



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

LEAVING CERTIFICATE EXAMINATION, 2010

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary Level – 200 marks)

THURSDAY, 10 JUNE MORNING 9:30 – 12:00

Answer **Sections A and B of Question 1** and **three** other questions.

Question 2.

(45 marks)

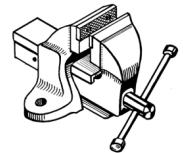
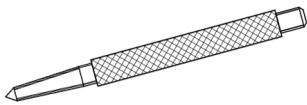
- (a) (i) With the aid of a suitable diagram, describe the operation of **any one** of the following furnaces:
Cupola furnace, Electric arc furnace, Blast furnace.
- (ii) For the furnace selected at 2(a)(i), name the material produced and suggest **one** suitable application for this material.

- (b) Select **any three** from the alloys listed below and state the metals used to produce **each**:

- (i) Soft solder, (ii) Stainless steel, (iii) Brass, (iv) Bronze.

- (c) Name suitable materials used to manufacture **any three** of the following:

- (i) Centre punch, (ii) Satellite dish, (iii) Cutlery, (iv) Bench vice.



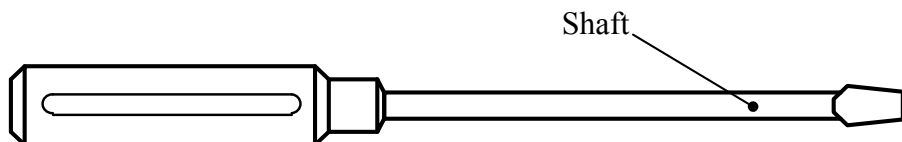
- (d) Name **any two** non-ferrous metals.

Question 3.

(45 marks)

- (a) Name and describe the heat treatment process required to achieve each of the following:
- (i) soften copper before hollowing;
- (ii) reduce the hardness in the point of a centre punch.

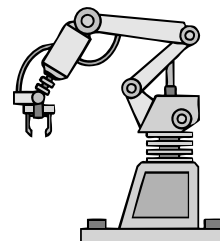
- (b) Describe how the mild steel shaft of the screwdriver shown is case-hardened.



- (c) List **two** reasons why it is necessary to wear protective clothing when heat treating metals.
- (d) State the main difference between *low carbon steel* and *high carbon steel*.

OR

- (d) Describe **two** applications of robotics in the car manufacturing industry.



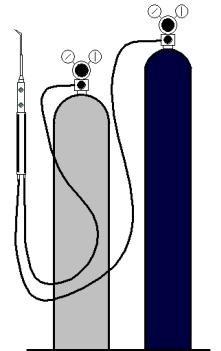
Question 4.

(45 marks)

- (a) (i) Describe the basic differences between manual metal arc welding and adhesive bonding.
- (ii) Suggest a suitable application for **each** of the joining processes in 4(a)(i) above.

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

- (i) Name **any one** of the two gases most commonly used when gas welding;
- (ii) What is the function of the flashback arrestor?
- (iii) Name the flame produced when equal amounts of each gas is used;
- (iv) State **one** safety precaution to be observed.



- (c) List **three** steps to be observed to ensure a successful soft soldered joint.
- (d) Explain why it is important to work in a well ventilated area when using adhesives.

Question 5.

(45 marks)

(a) For **any one** of the plastic components shown below:

- (i) Name the process used to manufacture the component;
- (ii) Describe, with the aid of a diagram, the manufacturing process named in 5(a)(i).



Golf tee



Model car body



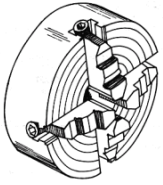
Water bottle

- (b) State **two** safety precautions to be observed when filing acrylic sheet.
- (c) Describe **any three** of the following terms associated with plastic technology:
 - (i) Thermosetting plastic, (ii) Elastic memory, (iii) PVC, (iv) Former.
- (d) Name a suitable plastic material for the manufacture of **each** of the following:
 - (i) Cavity wall insulation, (ii) Gear wheel.

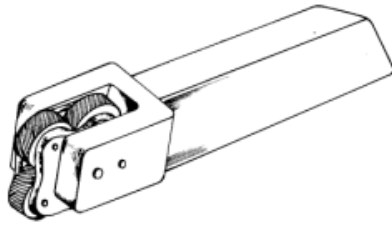
Question 6.

(45 marks)

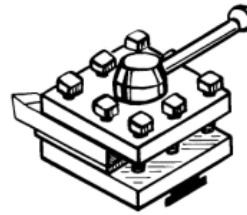
(a) Identify **any three** of the lathe parts shown:



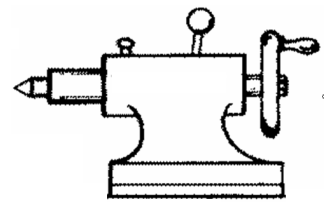
(i)



(ii)



(iii)



(iv)

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

(i) Chuck key,

(ii) Feed,

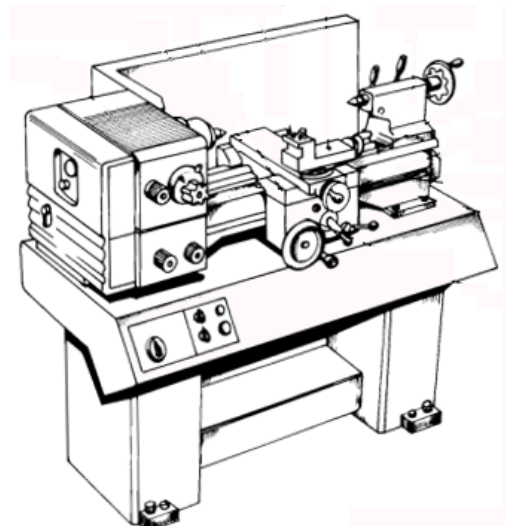
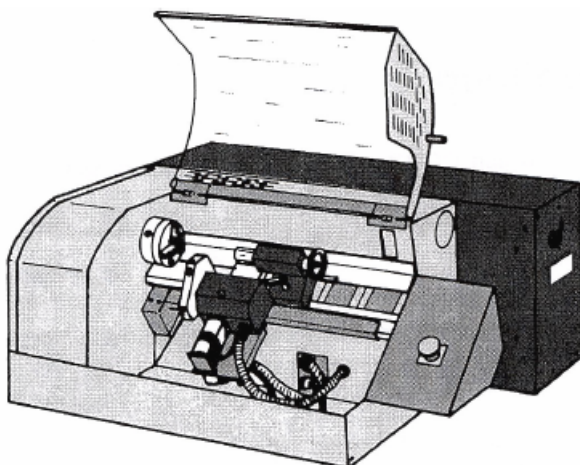
(iii) Swarf,

(iv) Clearance angle.

(c) Describe **one** method of taper turning on a centre lathe and identify **one** safety precaution to be observed when taper turning.

OR

(c) Identify **three** advantages of a Computer Numerical Controlled (CNC) lathe over a Manual lathe.



Question 7.

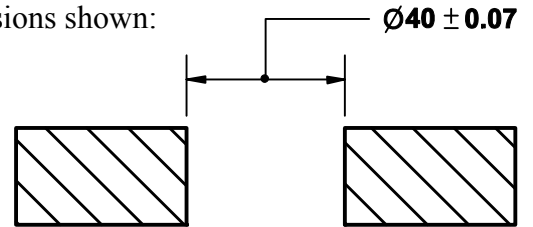
(45 marks)

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

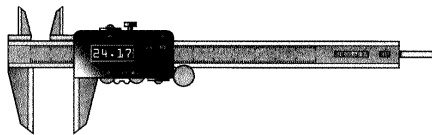
(b) A hole is produced in an aluminium plate to the dimensions shown:

State the:

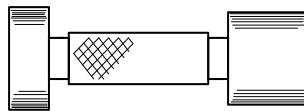
- (i)** Nominal diameter of the hole;
- (ii)** Maximum diameter of the hole;
- (iii)** Minimum diameter of the hole;
- (iv)** Tolerance of the hole.



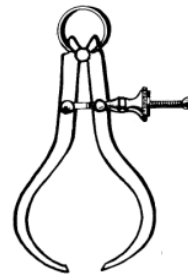
(c) Name and give **one** application for **any three** of the tools shown.



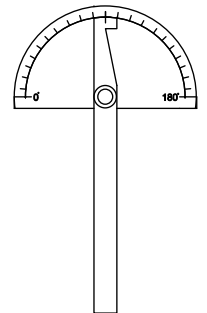
(i)



(ii)



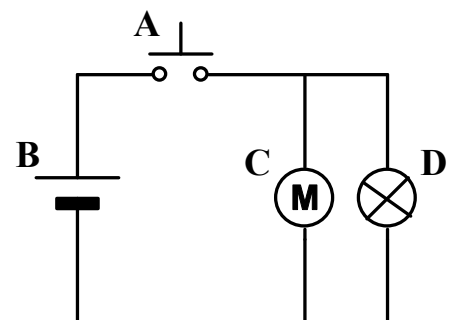
(iii)



(iv)

OR

(c) Identify **any three** of the electronic components **A, B, C** and **D** shown in the circuit.



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