

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.

SECTION A - 30 marks

Give brief answers to any six of the following:

- (a) List two safety precautions to be observed when using an electric soldering iron.
- (b) Suggest a suitable application for the Light Emitting Diode (LED) shown.
- (c) State one use for a Vee block.
- (d) Define the term *ductility* in relation to the properties of metals.
- (e) Explain the meaning of an *interference fit* between a shaft and hole.
- (f) Name the thread forms suitable for the operation of:
 - (i) a car jack, (ii) a quick-release type of bench vice.
- (g) Identify **two** ways computer aided technology can be used to improve the design and manufacturing process.
- (h) Name two machines that use a *rack and pinion* mechanism.





SECTION B - 35 marks

Answer any three of the following:

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

Strip heater,

Vernier height gauge,

Cam and follower.

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

Network, DVD-R,

External hard drive,

Broadband.

- (k) Define *compressive strength* in relation to the properties of metals and give **one** application where a metal needs to be strong in compression.
- (I) Explain **any two** of the following:

Worm and wheel drive, Electrical fuse,

Morse taper sleeve,

Plastic dip coating.

(m) Name the mechanism shown and explain how it operates.



(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:

(ii) Satellite dish,

(i) Centre punch,





(iii) Cutlery,



(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.

- (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 oberved.
- (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.

- (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).







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.



(45 marks)

Question 6.

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



- (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.

(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.



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



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