



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2024

Marking Scheme

Technology

Ordinary 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.

The table below contains information about annotations used for marking throughout the examination paper.

Annotation	Use	Marks (if applicable)
✓ ₁	Valid information	1
✓ ₂	Valid information	2
✓ ₃	Valid information	3
✓ ₄	Valid information	4
✓ ₆	Valid information	6
✓ ₈	Valid information	8
SEEN	Surplus information seen by examiner	N/A
0	Incorrect answer	0
⋈	Page seen by examiner/ information not valid	N/A

Section A. Answer **any nine** questions. All questions carry 8 marks.

1. The Health and Safety Authority (HSA) provide a range of different colour-coded safety signs.

- (i) State the meaning of the safety sign shown.

Wash your hands.



- (ii) Explain what is meant by a safety sign that is **blue** in colour.

Indicates a mandatory action, hygiene instruction, etc.

(4+4 marks)

2. The image shows a wallet which has Radio Frequency Identification (RFID) protection built in to protect it from *skimming*.

- (i) Explain what is meant by the term skimming.

Skimming is a method of obtaining an individual's payment card data to use their account illegally.



- (ii) Outline **one** benefit of using this type of wallet compared to a traditional wallet.

Personal data is safe, size of wallet is smaller making it easier to carry, etc.

(4+4 marks)

3. The *SolarEV City Concept* combines solar panels on rooftops and electric vehicles on the streets. Using this, and other concepts, the city of Paris aims to eliminate local CO₂ (carbon dioxide) emissions by the year 2050.

Describe **two** other ways urban areas can reduce carbon emissions.

Greater use of public transport, use renewable energy, reduce energy demand through efficient urban design, etc.



(4+4 marks)

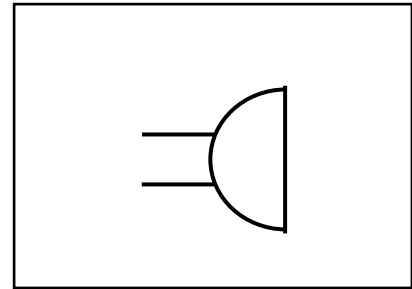
4. The image shows a DC buzzer used in electronics.

(i) Explain what is meant by the term DC.

Direct Current.



(ii) Using the *Formulae and Tables* booklet, or otherwise, draw the symbol for a buzzer in the box provided.



(4+4 marks)

5. The image shows a *graphic view* used to represent a camera.

(i) Name the graphic view used.

Exploded view (Isometric).



(ii) State **two** advantages of using this type of representation.

The representation shows how the various parts can be assembled together, it provides a better understanding of a product, etc.

(4+4 marks)

6. The tool shown is commonly used in the Technology room.

(i) Name the tool.

The Sliding Bevel.



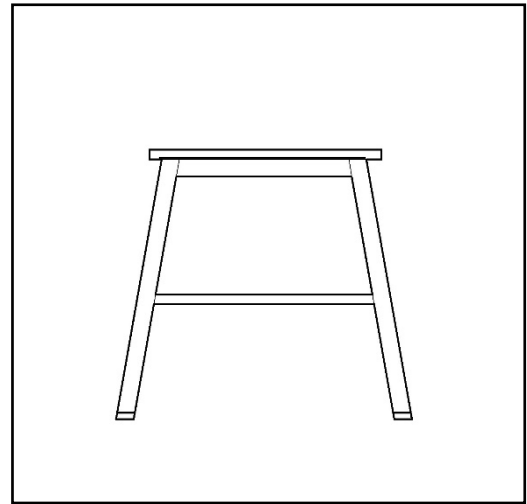
(ii) Describe a situation where this tool might be used.

It can be useful when a line must be marked at an angle on wood. It can also be used to check an angle, etc.

(4+4 marks)

7. The image shows a *machine tool stand*.

In the box provided, make a well-proportioned 2D sketch of the stand when viewed in the direction of arrow **A**.



(Very good sketch- 8 marks,
fair sketch 4 marks)

8. The image shows a mechanism that allows the driver and driven wheels to rotate in the same direction.

- (i) Name the mechanism shown.

Toothed belt and pulley system.



- (ii) Outline **two** advantages of using this mechanism.

Nonslip belt, quiet, relatively cheap, low maintenance, etc.

(4+4 marks)

9. The image shows an innovative hairdryer that has been *ergonomically* designed.

- (i) Give **one** example of how this hairdryer is ergonomically designed.

Shape of the handle, no sharp edges/points, extra attachments for different end uses, switch position, etc.

- (ii) The hairdryer has a power rating of 2 kW.

Calculate how much it will cost to run the hairdryer for 15 minutes, if the cost per unit of electricity is €1 per kWh.

Calculation: $15/60 \times 2 \text{ kW} = \text{€}0.50$

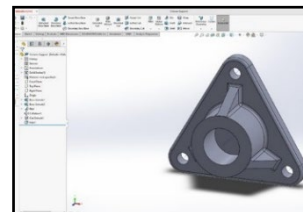


(4+4 marks)

10. The image shows a screenshot from a computer-aided design (CAD) *software* package.

(i) Explain what is meant by the term software.

A set of instructions, data or programs that tell a computer how to perform specific tasks, etc.

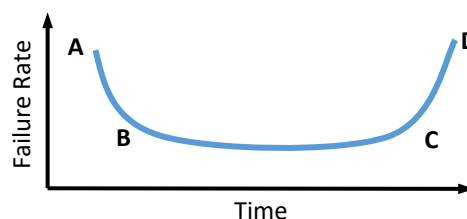


(ii) State **two** reasons why a student would use CAD in Technology.

When designing a product, to create drawing files when using a laser cutter/3D printer, the communicate working drawings, etc.

(4+4 marks)

11. The graphic shows the bathtub curve which is used to represent the failure rate of a product over a period of time.



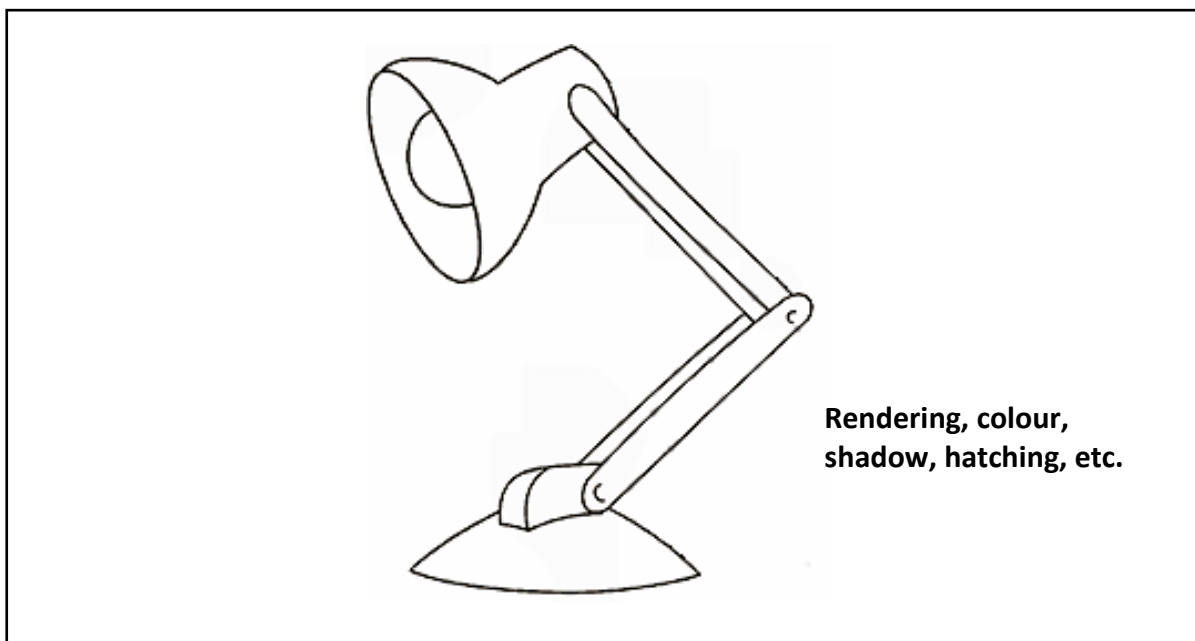
Suggest a reason for the high failure rate at **A-B**, and at **C-D**.

High failure rate at A-B: Early stage in the life of a product- faults are more likely to occur. As problems are resolved, the failure rate begins to fall.

High failure rate at C-D: The product is approaching its end of life and faults increase due to failing parts within the product, etc.

(4+4 marks)

12. Use **two** graphic techniques to enhance the representation of the desk lamp shown.



Rendering, colour, shadow, hatching, etc.

(4+4 marks)

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

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

- 2(a) (i) Name the type of structure typically used in the manufacture of a helmet.
Shell structure- the outer shell needs to be hard and durable.
ABS is a suitable material for the manufacture of the outer shell.
- (ii) Outline **one** other application for this type of structure.
Car body, ceramic vase, egg, etc.



(10 Marks, 6+4)

- 2(b) (i) Suggest a suitable plastic for the manufacture of the wheels. Justify your selection.
Polyurethane- strong and long-lasting, etc.
- (ii) Briefly outline the purpose of a ball bearing system in the wheel assembly.
A ball bearing system allows the wheel to roll faster and smoother by reducing friction.
- (iii) Describe, using notes and sketches, how the truck assembly could be attached to the deck of the skateboard.
Any relevant method sketched and annotated, e.g., nut and bolt assembly, etc.



(8 Marks, 2+4+2)

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

2(c)



- (i) Outline **one** advantage and **one** disadvantage of using facial recognition to control access to different venues.
Adv: Enhanced security, fraud prevention, convenience, etc.
Disadv: Access to personal data, potential problems if software malfunctions, e.g., delayed access, etc.
- (ii) State **one** other *biometric* means that could be used to control access to an event.
Fingerprints, retina scans, voice recognition, etc.

(6 Marks, 4+2)

OR

- 2(d) (i) Outline **two** quality characteristics of the surveillance cameras.
Resolution, night vision, motion detection, recording, etc.
- (ii) The law to trial AI based surveillance has been quite controversial. Outline **one** disadvantage to AI-based surveillance.
Any relevant disadvantage, e.g., privacy concerns, potential for errors, etc.

(6 Marks, 4+2)

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

- 3(a) (i)** Outline **two** advantages to using the JA1 Pulse aircraft to respond to a medical emergency.
Access to difficult terrain, fast response time, etc.

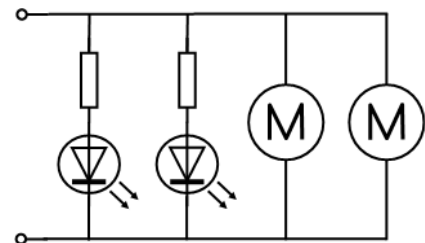


- (ii)** Suggest a suitable material for the fuselage (body) of the aircraft. Justify your selection.
Carbon fibre- high strength to low weight ratio, etc.

(10 Marks, 6+4)

- 3(b) (i)** Explain what is meant by the term prototype.
A first or preliminary version of a product from which other forms are developed.
- (ii)** Suggest **two** safety features that could be incorporated into the design of the JA1 pulse.
Greater stability when flying in windy conditions, propellers are higher than a person's head for operational safety, etc.

- (iii)** A student has decided to make a model of a similar aircraft to include two DC motors and two LEDs.
 Draw a labelled diagram of a suitable electronic circuit for the model aircraft.

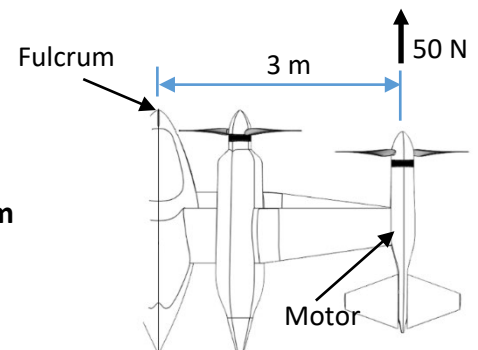


(8 Marks, 2+4+2)

Answer 3(c) or 3(d)

- 3(c)** The diagram shows a wing of the JA1 aircraft.

- (i)** Calculate the moment when a force of 50 N is applied at a distance of 3 metres from the fulcrum as shown.
Moment = Force (N) x Distance (m) = 50N x 3m = 150Nm
- (ii)** If the motor was moved farther away from the fulcrum, what effect would this have on the moment force?
The moment would be increased.



(6 Marks, 4+2)

OR

- 3(d) (i)** Briefly outline **two** benefits of using a WBS when planning for the design and manufacture of a product.
Identify tasks and sequences, identify resources required, provide greater clarity when organising schedules, etc.
- (ii)** Suggest a sequence of steps to 3D print a propeller for a model aircraft.
Create a design using CAD software, export the STL File, choose your materials, choose your parameters, create the Gcode, print, etc.

(6 Marks, 4+2)

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

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

- 1(a) (i) Outline **two** advantages of using a PIC in a child's toy.
Multiple inputs and outputs, reprogrammable, etc.

- (ii) Suggest **one** other child's toy that could use a PIC and outline why it would be useful to use a PIC in this toy.

Any relevant example and justification, e.g., remote controlled all-terrain buggy- multiple functions- lights, motors, different speeds, etc.



(10 marks, 6+4)

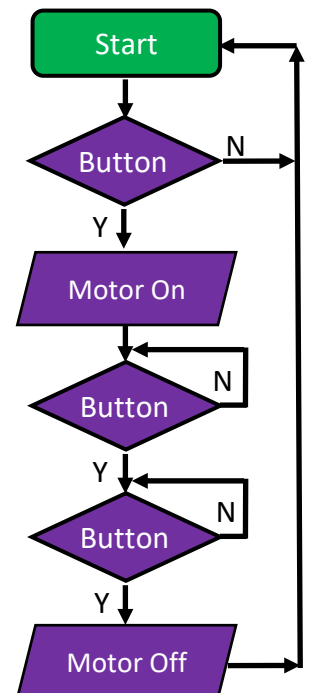
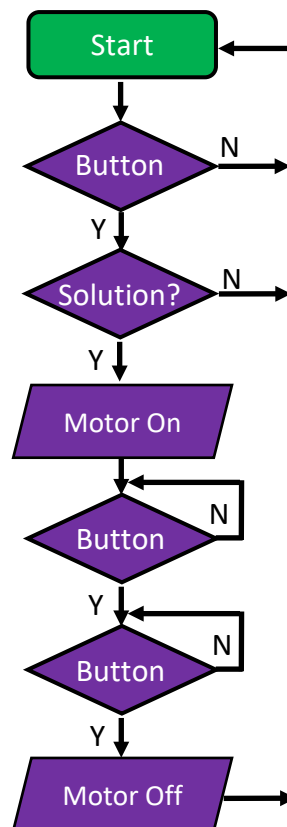
- 1(b) (i) Complete a flowchart to operate the bubble blower in the following sequence:

- When a button is pressed, the motorised blower is turned on
- When the button is pressed a second time, the motorised blower increases its speed
- When the button is pressed a third time, the motorised blower stops.

- (ii) Suggest a modification of the flowchart to alert the user when the bubble solution is running low.

- (iii) Name a suitable sensor that could be used to detect when the bubble solution is low.

Float switch sensor.



Any valid alternative solution accepted.

(20 Marks, 6+8+6)

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

1(c) The image shows a Diplus S600 robotic vacuum cleaner and its charging unit. It is an example of a home automation system that is becoming increasingly popular.

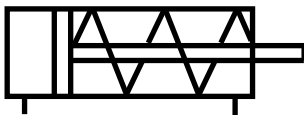


- (i) Outline **two** advantages of using home automation systems.
Increase home comfort, use less energy, save money, etc.
- (ii) Give **one** other example of a home automation device.
Robotic lawn mower, smart lights, voice-activated assistants e.g., Alexa, etc.

(10 Marks, 6+4)

OR

1(d) The graphic shows the pneumatic symbol for a single-acting cylinder (actuator).



- (i) Explain how a single-acting cylinder works with reference to the graphic shown.
A single acting cylinder has one port, which allows compressed air to enter the cylinder chamber and extend the rod in one direction. When the compressed air leaves the cylinder, the spring returns the rod to its original position.
- (ii) Give **one** practical example of where a single-acting cylinder could be used in everyday life.
Assembly operations- materials handling, clamping work, packaging operations, etc.

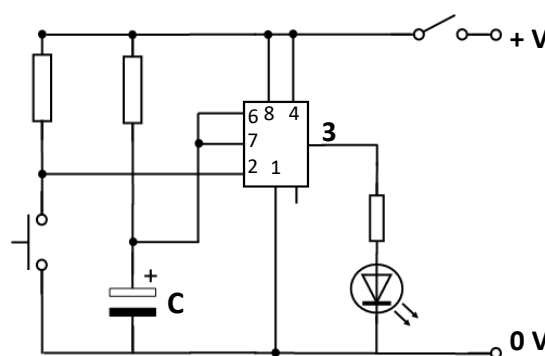
(10 Marks, 6+4)

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

- 2(a) (i) Explain what is meant by the term polarised.
The component only allows current to flow through it in one direction.
In the case of an LED, current flows from the anode (+) to the cathode (-).
- (ii) Describe how a student would ensure that an LED is correctly polarised when inserting it into a circuit.
The anode of the LED is connected to the positive terminal of the power supply and the cathode is connected to the negative terminal of the power supply.

(10 marks, 6+4)

- 2(b) (i) Explain what is meant by the abbreviation IC.
Integrated circuit.
- (ii) Briefly outline the purpose of capacitor C in the circuit.
Capacitor C is used to control the length of time the output stays activated. The larger the capacitor the longer the output will stay on when configured in a monostable mode.
- (iii) Redraw the circuit to include an LED output at pin 3 of the 555 IC.



(20 Marks, 6+8+6)

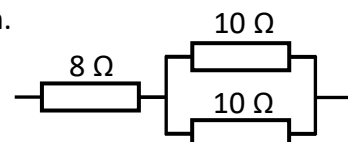
Answer 2(c) or 2(d)

- 2(c) (i) Explain what is meant by the abbreviation PCB.
Printed circuit board.
- (ii) In **each** case, when drilling and soldering, describe **one** safety precaution that must be observed by the student.
Drilling- eye protection, clamp material securely, etc.
Soldering- fume extraction, place soldering iron in its stand when not in use, etc.

(10 Marks, 4+6)

OR

- 2(d) (i) Briefly outline what is meant by the term tolerance when referring to resistors.
This is the acceptable deviation allowed for the stated value of resistor.
e.g., 5% deviation for a 330 Ω resistor = 16.5 Ω . Therefore, the acceptable range for this resistor is 313.5 Ω to 346.5 Ω .
- (ii) Calculate the total resistance for the partial circuit shown.
Resistors in parallel: $1/10 + 1/10 = 2/10 = 1/5$. $R = 5 \Omega$
Total resistance = $8 \Omega + 5 \Omega = 13 \Omega$



(10 Marks, 4+6)

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

- 3(a) (i) Suggest **two** benefits of using a VR headset.
Realistic simulations, educational training, interactive, etc.
- (ii) Outline the difference between virtual reality and augmented reality.
Augmented reality uses a real-world setting while virtual reality is completely virtual.

(10 marks, 6+4)

- 3(b) (i) Outline **two** reasons why data centres use large amounts of electricity.
Many devices operating simultaneously require large volumes of electricity, heat generated from these devices needs to be cooled using fans, which in turn requires electricity to operate, etc.
- (ii) Describe the main function of **any two** items of hardware listed above.
Router: Disperses the signal to devices on the network
Switches: Allows two or more IT devices to connect with one another using ethernet cables.
Modem: Responsible for sending and receiving signals from the ISP.
Firewall: A network security device that monitors network traffic and blocks specific traffic based on a defined set of security rules, etc.
- (iii) Suggest **one** way in which the hardware could be kept cool in a data centre.
Use of fans, coolant systems, layout of hardware in the data centre, etc.

(20 Marks, 6+8+6)

Answer 3(c) or 3(d)

- 3(c) (i) Outline **two** examples of social engineering.
Phishing, Baiting, Malware, etc.
- (ii) Describe **two** measures that can be taken by individuals to avoid social engineering.
Multi-factor authentication, keep software and firmware updated regularly, etc.

(10 Marks, 4+6)

OR

- 3(d) (i) State **a** reason why a user might need to purchase a licence for a particular software application.
To use software legitimately, protect the intellectual property of the software developer, etc.
- (ii) Outline the difference between *software* and *hardware* when referring to computers.
Software: Computer programs and apps.
Hardware: Physical components- monitor, keyboard, mouse, etc.



(10 Marks, 4+6)

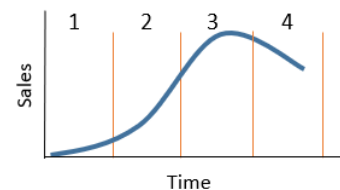
Option 4 - Manufacturing Systems - Answer 4(a) and 4(b)

- 4(a) (i) Suggest **two** reasons why a company might use this technique when designing a product.
To better understand how a product is made, to gain a competitive advantage over other manufacturers, etc.
- (ii) Many people feel that this technique should not be allowed.
Outline **one** objection people might have with reverse engineering.
Patent infringement, ethical concerns, etc.

(10 marks, 6+4)

- 4(b) (i) Give **two** reasons why the sales are low in year 1.
Market introduction and development, little demand as customers may not be aware of the new product, etc.

- (ii) Briefly outline **two** challenges for the company in meeting the demand for the product in Year 2.
Manufacturing capacity, supply of materials, distribution of the product, etc.



- (iii) Describe **two** techniques the company could use to increase its sales as the demand for the product declines during year 4.
Introduce new features, introduce promotional offers, etc.

(20 Marks, 6+8+6)

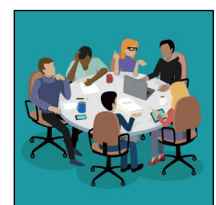
Answer 4(c) or 4(d)

- 4(c) (i) Briefly describe **two** problems of planned obsolescence for a consumer.
Cost of replacing a product, disposal of the product at its end-of-life, etc.
- (ii) Suggest **two** benefits of planned obsolescence for the manufacturer of a product.
Increased sales, further funding for research and development, etc.

(10 Marks, 4+6)

OR

- 4(d) (i) Describe **two** characteristics of a good team leader.
Leads by example, empowers employees, good communicator, etc.
- (ii) Suggest **two** reasons why it is important to have people who work well as a team.
To solve problems effectively, staff morale, etc.



(10 Marks, 4+6)

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

- 5(a) (i) Explain what is meant by the term composite, when referring to materials.
A composite material is a combination of two or more materials with different physical and chemical properties. Within the finished material, the individual elements remain separate and distinct. Composite materials are typically stronger, lighter, more durable when compared with common materials.
- (ii) Name **one** other composite material and outline **one** advantage of using this material.
Concrete - compressive strength, etc.
- (10 marks, 6+4)
- 5(b) (i) Briefly outline **two** reasons for the use of metal tubing in manufacturing the suspension system.
Lightweight, strength to weight ratio maintained, less material cost, etc.
- (ii) Describe a suitable finish that could be applied to protect the metal tubing from degradation.
Galvanising- a process of applying a protective zinc coating to steel or iron to prevent rusting.
Alternative finishes- Powder coating, paint, etc.
- (iii) The metal tubes are joined using *permanent* jointing methods while the shell is attached to the suspension using *semi-permanent* joints.
Explain what is meant by both permanent and semi-permanent joints, giving an example of each.
A permanent joint cannot be dismantled without breaking, e.g., a welded joint.
A semi-permanent joint can be dismantled without breaking the assembled parts, e.g., nut and bolt, etc.
- (20 Marks, 6+8+6)

Answer 5(c) or 5(d)

- 5(c) (i) Name a suitable plastic that could be used when manufacturing the steering wheel. Justify your selection.
Polyurethane- highly durable, soft, etc.
- (ii) Outline **two** problems for the environment caused by using plastics to manufacture products.
Disposal of plastics can be hazardous for the environment, damage wildlife habitats/biodiversity, etc.
- (10 Marks, 6+4)

OR

- 5(d) (i) Explain what is meant by the term smart material.
Smart materials have one or more properties that can be significantly changed in a controlled fashion by external stimuli such as light or temperature.
- (ii) Suggest **one** other application for a photochromic material.
Sunglasses, privacy shields, optical switches, etc.
- (10 Marks, 6+4)



Leaving Certificate Examination, 2024

Technology

Coursework Briefs

Ordinary Level and Higher Level

200 marks

The Thematic Briefs for the Leaving Certificate Examination 2024 are given overleaf.

The Coursework must be available for assessment by Friday 22 March 2024.

Leaving Certificate Technology

Ordinary Level and Higher Level 2024

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. Digital drawings or other manufacturing details, if presented for assessment, must be included in **hardcopy** format in your design folio.
8. Where computer aided manufacture (CAM) is used, supporting CAD drawings must be included in your design folio to authenticate your own individual work.
9. The coursework should display knowledge and skills developed through your study of the core and chosen options.
10. All important operating features of the artefact must be clearly visible and be easily accessible without dismantling.
11. 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.
12. 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.
13. You must reference and acknowledge all research sources used such as: publications including books, professional journals and government reports; online sources and other types of media; any material generated using artificial intelligence (AI) software or applications; and material from specialist organisations and relevant individuals. To include such material without properly referencing the source will be considered plagiarism. In addition, the copying from, or reproduction of, material from such sources may also be considered plagiarism.
14. Material copied directly from the Internet or from other sources and presented as your own work will not receive any marks.
15. Any case of suspected copying, plagiarism (which includes the use of AI software), improper assistance, or procurement of work prepared by another party will be thoroughly investigated.

The coursework must be available for assessment by Friday 22 March 2024.

Leaving Certificate 2024 - Ordinary Level

Thematic Brief

Play is an important part of the social and intellectual development of a child.

Playful learning creates a positive and holistic learning experience that supports the growth and development of young people in various aspects of their lives. It nurtures their curiosity, creativity, and love for learning.

Some characteristics of playful learning experiences are:

- Enjoyable and fun
- Actively engaging
- Socially interactive
- Meaningful

In this context, design and make a working model of a toy, system, or educational resource that could be used to support playful learning in a context of your choice. Using modern materials and technologies, your model should incorporate an electronic and/or mechanical system and should be well presented.

Note: The maximum dimension of the artefact you present for assessment should not exceed 500 mm.

If multimedia presentations are used to enhance your display, a hardcopy printout and a digital file (USB flash drive) must be included in your portfolio.

Coursework at Ordinary Level is weighted as follows:

- Design Folio - 40% of marks
- Artefact - 60% of marks

Total - 200 marks

Design Folio - Ordinary Level - 80 marks			
No.	Heading	Description	Marks
1	Analysis, research and investigation	Analysis of thematic brief. Research into chosen area. Analysis of existing solutions.	10
2	Overall management of the project	Analysis of available resources, time and budget constraints; proposed timeframe etc.	5
3	Environmental impact	Impact of materials and production processes; product use; suitability for reuse/recycling.	5
4	Design ideas and selection of optimum solution	Annotated freehand sketches outlining three possible solutions. Optimum solution identified and justified.	10
5	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
6	Production planning	Materials and component lists; scheduling, work breakdown structure, costing.	10
7	Product realisation	Sequence of manufacture including photographic record.	15
8	Evaluation and testing	Testing against chosen brief. Evaluation of final artefact. Comparison of planned schedules and actual schedules. Suggested modifications with justification.	5
9	Presentation and ICT	Correct sequence of presentation. Quality of material presented. ICT skills in production of folio.	5

Artefact - Ordinary Level - 120 marks			
No.	Heading	Description	Marks
1	Artefact meets theme & specification	Solution presented fulfils the thematic brief and specifications.	15
2	Creativity	Creativity in design, aesthetics & ergonomics. Creative and appropriate use of materials.	15
3	Production skills	Processing of materials. Assembly of materials and components. Range and depth of skills.	30
4	Functionality	Artefact works well. Appropriate/limited use of commercial components/solutions.	30
5	Quality and finish	High quality manufacture. Artefact well finished. Due regard for health and safety.	20
6	Presentation	Coursework well presented. Parts well integrated and labelled where appropriate.	10

Note: *While the general headings and marks above will largely remain the same, breakdowns may vary depending on the actual brief for any given year.*

