



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

LEAVING CERTIFICATE EXAMINATION, 2004

ENGINEERING - MATERIALS AND TECHNOLOGY

(Ordinary Level - 200 marks)

THURSDAY, 24 JUNE, AFTERNOON 2.00 - 4.30

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

1.

(65 marks)

SECTION A - 30 marks

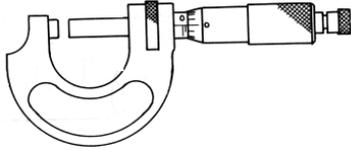
Give **brief** answers to **any six** of the following:

(a) State **two** safety precautions to be observed when working in a welding environment.

(b) Name the electronic component represented by the symbol shown. 

(c) Explain the term 'Conductivity' in relation to the properties of metals.

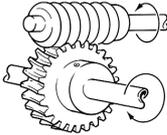
(d) Name the metals that make up the composition of solder.

(e) Name the measuring instrument shown and give an application for its use. 

(f) Identify the thread forms suitable for:

(i) a lathe leadscrew;

(ii) a quick-release type of bench vice.

(g) Name the gear mechanism shown and give an application for its use. 

(h) Identify **two** applications for robotics in engineering.

SECTION B - 35 marks

Answer **any three** of the following:

(i) Describe the function and operation of **any one** of the following:

Scanner; Reamer; Bevel gauge.

(j) Explain **any two** of the computing terms:

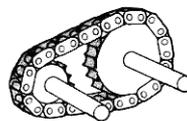
Output device; Downloading; Computer Control; Firewall.

(k) Define malleability in relation to the properties of metals and give **one** example of a malleable metal.

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

Engraving; Stepper motor; Dip coating; Bimetal strip.

(m) Name the **two** drive systems shown.



2.

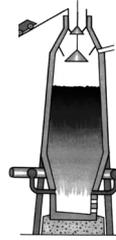
(45 marks)

(a) Name the furnaces shown.

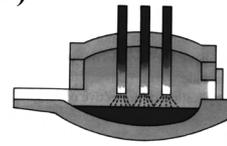
(i)



(ii)



(iii)



(b) For one of the furnaces above:

(i) Produce a **simple line drawing** and identify its parts;

(ii) Describe how heat is produced;

(iii) Name the metal produced.

(c) Give a suitable application for **any two** of the following:

(i) Aluminum; (ii) Mild Steel; (iii) Copper.

(d) Explain the term *Alloy*.

3.

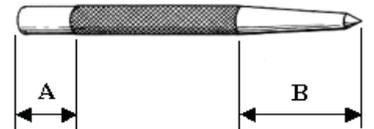
(45 marks)

(a) Explain the difference between hardening and annealing of metals.

(b) Name the heat treatment used to produce a hard surface on mild steel components.

(c) (i) Describe the different heat treatments applied to Part A and Part B of the center punch.

(ii) Why are the different treatments necessary?

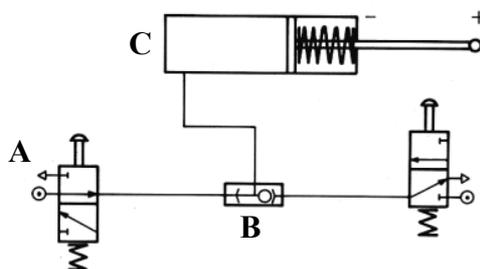


(d) Explain the difference between the following cooling media in heat treatment:

(i) Oil; (ii) Water.

OR

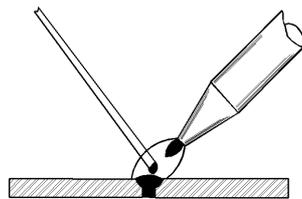
(d) Name **any two** of the components A, B and C shown in the pneumatic circuit.



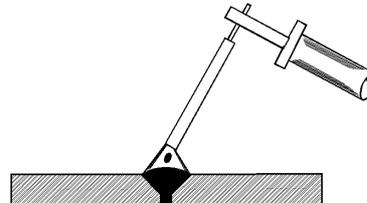
4.

(45 marks)

- (a) Identify the **three** types of flame used in oxygen and acetylene welding.
- (b) (i) Explain the function of a flux when soldering.
(ii) Describe the terms (a) Passive flux and (b) Active flux.
- (c) Identify the welding processes shown and describe the basic differences between them.



(i)



(ii)

- (d) Name **two** safety precautions to be observed when brazing.

5.

(45 marks)

- (a) Vacuum Forming, Compression Moulding and Blow Moulding are methods of manufacturing plastic components.

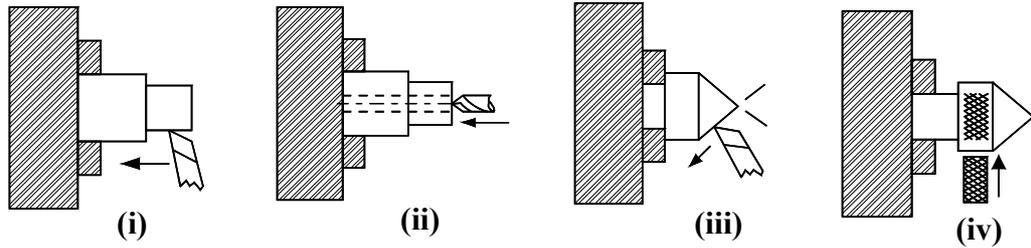
With the aid of a simple line diagram describe **one** method and the type of component produced.

- (b) Identify the main difference between thermoplastics and thermosetting plastics.
- (c) Describe an application for **one** of following:
- (i) Plastic dip coating tank;
- (ii) Strip heater.
- (d) Identify a suitable application for *Polystyrene*.

6.

(45 marks)

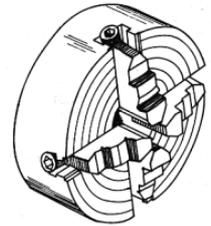
(a) Name **any three** of the lathe operations shown in the production of the Plumb Bob.



(b) Describe **any two** of the following in relation to machining:

(i) Coolant; (ii) Clearance angle; (iii) Depth of cut; (iv) Cutting speed.

(c) Name the type of chuck shown and identify **two** other workholding methods used on the lathe.



OR

(c) What is meant by **any three** of the following CNC terms:

(i) Simulation; (ii) Safety switch; (iii) G Codes; (iv) CAD/CAM.

7.

(45 marks)

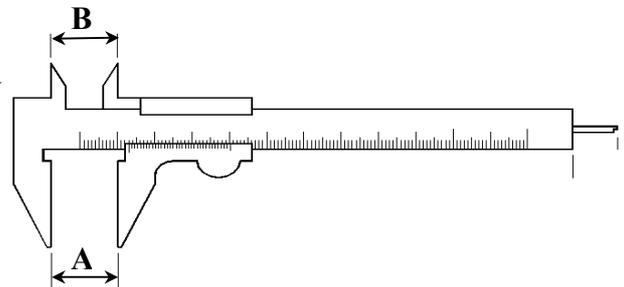
(a) Explain **any two** of the following:

(i) Interference fit; (ii) Clearance fit; (iii) Transition fit.

(b) A hole is manufactured to the following dimensions $50 \text{ mm} \pm 0.04$. For this hole state:

(i) Nominal diameter; (ii) Upper Limit; (iii) Lower Limit; (iv) Tolerance.

(c) Name the measuring instrument shown and identify the type of measurement taken at A and B.



OR

(c) Explain a function for the circuit shown and name **any two** of the components A, B and C.

