

OCR

Oxford Cambridge and RSA

Tuesday 23 May 2017 – Morning

LEVEL 1/2 CAMBRIDGE NATIONAL AWARD/CERTIFICATE IN PRINCIPLES IN ENGINEERING AND ENGINEERING BUSINESS

R101/01 Engineering principles

Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

- A calculator may be used

Duration: 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the barcodes.

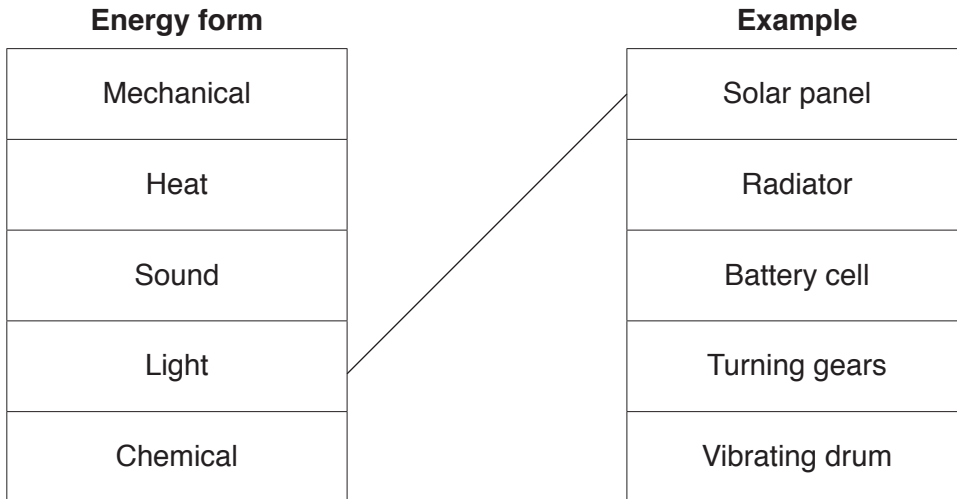
INFORMATION FOR CANDIDATES

- The total number of marks for this paper is **60**.
- The number of marks for each question is given in brackets [] at the end of the question or part question.
- Dimensions are in millimetres unless stated otherwise.
- Your quality of written communication will be assessed in questions marked with an asterisk (*).
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 (a) Energy can be produced in many different forms.

(i) Draw lines to link the energy form to the correct example.
One has been done for you.



[4]

(ii) Give **one** application of spur gears in use.

..... [1]

(iii) Describe **one** example of how electrical energy is used to perform a mechanical task.

.....

 [2]

(b) (i) Describe how energy conversion is achieved using a wind up torch light.

.....
 [2]

(ii) A pendulum at the highest point of its swing is an example of potential energy.
Give **one** other example of potential energy.

..... [1]

2 Fig. 1 shows a fishing rod used as a simple lever.

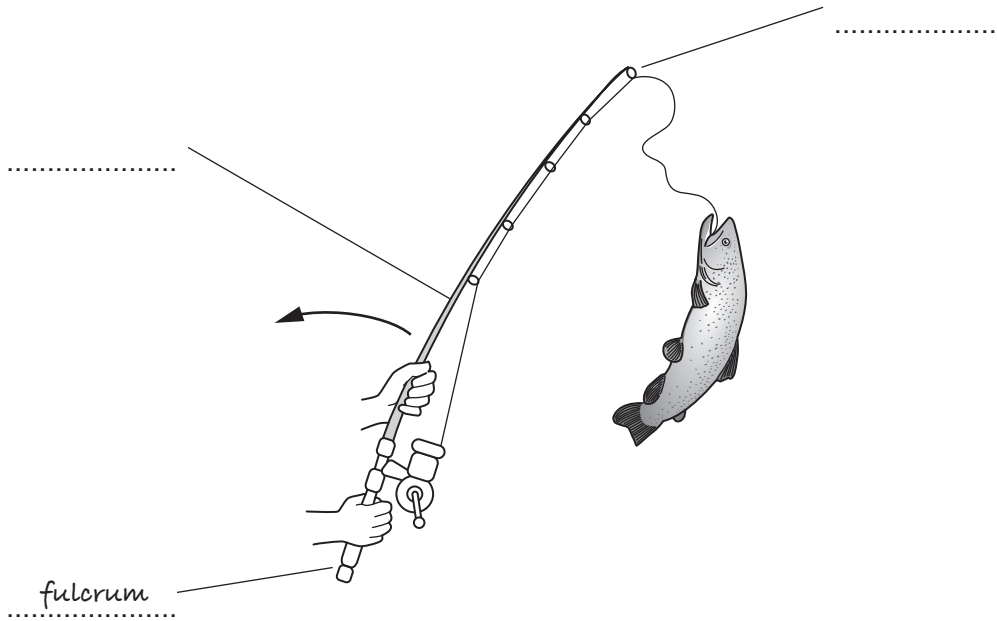


Fig. 1

(a) (i) Complete the labels on Fig. 1 with the correct parts of the lever. One has been done for you. [2]

(ii) State what class of lever is represented by the fishing rod.

..... [1]

(iii) Explain how the use of the fishing rod as a lever is different from the use of a pair of scissors.

.....
.....
.....
.....
..... [3]

(b) Fig. 2 shows a charging device for handheld electrical equipment.



Fig. 2

(i) State **two** ways that the input voltage differs from the output.

1

.....

2

.....

[2]

(ii) Give **two** benefits of using rechargeable DC electrical devices.

1

.....

2

.....

[2]

3 (a) An engine-driven pulley is used to drive a generator.

The driver pulley has a diameter of 180 mm and the driven pulley has a diameter of 90 mm.

(i) Calculate the velocity ratio of the pulleys.

.....
.....
..... [2]

(ii) State the speed of the generator when the engine is turning at 1000 revolutions per minute.

.....
..... [1]

(iii) Give **two** advantages of using a pulley and belt system.

1

.....

2

..... [2]

(iv) A hydraulic pump is also driven by the engine.
Give **one** application for the hydraulic pump.

..... [1]

(v) Pulley systems are one way of driving ancillary equipment such as generators and pumps.
Give **one** other method that could be used.

..... [1]

(b) Fig. 3 shows an engine-driven generator.

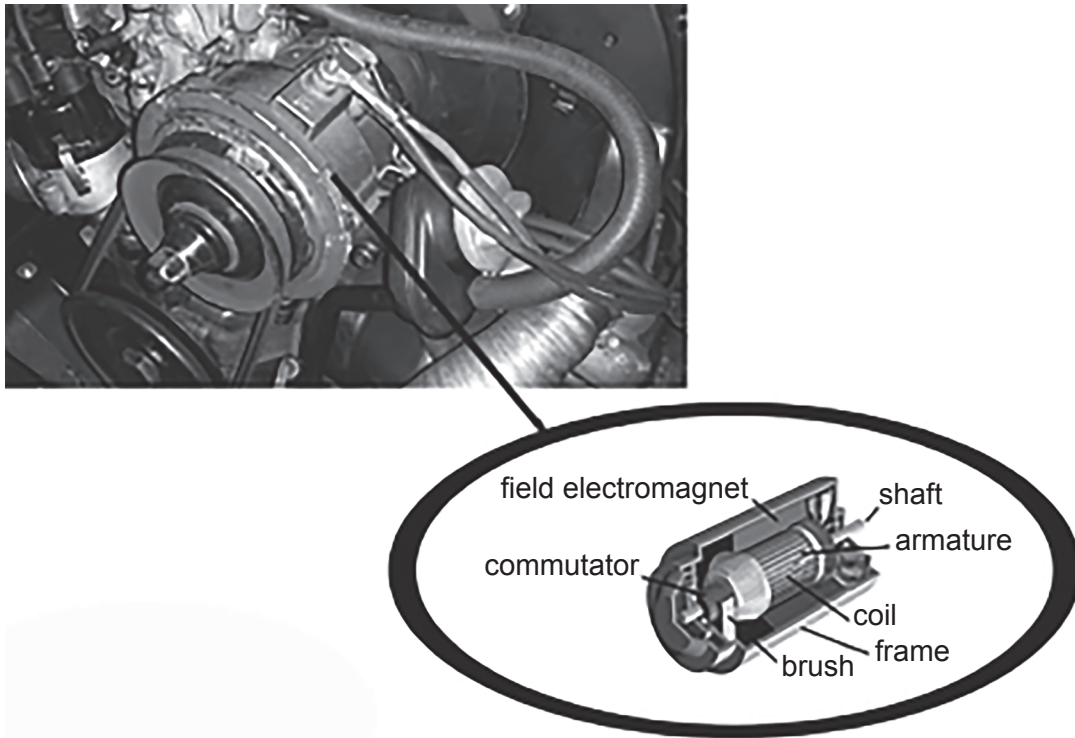


Fig. 3

Explain how the generator in Fig. 3 is used to produce electrical energy.

.....

.....

.....

.....

[3]

4 (a) Fig. 4 shows two lighting circuits.

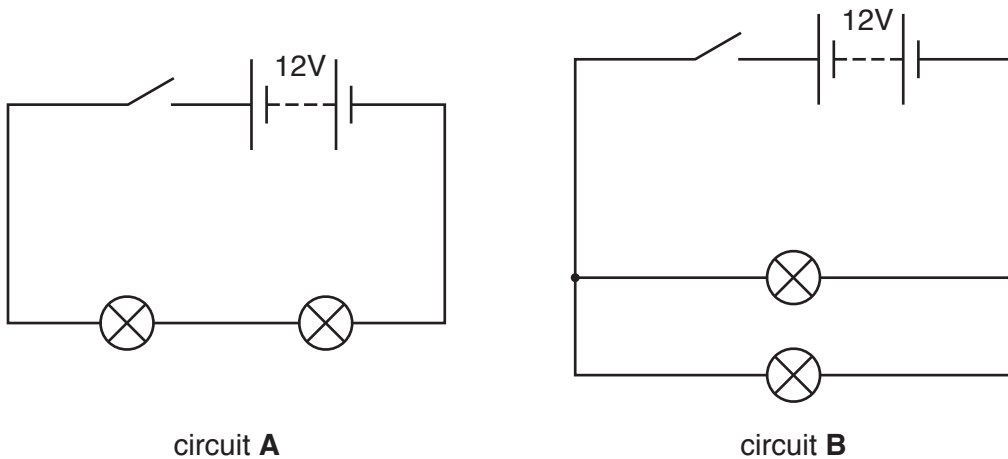


Fig. 4

(i) State the arrangement of circuit **A**.

..... [1]

(ii) Suggest why the arrangement in circuit **B** is usually used for lighting circuits.

.....
 [1]

(iii) State the name of unit that is used to give the power rating of the lamps.

..... [1]

(b) Complete the following statement using the correct terms from the list below.

- series resistor ammeter parallel**

To measure current, the is placed in
 with the component, while a voltmeter is placed in with the
 component to measure the voltage. [3]

(c) Each lamp filament in circuit **A** has a resistance of $2.6\ \Omega$.
 Calculate the total current flowing with the switch closed.

.....

 [2]

- (d) (i) Fig. 5 shows a multimeter.
Draw an arrow to show the dial position to measure the potential difference of the circuit.

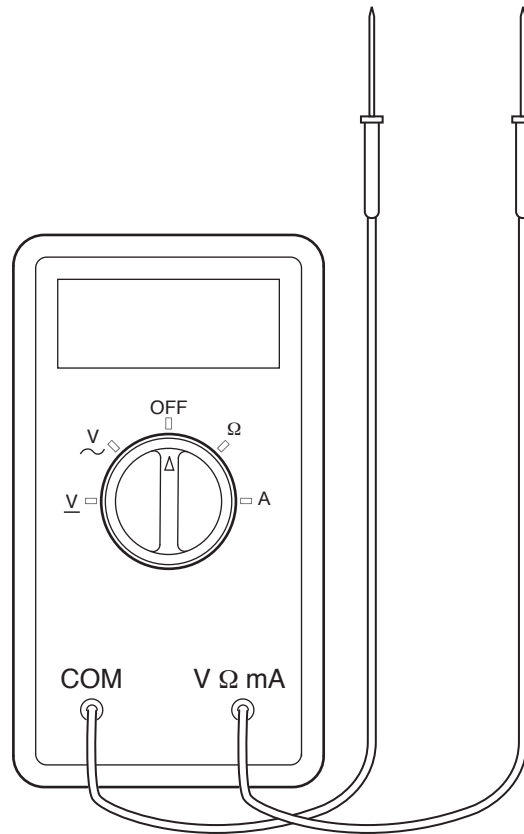


Fig. 5

[1]

- (ii) When measuring the potential difference, state the effect on the meter reading if the polarity of the probes is reversed.

.....

..... [1]

5 Fig. 6 shows a workshop compressor.

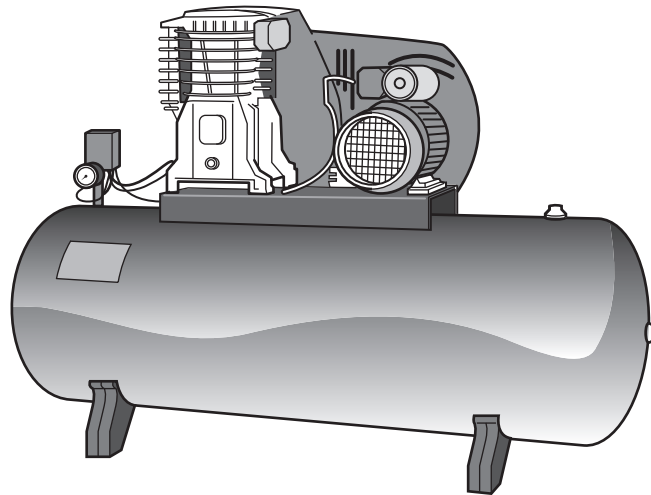


Fig. 6

(a) (i) Explain how the compressor is used to produce and store a source of power for a pneumatic system.

.....
.....
.....
.....
..... [3]

(ii) State how the pressure could be measured in a pneumatic or hydraulic system.

..... [1]

(iii) Give **one** reason why, when measured, the pressure in a pneumatic or hydraulic system may be lower than expected.

..... [1]

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