Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2026

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

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THURSDAY, 4 JUNE MORNING 9:30 – 12:00

Answer **any FOUR** questions.

All questions carry equal marks.

Question 1 **(50 marks)**

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



pillar drill

(a) State **two** safety precautions that must be observed when using a pillar drill.

(b) Give **one** advantage **and one** disadvantage of using adhesives for joining materials.

(c) Explain the importance of *testing* when designing engineering projects.



cutting tool

(d) Name the cutting tool shown opposite and give **one** example of where it may be used.

(e) Explain the term *melting point* in relation to plastics.

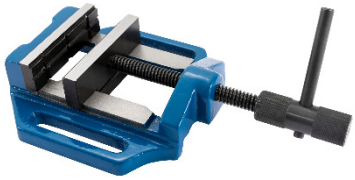


car jack

(f) The car jack shown, depends on hydraulic technology to function. Explain the term *hydraulic technology.*

(g) Explain the term *electrical conductor* **and** give **one** example of a material that can be used as an electrical conductor.

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



(i) Machine vice,



(ii) 3D printer,



(iii) Wire tensioner.

(i) Explain the difference between a Ø10 mm hole **and** an M10 mm hole.



(j) Identify the mandatory safety symbol shown.

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

(i) Smart technology, **(ii)** Cybersecurity, **(iii)** 5G.

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

(i) Surface finish, **(ii)** Ball bearing, **(iii)** Pilot hole.

(m) State **one** suitable application of the eye bolt shown.



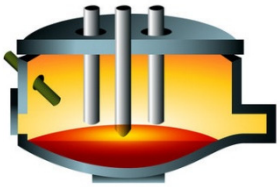
eye bolt

Question 2 **(50 marks)**

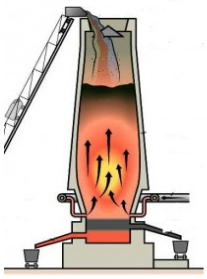
(a) Three metal-producing furnaces are shown below:



Basic oxygen furnace



Electric arc furnace



Blast furnace

Select **one** of the furnaces named above **and** answer **each** of the following:

(i) Draw a simple diagram of the furnace and label the main parts.

(ii) Name **one** metal produced.

(iii) Describe how the metal is removed from the furnace.

(b) Name the metals used to produce **any two** of the alloys listed below:



(i) Cast iron,



(ii) Brass,



(iii) Solder.

(c) You have been asked to manufacture a **mountain bike** for a cross-country cycling event.

(i) Name a suitable material for **each** of the parts labelled on the mountain bike shown.

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



mountain bike

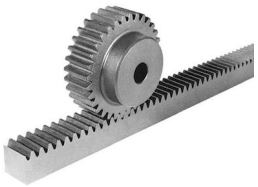
(d) Name **any two** of the mechanisms shown, and give **one** application of **each** mechanism named.



(i)



(ii)



(iii)

Question 3 **(50 marks)**

(a) State **two** safety precautions to be observed when working with hot metals during a heat treatment process.



(b) Identify **any two** of the heat treatment processes described below:

(i) Heating high carbon steel to 900˚C and cooling it slowly in a furnace.

(ii) Heating high carbon steel to 900˚C and cooling it quickly.

(iii) Heating hardened carbon steel to 250˚C and cooling it quickly.

(c) Explain **any two** of the following heat treatment terms associated with the manufacturing of gears.

(i) Normalising,

(ii) Case hardening,

(iii) Carbon content.



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

(i) Malleability, **(ii)** Elasticity, **(iii)** Tensile strength.

OR

(d) Answer **any two** of the following:

(i) Describe **two** ways that robotic technology can improve workplace safety.

(ii) Identify **two** manufacturing processes where robotic technology is used.

(iii) Explain the term *pneumatics*.



Question 4 **(50 marks)**

(a) Name the type of oxy-acetylene flame produced for **each** of the following gas conditions:

(i) Equal amounts of oxygen and acetylene,

(ii) Excess oxygen,

(iii) Excess acetylene.

(b) Describe **any two** of the following soft soldering terms:

(i) Flux, **(ii)** Tinning, **(iii)** Mechanically clean, **(iv)** Sweated joint.

(c) State the function of **any three** of the following items used in welding:



(i) Gas regulator,



(ii) Welding apron,



(iii) Welding goggles,



(iv) Fume extractor.

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

(i) State **one** benefit of using an assembly jig in welding.

(ii) Suggest **one** method of joining copper pipes.

(iii) Give **one** advantage of using a temporary joint in engineering.

(iv) Explain the function of an earth clamp in arc welding.



assembly jig



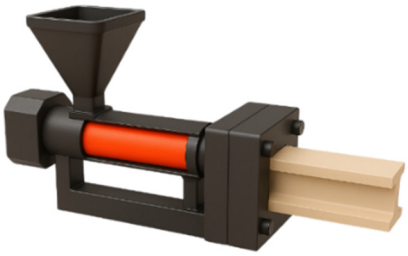
earth clamp

(e) State **two** safety precautions to be observed when manual metal arc welding.



Question 5 **(50 marks)**

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



A



B



C

(ii) Describe **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) Fibreglass,

(ii) Biodegradable plastic,

(iii) Thermoplastic,

(iv) Elastic memory.

(c) Plastics are commonly used in the manufacture of car parts.

Select **any two** of the car parts shown below **and** name a suitable plastic material for **each** of the car parts identified.



(i) Rear light cover



(ii) Interior door panel



(iii) Seat belts



(iv) Wheel covers

(d) Identify **two** environmental hazards associated with the incorrect disposal of plastics.



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:

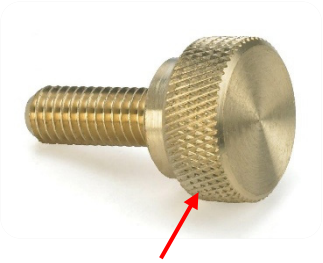
(i) Spindle speed,

(ii) Swarf,

(iii) Coolant,

(iv) Feed.

(c) The thumb screw shown opposite has been knurled on a centre lathe.



knurled thumb screw

(i) Describe the process of knurling.

(ii) Name **two** other machining processes that can be performed on a centre lathe.

(iii) Identify **any two** integrated safety features found on a centre lathe.

OR

(c) Modern engineering workshops use a variety of CNC machines for manufacturing components.

(i) Explain the term *CNC*.

(ii) Name **two** CNC machines which may be found in a modern engineering workshop.

(iii) State **two** advantages of using CNC machines to produce engineering components.



Question 7 **(50 marks)**

(a) Describe **any two** of the following terms in relation to limits and fits:

(i) Interference fit,

(ii) Lower limit,

(iii) Clearance fit.

(b) A pneumatic fitting is to be manufactured to the dimensions and tolerances shown.

State the:

(i) Nominal diameter of the **body**;

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

(iii) Smallest diameter of the **body**;

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



***Body:* Ø20.00 ± 0.5 mm**

***Hole:* Ø14.00 ± 0.1 mm**

(c) **(i)** Name **any three** of the instruments shown at **A**, **B**, **C** and **D** below.



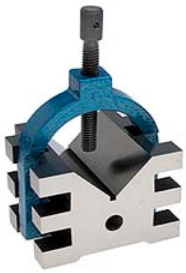
A



B



C



D

(ii) Explain why it is important to zero a measuring tool before use.

(iii) Give **two** advantages of a digital readout on measuring instruments.



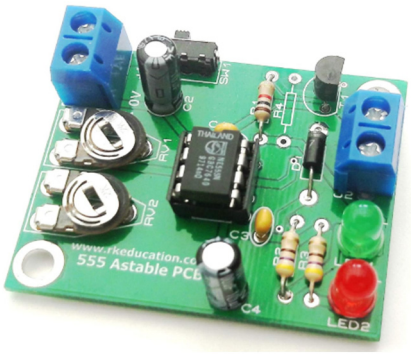
OR

(c) The 555 Timer PCB (printed circuit board) shown, can be used in project work.

(i) Identify **any two** electronic components on the PCB shown.

(ii) Explain **one** benefit of using PCBs in project work.

(iii) State **one** other application of a timer circuit.



555 Timer PCB