



## 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



Candidate forename				Candidate surname					
Centre numb	er					Candidate nu	ımber		

#### **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.

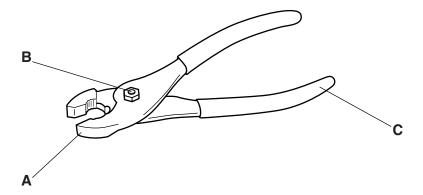


Fig. 1

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

		Fulcrum	Load	Effort	
	Α				
	В				
	C				
					[3]
(ii)	State the class	of lever shown in F	ig. 1.		
					[1]
(iii)	Give one other	example of a lever	mechanism.		
					[1]

(b) Fig. 2 shows a gear arrangement.

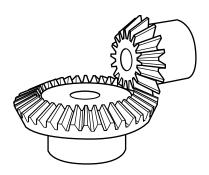


Fig. 2

(i)	State the type of gears shown in Fig. 2.	
		[1]
(ii)	State <b>one</b> practical application for this type of gear.	
		[1]
\ <b>-</b> :	O alconor a tarath and abit as health are a conflict.	

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

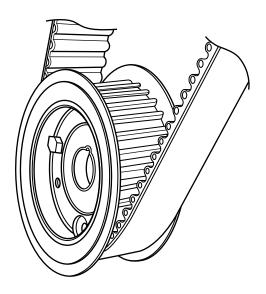


Fig. 3

 4

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

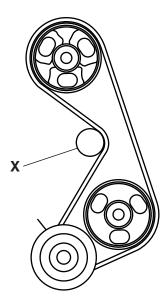


Fig. 4

State the purpose of component X.	
·	41
	Ш

2

(a)	Give <b>two</b> examples of a dynamic load.	
	1	
	2 <b>[2</b>	
(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 <b>one</b> example, what is meant by the term 'potential energy'.	
	[3]	1

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

	watts	age	volta	<b>;</b>	cells	istors	res
up of one or more	be made	that can	a battery	t by	a circuit	supplied to	Voltage can be
across a circuit		sure of	the meas	ce is	difference	Potentia	
[2]							component.

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

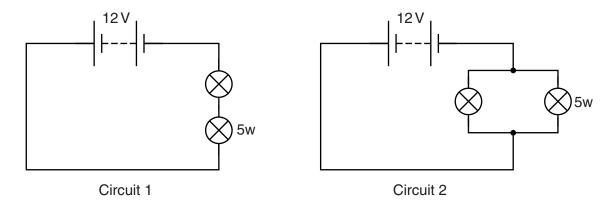


Fig. 5

(i)	State the type of arrangement used to connect the lamps in Circuit 1.	
		[1]
(ii)	Give <b>two</b> 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	

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

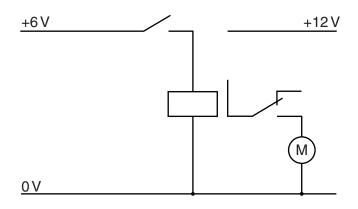


Fig. 6

(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.	
		<b>Γ</b> Δ1

© OCR 2016 Turn over

4 Fig. 7 shows a pneumatic system.

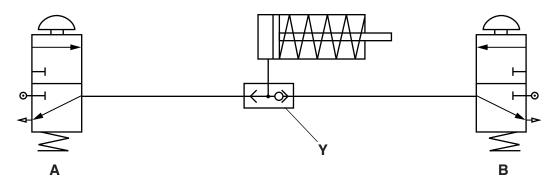


Fig. 7

(a) (i)	Name component <b>Y</b> shown in Fig. 7.	[1]
(ii)	Describe how component <b>Y</b> 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]

		[2]
	Explain the purpose of the litter.	
	Explain the purpose of the filter.	
(c)	Compressed air is filtered before being supplied to system components.	

© OCR 2016 Turn over

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

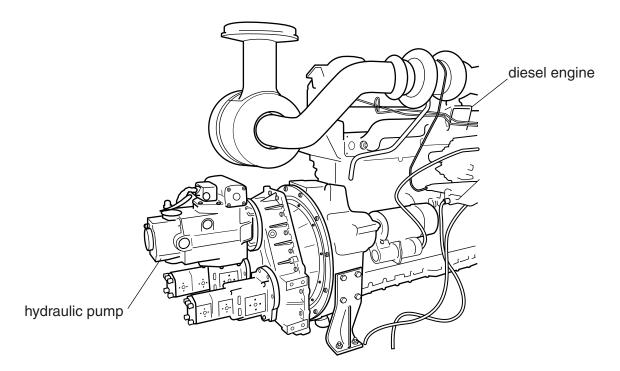


Fig. 8

(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 <b>one</b> advantage of using	ng this type of power	r source to produce hydra	ulic power.
				[1]
(iii)	Give one other hydraulic ap	oplication different to	the example given in Fig.	. 8.
				[1]
(b) (i)	Give one type of energy co	nversion.		
		energy to		energy [1]
(ii)	Describe <b>one</b> practical appl	lication of the type of	f energy conversion given	in part (i).
				[2]

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

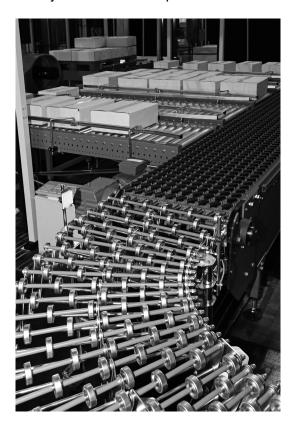


Fig. 9

Describe a system that could be used to power and drive the conveyor.
[3

© OCR 2016 Turn over

(b)*	Discuss the reasons for choosing AC or DC power supplies for a range of applications.
	[6]

#### **END OF QUESTION PAPER**



#### Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

 $For queries \ or \ further \ information \ please \ contact \ the \ Copyright \ Team, \ First \ Floor, 9 \ Hills \ Road, \ Cambridge \ CB2 \ 1GE.$ 

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.