resistance of the circuit shown.

Calculation:

Resistors in parallel: $\frac{1}{Rt} = \frac{1}{2000} + \frac{1}{3000}$

Total: 500 + 1200 = 1700 Ω



(Correct formula– 3 marks)

(6 marks)

7. State **two** features of the gearbox shown, which facilitate a smooth transmission of power with minimal noise.

Helical gears, use of bearings, choice of materials for manufacture, use of a lubricant, etc.

(3+3 marks)

8. Some of the most common cybersecurity risks are socially engineered malware, phishing attacks and unpatched software. Explain **any two** of these terms.

(i) Socially engineered malware.
SEM is an attack that tricks users (often by appealing to the user) into downloading and installing malicious software that compromises the security of their system.

(ii) Phishing.
Attempting to gain sensitive information such as usernames, passwords and credit card details by targeting content relevant to the user.

(iii) Unpatched software.
Operating systems and software develop vulnerabilities with extensive use, these vulnerabilities are rectified with patches. Unpatched software does not have these protections.

(3+3 marks)

9. Explain **each** of the following terms in relation to plastic materials.

(i) Monomer.
A molecule that can be bonded to other molecules to form a polymer.

(ii) Brittleness.
The property of a material which causes it to break without deformation. In some plastics it can be related to prolonged exposure to UV light.

(3+3 marks)

10. ***Busybees Furniture*** is an Irish furniture retail company specialising in the upcycling and sale of furniture and home furnishings.

Explain the meaning of the following terms in relation to environmental sustainability.

(i) Upcycling.

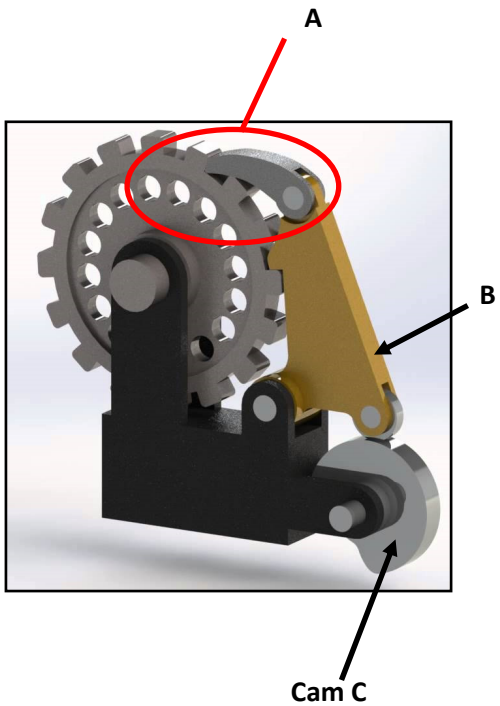
The process of transforming used materials or products into new products of better quality with improved utility or environmental value.

(ii) Carbon neutral.

The aim of balancing carbon emitted into the atmosphere with actions that reduce or offset these culminating with net zero carbon emissions e.g. power production by fossil fuels could be replaced with solar power. Increased afforestation to offset increased CO_2 emissions etc.

(3+3 marks)

11. The device shown is cam operated.



(i) Name the mechanism shown at **A**.

Ratchet and pawl.

(ii) Describe, in detail, how this device operates as the cam C rotates.

As cam C rotates, the follower linkage B will raise and lower, releasing the pawl and allowing the ratchet wheel to rotate. The cam will also cause the pawl to lock the ratchet as it rotates.

(2+4 marks)

12. The image shows a winch used on a helicopter to lift loads.
The winch lifts a load with a mass of 65 kg through a vertical distance so that the load gains 7014.15 J in potential energy before coming to rest.

Assume g = 9.81 m/s^2

Calculate the vertical distance through which the load is lifted.

Calculation:

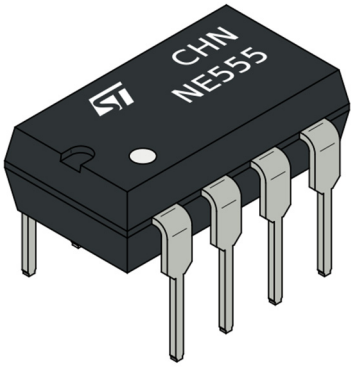
PE = mgh

$$\mathbf{h = \frac{PE}{mg} = \frac{7014.15}{65 \times 9.81} = 11m}$$

(Alt Formula: Work = Force x Distance)

(Correct formula= 3 marks)
(6 marks)

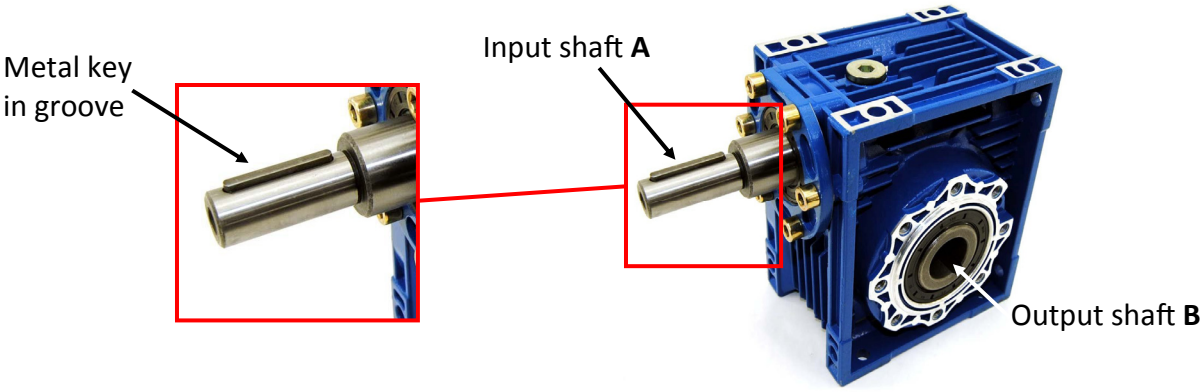
13. Sketch **any two** orthographic views of the integrated circuit chip shown.



Any two orthographic views required.

(3+3 marks)

14. The housing shown contains a mechanism to reduce the rotational speed of the output shaft at **B**.

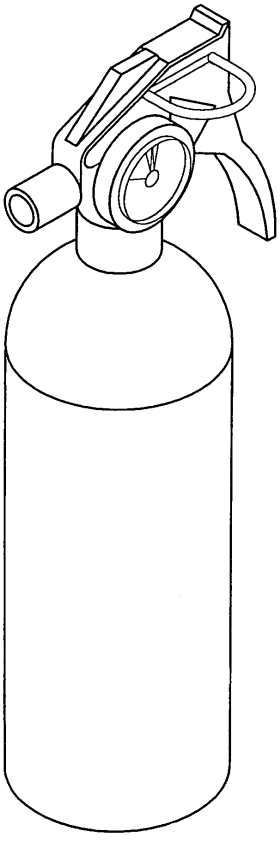


(i) Name a mechanism which fits inside the housing and achieves a rotational speed reduction of 30:1.
Worm and wormwheel.

(ii) Outline a function of the key and groove shown on input shaft **A**.
The metal key will sit in the groove and allow a gearwheel or pulley wheel to rotate without slippage. These can also be easily removed and changed or replaced.

(2+4 marks)

15. Use **two** techniques to enhance the graphic representation of the fire extinguisher shown.



Two distinct graphic techniques required.

(3+3 marks)

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Coimisiún na Scrúduithe Stáit
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Technology

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Marking Scheme

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.

Section B - Core - *Answer Question 2* ***and*** *Question 3.*

Question 2 *- Answer 2(a)* ***and*** *2(b)* *(a) - 8 marks, (b) - 10 marks, (c) OR (d) - 6 marks*

2(a) (i) State **two** advantages of the use of wireless technology in underdeveloped countries.
The installation of wired technology would take a long time, large areas could be covered within a reasonable timeframe, remote areas could gain access, etc.

(ii) State **two** other applications of drone technology.
Surveillance, mapping large areas, photography, military, deliveries, etc.

(8 marks, 4+4)

2(b) (i) Outline **two** reasons for using carbon fibre in the manufacture of Aquila.
Strong, lightweight, a more flexible material than metals, it is less likely to break in hostile windy environments, can have any colour integrated into the material, etc.

(ii) Explain the terms *aerodynamics* and *GPS*.
Aerodynamics—the movement of air as it interacts with solid objects such as aircraft wings, the flow of air will be influenced by the shape of these solid objects.

GPS—Global Positioning Systems in a satellite based navigation system.

(iii) Describe **two** design challenges in maintaining the 5000 watts of power required to keep Aquila aloft at cruising speed during night-time.

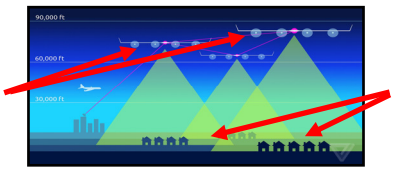
Means of storing charge generated during sunlight, heavy batteries cannot be added as it is necessary to maintain lightweight structure, it is intended that these aircraft will remain in flight for months, design for minimal power consumption, etc.

(10 marks, 4+4+2)

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

2(c) (i) Outline, with reference to the given image, the use of a fleet of solar drones to ensure uniform on-line coverage over a large area.

Solar drones orbit at a predetermined height and distance apart.



Drones provide an overlapping area of coverage. This ensures that there are no areas without coverage.

(ii) Explain the role of a *repeater* in wireless transmission.
Existing signals from wireless routers are rebroadcast to create or extend networks.

(6 marks, 4+2)

OR

2(d) (i) Name **and** state the function of component **A**.
Capacitor - it will store charge.

(ii) Explain the operation of the transistor **B** in this circuit.
The capacitor is charged by the solar panel increasing the voltage over time. At the trip point, the 1381 applies a voltage to the base of the NPN transistor (B) which switches on the motor.

(6 marks, 4+2)

Question 3 *- Answer 3(a)* ***and*** *3(b)* *(a) - 8 marks, (b) - 10 marks, (c) OR (d) - 6 marks*

3(a) Outline **one** method of reducing environmental impact in **each** of the following areas:

- Stadium and office lighting
  Replace bulbs with low energy lighting, use LED lights, sensor control lighting, etc.
- Transport access
  Train and tram development, use electrical vehicles, planned access routes, etc.
- Waste management
  Segregation bins, reduce packaging at stadium outlets, etc.

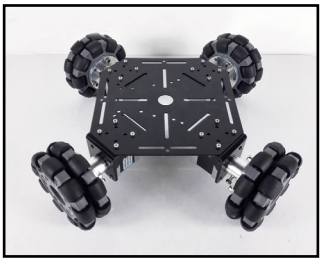
(8 marks, 3+3+2)

3(b) (i) Outline **three** properties to be considered when choosing a material suitable for fabricating the casing of the robot. Suggest an appropriate plastic for manufacturing this casing.
Impact resistance, lightweight, moulds easily, pigmentation, weather resistant.
Appropriate plastic: Polycarbonate, ABS, etc.

(ii) Explain the term *centre of gravity* with reference to the design of *AlanTim*.
The point where weight of the robot is evenly dispersed and in equilibrium, this ensures that the robot will be stable and will not fall or be knocked down easily.

(iii) Outline with annotated sketches, a method of providing *AlanTim* with mobility and manoeuvrability.
Suggested solution:

Any valid alternative solution accepted.



Each wheel is independently driven by a stepper motor. This allows complete control over direction of movement.

(10 marks, 4+2+4)

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

3(c) (i) Specify **one** device that might be used for paperless ticket entry to such events.
Chip and pin credit cards used for payment could be used for entry, barcode scanner, QR code reader, etc.

(ii) Explain the use of a feedback loop **and** an interface in a paperless ticketing systems.

A feedback loop takes the system output into consideration allowing an adjustment in performance, e.g. no entry unless payment has been authorised on ticket verification, etc.

The interface will provide a link between the user and the ticketing controller, e.g. touchscreen, intercom, mouse, etc.

(6 marks, 2+4)

OR

3(d) (i) Outline how the HSA can contribute to a reduction in the incidence of workplace accidents.
Routine checking of workplaces, advise and enforce highest standards, use legal enforcement, educational awareness programmes, etc.

(ii) Suggest **two** best practice guidelines to help prevent accidents in a technology room.

All machines have annual safety servicing, safety signage in place, comprehensive instruction in the safe use of each machine, use of safety equipment, etc.

(6 marks, 4+2)

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

Option 1 - Applied Control Systems

(a) - 10 marks, (b) - 16 marks, (c) OR (d) - 14 marks

1(a) (i) List **three** applications of smartcards.
Credit and bank cards, passports, employee identification cards, transport cards, store loyalty cards, etc.

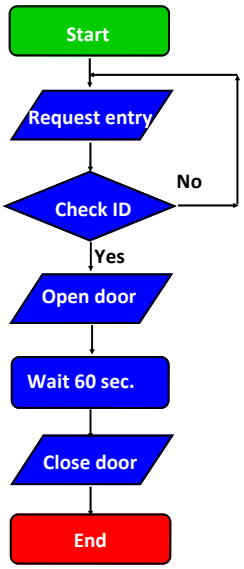
(ii) Explain the features of an *embedded integrated circuit* and a *contactless card*.

Embedded IC are chips that are implanted into cards, this allows data contained on the card to be accessed.

Both the card and reader have antennae which allows proximity reading of the card rather than close reading of the chip data - this provides fast reading.

(10 marks, 6+4)

1(b) (i) Complete a flowchart for the operating sequence of the automated door system.



(ii) Suggest **one** activation method and **one** output component for the circuit.

Activation: card reader, biometric, infrared remote, etc.

Output: solenoid, motor, etc.

(iii) Suggest a modification to your flowchart to close the door on request from the user.

Replace the 'wait 60 sec.' command with a decision block to check if a request has been received from the user to close the door, etc.

Any valid alternative solution accepted. *(16 marks, 8+4+4)*

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

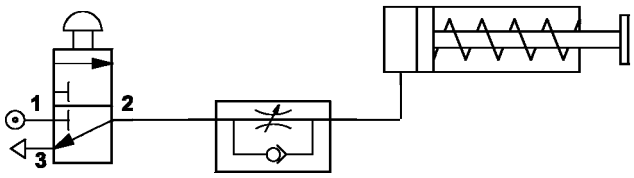
1(c) (i) Name the type of robot shown and describe the main features of its control system.
Cartesian robot– reasonably easy to build, 3 axes linear movement, axes movement at 90 degrees to each other, used as a pick and place robot, etc.

(ii) Describe, using annotated sketches, an *end effector* that could be used to place chocolates in trays without damage.
Gripper or suction end effectors are suitable.

(14 marks, 8+6)

OR

1(d) (i) Draw a pneumatic circuit diagram to control the press.



(ii) Outline **two** ways in which a consistent air supply of good quality is provided and maintained for pneumatic systems.
The air is pressure controlled, lubricated (maintains equipment), filtered (cleaned) and dried.

(14 marks, 8+6)

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

(a) - 10 marks, (b) - 16 marks, (c) OR (d) - 14 marks

2(a) Outline, with examples, the use of AI in **each** of the following:

- Retailing
  Analysis of individual spending patterns, targeted marketing, robotic checkout, etc.
- Car technology
  Self parking systems, advanced cruise control, self driving cars/autonomous driving, etc.
- Entertainment.
  Interactive computer games, machine learning – learns viewers habits, etc.

(10 marks, 4+3+3)

2(b) (i) Explain the operation of the circuit with reference to voltages at the points A and B.

The basic principle of this circuit is to compare the voltages at the Op-Amp. The potential divider (20kΩ and 30kΩ resistors) provides a reference voltage at B. The LDR and resistor provide a potential divider circuit with the voltage from A feeding into the Op-Amp. As light levels change, the resistance of the LDR changes. When the voltage into the Op-Amp rises above the reference voltage at B, the output of the Op-Amp is turned on.

(ii) Calculate the Voltage at B.
30000Ω/(20000Ω + 30000Ω) x 6v = 3.6 V

(iii) Using your answer from (ii) above, calculate the resistance of the LDR when the voltage at point A is the same as the voltage at point B.
6V - 3.6V = 2.4V
(15kΩ/3.6V) x 2.4V = 10 kΩ

(16 marks, 8+4+4)

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

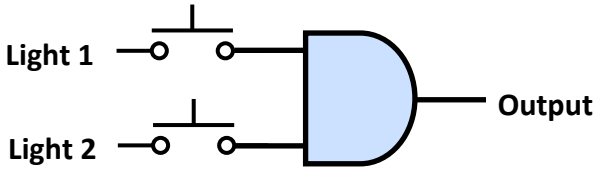
2(c) (i) Outline **two** functions of a relay in the motor circuit.
Acts as an electronic switch, allows a low voltage circuit to control a higher voltage circuit, etc.

(ii) Explain the abbreviations NC, NO and COM in this context.
NC - normally closed. NO - normally open. COM - common.

(14 marks, 8+6)

OR

2(d) (i) Using logic gates, draw a circuit that could use the sensor outputs to detect if a participant is **above** the maximum height.



(ii) Suggest electronic components for the light **and** sensor system.
Light: LED, bulb, laser, etc.
Sensor: IR sensor and receiver, motion detector, LDR, etc.

(14 marks, 8+6)

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

(a) - 10 marks, (b) - 16 marks, (c) OR (d) - 14 marks

3(a) (i) Suggest **two** dangers of this location sharing feature.
Feature may indicate young person on their own in a vulnerable place, tracking by undesirable or dangerous people, settings may not be private giving public access, etc.

(ii) Outline your understanding of privacy settings and their importance on social media.

The degree of access to personal information allowed by the user of social media accounts. A personal profile is created with access categorised as public (open to all), friends/followers (can be viewed by nominated people who may then chose to share with others) or locked (restricted access which can manage access to friend on a case by case basis) etc.

(10 marks, 6+4)

3(b) (i) Name **two** input devices used on a laptop.
Mouse, touchpad, keyboard, microphone, etc.

(ii) Describe **two** methods of reducing heat build up in laptop computers.
Turn off when not in use, use a docking station, placing on a soft surface may cover vents, fan, heat sink, etc.

(iii) When purchasing a laptop, describe the importance of **each** of the following elements, giving appropriate units and indicative sizes as necessary:

- Processor - **core i7 - recommended to provide efficient operation.**
- Installed memory (RAM) - **allows application to open quickly, e.g. 8GB**
- Operating system - t**o manage hardware/software- windows 10 or apple OS 10.5**
- Hard drive - **to store data- 250-500 GB.**

(16 marks, 4+4+8)

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

3(c) (i) Outline the equipment required to facilitate a video conference.
Internet connected computer or laptop with speaker and microphone, camera, software loaded, etc.

(ii) Explain the terms TCP/IP and VoIP.
TCP/IP - Transmission Control Protocol/Internet Protocol- communication connecting network devices to the internet.
VoIP - Voice over Internet protocol - voice communications and multimedia sessions on internet. *(14 marks, 8+6)*

OR

3(d) (i) Networks can be subject to security issues. Explain the possible impact on a network of *worms* and *distributed denial of service* (DDoS) attacks.

Worm is malware that replicates itself to spread, bandwidth is consumed, servers can overload, worms use up computer processing time, etc.

A DDoS attack makes a service that would usually work unavailable, such downtime results in lost revenue for business, reduces productivity, danger of theft of funds, data and intellectual property.

(ii) Outline the equipment needed and set-up required for the provision of on-line access to a range of devices on a wireless home network.
Wireless-enabled devices, broadband connection, router, modem, etc.

(14 marks, 8+6)

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

(a) - 10 marks, (b) - 16 marks, (c) OR (d) - 14 marks

4(a) (i) Explain the term ISO.

ISO - International Organisation for Standardisation is an international standard-setting body composed of representatives from various national standards organisations.

(ii) Describe, using a laptop computer as the example, **each** of the following quality characteristics:

Reliability: The likelihood that the laptop will not fail for a specified time period.

Conformance: This is the precision with which the laptop meets specified standards.

Durability: A measure of the length of time for which the laptop can be used until it is no longer possible/economical to use the device.

(10 marks, 4+6)

4(b) (i) Discuss **three** potential consequences for a firm or company that produces a batch of faulty products.

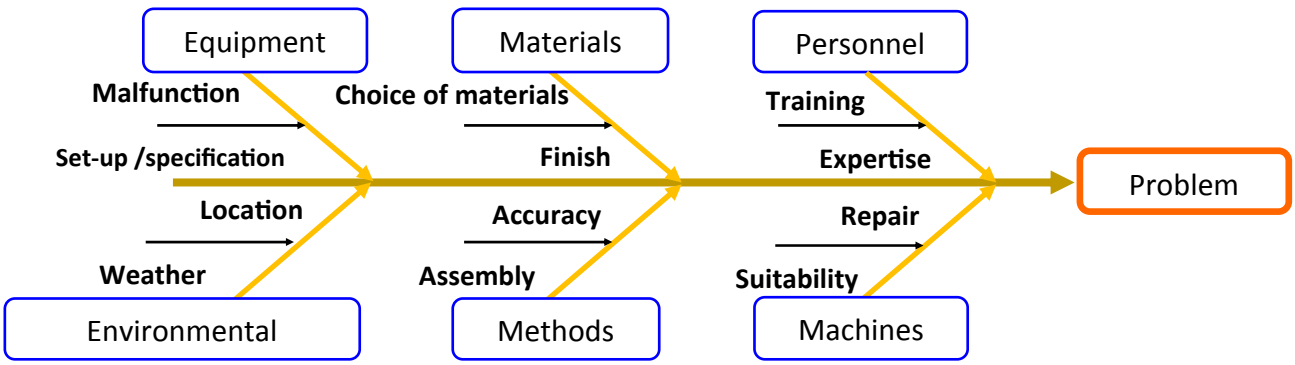
Loss of revenue, potential loss of market share, cost of repair or replacement, cost of extra materials, additional labour, negative publicity, etc.

(ii) Explain how human error can cause problems in the quality of a product produced on an assembly line.

Human error can impact on product inaccuracy, poor assembly, inadequate testing of product, poor finish, etc.

(iii) Compile a cause and effect diagram, using the headings outlined above, or otherwise, to examine a scenario which has led to the production of a wind turbine with inadequate output.

Suggested solution:



(16 marks, 6+4+6)

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

4(c) (i) Use the information in the table to calculate the Process Capability Index for each manufacturing process.

where Cp = $\frac{\text{Tolerance Range}}{6\sigma}$

= $\frac{16.1 - 15.9}{6 \times .391}$ = 0.085 3D Printer

= $\frac{16.1 - 15.9}{6 \times .030}$ = 1.11 Laser cutter

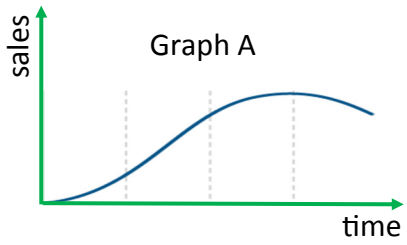
(ii) Select the process which should be used to manufacture the fidget spinner. Justify your selection.

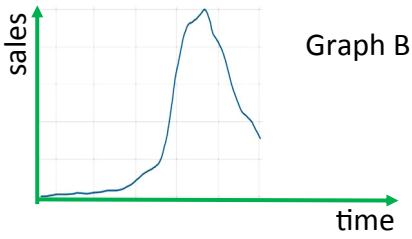
The laser cutter is capable with Cp at 1.11, which is greater than 1.
Laser cutter as it has more consistent accuracy and manufacturing speed is faster.

(14 marks, 8+6)

OR

4(d)





(i) Outline the **four** main stages of a product life cycle.

Introduction: **After all research and development is complete, the product is launched. The product may have few competitors and sales may remain low and it may take time for the market to accept the new product.**

Growth: **The market has accepted the product and sales begin to increase. The company may want to make improvements to the product to stay competitive.**

Maturity: **Sales will reach their peak. Other competitors enter the market with alternative solutions and increasing competition.**

Decline: **Sales begin to decline as the product reaches its saturation point. Most products are phased out of the market at this point due to the decrease in sales and because of competitive pressure. The market will see the product as old and no longer in demand.**

(ii) Compare the life cycle profile for fidget spinners (Graph B) with the life cycle curve A. Comment on any differences you identify.

Graph A has the expected stages for growth of a product. Graph B illustrates a product that initially had limited popularity but spiked in popularity for a short period of time following a surge in demand. This profile is consistent with a 'fad' product which peaked and fell off dramatically.

(14 marks, 8+6)

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

(a) - 10 marks, (b) - 16 marks, (c) OR (d) - 14 marks

5(a) Compare **any two** of the following materials in terms of strength, durability, weight and cost:

	Strength	Durability	Weight	Cost
Steel	**Good**	**Will rust**	**Heavy**	**Low cost**
Aluminium	**Fair**	**Very good**	**Light**	**Medium cost**
Titanium	**Very strong**	**Very good**	**Light**	**High cost**
Carbon fibre	**Very strong**	**Very good**	**Light**	**High cost**

(10 marks, 3+3+2+2)

5(b) (i) Suggest suitable materials for manufacturing **both** the lens **and** housing of the light. Justify your selection.
Lens—e.g. polycarbonate- transparent plastic, impact resistant, moulds easily.
Housing— e.g. aluminium- cast into hollow shape, weather resistant.
Any valid alternative material justified.

(ii) Design, with annotated sketches, a method for mounting the light on the handlebar of the bicycle.

Notched flexible link can be removed from frame. It locks onto the frame.

(iii) Explain the use of hollow tube as a commonly used profile in the manufacture of bicycle frames.
Reduced volume of material ensures lower cost and less weight, easier to shape, can give more aesthetic appearance with larger section material, etc.

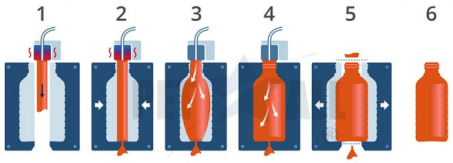
(16 marks, 6+6+4)

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

5(c) (i) Give **two** reasons why the blow moulding process may be suitable for the manufacture of water bottles.
Will allow hollow shapes to be created in a single piece, thin hollow shapes are produced, multiple bottles can be created quickly, etc.

(ii) Describe, with annotated sketches, the blow moulding process.

Heated plastic tube (parison) feeds into mould.
Air is blown in after mould closes.
The parison fills the mould and is trimmed after ejection, etc.



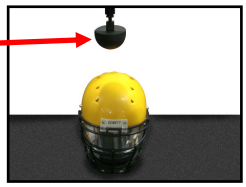
(14 marks, 6+8)

OR

5(d) (i) Describe *resistance to impact* as a material property.
The ability of a material to cope with shock load. It is an indicator of material toughness.

(ii) Outline an impact test to compare materials for the manufacture of bicycle helmets.

striker



Helmets are struck with a predetermined load. The energy used and the damage caused to the helmet will indicate its impact strength.
Alternative suggestion: Izod/Charpy tests outlined.

(14 marks, 6+8)

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Coimisiún na Scrúduithe Stáit
State Examinations Commission

2018. M103P
2018. M104P

Leaving Certificate Examination, 2018

Technology

Coursework Briefs

Ordinary Level and Higher Level

200 marks

The Thematic Briefs for the Leaving Certificate Examination 2018 are given overleaf.

The Coursework must be available for assessment by Friday 23 March 2018.

Leaving Certificate Technology

Ordinary Level and Higher Level 2018

Instructions to candidates:

1. The coursework submitted for assessment must consist of two components:
   - a design folio *and*
   - an artefact.

2. If **either** assessment component (written examination or coursework) is submitted at Ordinary Level, the subject is graded at Ordinary Level.

3. All coursework submitted for assessment must be clearly identified with your examination number.

4. The coursework submitted for assessment must be **your own individual work** and must be completed in school under the supervision of the class teacher.

5. Your coursework must not be removed from the school setting under **any** circumstances as doing so may result in such coursework being considered invalid.

6. The design folio should record all stages of your work and should document how the artefact meets the stated thematic brief.

7. When using research sources, including the Internet, the sources **must be acknowledged**. Research material copied directly from the Internet or from other sources and presented as your own work will not receive any marks.

8. The coursework should display knowledge and skills developed through your study of the core and chosen options.

9. All important operating features of the artefact must be clearly visible and be easily accessible without dismantling.

10. Where an electrical supply is used to operate the artefact, it should be of low voltage output. Where specialised equipment is required, it must be set up by you, have clear operating instructions and be ready to use.

11. The coursework presented for assessment must be displayed in an attractive manner. Multimedia presentations, where submitted, must be of **maximum** 3 minutes duration, must be set up by the candidate and must be ready for viewing.

The coursework must be available for assessment by Friday 23 March 2018.

Leaving Certificate 2018 - Higher Level

Thematic Brief

Access to high quality, safe and nutritious food is a universal requirement for human life and health. Much of modern food production relies on a global industry encompassing a diverse range of contributors, from local growers and artisan producers to huge multi-national corporations and large retailers.

Over time, many strands of the food industry, be that the local small scale producer or the large commercial business, have integrated the use of various technologies until now we find very few areas of food production and the food industry that have not been enhanced by the use of technological solutions.

Some examples of areas where technologies are used by the food industry include:

- Growth and Production
- Processing and Packaging
- Testing and Quality Control
- Logistics and Transportation
- Retail, Catering and Consumption.

In this context and with a focus on modern materials and processes, design and manufacture a working model of a device, system or technological aid that would be of benefit in an area of the food industry. Your solution should include an electro-mechanical element and should also be well presented.

Note: The maximum dimension of the artefact you present for assessment should not exceed 500mm.
If multimedia presentations are used to enhance your display, a hardcopy printout and a CD must be included in your portfolio.

Coursework at Higher Level is weighted as follows:

- Design Folio - 50% of marks
- Artefact - 50% of marks

Total - 200 marks

Design Folio - Higher Level - 100 marks

No.	Heading	Description	Marks
1	Analysis of thematic brief	Evidence of research of the broader context of the theme. Specification of chosen parameters.	10
2	Overall management of the project	Analysis of available resources, time and budget constraints; proposed timeframe/Gantt chart, etc.	5
3	Environmental impact	Demonstration of environmental awareness during design and realisation. Analysis of materials chosen for manufacture. Consideration of energy requirements, reuse/recycling etc.	10
4	Research, investigation and specifications of brief	Further research into chosen area. Analysis of existing solutions. A statement outlining the candidate's final brief and related specifications.	10
5	Design ideas and selection of optimum solution	Annotated **freehand** sketches **related to your design specification**, outlining three possible solutions. Optimum solution identified and justified.	15
6	Sketches and drawings for manufacture	Detailed annotated sketches and drawings including all elements/aspects of solution; circuit diagrams/flowcharts/models/prototypes/ dimensions/ scale/assembly details.	15
7	Production planning	Materials and component lists; costing; scheduling, work breakdown structure; Gant charts, critical path diagrams.	10
8	Product realisation	Sequence of manufacture including photographic record.	10
9	Testing, evaluation and critical reflection	Testing against chosen brief. Evaluation of final artefact. Comparison of planned schedules and actual schedules. Suggested modifications with justification. Critical reflection on the entire process	10
10	Presentation and ICT	Correct sequence of presentation. Quality of material presented. ICT skills in production and presentation of folio.	5

Artefact - Higher Level - 100 marks

No.	Heading	Description	Marks
1	Artefact meets theme and specifications	Solution presented fulfils the thematic brief and specifications as identified by the candidate	15
2	Originality and creativity	Originality and creativity in design, aesthetics and ergonomics. Creative and appropriate use of materials.	15
3	Production skills	Processing of materials. Assembly of materials. Range and depth of skills.	25
4	Functionality	Artefact works well. Appropriate/limited use of commercial components/solutions.	20
5	Quality and finish	High quality manufacture. Artefact well finished. Due regard for health and safety.	15
6	Presentation	Coursework well presented. Parts well integrated and labelled where appropriate.	10

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