



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2022

Marking Scheme

ENGINEERING –
Materials and 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.

LEAVING CERTIFICATE, 2022

Marking Scheme

Written Examination and Practical Examination

***ENGINEERING –
Materials and Technology***

ORDINARY LEVEL

Introduction – written examination

In considering the marking scheme, the following should be noted.

1. The solutions presented are examples only. All other valid solutions are acceptable and are marked accordingly.
2. The detail required in any answer is determined by the context and the manner in which the question is asked, and by the number of marks assigned to the answer in the examination paper and, in any instance, therefore, may vary from year to year.
3. Bonus marks at the rate of 5% of the marks obtained will be given to a candidate who answers entirely through Irish and who obtains less than 75% of the total marks. In calculating the bonus to be applied decimals are always rounded down, not up e.g., 4.5 becomes 4; 4.9 becomes 4, etc. The bonus table given on the next page applies to candidates who answer entirely through Irish and who obtain more than 75% of the total marks.
4. The table below contains information about annotations used for marking throughout the exam paper.

Annotation	Meaning
	Blank page
	Page marked by examiner



Coimisiún na Scrúduithe Stáit

Marcanna Breise as ucht freagairt trí Ghaeilge

Léiríonn an tábla thíos an méid marcanna breise ba chóir a bhronnadh ar iarrthóirí a ghnóthaíonn níos mó ná 75% d'iomlán na marcanna.

N.B. Ba chóir marcanna de réir an ghnáthrata a bhronnadh ar iarrthóirí nach ngnóthaíonn níos mó ná 75% d'iomlán na marcanna don scrúdú. Ba chóir freisin an marc bónais sin a **shlánú síos**.

Tábla 150 @ 5%

Bain úsáid as an tábla seo i gcás na n-ábhar a bhfuil 150 marc san iomlán ag gabháil leo agus inarb é 5% gnáthrata an bhónais.

Bain úsáid as an ngnáthrata i gcás 112 marc agus faoina bhun sin. Os cionn an mharc sin, féach an tábla thíos.

Bunmharc	Marc Bónais
113 - 116	5
117 - 123	4
124 - 130	3

Bunmharc	Marc Bónais
131 - 136	2
137 - 143	1
144 - 150	0

LEAVING CERTIFICATE

ENGINEERING - Materials and Technology

(Ordinary Level – 150 marks)

Written Examination Marking Scheme 2022

Answer **any Three** questions.

Question 1: 50 marks

Any eight parts @ 6 marks each.

Award 1 extra mark for each of the first two correctly answered parts.

Question 2: 50 marks

- (a) Any three parts @ 5 marks (15)
- (b) One part @ 12 marks (12)
- (c) (i) Three parts @ 3 marks
- (ii) Three parts @ 2 marks (15)
- (d) (i) One part @ 4 marks
- (ii) One part @ 4 marks (8)

Question 5: 50 marks

- (a) (i) Any two @ 5 marks
- (ii) One part @ 10 marks (20)
- (b) Any three parts @ 4 marks (12)
- (c) Any two parts @ 5 marks (10)
- (d) Two parts @ 4 marks (8)

Question 3: 50 marks

- (a) Any two parts @ 7 marks (14)
 - (b) Any two parts @ 7 marks (14)
 - (c) Two parts @ 5 marks (10)
 - (d) Any two parts @ 6 marks (12)
- Or**
- (d) Any two parts @ 6 marks (12)

Question 6: 50 marks

- (a) One part @ 7 marks
 - Two parts @ 5 marks (17)
 - (b) Any three parts @ 6 marks (18)
 - (c) (i) one part @ 5 marks
 - (ii) one part @ 5 marks
 - (iii) Two parts @ 3 + 2 marks (15)
- Or**
- (c) Three parts @ 5 marks (15)

Question 4: 50 marks

- (a) (i) One part @ 3 marks
- One part @ 2 marks
- (ii) One part @ 3 marks
- One part @ 2 marks
- (iii) One part @ 5 marks (15)
- (b) Any three parts @ 4 marks (12)
- (c) Any three parts @ 5 marks (15)
- (d) Two parts @ 4 marks (8)

Question 7: 50 marks

- (a) Two parts @ 6 marks (12)
 - (b) (i) 5 marks
 - (ii) 5 marks
 - (iii) 5 marks
 - (iv) 5 marks (20)
 - (c) Any three parts @ 6 marks (18)
- Or**
- (c) Any three parts @ 6 marks (18)

Sample Answers *and* Marking Scheme

Note: The solutions presented are examples only.

All other valid solutions are acceptable and are marked accordingly.

Question 1

(50 Marks)

(a) **Two safety precautions to be observed when using a pillar drilling machine:**

- Ensure the piece being drilled is secured in a machine vice.
- Personal Protective Equipment (PPE) must be worn to protect the eyes /face i.e., goggles / face shield.

(b) **One disadvantage of a non-permanent joint:**

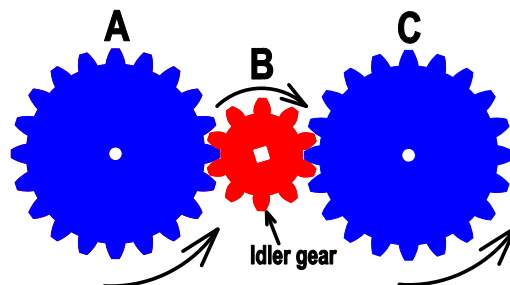
A non-permanent joint can fail / loosen due to vibration. The strength of non-permanent joints are not as strong as permanent joints and are not suitable for heavy loads.

(c) **Two benefits for the use of renewable energy:**

- Cleaner than burning fossil fuels.
- Renewable energy such as wind or solar will not run out.

(d) **Function of idler gear B:**

The idler gear **B** will make gear **A** and gear **C** turn in the same direction.



(e) **Reason for lubricating engine parts:**

Lubricating engine parts can help prevent overheating of engine parts, reduce friction and prevent seizing.

(f) **Benefit of using computer aided drawing (CAD) in engineering:**

Accurate, high-quality drawings can be produced.

(g) **Non-ferrous metals:**

Non-ferrous metals or alloys do not contain any amounts of iron.

Example:

Aluminium is a non-ferrous metal as it does not contain iron.

(h) **One reason why Aluminium is used:**

Aluminium is a light material and will not corrode

Award 1 extra mark for each of the first two question parts answered correctly. (Max: +2 marks)

Safety Precautions

Award 3 + 3

6 Marks

Disadvantage

6 Marks

Benefits

Award 3 + 3

6 Marks

Function

6 Marks

Reason

6 Marks

Benefit

6 Marks

Explain & name

Award 3 + 3

6 Marks

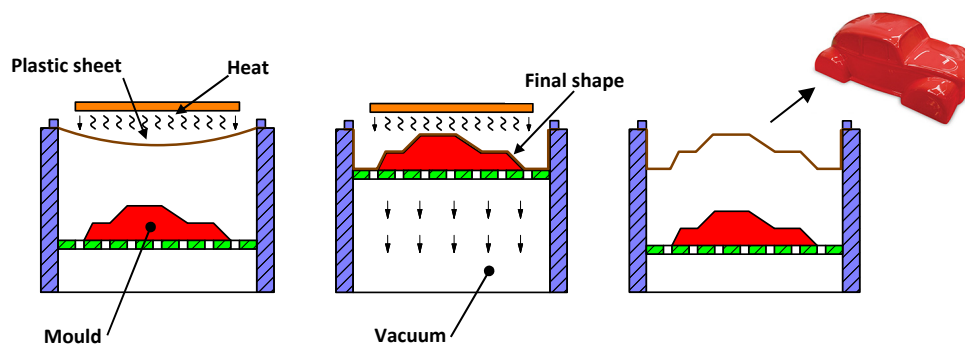
Reason

6 Marks

(i) Any one:

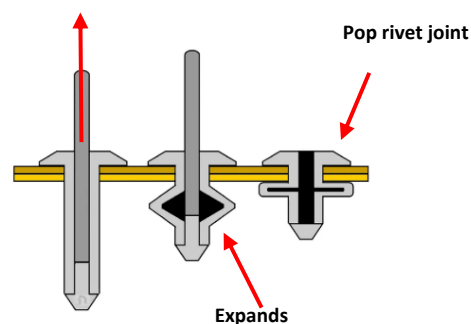
Vacuum former:

A vacuum former is a plastic thermoforming machine that is used to produce parts which are precisely formed on one side. The former contains a heating element, a height adjustable table, which is porous, and an air pump. The heating element is used to heat up and soften a sheet of plastic which has been clamped into a frame. When the plastic sheet begins to sag, a mould, placed on the porous table, is lifted into the plastic sheet. The air pump is then turned on creating a vacuum below the mould. This causes the plastic sheet to pull against the mould, forming the final shape. After cooling, the mould is lowered, and the plastic part is removed.



Pop riveting gun:

A pop riveting gun is used to create a pop rivet joint in sheet metal. A pop rivet is placed into the gun and passed through pre-drilled holes in the metals to be joined. As the handles of the gun are squeezed, a clamping mechanism grips the shaft of the rivet and draws it back into the gun. The enlarged end of the shaft causes the remaining part of the rivet to expand thereby clamping the sheets together. When the tensile force on the rivet gets too great the shaft breaks off leaving the pop rivet joint behind.

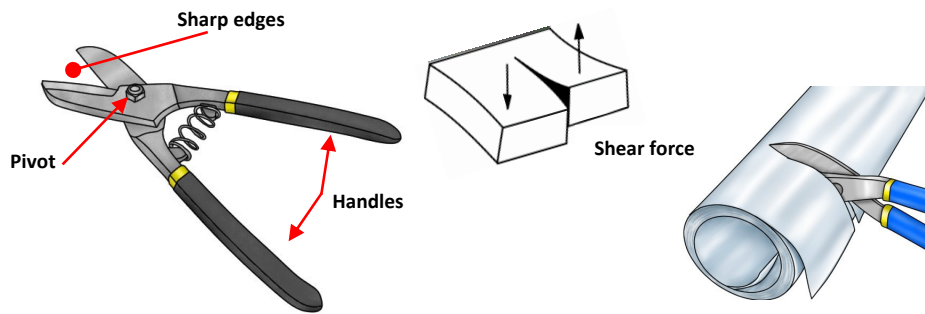


Describe

6 Marks

Tin snips:

Tin snips are hand operated tools, and their purpose is to cut light gauge metal sheets. The two handles, which rotate about a pivot point, have two sharp edges on either end. When the user closes the handles together the blades cut through the material. The action of the tin snips cutting through metal is like how a pair of scissors cuts through paper. Similarly, to scissors, they do not simply cut, but shear through the material. They do this by pushing up the metal on one side of the cut line and down on the other.



(j) Any one:

Wireless control:

Wireless control is the communication of signals between different devices through radio waves. Wi-Fi is an example of wireless technology used to connect computer, tablets, smartphones, and other devices to the internet. Wi-Fi is the radio signal sent from a wireless router to a nearby device, which translates the signal into data you can see or use to control devices. Smartphone Apps can now be used to control home heating / lighting systems wirelessly i.e., no wire connections are required.

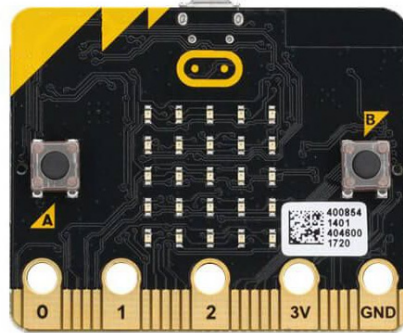


Explain

6 Marks

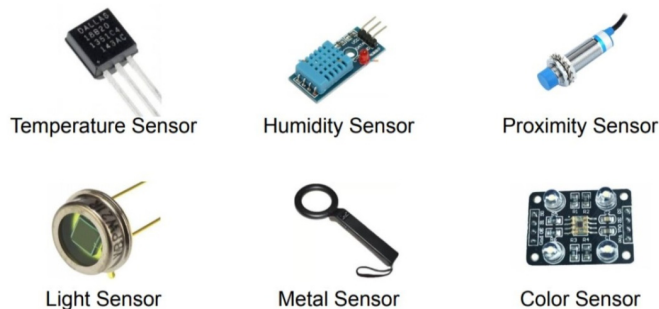
Micro:bit:

The Micro:bit is a pocket sized computer that allows a user to control motors or other devices using coding. The micro:bit has an LED light display, buttons, sensors and many input/output features that, when programmed, let it interact with you and your world.



Sensor:

A sensor is an input device that detects events or changes in its environment and sends the information to other electronic components / devices. Sensors are used in everyday objects such as touch-sensitive lamps which dim or brighten by touching the base. Biometric sensors are used on smart phones to provide access via fingerprint or face recognition.



(k)

Definition:

Malleability is the ability of a material to be hammered / flattened out in all directions without breaking.

Name: Lead

Definition & Name
Award 3 + 3

6 Marks

(l) **Any one:**

Conductor:

A conductor is a material that allows heat or electricity flow through it. Copper is an example of a good conductor as it will allow heat / electricity to flow through it.



Engraving:

The process of forming designs by cutting with a tool or corrosion by acids on the surface of material.



Prototype:

A prototype is an early sample, model, or release of a product built to test how well it might operate.

Describe

6 Marks

(m)

Two safety precautions:

- Keep your hands a safe distance back from the tip of the solder iron.
- Always replace the soldering iron back in its holder when not in use.

Safety Precautions
Award 3 + 3 Marks

6 Marks

Question 2

(50 Marks)

(a) Any three:

Tapping hole:

Furnace tapping is the process of removing slag and hot metal from the furnace. The tapping hole, usually located slightly above the floor of the furnace, is used for tapping (removing) slag and hot metal from the furnace.

Charge:

The charge is the material melted in the furnace. It can be made up of material such as ore, scrap iron/steel, coke, limestone, etc.

Refractory lining:

The refractory lining of a furnace is a protective layer inside the furnace that acts as a form of insulation to withstand high temperatures.

Slag:

Slag is a material produced during metal production. It is a glass-like by-product, left over after the metal has been separated from its ore. Slag floats on top of the metal and generally removes waste in metal smelting but can also help control the temperature of the molten metal.

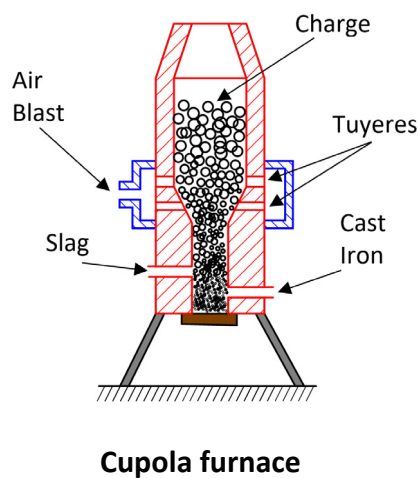
Explain

Award 3 @ 5 Marks

Total (15) Marks

(b) Any one:

Labelled diagram & operation:



Pig iron and scrap steel or cast iron, together with carbon, coke & limestone provide the charge. Like the blast furnace, the cupola furnace is coke-fired with limestone acting as a flux to turn the impurities into slag. Air is blown through the tuyeres helping the coke to burn, causing the charge to melt. The slag floats on top of the cast iron and is removed as required. The molten cast iron is tapped from the bottom of the furnace and cast into moulds of different shapes and sizes as required.

Describe

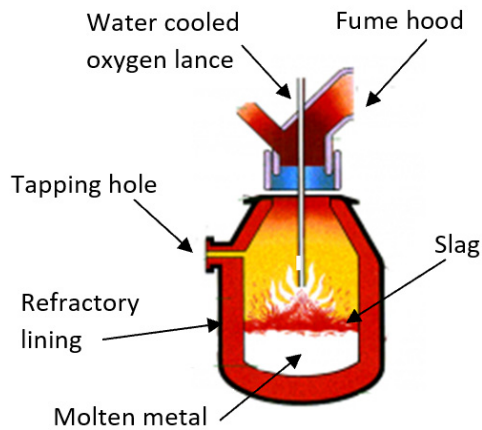
Award 6 Marks

Labelled diagram

Award 6 Marks

Total (12) Marks

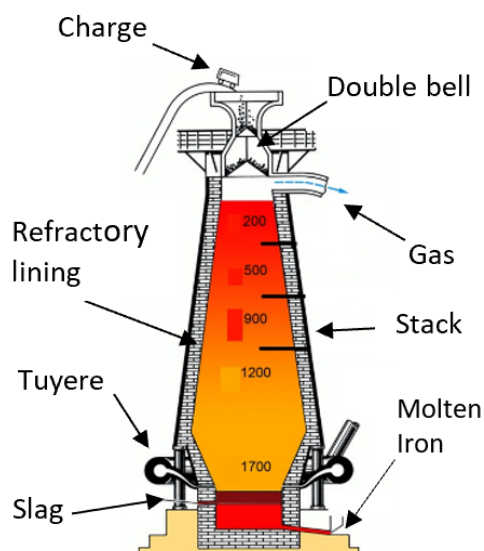
Labelled diagram & operation:



Basic oxygen furnace

The charge consists of scrap iron and steel together with lime and molten pig iron. Oxygen is blown at the surface of the molten charge from a water-cooled lance which is lowered through the mouth of the furnace. Impurities in the charge are oxidized and form a slag on the surface. At the end of the blow, the steel is poured off through a tapping hole followed by emptying the slag through the mouth of the furnace.

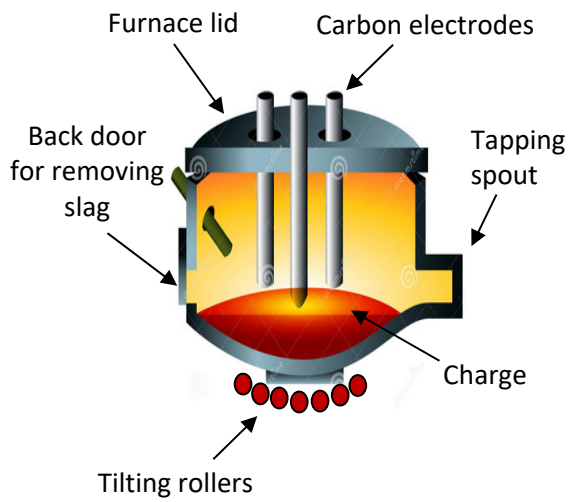
Labelled diagram & operation:



Blast furnace

Iron ore, coke and limestone provide the charge and are fed in through the top of the furnace. As the coke burns, carbon monoxide is produced, and combines with the oxygen in the ore, leaving iron. The limestone combines with impurities to form slag. The molten iron falls to the bottom of the furnace where it is tapped off from time to time. The slag floats on top of the molten iron and is tapped off when necessary.

Labelled diagram & operation:



Electric Arc furnace

Cold scrap iron or steel make up most of the charge together with small amounts of lime and carbon. Heat for this furnace is produced by an electric arc created between carbon electrodes and the charge. The lime combines with impurities producing slag. When the correct composition of steel is achieved the slag is removed through the back door. The furnace is then tilted forwarded on its rollers allowing the molten steel to flow out the tapping spout.

(c)

Roll cage: (i) Tubular Steel
(ii) Good strength to weight ratio

Seat: (i) Leather
(ii) Durable

Wheel rim: (i) Aluminium
(ii) Does not corrode

(i) Material
Award 3 @ 3 Marks
(ii) Reason
Award 3 @ 2 Marks
Total (15) Marks

(d) **Belt & pulley mechanism:**

(i) **Advantage -** Generally quiet when in use, cheap, requires no lubrication. Easier to assemble compared to gear drive systems.

(ii) **Disadvantage -** Belts can stretch causing slippage resulting in loss of drive. Belts can also snap / break

(i) Advantage
Award 1 @ 4 Marks
(ii) Disadvantage
Award 1 @ 4 Marks
Total (8) Marks

Question 3

(50 Marks)

(a) Any two:

(i) Annealing:

Annealing is a heat treatment process used to soften metals. To anneal steel, it is heated to a cherry red colour, approx. 900° and allowed to cool down as slow as possible. This can be achieved by leaving the metal in a furnace while the furnace is cooling down. Annealing relieves internal stresses, increases ductility and malleability of a metal.

(ii) Normalising:

Normalising is a heat treatment process that is used to make a metal more ductile and tough after processes such as thermal or mechanical hardening. Normalising steel involves heating it to a temperature typically in the range of 830°-950° and then cooling in air. The heating and slow cooling changes the microstructure of the steel, altering its mechanical properties.

(iii) Tempering:

Tempering removes some of the hardness while increasing the toughness of a metal. It is achieved by heating the metal to a specific temperature which is determined by the colour of the metal. On heating, colours appear and when the correct colour is achieved i.e., light straw appears at approx. 250° - 350°, it is quenched in cold water.

Describe

Award 2 @ 7 Marks

Total (14) Marks

(b) Any Two:

(i) Quenching:

Quenching is when a hot metal is cooled very quickly i.e., when a cherry red metal is moved about when dipped into cold water.

(ii) Carbon content:

If iron is mixed with carbon, steel is produced. The amount of carbon (carbon content) mixed with iron, will determine the type of steel produced i.e.

- Low carbon steel contains less than 0.03% of carbon.
- Medium carbon steel contains between 0.03% and 0.06% carbon.
- High carbon steel contains more than 0.06% carbon.

(iii) Hardening temperature:

To ensure high carbon steel is hardened correctly the steel must be raised to the correct temperature before cooling. This critical temperature is known as its hardening temperature.

Explain

Award 2 @ 7 Marks

Total (14) Marks

(iv) Case hardening:

Case hardening is a method of making low carbon steel very hard on the outside while leaving its centre tough. Low carbon steel may be case hardened by first increasing the amount of carbon in the outer surface by 'carburising'. Carburising is carried out by heating the steel to a cherry red and allowing it to cool in a carbon rich material. The steel part will now have a skin or 'case' rich in carbon. The part is then heated to a cherry red and quenched, producing a hardened skin with a tough core.

(c) Two PPE items:

- Wear heat resistant gloves to protect from sparks and hot pieces of metal.
- Face guard / goggles to protect the face / eyes from sparks.

PPE items
Award 2 @ 5 Marks
Total (10) Marks

(d) Any Two:

(i) Brittleness:

A brittle material will break / shatter under impact. Cast iron, glass and concrete are brittle materials.

(ii) Melting point:

Melting point is the temperature at which a metal changes its state from solid to liquid.

(iii) Toughness:

This property enables a material to withstand blows or an impact. The amount of energy it takes to fracture a material is an indicator of its toughness.

(iv) Elasticity:

The property of elasticity is the ability of an object or material to return to its original shape after being stretched.

Explain
Award 2 @ 6 Marks
Total (12) Marks

OR

(d) Any two:

- (i) Medicine:** Performing operations from a distance
- (ii) Gardening:** Robotic lawnmowers
- (iii) Manufacturing:** Robotic welding

Example
Award 2 @ 6 Marks
Total (12) Marks

Question 4

(50 Marks)

(a)

(i) Function of part A and part B:



Part **A** is the welding nozzle, it has a single hole and helps direct the oxy-acetylene gas mix at the weld area. Different size welding nozzles are available with different sized holes / bores to control the size of the flame produced at the tip.

Part **B** is a valve which can be opened and closed by turning. The valve controls the amount of gas entering the oxy-acetylene torch mixer. The red valve controls the acetylene while the blue valve controls the oxygen.

(ii) Name any two flames:

- Neutral flame
- Oxidising flame
- Carbursing flame

(iii) Gas regulator:

The primary function of a regulator is to reduce high-pressure gas in a cylinder to a lower, usable level when it passes from the cylinder to the torch. The regulator includes two gauges, one gauge displays the regulated gas pressure passing from the cylinder to the torch, the other displays the gas pressure inside the cylinder.

(i) Function A & B

Award 1 @ 3 Marks

Award 1 @ 2 Marks

(ii) Two flames

Award 1 @ 3 Marks

Award 1 @ 2 Marks

(iii) Function

Award 5 Marks

Total (15) Marks

(b) Any three:

(i) Earth clamp

The earth clamp forms the circuit when welding. It clamps onto the material being welded and when the electrode creates the arc the clamp closes the circuit.

(ii) Welding helmet

The welding helmet protects your eyes and skin from severe sparks, ultraviolet and infrared rays emitted by the arc.

(iii) Electrode holder

The electrode holder has an insulated handle and is used to hold the electrode when welding.

Purpose

Award 3 @ 4 Marks

Total (12) Marks

(iv) Welding curtain

The welding curtain is a flame-retardant shield used to deflect welding and grinding sparks. They also absorb harmful UV light to protect bystanders within the vicinity of the welder.

(c) Any three:

(i) Tool A

Name: Clamp / C-Clamp / G-Clamp

Application: To hold two pieces of material together.

(ii) Spot welding

Spot welding or resistance welding is only suitable for light gauge material. If heavy gauge steel plate is used, the spot welder will not be able to generate enough heat at the weld spot (nugget) to melt the two metals.

(iii) Sweated joint

When a soldered joint is over a large area, a method known as 'sweating' can be used. Both parts are first tinned with a light coat of solder. The parts are then placed / fitted together and heated until the solder on both remelts and unites. The solder appears to 'sweat' out of the joint.



Example:

Sweated joints are used in plumbing when joining two copper pipes together. This type of joint also provides an excellent seal between the two pipes.

(iv) One advantage:

The knurled surface assists in hand tightening the screw, it does not require the use of a tool.

(d)

Two safety precautions:

- Check the hoses for any damage before you start welding.
- Make sure the gas cylinders are secure and cannot fall over.

Award 3 @ 5 Marks

Total (15) Marks

Safety precautions

Award 2 @ 4 Marks

Total (8) Marks

Question 5

(50 marks)

(a)

(i) Name any two:

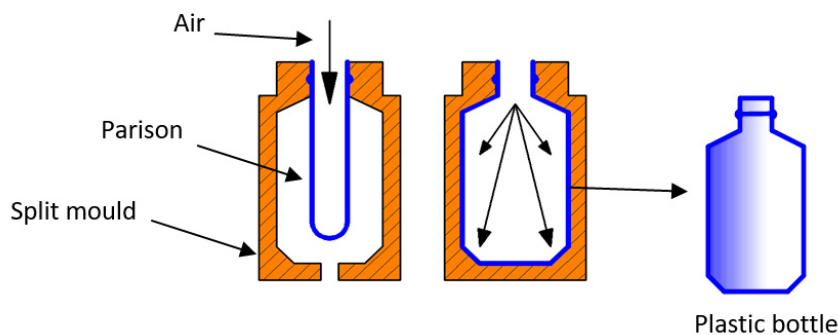
A: Blow moulding

B: Compression moulding

C: Injection moulding

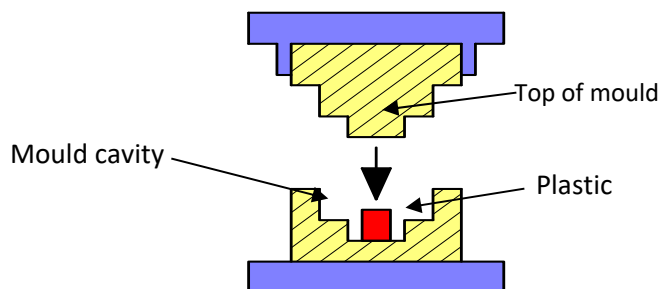
(ii) Describe any one plastic manufacturing process:

Blow moulding:



Used to produce articles from a heated thermoplastic tube called a parison. The mould closes around the extruded parison and air is blown inside forcing the parison out against the wall of the mould. The article is formed by the internal shape of a split mould. The component is allowed to cool before being removed from the opened mould.

Compression moulding:



A measured amount of thermosetting plastic polymer is placed into the cavity of the mould. Heat from the mould causes the polymer to melt. The mould cavity is shaped to form the outside of the object. The top half of the mould closes dispensing the melted plastic to form the object. Pressure is maintained to allow the plastic to harden. Once solidified the mould is opened and the part is released.

(i) Name

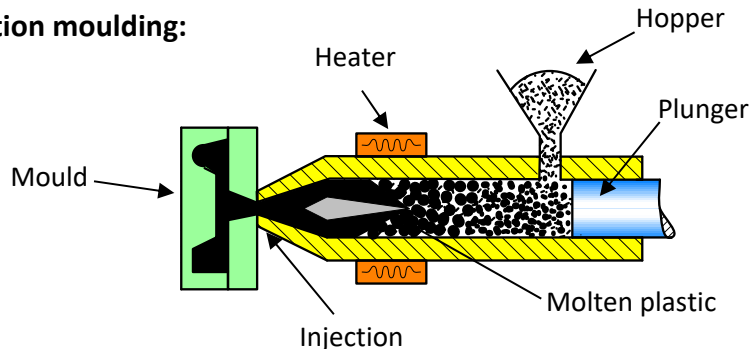
Award 2 @ 5 Marks

(ii) Describe

Award 1 @ 10 Marks

Total (20) Marks

Injection moulding:



Thermoplastic is softened by heating it inside an injection nozzle. The softened plastic is forced by a plunger into a cold mould where it hardens rapidly and is then ejected. Injection moulding is used for the rapid molding of components.

(b) Any three:

(i) Thermosetting plastic:

Thermosetting plastic is a plastic which remains hard when heated.

(ii) Thermoplastic:

Thermoplastic is a plastic which softens when heated.

(iii) Fibreglass:

Fibreglass is a composite, made of woven glass fibres, held together with a polyester resin. The combination of materials forms an extremely strong and durable composite.

(iv) Elastic memory:

Elastic memory describes the ability of a plastic to return to its original shape after being formed. The plastic remembers its original shape and will return to this shape if heated i.e. it is a smart material.

Describe

Award 3 @ 4 Marks

Total (12) Marks

(c) Any two:

- (i) **Number plate:** Acrylic
- (ii) **Dashboard:** Polypropylene (PP), Styrene, Polycarbonate, ABS.
- (iii) **Seat belts:** Polyvinylchloride (PVC)
- (iv) **Door handles:** Acrylonitrile Butadiene Styrene (ABS)
- (v) **Headlights:** Acrylic / Polycarbonate

Name

Award 2 @ 5 Marks

Total (10) Marks

(d)

Safety precautions:

- Do not leave pieces of hot plastic unattended on the bench / work area.
- Wear protective gloves if handling hot sheets of plastic.

Safety Precautions
Award 2 @ 4 Marks
Total (8) Marks

Question 6

(50 Marks)

(a) Name any three:

- A : Emergency switch
- B: Chuck
- C: Tool post
- D: Tailstock

Name

Award 1 @ 7 Marks

Award 2 @ 5 Marks

Total (17) Marks

(b) Any three:

(i) Cutting fluid

Cutting fluid is used when machining metals to, improve tool life, reduce the buildup of heat, improve surface finish and flush away chips from the cutting zone.

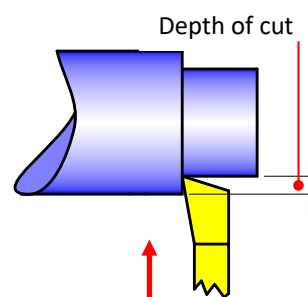


(ii) Spindle speed

This is the speed at which the chuck rotates in RPM. This speed can be adjusted using the gears.

(iii) Depth of cut

This is the distance the cutting tool is moved into the workpiece when cutting.



(iv) Feed

Feed is the amount per revolution at which the drill moves into the material being drilled.

Explain

Any 3 @ 6 Marks

Total (18) Marks

(c)

(i) **Name:** Parting off

(ii) **Description of process:**

- Secure the parting off tool in the tool post, square to the workpiece.
- Check that the tool tip is in line with the centre of the workpiece.
- Align the tool tip outside of the line where you require to cut.
- Select a suitable cutting speed and direction and turn on the lathe.
- Engage the tool tip into the turning workpiece and cut in a continuous motion.

(iii) **Name: any two**

Facing off / parallel turning / taper during / knurling / drilling.

(i) Name

Award 1 @ 5 Marks

(ii) Describe

Award 1 @ 5 Marks

(iii) Name

Award 1 @ 3

Award 1 @ 2 Marks

Total (15) Marks

OR

(c)

Three advantages:

- The laser cutter can cut with high precision.
- Can process components that would be considered very complicated.
- Suitable for accurate mass production of components.

Advantages

Award 3 @ 5 Marks

Total (15) Marks

Question 7

(50 Marks)

(a)

Name the type of fit:

A: Clearance fit

B: Interference fit

Name

Award 2 @ 6 Marks

Total (12) Marks

(b)

(i)	Nominal diameter of the hole;	20.00 mm
(ii)	Largest diameter of the shaft;	20.08 mm
(iii)	Largest diameter of the hole;	20.05 mm
(iv)	Tolerance of the shaft;	0.16 mm

Calculations

Award 4 @ 5 Marks

Total (20) Marks

(c)

Any three:

- (i) **Digital Micrometer** - For accurate measurement of machine parts. Measurement can be read directly from a digital display.
- (ii) **Outside calipers** - For gauging the outside diameter of round bars.
- (iii) **Digital Vernier calipers** - Used for accurately measuring the diameter of round bars or internal diameter of holes. Measurement can be read directly from a digital display.
- (iv) **Engineers protractor** - Used for checking or accurately marking out angles on material.

Name

Award 3 @ 3 Marks

Application

Award 3 @ 3 Marks

Total (18) Marks

OR

(c) Any three:

- (i) Light bulb / L.E.D.
- (ii) Variable resistor
- (iii) Switch
- (iv) Battery / PV Solar panel

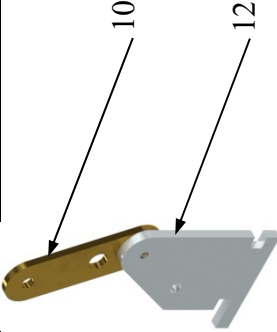
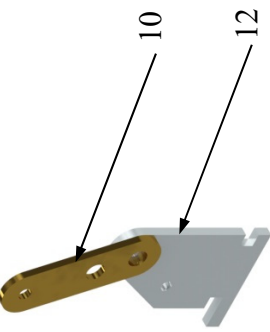
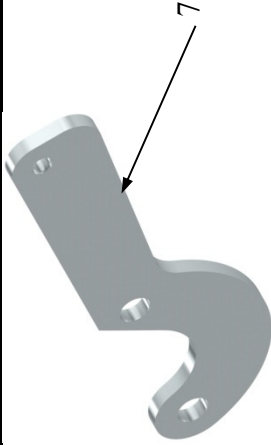
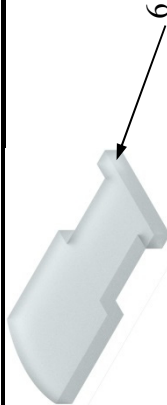
Name

Award 3 @ 6 Marks

Total (18) Marks

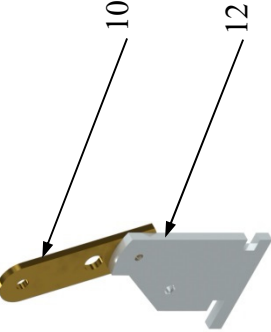
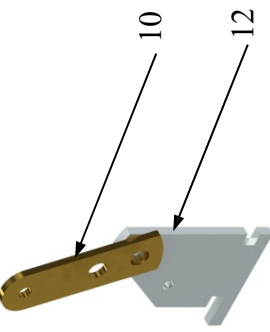
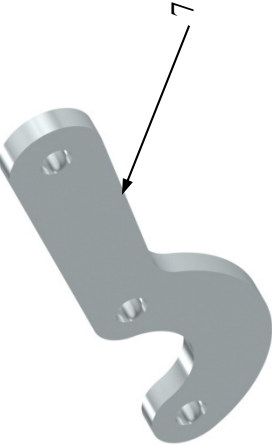


Leaving Certificate Engineering Practical Marking Scheme 2022 Day 1

Subjective Marking 1 - 20				5 – 8 Poor 1 – 4 Very Poor			
Section	Part Number	Pictorial Sketch / Description		Concept	Mark	Mark	Mark
1	All Parts of Test-piece			Assembly Function Finish Subjective Mark 1 – 20	20	20	20
2	Parts 10 and 12 Left			Part 10 Left 8 Marks Part 12 Left 12 Marks	4 4 4 4 4	4	20
3	Parts 10 and 12 Right			Part 10 Right 8 Marks Part 12 Right 12 Marks	4 4 4 4 4	4	20
4	Part 7			Part 7 20 Marks	4 4 4 4 4	4	20
5	Part 6			Part 6 20 Marks	4 4 12	4	20

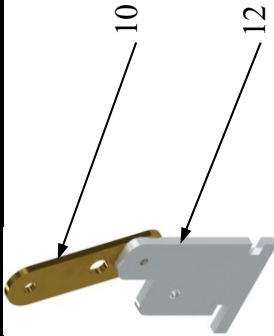
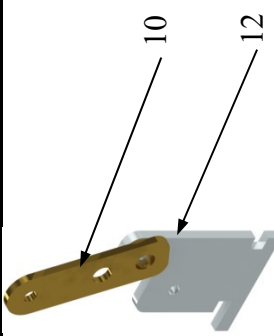
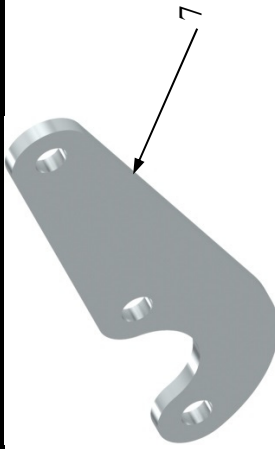
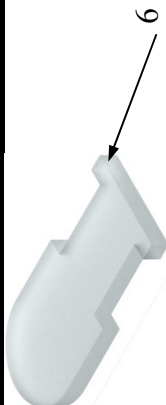


Leaving Certificate Engineering Practical Marking Scheme 2022 Day 2

Subjective Marking 1 - 20				5 – 8 Poor 1 – 4 Very Poor			
Section	Part Number	Pictorial Sketch / Description		Concept	Mark	Mark	Mark
1	All Parts of Test-piece			Assembly Function Finish Subjective Mark 1 – 20	20	20	20
2	Parts 10 and 12 Left			Part 10 Left 8 Marks Part 12 Left 12 Marks	4 4 4 4 4	4	20
3	Parts 10 and 12 Right			Part 10 Right 8 Marks Part 12 Right 12 Marks	4 4 4 4 4	4	20
4	Part 7			Part 7 20 Marks	4 4 4 4 4	4	20
5	Part 6			Part 6 20 Marks	4 4 12	4	20



Leaving Certificate Engineering Practical Marking Scheme 2022 Day 3

Subjective Marking 1 - 20										17 - 20 Excellent										13 - 16 Very Good										9 - 12 Good										5 - 8 Poor										1 - 4 Very Poor									
Section	Part Number	Pictorial Sketch / Description										Concept																				Mark	Mark																										
1	All Parts of Test-piece											Assembly Function Finish										Subjective Mark 1 – 20										20	20																										
2	Parts 10 and 12 Left											Part 10 Left 8 Marks										Marking Out, Ø5.5 and Ø8 mm Holes										4	20																										
												Part 12 Left 12 Marks										External Profile										4																											
																						Marking Out, M5 and Ø5.5 mm Holes										4																											
																						6 mm x 6 mm Slots										4																											
																						External Profile										4																											
3	Parts 10 and 12 Right											Part 10 Right 8 Marks										Marking Out, Ø5.5 and Ø8 mm Holes										4	20																										
												Part 12 Right 12 Marks										External Profile										4																											
																						Marking Out, M5 & Ø5.5 mm Holes										4																											
																						6 mm x 6 mm Slots										4																											
																						External Profile										4																											
4	Part 7											Part 7 20 Marks										Marking Out, Ø5.5 and Ø8 mm Holes										4	20																										
																						Handle Profile										4																											
																						Internal 15 mm Radius										4																											
																						External 35 mm Radius										4																											
																						10 mm Radii										4																											
5	Part 6											Part 6 20 Marks										Marking Out										4	20																										
																						Radius Profile										4																											
																						28 mm Rectangular Slots										12																											

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