Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION 2009

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary Level – 200 marks)

THURSDAY 4 JUNE, AFTERNOON 2:00 – 4:30

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

Question 1. **(65 marks)**

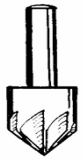
SECTION A - 30 marks

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

(a) State **two** safety precautions to be observed when using adhesives to join materials.

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

(c) State **one** reason for drilling a pilot hole.



(d) Identify the cutting tool shown.

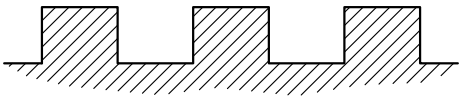
(e) Give **one** example of the use of a plug gauge.

(f) State **two** advantages of using Computer Aided Drawing (CAD).

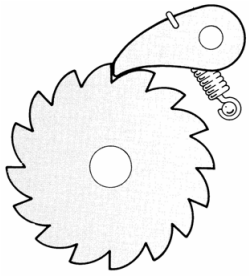
(g) Identify **each** of the thread forms shown:

(i)

(ii)



(h) State **one** application for the ratchet and pawl mechanism shown.



SECTION B - 35 marks

Answer **any three** of the following:

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

Electric soldering iron, Rack and pinion, Plastic dip coating tank.

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

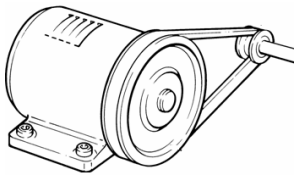
Hardware, Browser, Virus, CPU.

(k) Describe, with the aid of a diagram, the difference between a *compressive force* and a *tensile force*.

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

Self-locking nut, Electrical insulator, Bevel gear, Cam and follower.

(m) Name the drive system shown and give a suitable application.



Question 2. **(45 marks)**

(a) **(i)** Name the furnaces used to produce **any two** of the following materials:

Pig iron, High carbon steel, Cast iron.

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

(b) **(i)** Explain the term *alloy.*

(ii) Identify **two** alloys from the following list:

Solder, Copper, Brass, Zinc.

(c) Select **any three** metals from the list below and state **one** suitable application for **each**:

Tungsten, Aluminium, Lead, Stainless steel.

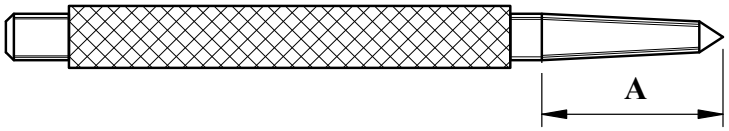
(d) What is the difference between a *ferrous metal* and a *non-ferrous* metal?

Question 3. **(45 marks)**

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

(i) Annealing, **(ii)** Case hardening, **(iii)** Work hardening.

(b) Describe how part **A** of the centre punch shown is hardened and tempered.



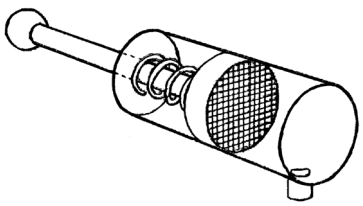
(c) Outline **two** safety precautions to be observed when hardening and tempering the point of a centre punch.

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

(i) Malleability, **(ii)** Elasticity, **(iii)** Brittleness.

OR

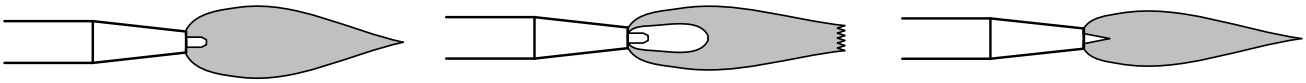
(d) **(i)** Identify the pneumatic component shown.



(ii) Describe a suitable application for this pneumatic component.

Question 4. **(45 marks)**

(a) Name the **three** types of oxyacetylene flame shown:



(i) **(ii)** **(iii)**

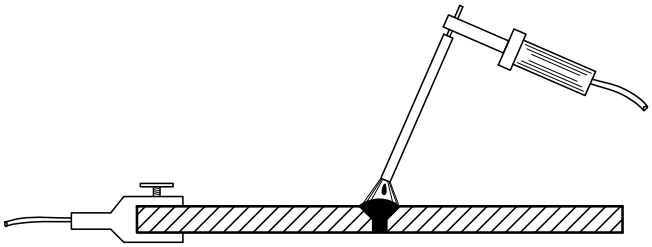
(b) Answer **any three** of the following in relation to **manual metal arc welding**:

(i) How is the heat produced for welding?

(ii) Why is a flux required at the joint?

(iii) What is the function for the earth clamp?

(iv) State **one** suitable safety precaution to be observed.



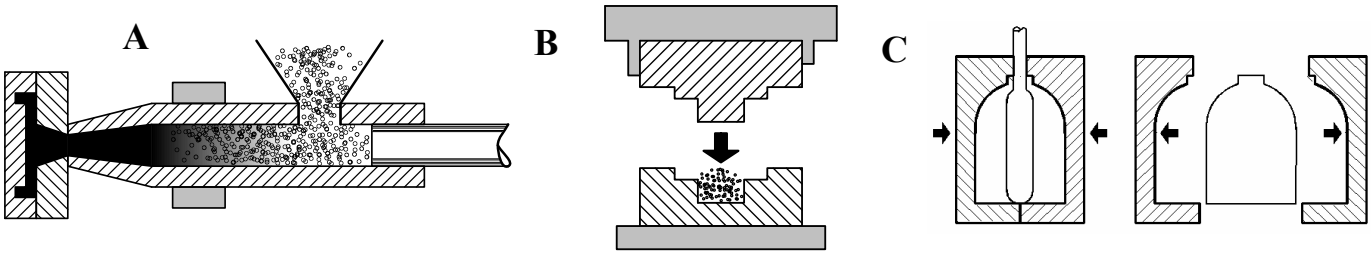
(c) Select **any three** from the following materials and identify the process used for making a permanent joint in **each** case.

(i) Tinplate, **(ii)** Mild steel plate, **(iii)** Acrylic, **(iv)** Light gauge aluminium.

(d) Give **two** reasons why goggles must be worn when gas welding.

Question 5. **(45 marks)**

(a) **(i)** Name **any two** of the plastic manufacturing processes shown.



(ii) Describe **any one** of the plastic manufacturing processes named at **5(a)(i)** and state a suitable end product.

(b) Identify **two** safety precautions to be observed when forming hot plastic sheet.

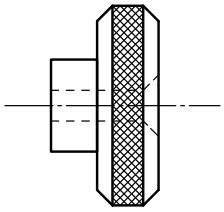
(c) Explain the essential difference between a *thermoplastic* and a *thermosetting plastic*.

(d) Name an industrial application for **each** of the following:

(i) Nylon, **(ii)** Polystyrene.

Question 6. **(45 marks)**

(a) The model car wheel shown is to be turned on a centre lathe.
Name **three** turning operations used in the production of the car wheel.



(b) **(i)** Describe **any one** of the following work holding methods used on the lathe.

Four jaw independent chuck, Fixed steady, Faceplate.

(ii) State a suitable safety precaution to be observed for the work holding method selected at **6(b)(i)**.

(c) In relation to machining, describe **any two** of the following terms:

(i) Rake angle, **(ii)** Coolant, **(iii)** Tailstock.

OR

(c) Explain **any two** the following CNC lathe terms:

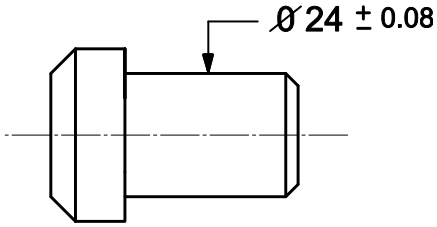
(i) Safety switch, **(ii)** G code, **(iii)** CAD/CAM.

Question 7. **(45 marks)**

(a) Describe, using sketches, **any two** of the following types of fit for a shaft and hole assembly:

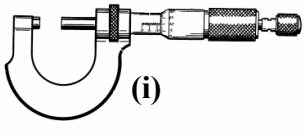
(i) Clearance fit, **(ii)** Transition fit, **(iii)** Interference fit.

(b) A brass shaft is machined to the dimensions shown.

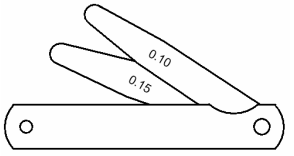


State the:
(i) nominal diameter of the shaft;
(ii) maximum diameter of the shaft;
(iii) minimum diameter of the shaft;
(iv) tolerance on the shaft.

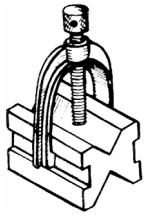
(c) Name and give **one** application for **any three** of the instruments shown:


(i)


(ii)

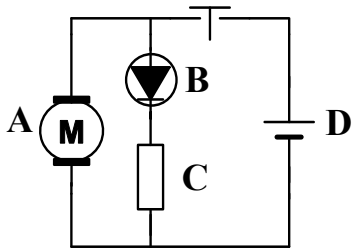


(iii)


(iv)

OR

(c) Identify **any three** of the electronic symbols shown in the circuit diagram.



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