

OCR

Oxford Cambridge and RSA

Tuesday 24 May 2016 – 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



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|-----------------------|--|----------------------|--|
| 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 bar codes.

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) Fig. 1 shows a workshop tool that uses a lever to operate.

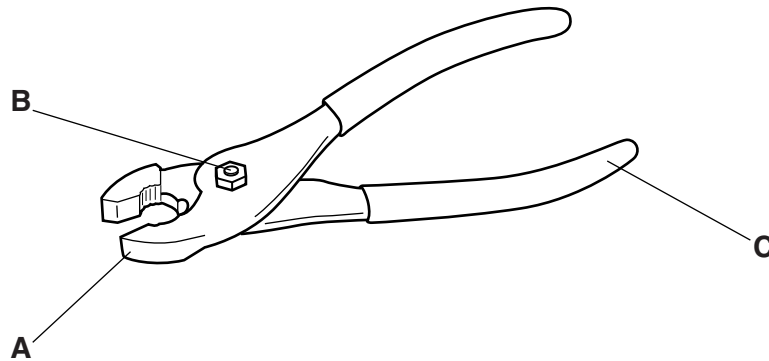


Fig. 1

- (i) Match the terms below to the parts identified in Fig. 1.

Fulcrum Load Effort

- A**
- B**
- C** **[3]**

- (ii) State the class of lever shown in Fig. 1.

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

- (iii) Give **one** other example of a lever mechanism.

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

(b) Fig. 2 shows a gear arrangement.

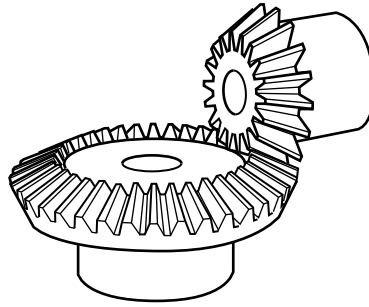


Fig. 2

(i) State the type of gears shown in Fig. 2.

..... [1]

(ii) State **one** practical application for this type of gear.

..... [1]

(c) Fig. 3 shows a toothed drive belt on a pulley.

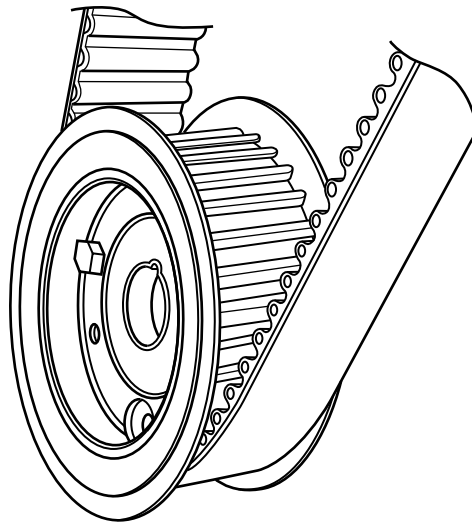


Fig. 3

(i) State **two** benefits of using a toothed drive belt.

1

2

[2]

(ii) State **one** alternative drive system other than a toothed belt.

..... [1]

(d) Fig. 4 shows a drive system. The position of component **X** is adjustable.

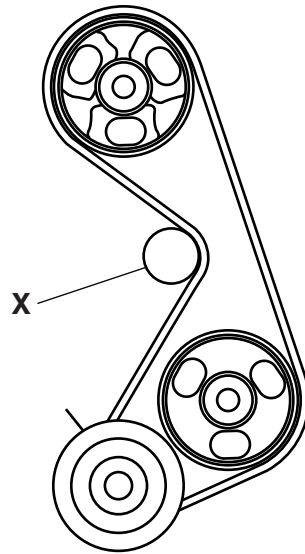


Fig. 4

State the purpose of component **X**.

..... [1]

2 (a) Give **two** examples of a dynamic load.

1

2

[2]

(b) A vehicle travels from 0 m/s to reach a speed of 20 m/s after 4 seconds.
Calculate the acceleration.

Use the formula:

$$a = \frac{v - u}{t}$$

.....

.....

..... [3]

(c) Explain, using **one** example, what is meant by the term 'potential energy'.

.....

.....

..... [3]

3 (a) Complete the statement below using the correct terms from the list.

- resistors cells voltage watts**

Voltage can be supplied to a circuit by a battery that can be made up of one or more Potential difference is the measure of across a circuit component. [2]

(b) Fig. 5 shows two circuits, each using two identical lamps.

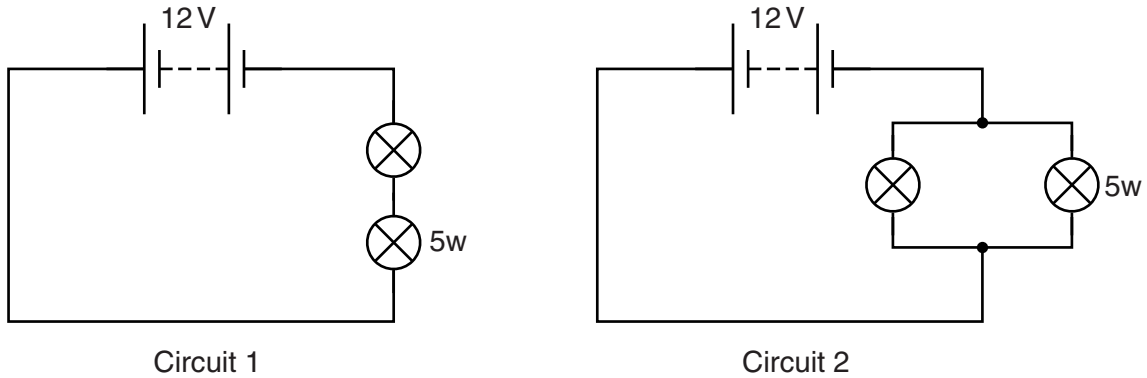


Fig. 5

(i) State the type of arrangement used to connect the lamps in Circuit 1.
 [1]

(ii) Give **two** benefits of using Circuit 2 over Circuit 1.
 1
 2 [2]

(iii) Calculate the total current in Circuit 1.
 Use the formula:
 $I = P/V$

 [2]

(c) Fig. 6 shows a circuit used to operate a motor.

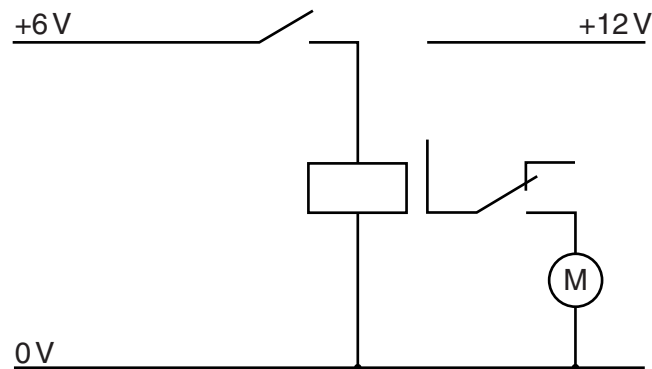


Fig. 6

- (i) Draw an ammeter on the circuit in Fig. 6 to measure the motor current. [1]
- (ii) Draw a voltmeter on Fig. 6 to show the voltage at the motor. [2]
- (iii) Explain how the circuit in Fig. 6 operates.

.....

.....

.....

.....

.....

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..... [4]

4 Fig. 7 shows a pneumatic system.

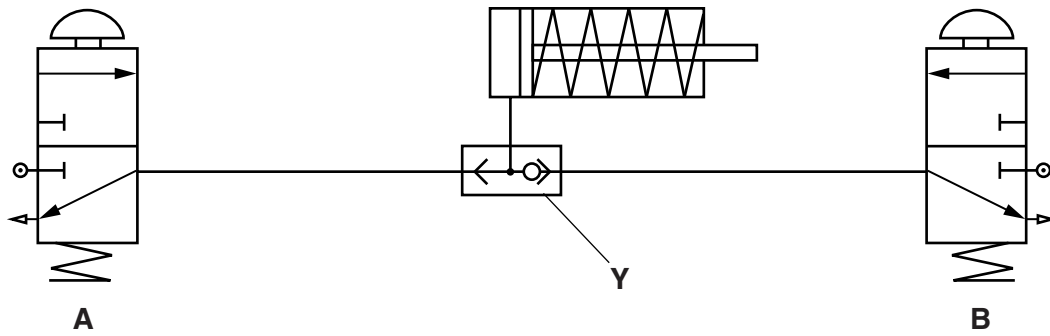


Fig. 7

- (a) (i) Name component Y shown in Fig. 7.
 [1]
- (ii) Describe how component Y operates.

 [2]
- (iii) Describe the operation of the circuit shown in Fig. 7.

 [3]
- (b) (i) Describe what is meant by the term 'compressibility' in a pneumatic circuit.

 [2]
- (ii) Describe how compressibility differs in a hydraulic circuit.

 [2]

(c) Compressed air is filtered before being supplied to system components.

Explain the purpose of the filter.

.....

.....

..... [2]

5 (a) Fig. 8 shows a hydraulic pump that is used to power a hydraulic lifting arm.

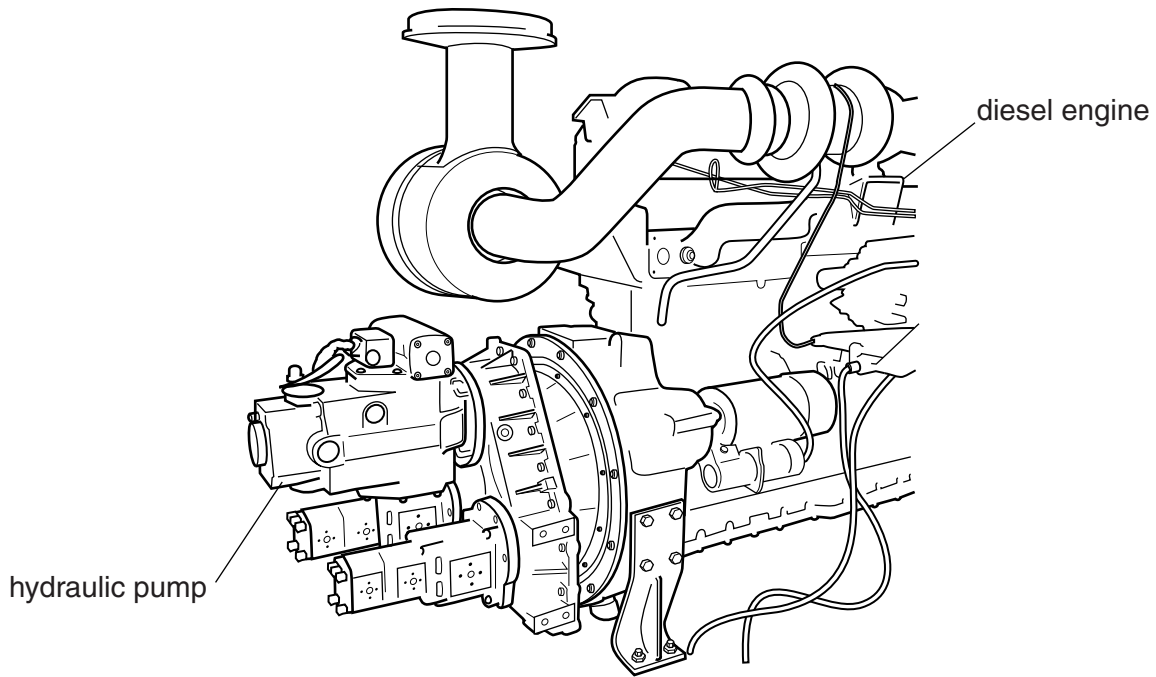


Fig. 8

(i) Select the type of power source from the list below that is used to drive the hydraulic pump.

- mechanical
- electrical
- pneumatic

..... [1]

(ii) State **one** advantage of using this type of power source to produce hydraulic power.

..... [1]

(iii) Give **one** other hydraulic application different to the example given in Fig. 8.

..... [1]

(b) (i) Give **one** type of energy conversion.

..... energy to energy [1]

(ii) Describe **one** practical application of the type of energy conversion given in part (i).

.....

 [2]

6 (a) Fig. 9 shows a roller conveyor used to move products at a manufacturer's site.

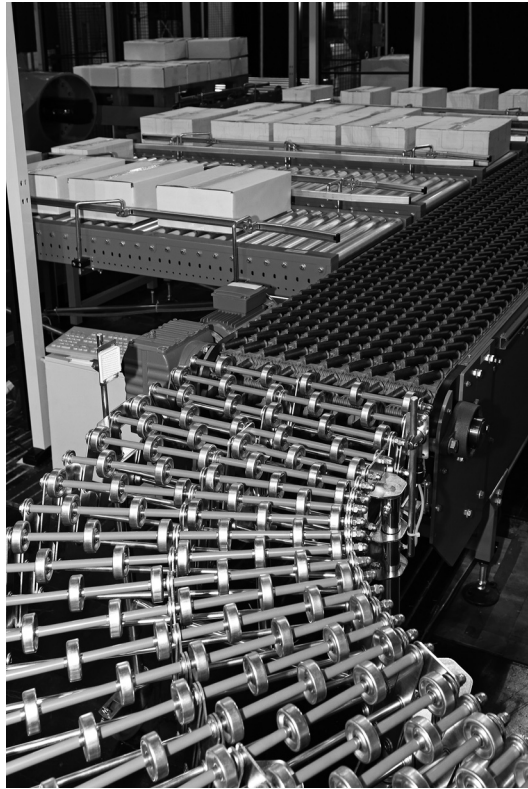


Fig. 9

Describe a system that could be used to power and drive the conveyor.

.....

.....

.....

..... [3]

