Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2025

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

THURSDAY, 5 JUNE MORNING 9:30 – 12:00

Answer **any FOUR** questions.

All questions carry equal marks.

The 2025 examination papers were adjusted to compensate for disruptions to learning due to COVID-19. This examination paper does not necessarily reflect the same structure and format as the examination papers of past or subsequent years.

Question 1. **(50 marks)**

Give **brief** answers to **any eight** of the following:



bandsaw

(a) State **two** safety precautions to be observed when using a bandsaw.

(b) Explain the term *permanent joint* **and** give **one** example of a *permanent joint* in engineering.

(c) State **one** reason for testing electronic circuits before assembly.

(d) Give **one** reason why it is important to work in a ventilated area when using adhesives.



3D printer

(e) State **two** advantages of using a 3D printer for manufacture in engineering.

(f) Explain the term *non-ferrous* **and** name **one** *non-ferrous* metal.

(g) Give **one** reason for producing a prototype when designing new products.



deburring

(h) Define *malleability* in relation to the properties of materials **and** name **one** material which is malleable.

(i) Give **one** reason why metal edges are deburred.

(j) Explain **any one** of the following:

(i) Artificial intelligence (AI), **(ii)** Renewable energy, **(iii)** Virtual reality (VR).

(k) Describe the main operating features of **any one** of the following:



(i) Hot wire strip heater,



(ii) Soldering iron,



(iii) Pop rivet gun.

(l) Describe **any one** of the following:

(i) Internal thread, **(ii)** Blind hole, **(iii)** Countersunk hole.

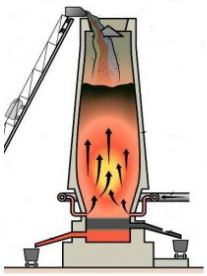
(m) Name the type of nut shown **and** state **one** application for it.



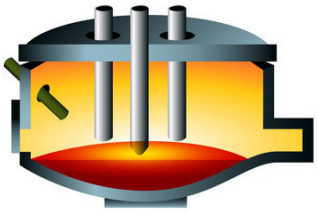
nut

Question 2. **(50 marks)**

(a) Name **each** of the furnaces labelled **A**, **B** and **C** shown.



A



B



C

(b) Select **one** of the furnaces labelled at **Q2(a)** above **and** answer **each** of the following:

(i) List the materials used in the charge;

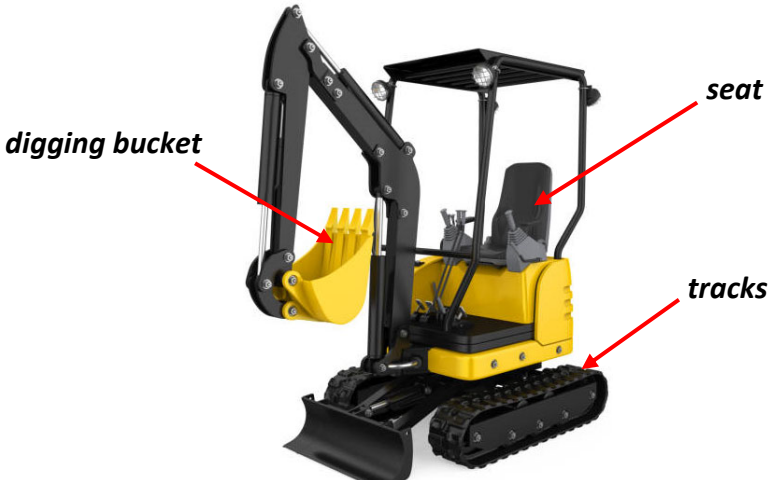
(ii) Describe how the charge is heated;

(iii) Name the metal produced.

(c) You have been asked to manufacture a mini excavator as shown below.

(i) Name a suitable material for **each** of the parts labelled on the mini excavator.

(ii) State **one** reason for the selection of **each** material named.



mini excavator

(d) Name **any two** of the mechanisms **A**, **B** and **C** shown below, **and** state **one** use for **each** mechanism named.



A



B



C

Question 3. **(50 marks)**

(a) Explain the reason why **each** of the following heat treatment processes are carried out:

(i) Normalising,

(ii) Hardening.

(b) The blade of the concrete saw shown is annealed, tempered and quenched as part of the manufacturing process.



concrete saw **blade**

Describe **any two** of the following processes:

(i) Annealing,

(ii) Tempering,

(iii) Quenching.

(c) State **two** items of personal protective equipment (PPE) that should be worn when working with hot metals.



(d) Explain **any two** of the following metal properties:

(i) Toughness, **(ii)** Melting point, **(iii)** Brittleness.

OR

(d) Explain how robotic technology has changed **each** of the areas shown below:



(i) Parcel deliveries,



(ii) Medical procedures,

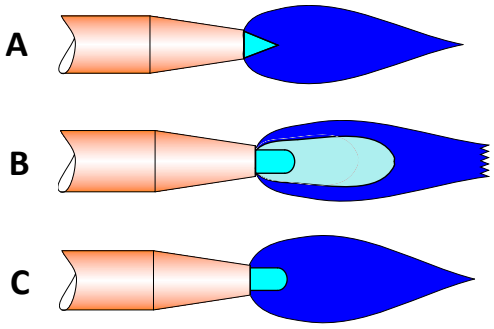


(iii) Mass production.

Question 4. **(50 marks)**

(a) **(i)** Name **each** of the oxy-acetylene flames shown at **A**, **B** and **C**.

(ii) State the proportions of oxygen and acetylene required for **each** of the flames shown at **A**, **B** and **C**.



(b) Explain the function of **any three** of the following items used in manual metal arc welding:



(i) Welding curtain,



(ii) Chipping hammer,

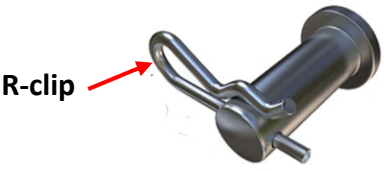


(iii) Electrode holder,



(iv) Welding shield.

(c) Answer **any three** of the following:



(i) Outline **one** benefit of using the *R-clip* shown.

(ii) Suggest **one** method of joining sheet aluminium.

(iii) Give **two** reasons why flux is required when soldering.

(iv) Name tool **A** shown opposite **and** give **one** use for this tool.



tool A

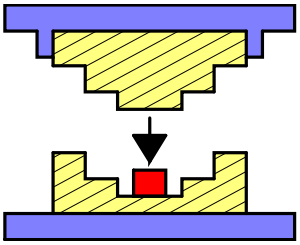
(d) State **two** safety precautions to be observed when using oxy-acetylene welding equipment.



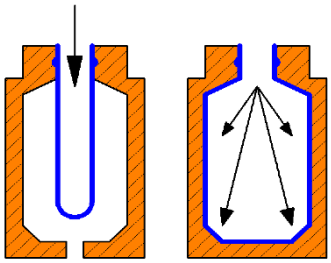
Question 5. **(50 marks)**

(a) **(i)** Name **each** of the plastic manufacturing processes shown at **A**, **B** and **C**.

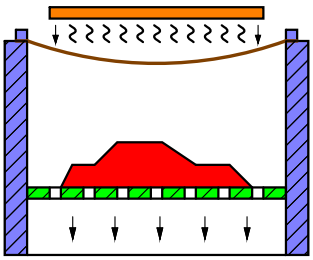
A



B



C



(ii) Describe, with the aid of a labelled diagram, **any one** of the manufacturing processes named by you, at **Q5(a)(i)** above.

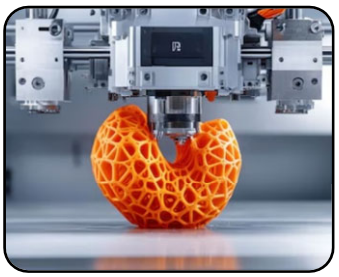
(b) In relation to plastic technology, describe **any two** of the following:

(i) Thermosetting plastic,

(ii) Laminating,

(iii) Thermoplastic,

(iv) Elastic memory.

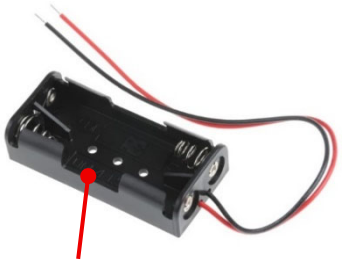


(c) State **two** safety precautions to be observed when 3D printing plastic components.

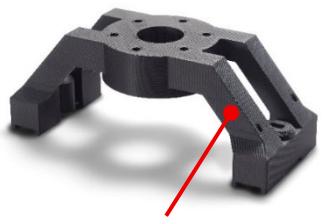
(d) Select **any two** of the items shown below **and** name a suitable plastic material for **each** of the parts identified.



(i) Vehicle chassis,



(ii) Battery holder casing,



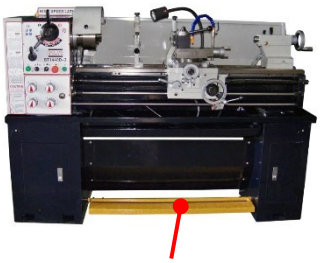
(iii) 3D printed model,



(iv) Gears.

Question 6. **(50 marks)**

(a) Identify **any three** of the centre lathe parts shown at **A**, **B**, **C** and **D**.



A



B



C



D

(b) Explain **any three** of the following in relation to machining:

(i) Cutting fluid,

(ii) Clearance angle,

(iii) Depth of cut,

(iv) Swarf.

(c) The stunt bike pegs shown opposite were manufactured on a centre lathe.

(i) Name **any two** centre lathe processes used to manufacture the stunt bike pegs.

(ii) Describe **any one** of the processes named by you, at **Q6(c)(i)** above.

(iii) Specify **any two** items of personal protective equipment (PPE) that should be worn when operating a centre lathe.



stunt bike pegs

OR

(c) **(i)** Outline **one** advantage of using CAD in the design and manufacturing process.

(ii) Name **one** CNC machine commonly used in the engineering workshop.

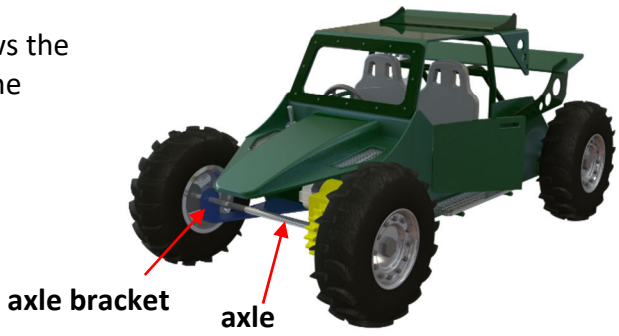
(iii) Give **two** advantages of using CNC machines.



Question 7. **(50 Marks)**

(a) **(i)** Name the type of fit required, which allows the axle to rotate inside the axle bracket on the *Model Off-Road Sand Car* shown.

(ii) Name **one** other type of fit **and** suggest a suitable application for it.



Model Off-Road Sand Car

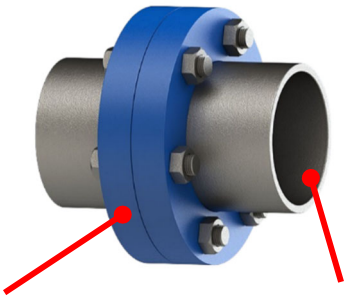
(b) The following pipe assembly is to be machined to the dimensions shown.

State the: **(i)** Nominal diameter of the **flange**;

(ii) Smallest diameter of the **hole**;

(iii) Largest diameter of the **hole**;

(iv) Tolerance of the **hole**.



flange: Ø50.00 ± 0.50 mm **hole:** Ø20.00 ± 0.50 mm

(c) Name **any three** of the instruments shown **and** give **one** application of **each** instrument named.



(i)



(ii)



(iii)



(iv)

OR

(c) **(i)** State **one** advantage of using a *Printed Circuit Board* (PCB) for the assembly of circuits.

(ii) Give **two** examples where a Printed Circuit Board (PCB) may be used.

(iii) Explain the term *microchip.*

