



Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2015

ENGINEERING – MATERIALS AND TECHNOLOGY

(Ordinary level – 200 marks)

THURSDAY, 4 JUNE

MORNING, 9:30 – 12:00

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

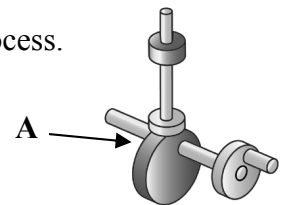
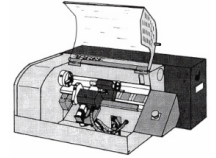
Question 1.

(65 marks)

SECTION A – 30 marks

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

- (a) List **two** safety precautions to be observed when using a strip heater to bend acrylic.
- (b) Explain the term *electrical conductor* in relation to the properties of metals.
- (c) State **two** operations where a centre lathe tailstock is used.
- (d) State **two** advantages of using Computer Aided Manufacture (CAM).
- (e) Outline **two** reasons why *testing* is essential in project work.
- (f) State **two** reasons why the quality of finish is important in the manufacturing process.
- (g) Name the mechanism labelled A, shown opposite.
- (h) Name the thread forms suitable for **each** of the following:



(i)

Engineering machine vice,



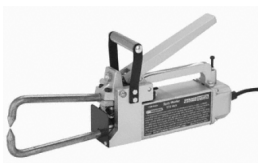
(ii)

Machine screw.

SECTION B – 35 marks

Answer **any three** of the following:

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



Spot welding machine



Rack and pinion mechanism



Plastic dip coating tank.

- (j) Explain **any two** of the following:
Software, Wireless technology, Computer simulation, USB port.
- (k) Define the term *brittleness* and name a material which is brittle.
- (l) Explain **any two** of the following:
Printed circuit board (PCB), Metal alloy, Knurling, Worm and worm wheel.
- (m) Name the **two** cutting tools shown at (i) and (ii).

(i)



(ii)

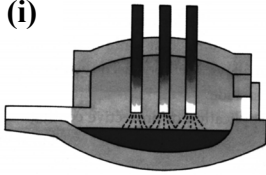


Question 2.

(45 marks)

- (a) Name **each** of the furnaces shown.

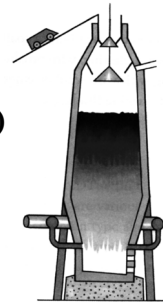
(i)



(ii)



(iii)



- (b) Select **one** of the furnaces shown 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 charge is heated or melted;
- (iv) Name the metal produced.

- (c) Identify a suitable material for the manufacture of **each** of the components shown below:



(i) Frying pan,

(ii) Engineering square,

(iii) Hot water cylinder.

- (d) Name the metals used to produce **each** of the alloys listed below:

- (i) Brass, (ii) Solder.

Question 3.

(45 marks)

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

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

- (b) Describe how the head of the engineering hammer shown could be hardened and tempered.



- (c) State **two** safety precautions to be observed when handling hot metals during heat treatment.

- (d) Outline the effects of using **each** of the following, when cooling metals during heat treatment:

- Water
- Oil.

OR

- (d) State **two** applications for robotics in the manufacturing industry.

Question 4.

(45 marks)

- (a) Describe **any three** of the following soft soldering terms:
(i) Flux, (ii) Sweating, (iii) Cored solder, (iv) Tinning.
- (b) (i) Name **three** types of flame which can be produced when using the oxy-acetylene torch.
(ii) State the proportions of oxygen and acetylene required for **each** of the three flames at 4(b)(i).
- (c) Answer **any three** of the following:
(i) Describe how heat is produced during manual metal arc welding.
(ii) Name a suitable method used to join light gauge aluminium.
(iii) List **two** safety precautions to be observed when soldering electrical circuits.
(iv) Name the type of machine screw shown and suggest a suitable application.
- (d) Explain **two** reasons why the face must be protected during manual metal arc welding.



Question 5.

(45 marks)

- (a) The three items shown below are manufactured from plastic materials.



Ice cube tray



Sports bottle



Toothbrush

- (i) Identify a manufacturing process used in the production of **each** of the items shown above.
(ii) Describe with the aid of a diagram, **one** of the manufacturing processes named in 5(a)(i).
- (b) State **two** safety precautions to be observed when machining acrylic.
- (c) Explain **any three** of the following terms associated with plastic technology:
(i) Thermoplastic, (ii) Fibreglass, (iii) Thermoforming, (iv) Thermosetting plastic.
- (d) Describe a procedure used to produce a highly finished edge on an acrylic sheet.

Question 6.

(45 marks)

- (a)** Identify **any three** of the lathe components shown.



(i)



(ii)



(iii)



(iv)

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

(i) Taper turning, **(ii)** Spindle speed, **(iii)** Cutting fluids, **(iv)** Feed.

- (c)** A chuck for use in a centre lathe is shown.



- (i)** Name this chuck.
(ii) Describe **two** applications for the chuck shown.
(iii) State **one** safety precaution to be observed when using this type of chuck.

OR

- (c)** Explain **any three** of the following in relation to Computer Numerical Control (CNC) machining:

(i) CAD, **(ii)** X-axis, **(iii)** Stepper motor, **(iv)** Safety switch.

Question 7.

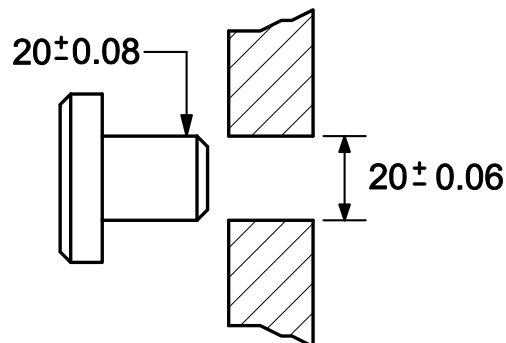
(45 marks)

(a) Describe **any two** of the following terms in relation to limits and fits:

- (i) Lower limit, (ii) Interference fit, (iii) Allowance.

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

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



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



(i)



(ii)



(iii)



(iv)

OR

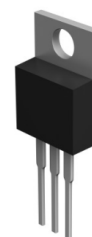
(c) Name **each** of the electronic components shown below and outline the function of **each** component named.



(i)



(ii)



(iii)

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Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2015

ENGINEERING - PRACTICAL
HIGHER and ORDINARY LEVELS

150 marks

27th APRIL - 8th MAY - MORNING: 10:00 to 1:00
AFTERNOON: 2:00 to 5:00

PLEASE READ CAREFULLY

INSTRUCTIONS

- (a) The Examination Number must be clearly stamped or engraved, by the **teacher**, on the test-piece in the position indicated on the drawing 2015. M74A(L₂). If the test-piece is not assembled, the Examination Number must be indicated on each separate part of the test-piece.
- (b) Candidates are not permitted to communicate with or assist one another.
- (c) Completed **mild steel** parts **only** must be sprayed with a clear rust preventive aerosol.

From the materials supplied, make the **Vice** shown on the drawings to the shape and dimensions specified.

PART	MATERIAL	PROCESS
1	Clear Polycarbonate	Mark out, drill, tap and shape.
2	Clear Polycarbonate	Mark out, drill and shape.
3	Aluminium	Mark out, drill and shape.
6	Aluminium	Mark out and shape.
7	Brass	Mark out, drill and shape.

Note: (i) Parts 4, 5, 8 and 9 have been made prior to examination day. Part 6 has been part-prepared. Using the screws, nut and washer supplied assemble the Vice, as detailed on the assembly drawing.

(ii) **Accuracy, finish and function are important.**



Coimisiún na Scrúdaithe Stáit

SCRÚDÚ ARDTEISTIMÉIREACHTA, 2015

INNEALTÓIREACTH - PRAITICIÚIL
ARDLEIBHÉAL agus GNÁTHLEIBHÉAL

150 marc

27 AIBREÁN - 8 BEALTAINE

- MAIDIN:

10:00 go dtí 1:00

TRÁTHNÓNA:

2:00 go dtí 5:00

LÉIGH NA TREORACHA SEO GO CÚRAMACH IAD LE DO THOIL

TREORACHA

- (a) Ba chóir don **mhúinteoir** Scrúduimhir an Iarrthóra a ghreanadh nó a scríobadh san ionad a thaispeántar ar an líníocht 2015. M74A(L₂). Mura bhfuil an triailphíosa curtha le chéile, ní mór an Scrúduimhir a thaispeáint ar gach páirt ar leith den triailphíosa.
- (b) Níl sé de chead ag iarrthóirí caidreamh a bheith acu lena chéile ná cúnamh a thabhairt dá chéile.
- (c) Ní mór sprae trédhearcadh aerosol chun meirg a chosc a chur ar na páirteanna déanta as **cruach bhog amháin** agus iad críochnaithe.

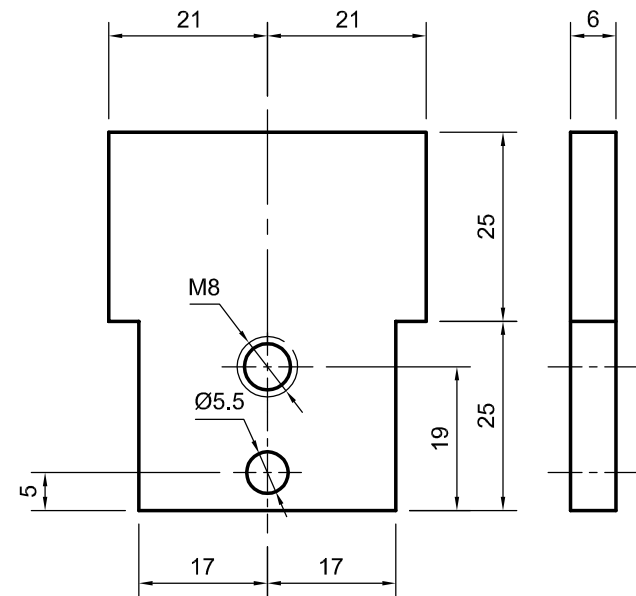
As na hábhair a sholáthraítear, an **Bhís** a thaispeántar sna líníochtaí a dhéanamh sa chruth agus de réir na dtoisí a shonraítear.

PÁIRT	ÁBHAR	PRÓISEAS
1	Polacharbónáit thrédhearcach	A mharcáil amach, a dhruileáil, a tapa agus a dheilbhiú.
2	Polacharbónáit thrédhearcach	A mharcáil amach, a dhruileáil agus a dheilbhiú.
3	Alúmanam	A mharcáil amach, a dhruileáil agus a dheilbhiú.
6	Alúmanam	A mharcáil amach agus a dheilbhiú.
7	Prás	A mharcáil amach, a dhruileáil agus a dheilbhiú.

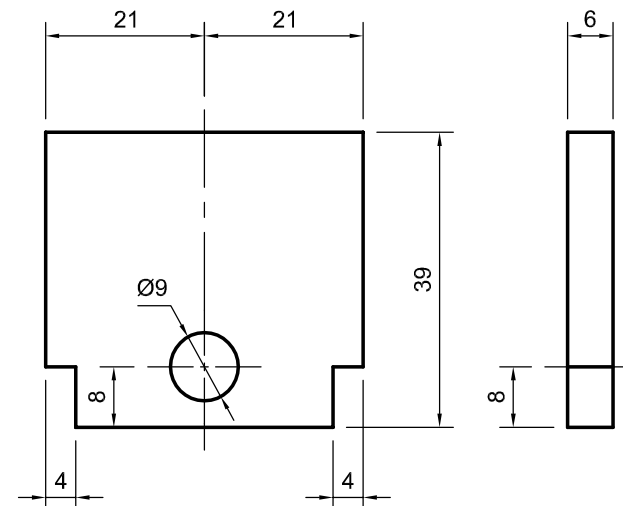
Nóta: (i) Rinneadh páirteanna 4, 5, 8 agus 9 roimh lá an scrúdaithe. Tá páirt 6 páirtdeanta. Ag baint úsáide as na scríúnná, an cnó agus an leicneán a sholáthraítear, cóimeáil an Bhís faoi mar atá sa líníocht cóimeála.

(ii) Tá tábhacht ag baint le cruinneas, le bailchríoch agus le hoibriú.

1

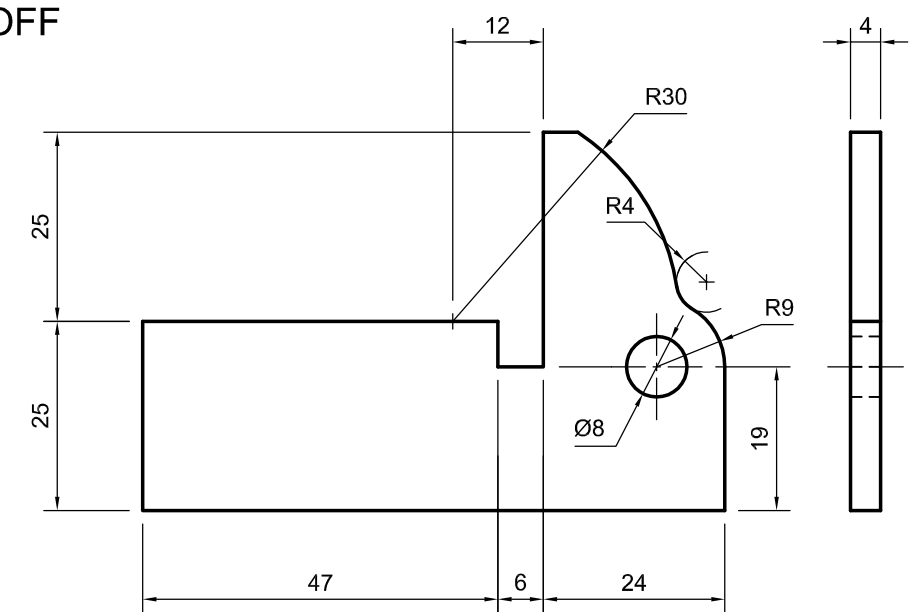


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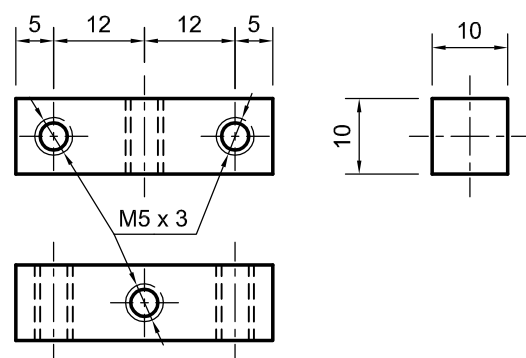


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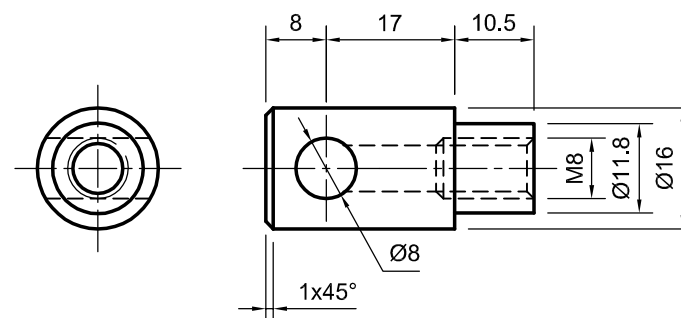
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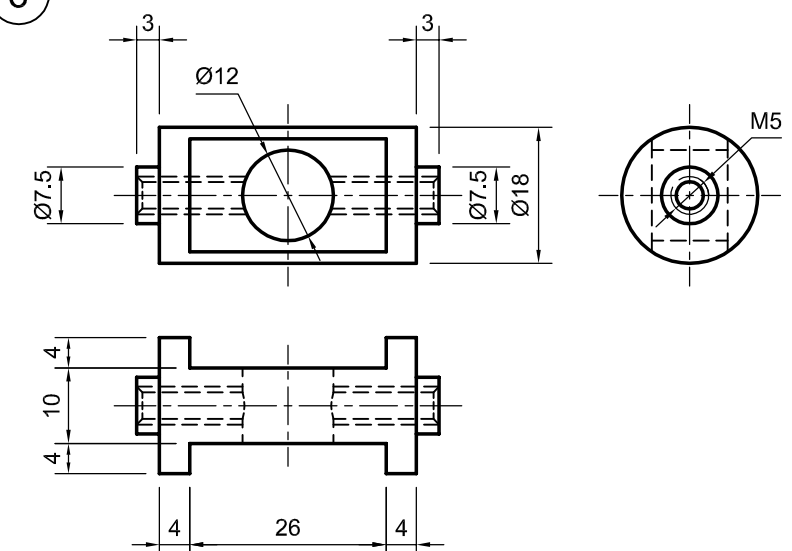
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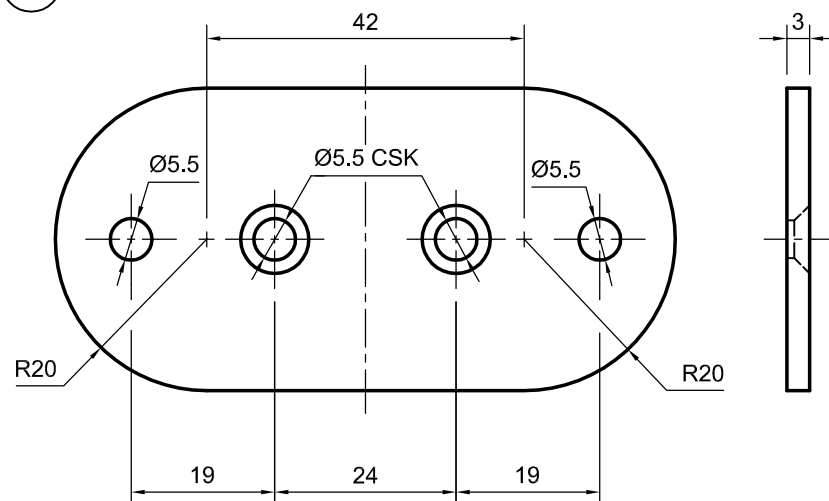
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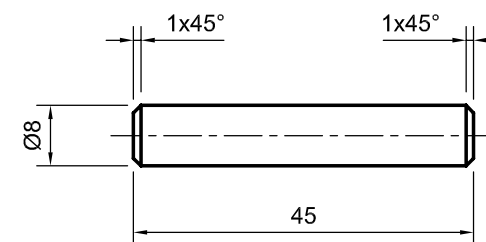
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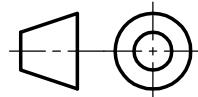
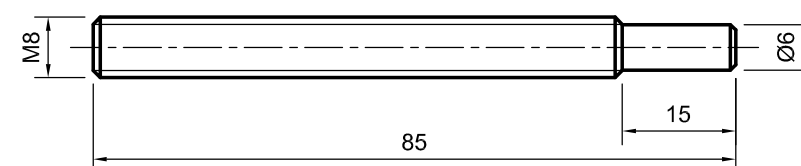
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8

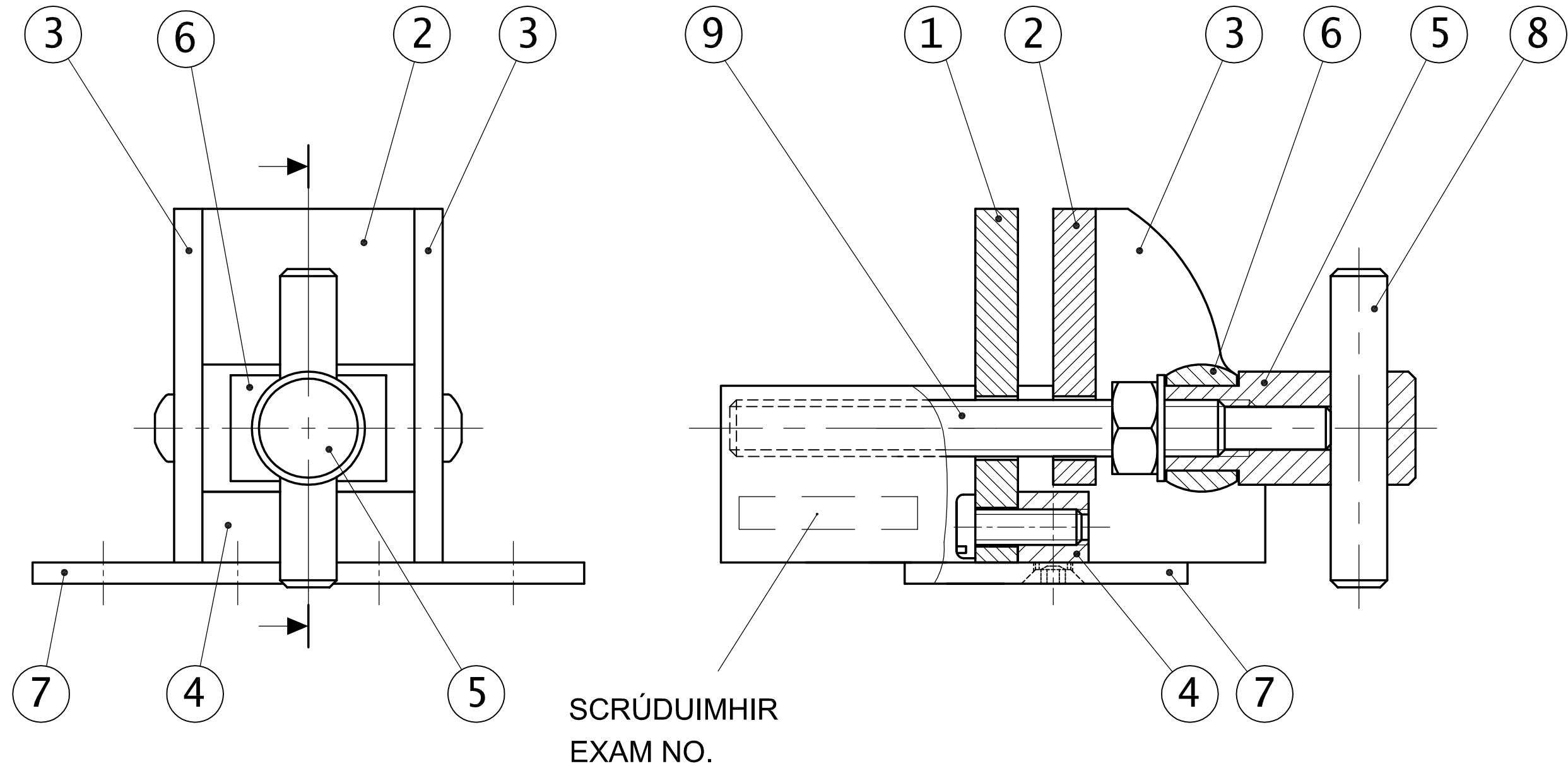


9



THALL
OVER

SCRÚDÚ ARDTEISTIMÉIREACHTA INNEALTÓIREACHT - PRAITICIÚIL
LEAVING CERTIFICATE ENGINEERING - PRACTICAL



SONRAÍ CÓIMEÁLA
ASSEMBLY DETAILS