



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2019

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

THURSDAY, 6th JUNE

MORNING, 9:30 – 12:00

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

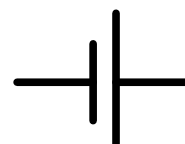
Question 1.

(65 marks)

SECTION A – 30 marks

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

- (a) State **two** safety precautions that should be followed when using a bandsaw.
- (b) List **one** use for the fiber optic inspection camera shown.
- (c) State **two** properties associated with copper.
- (d) Describe **one** way in which modern developments in technology have changed car manufacturing.
- (e) Give an example of **each** of the following:
 - (i) A temporary joint;
 - (ii) A permanent joint.
- (f) Identify the mechanism shown opposite **and** give **one** appropriate use for it.
- (g) State **one** application of vacuum forming.
- (h) Name the electronic component represented by the symbol shown **and** suggest **one** suitable use of this component.



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



Shears



Tailstock.

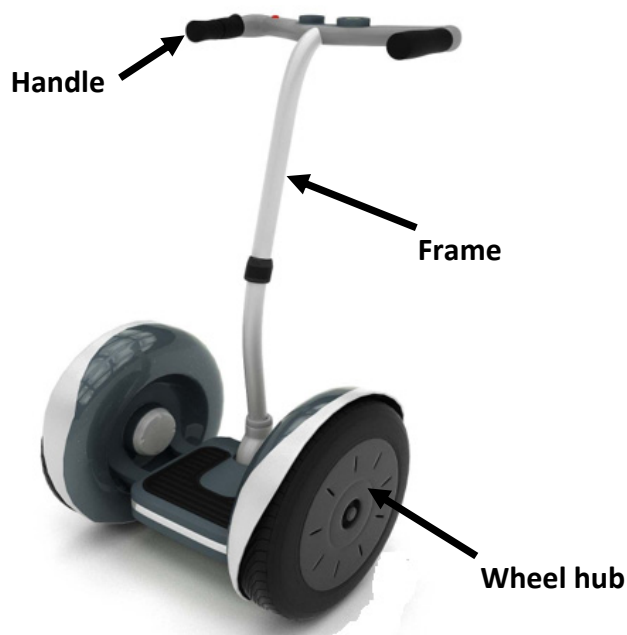
- (j) Explain **any two** of the following:
Hacking, Virtual reality, Mobile technology, Skype.
- (k) Define the term *hazard* in relation to health and safety **and** give **one** example of a hazard.
- (l) Explain **any two** of the following:
Countersink drill, Blind hole, Swarf, Reamer.
- (m) Name the type of chuck shown **and** give a suitable application of it.



Question 2.

(45 marks)

- (a) Name the metals produced from **each** of the furnaces listed below:
- (i) Blast furnace;
 - (ii) Basic oxygen furnace;
 - (iii) Electric arc furnace.
- (b) Select **one** of the furnaces listed at **Q2(a)** above **and** with the aid of a suitable diagram, answer **each** of the following:
- (i) Label the main parts of the furnace;
 - (ii) List the materials used in the charge;
 - (iii) Describe how the charge is heated.
- (c) You have been asked to manufacture a personal transporter for use by tourists in a city.
- (i) Name a suitable material for **each** of the parts labelled on the personal transporter shown below;
 - (ii) State **one** reason for the selection of **each** material.



- (d) An alloy is made by combining two or more metals.
- (i) Name **two** alloys;
 - (ii) List the metals used to make **one** of the alloys, named by you, in **2(d)(i)**.

Question 3.

(45 marks)

- (a) (i) Explain **two** heat treatment processes carried out at **cutting edge A** during the manufacture of the cold chisel shown.



- (ii) State the mechanical property most associated with the **cutting edge** at **A**.

- (iii) State the mechanical property most associated with the **head** of the cold chisel shown at **B**.

- (b) Describe **each** of the following with regard to heat treatment:

- (i) Quenching;
(ii) Work hardening.

- (c) State **two** safety precautions to be observed when cooling hot metals.

- (d) Explain **any two** of the following terms:

- (i) Malleability, (ii) Tensile strength, (iii) Brittleness.

OR

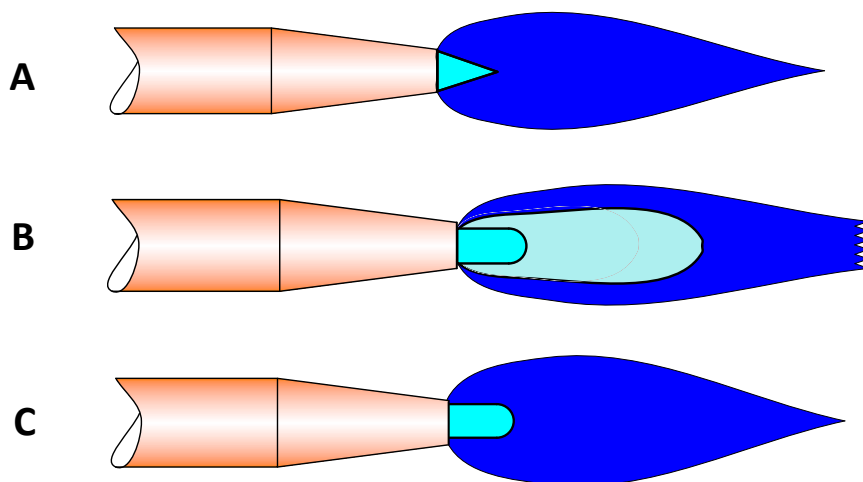
- (d) (i) State **two** engineering manufacturing processes where robots are used.
(ii) Give **two** advantages of robotics in manufacturing.



Question 4.

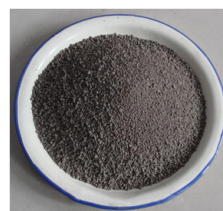
(45 marks)

- (a) (i) Name **each** of the flames shown at **A**, **B** and **C**.



- (ii) State the proportions of oxygen and acetylene required for **each** of the flames shown at **A**, **B** and **C**.

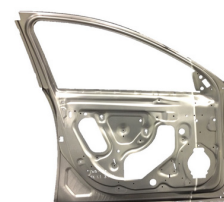
- (b) Give **one** suitable use for **any three** of the following:



- (i) Earth clamp, (ii) Flashback arrestor, (iii) Flux, (iv) Electrode.

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

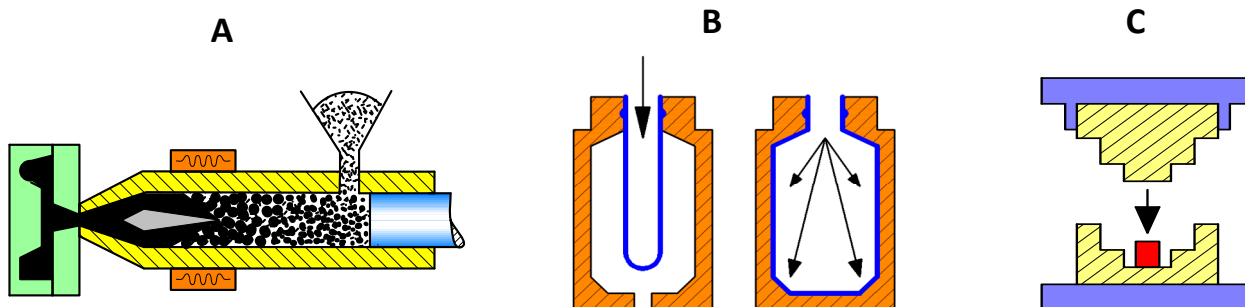
- (i) Name a suitable method used to join sheet steel.
 (ii) Why is it important to test a circuit before soldering it together?
 (iii) Explain the difference between an **M5** hole and a **Ø5** hole.
 (iv) Explain why it is important to work in a well-ventilated area when using adhesives.



- (d) State **two** safety precautions to be observed before starting a welding process.

Question 5.

(45 marks)



- (a) (i) Name the **three** plastic manufacturing processes shown at **A**, **B** and **C**.
- (ii) Describe with the aid of a labelled diagram **any one** of the manufacturing processes, named by you, at **5(a)(i)** above.
- (b) In relation to plastic technology, describe **any two** of the following:
- (i) Thermosetting plastic;
 - (ii) Elastic memory;
 - (iii) Thermoplastics.
- (c) Select **any two** of the products shown below and name a suitable plastic material which can be used to make **each** of the products selected:



(i) Rear light cover for vehicles



(ii) Tool handles



(iii) Kitchen worktops.

- (d) State **two** safety precautions to be observed when plastic dip coating.



Question 6.

(45 marks)

(a) Name **any three** of the lathe parts shown.



(i)



(ii)



(iii)



(iv)

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

(i) Cutting speed,

(ii) Clearance angle,

(iii) Tolerance,

(iv) Cutting fluids.

(c) Dumbbell bars have a series of patterns, usually featuring diagonal lines going in opposite directions, to form a grip.

(i) Name a lathe process used to produce these patterns.

(ii) Describe this lathe process.

(iii) State **two** safety precautions to be observed during this lathe process.



OR

(c) A large number of copies of the chess piece shown below have to be machined.



State **three** advantages of using a computer numerical control lathe (CNC lathe) rather than using a manual control lathe to produce these chess pieces.

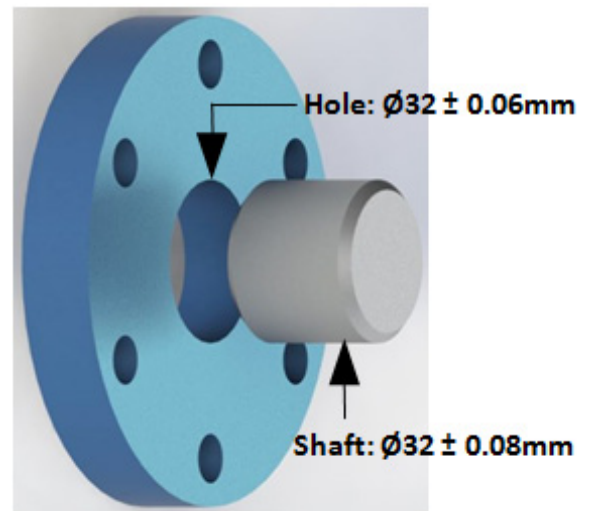
Question 7.

(45 marks)

- (a) Describe **any two** of the following:
- (i) Interference fit, (ii) Clearance fit, (iii) Upper limit.

- (b) A hole and shaft assembly is manufactured to the dimensions shown.

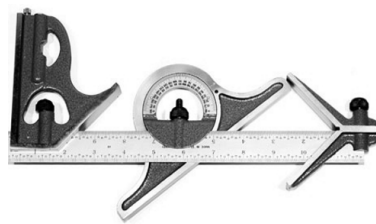
- State the:
- (i) Nominal diameter of the shaft;
 - (ii) Largest diameter of the shaft;
 - (iii) Smallest diameter of the hole;
 - (iv) The tolerance of the hole.



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



(i)



(ii)



(iii)



(iv)

OR

- (c) The electronic components below can be used in the manufacture of the Model Space Rover shown.



- (i) Name **any three** of the electronic components shown below.
- (ii) State the function of **each** component, named by you, in 7(c)(i).



A



B



C



D