



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2018

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)



THURSDAY, 7th JUNE

MORNING, 9:30 – 12:00

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

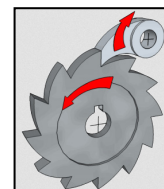
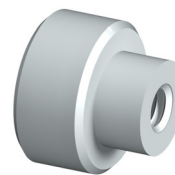
Question 1.

(65 marks)

SECTION A – 30 marks

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

- (a) State **two** safety precautions to be observed when manufacturing the component shown on a CNC lathe.
- (b) Is a *Solar Panel* a renewable energy source or a non-renewable energy source?
- (c) Identify **two** applications for the ratchet and pawl mechanism shown.
- (d) State **two** reasons why it is important to have *dimensioned drawings* in project work.
- (e) Explain the term *temporary joint*.
- (f) Explain why the LED shown has one *short leg*.
- (g) Name the *alloy* which is produced from lead and tin.
- (h) State **two** uses of an USB cable.



SECTION B – 35 marks

Answer **any three** of the following:

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



Four-jaw independent chuck



Strip heater



Knurling tool.

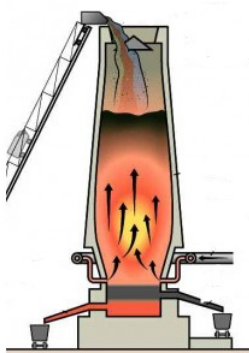
- (j) Explain **any two** of the following:
Virus, CNC laser cutter, Social networks, Web browser.
- (k) Define the term *electrical insulator* in relation to the properties of materials **and** name **one** material which is a good electrical insulator.
- (l) Explain **any two** of the following:
Printed Circuit Board (PCB), Rack and pinion, Parting-off tool, Variable resistor.
- (m) Name the cutting tool shown and state its function.



Question 2.

(45 marks)

- (a) Name and state the functions of **each** of the following furnaces.



(i)



(ii)



(iii)

- (b) Select **one** of the furnaces shown at 2(a) above and answer **each** of the following:

- (i) Draw a diagram of the furnace and label the main parts;
- (ii) Name the materials in the charge;
- (iii) Describe how the metal is removed from the furnace.

- (c) (i) Name a suitable material for the manufacture of **each** component shown below.
- (ii) State **one** reason for the selection of **each** material.



Lathe cutting tool tip



Musical instrument



Lathe bedway

- (d) Select **any two** of the following metals and state if they are ferrous or non-ferrous:



(i) Aluminium



(ii) Copper



(iii) Cast iron.

Question 3.

(45 marks)

- (a) (i) During a heat treatment process carbon steel is cooled **quickly** from a temperature of 900°C. Name this heat treatment process **and** state the mechanical property associated with it.
- (ii) During a heat treatment process carbon steel is cooled **slowly** from a temperature of 900°C. Name this heat treatment process **and** state the mechanical property associated with it.

- (b) Describe the heat treatment processes used in **each** of the following cases:

- (i) To *temper* the point of a scriber.



- (ii) To *case harden* the point of a screwdriver.



- (c) State **two** safety precautions to be observed during the heat treatment of metals.

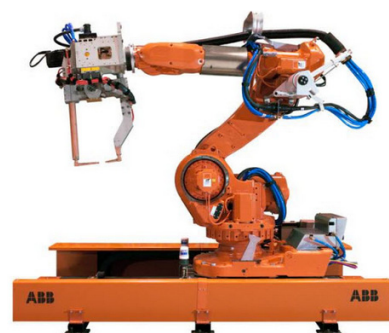


- (d) Explain **any two** of the following metal properties:

- (i) Conductivity, (ii) Brittleness, (iii) Toughness.

OR

- (d) State **two** applications of robotics in industry.



Question 4.

(45 marks)

- (a)
- (i) Name the **two** gases most commonly used in gas welding.
 - (ii) State the *colour* of **each** cylinder used to store the gases named in 4(a)(i) above.
 - (iii) Identify the **three** types of flame produced when gas welding.

- (b) State the function of **any three** of the following in manual metal arc welding:



(i) Welding mask,



(ii) Generator,



(iii) Electrode holder,



(iv) Leather gloves.

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

- (i) State **two** advantages of using *spot welding* to join sheet steel.



- (ii) Name a suitable method used to produce a permanent joint between electronic components.

- (iii) Describe **one** suitable reason for using a locknut when assembling project work.



- (iv) State **two** health hazards associated with gas welding.

- (d) State **two** safety precautions to be observed when using an electrical soldering iron.



Question 5.

(45 marks)

- (a) The three components shown below were manufactured from plastic materials.



Safety hard hat,



Baby bottle,



Toy car.

- (i) Name a plastic manufacturing process used in the production of **each** of the components shown above.
- (ii) Describe with the aid of a diagram, **any one** of the manufacturing processes named by you, at 5(a)(i) above.

- (b) In relation to plastic technology, answer **each** of the following:

- (i) Name the term used for a plastic which remains hard after being heated;
- (ii) Name the term used for a plastic which softens when heated;
- (iii) State **one** suitable method used for the disposal of waste plastics.

- (c) Select **any two** of the products shown below **and** name a plastic material which is suitable for the production of **each**:



(i) Plastic bag



(ii) Garden hose



(iii) Food container.

- (d) State **two** safety precautions to be observed when forming plastics on a strip heater.

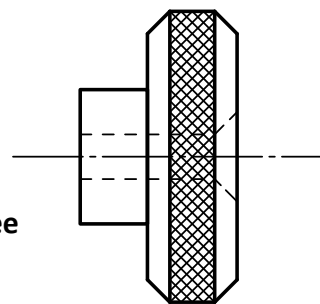
Question 6.

(45 marks)

(a) The model steering wheel shown is to be turned on a centre lathe.

(i) Name **three** turning operations used in the production of the steering wheel.

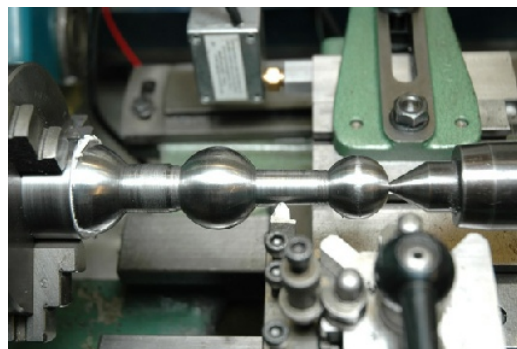
(ii) Describe, with the aid of suitable diagrams, **each** of the **three** turning operations named by you at 6(a)(i) above.



(b) Describe a suitable application for **each** of the lathe work-holding methods shown below.



(i) Self centering three-jaw chuck



(ii) Using a centre

(c) A part for a centre lathe is shown opposite.

(i) Name the lathe part shown.

(ii) Describe the function of the lathe part shown.

(iii) State **two** safety precautions to be observed when using the lathe part shown.



OR

(c) Describe **any three** of the following in relation to the operation of a CNC lathe:

(i) Safety guard

(ii) Stepper motor

(iii) Part programme

(iv) CAM.

Question 7.

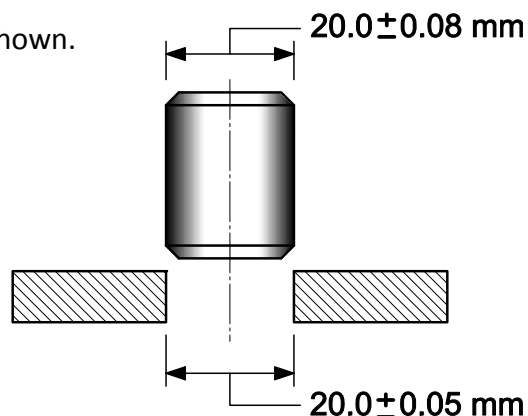
(45 marks)

- (a) (i) Describe **two** methods used to accurately measure the diameter of a shaft.
- (ii) State **two** advantages of a digital readout on measuring instruments.

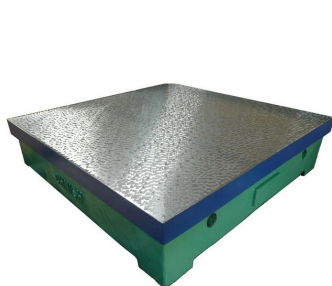


- (b) A hole and shaft are manufactured to the dimensions shown.

- State the:
- (i) Nominal diameter of the shaft;
 - (ii) Largest diameter of the shaft;
 - (iii) Smallest diameter of the hole;
 - (iv) The type of fit which will result from the assembly of the largest shaft and the smallest hole.



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



(i)



(ii)



(iii)



(iv)

OR

- (c) (i) Draw the circuit symbol for **any three** of the electronic components labelled A, B, C or D.
- (ii) State the function of **each** of the electronic components selected at 7 (c)(i) above.

