Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2014

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary Level – 200 marks)

THURSDAY, 5 JUNE MORNING 9:30 – 12:00

Answer **Question 1**, **Section A** and **Section B**, and **three** other questions.

Question 1. **(65 marks)**

SECTION A – 30 marks

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

(a) State **two** safety precautions to be observed when using a scroll saw to cut acrylic.

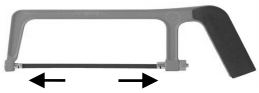
(b) Explain the term *permanent joint*.

(c) Name **any two** computer input devices.

(d) Name the electronic component represented by the symbol shown and suggest **one** suitable application for it.

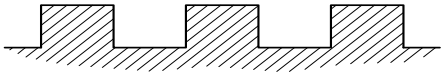
(e) Give **one** end-product of the *blow moulding* process.

(f) Name the type of force exerted on the hacksaw blade shown.



(g) Identify the **two** thread forms shown.

(i) 

(ii) 

(h) Identify the measuring instrument shown and suggest **one** suitable application for it.

SECTION B – 35 marks

Answer **any three** of the following:

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

Pop riveting gun

Ratchet and pawl mechanism

Brazing hearth.

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

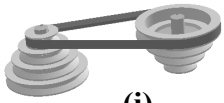
Computer tablet, Scanner, Streaming media, 3D printer.

(k) Define the term *malleability* and name a material which is malleable.

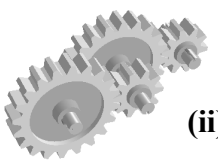
(l) Explain **any two** of the following:

Light dependent resistor (LDR), Compressor, Engraving, Self-locking nut.

(m) Name the **two** drive systems shown at **(i)** and **(ii)**.



(i)



(ii)

Question 2. **(45 marks)**

(a) Identify a suitable material for the manufacture of **each** component listed below:

(i) Twist drill, **(ii)** Fuel burner, **(iii)** Bicycle frame.

(b) Describe **any three** of the following:

(i) Iron ore, **(ii)** Galvanised steel, **(iii)** Tuyere, **(iv)** Tinplate.

(c) **(i)** Select **any two** of the metals listed below, and in **each** case name a suitable furnace used in the production of the metal:

Cast iron, High carbon steel, Pig iron.

(ii) With the aid of a suitable diagram, describe **one** of the furnaces named at **2(c)(i)** above.

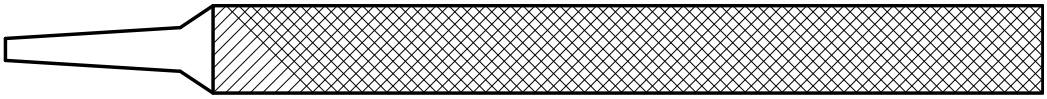
(d) Name **any two** *metal alloys* and state a suitable use for **each**.

Question 3. **(45 marks)**

(a) **(i)** Outline **any two** reasons for the heat treatment of metals.

(ii) Name **three** heat treatment processes that may be applied to steels.

(b) Describe **two** heat treatment processes that are carried out on the file shown.



(c) State **two** reasons why it is essential to wear safety goggles when heat treating metals.

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

(i) Elasticity, **(ii)** Toughness, **(iii)** Conductivity.

OR

(d) State **two** advantages of using robotics in the manufacturing industry.

Question 4. **(45 marks)**

(a) Describe, with the aid of suitable diagrams, the make-up of the following oxy-acetylene flames:

(i) Oxidising flame, **(ii)** Neutral flame, **(iii)** Carburising flame.

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

(i) Earth clamp, **(ii)** Welding mask, **(iii)** Pressure gauge, **(iv)** Flashback arrestor.

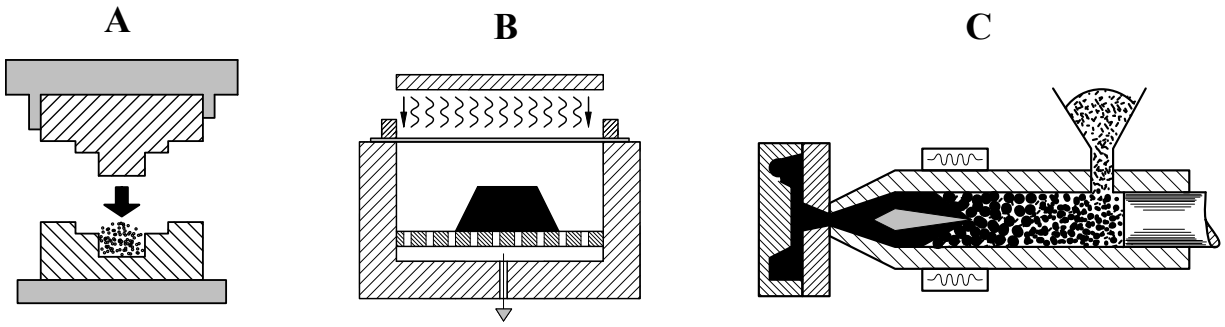
(c) Answer **any three** of the following:

(i) State **two** reasons why flux is required when soldering.
(ii) Name the special machine screw shown and suggest a suitable application.
(iii) List **two** safety precautions to be observed when spot welding.
(iv) Name the type of washer shown and suggest a suitable application.

(d) State **two** safety precautions to be observed when using an electrical soldering iron.

Question 5. **(45 marks)**

(a)



(i) Name the **three** plastic manufacturing processes shown at **A**, **B** and **C** above.

(ii) Describe **any one** of the manufacturing processes **A**, **B** or **C** shown above and identify **one** component produced by this process.

(b) Describe, with the aid of a diagram, the operation of **one** of the following **and** identify a suitable application:

(i) Strip heater;
(ii) Plastic dip coating tank.

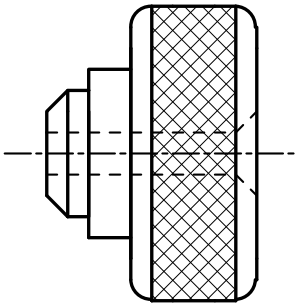
(c) State **two** safety precautions to be observed when using adhesives to bond acrylic sheet.

(d) Name a plastic used in the manufacture of **each** of the following:

(i) Cavity wall insulation, **(ii)** Gear wheel.

Question 6. **(45 marks)**

(a) The wheel shown is to be turned on a lathe from a 30 mm diameter aluminium bar. Describe **any three** of the turning operations used to produce the wheel.



(b) Explain **any three** of the following:

(i) Centre drill, **(ii)** Rake angle, **(iii)** Knurling, **(iv)** Clearance angle.

(c) A part for a centre lathe is shown opposite.

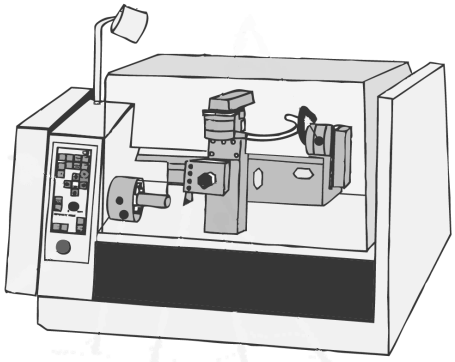
(i) Name this lathe part.

(ii) Describe **two** operations that can be performed on a centre lathe using the part shown.

(iii) State **one** safety precaution to be observed when using this lathe part.

OR

(c) A CNC lathe is shown below.



(i) What do the letters CNC stand for?

(ii) Describe **one** advantage of a CNC lathe over a manual lathe.

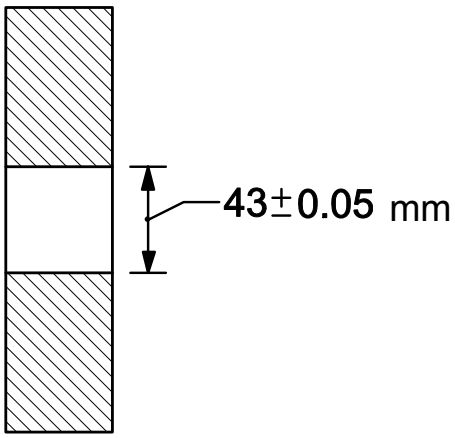
(iii) State **one** safety precaution to be observed when operating a CNC lathe.

Question 7. **(45 marks)**

(a) Using sketches, describe the difference between a clearance fit and an interference fit in a shaft and hole assembly.

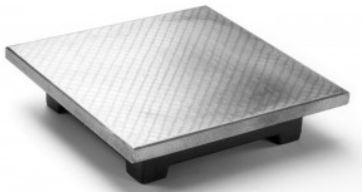
(b) A hole is produced in a brass plate to the dimensions shown.

State the:
(i) Nominal diameter of the hole;
(ii) Smallest diameter of the hole;
(iii) Largest diameter of the hole;
(iv) Tolerance of the hole.



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

(i)



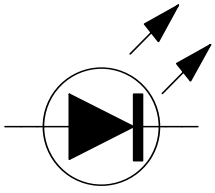
(ii)

(iii)

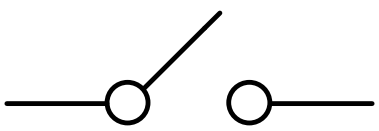
(iv)

OR

(c) Name **each** of the electronic components represented by the circuit symbols shown and outline the function of **each** component named.



(i)



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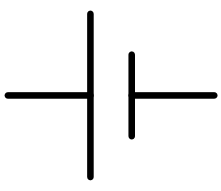

(iii)

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