OCR
Oxford Cambridge and RSA

Level 2 Cambridge Technical in Engineering

Unit 1: Fundamentals of mechanical, electrical/electronic and fluid power engineering

Sample Assessment Material

Date - Morning/Afternoon

Time allowed: 45 minutes

You must have:

- a scientific calculator

First Name							Last Name				
Centre Number							Candidate Number				
Date of Birth											

INSTRUCTIONS

- Use black ink.
- Complete the boxes above with your name, centre number, candidate number and date of birth.
- Answer **all** the questions.
- Write your answer to each question in the space provided.

INFORMATION

- The total mark for this paper is **40**.
- The marks for each question are shown in brackets **[ ]**.
- This document consists of 18 pages.

Answer **all** the questions.

Put a tick (✓) in the box next to the **one** correct answer for each question.

1 What is the SI unit for electric current?

(a) kelvin ☐

(b) ampere ☐

(c) candela ☐

(d) metre ☐

2 What is a measurement with no errors called?

(a) tolerance ☐

(b) indicated value ☐

(c) true value ☐

(d) accuracy ☐

3 What SI prefix letter can be used to represent the value 10^6?

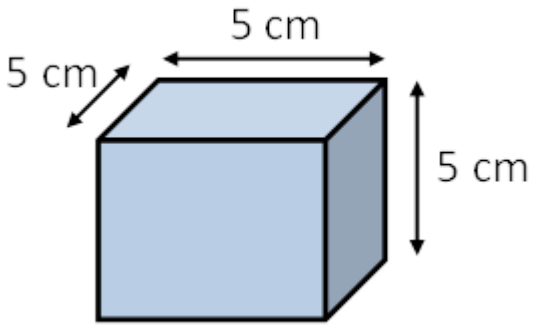
(a) M ☐

(b) G ☐

(c) T ☐

(d) m ☐

4 What is the volume of the cuboid shown below?



(a) 5 cm^3 ☐

(b) 15 cm^3 ☐

(c) 25 cm^3 ☐

(d) 125 cm^3 ☐

5 Which of the following SI derived units represents force?

(a) joule ☐

(b) watt ☐

(c) newton ☐

(d) lux ☐

6 What is a ferrous metal?

(a) A metal that contains copper ☐

(b) A metal that contains aluminium ☐

(c) A metal that contains iron ☐

(d) A metal that contains zinc ☐

7 What type of material is bronze?

(a) Non-ferrous metal ☐

(b) Ferrous metal ☐

(c) Polymer ☐

(d) Composite ☐

8 What type of material is nylon?

(a) A ceramic ☐

(b) A composite ☐

(c) A polymer ☐

(d) A smart material ☐

9 What is epoxy resin?

(a) A smart material ☐

(b) A thermoplastic ☐

(c) A thermoset plastic ☐

(d) A ceramic ☐

10 What type of material is glass?

(a) A ceramic ☐

(b) A smart material ☐

(c) A composite ☐

(d) A polymer ☐

11 What is an alloy?

(a) A mixture of two elements, at least one of which is a metal ☐

(b) A mixture of two thermoplastics, one of which is acrylic ☐

(c) A mixture of two smart materials ☐

(d) A mixture of two composite materials ☐

12 Which of the following material can be classified as a 'smart material'?

(a) Shape-memory plastic ☐

(b) Glass reinforced plastic (GRP) ☐

(c) Titanium ☐

(d) Tungsten carbide ☐

13 What is elasticity?

(a) The ability of a material to retain a new shape after stretching ☐

(b) The ability of a material to return to its original shape after stretching ☐

(c) The ability of a material to break without stretching ☐

(d) The ability of a material to stretch without ever breaking ☐

14 What is a tough material?

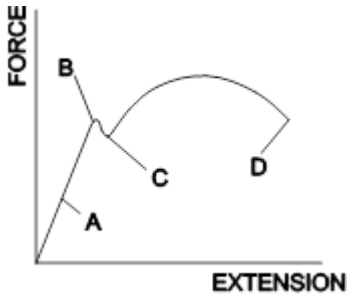
(a) A material that has resistance to being deformed by compression ☐

(b) A material that has resistance to being deformed by stretching ☐

(c) A material that has resistance to wear and abrasion ☐

(d) A material that has resistance to shock loading and impact ☐

15 Which letter on the force/extension graph below identifies the elastic limit?



(a) A ☐

(b) B ☐

(c) C ☐

(d) D ☐

16 What is strain?

(a) The response of a system to an applied stress ☐

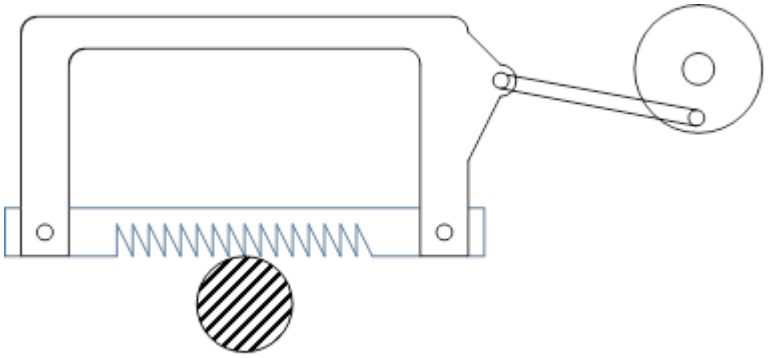
(b) The response of a system to temperature change ☐

(c) The response of a system to a breaking point ☐

(d) The response of a system to plastic deformation ☐

17 **The image below shows a mechanical hacksaw cutting a steel bar.**

What type of motion does the hacksaw use on its cutting stroke?



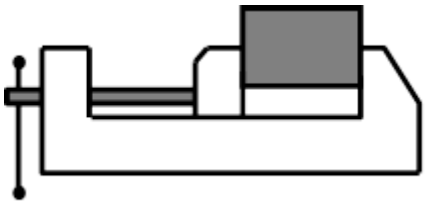
(a) Rotary ☐

(b) Reciprocating ☐

(c) Linear ☐

(d) Oscillating ☐

18 **The diagram below shows a piece of metal held in the jaws of a bench vice.**
What forces are acting upon the piece of metal?



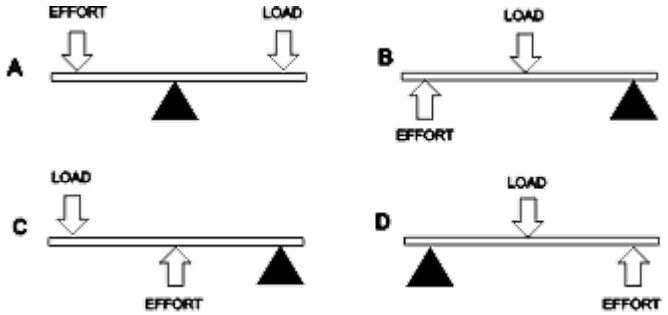
(a) Compressive forces ☐

(b) Tensional forces ☐

(c) Torsional forces ☐

(d) Bending forces ☐

19 Which of the following diagrams shows a class 3 lever arrangement?



(a) A ☐

(b) B ☐

(c) C ☐

(d) D ☐

20 What is the mechanical advantage (MA) for a lever when the Load is 300 N and Effort is 10 N?

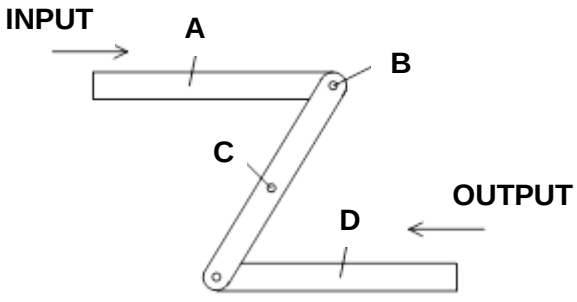
(a) 0.3 ☐

(b) 30 ☐

(c) 300 ☐

(d) 3000 ☐

21 Which letter on the parallel linkage system arrangement shown below identifies the position of the fixed pivot?



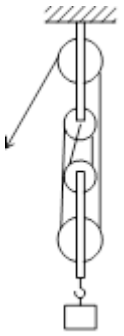
(a) A ☐

(b) B ☐

(c) C ☐

(d) D ☐

22 What type of pulley system arrangement is shown in the diagram below?



(a) 1:1 ☐

(b) 2:1 ☐

(c) 3:1 ☐

(d) 4:1 ☐

23 What is the velocity ratio (VR) for a simple pulley system when the driver pulley has a diameter of 5 cm and the driven pulley has a diameter of 50 cm?

(a) 0.1 ☐

(b) 10 ☐

(c) 45 ☐

(d) 250 ☐

24 What type of gear system is shown in the image below?

(a) Helical gears ☐

(b) Worm gears ☐

(c) Spur gears ☐

(d) Bevel gears ☐

25 **What is the velocity ratio (VR) for a gear system where the number of teeth on the driver gear is 80 and the number of teeth on the driven gear is 40?**

(a) 0.5 ☐

(b) 2 ☐

(c) 40 ☐

(d) 3200 ☐

26 **What is an electric current that flows in one direction only called?**

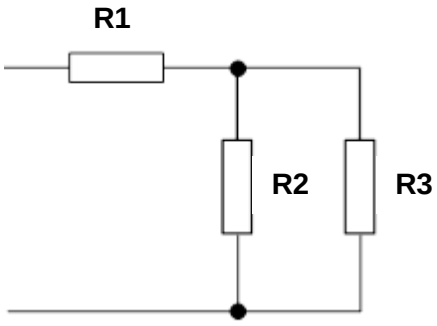
(a) Alternating Current ☐

(b) Direct Current ☐

(c) Oscillating Current ☐

(d) Straight Current ☐

27 How are resistors **R2** and **R3** connected in the circuit below?



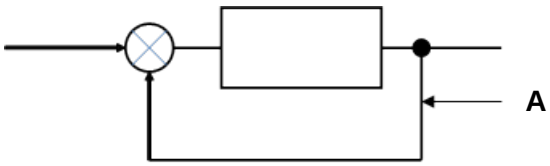
(a) Star ☐

(b) Delta ☐

(c) Parallel ☐

(d) Series ☐

28 **What is the line labelled A in the system block diagram below?**



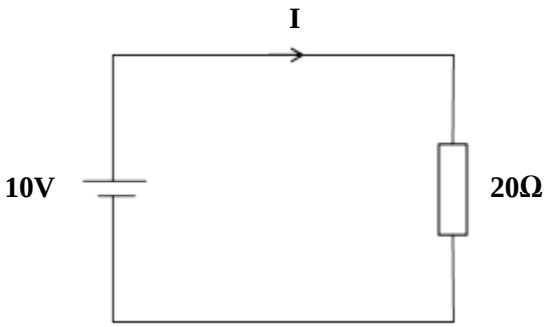
(a) Feedback ☐

(b) Input ☐

(c) Output ☐

(d) Process ☐

29 **Using Ohms Law, what is the value of current (I) flowing in the series circuit below?**



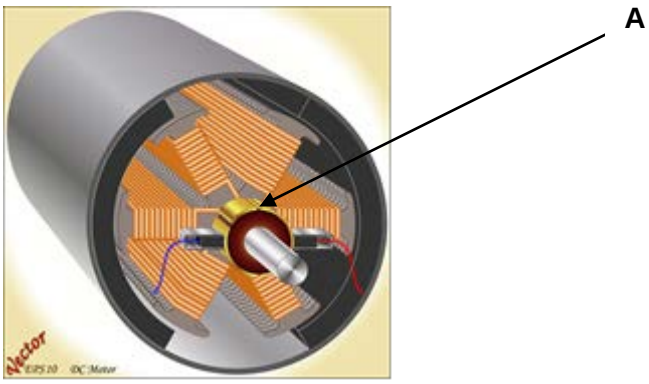
(a) 0.5 A ☐

(b) 2 A ☐

(c) 10 A ☐

(d) 200 A ☐

30 **What part of the DC motor is labelled A in the image below?**



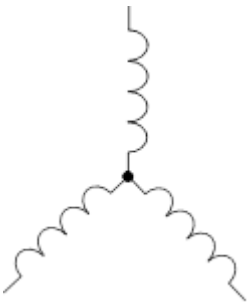
(a) Commutator ☐

(b) Stator ☐

(c) Armature ☐

(d) Bearing ☐

31 **How are the AC motor windings connected below?**



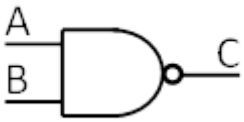
(a) Shunt ☐

(b) Series ☐

(c) Delta ☐

(d) Star ☐

32 **What type of logic gate symbol is shown below?**



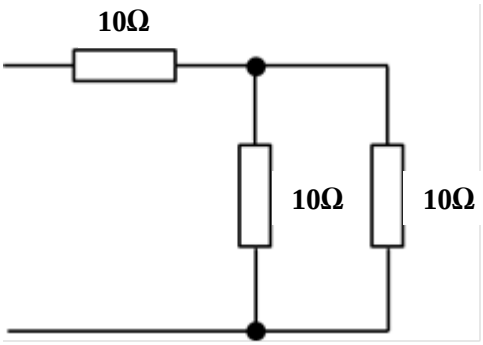
(a) AND ☐

(b) OR ☐

(c) NAND ☐

(d) NOR ☐

33 **What is the total resistance of the circuit shown below?**



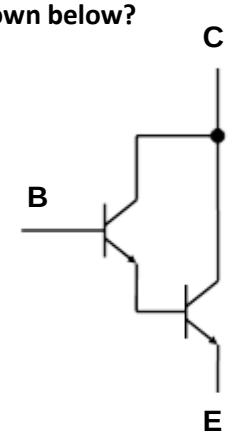
(a) 10 Ω ☐

(b) 15 Ω ☐

(c) 20 Ω ☐

(d) 30 Ω ☐

34 **What type of process device is shown below?**



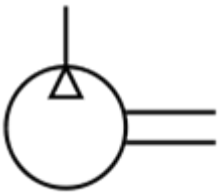
(a) Diode ☐

(b) Darlington Pair ☐

(c) Transistor ☐

(d) Microprocessor ☐

35 **What fluid power symbol is shown below?**



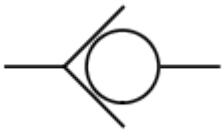
(a) Shuttle valve ☐

(b) Receiver ☐

(c) Compressor ☐

(d) Linear single acting cylinder ☐

36 What type of fluid power valve symbol is shown below?



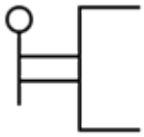
(a) Directional ☐

(b) Reducing ☐

(c) Regulating ☐

(d) Non-return ☐

37 What fluid power valve activation type is shown below?



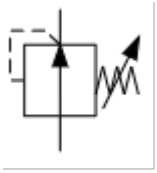
(a) Push ☐

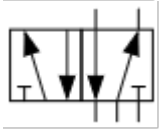
(b) Lever ☐

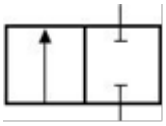
(c) Roller tip ☐

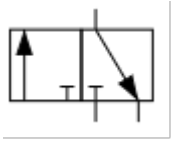
(d) Solenoid ☐

38 Which of the following fluid power symbols is a 5/3 valve?

(a) 

(b) 

(c) 

(d) 

39 What is the missing term in the formula below?

$$Pressure = \frac{Force}{?}$$

(a) Flow

(b) Volume

(c) Time

(d) Area

40 If the flow rate of fluid in a pipe is 20 cm^3 per minute how long does it take for 200 cm^3 of fluid to flow?

(a) 1 minute

(b) 10 minutes

(c) 180 minutes

(d) 4000 minutes

END OF QUESTION PAPER

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SPECIMEN

Sample Assessment Material

LEVEL 2 CAMBRIDGE TECHNICALS IN ENGINEERING

Unit 1: Fundamentals of mechanical, electrical/electronic and fluid power engineering

MARK SCHEME

Duration: 45 minutes

MAXIMUM MARK 40

SPECIMEN

Version: 1 **Date:** September 2016

This document consists of 2 pages

Question	Answer
1	B
2	C
3	A
4	D
5	C
6	C
7	A
8	C
9	C
10	A
11	A
12	A
13	B
14	D
15	B
16	A
17	C
18	A
19	C
20	B
21	C

Question	Answer
22	D
23	B
24	D
25	A
26	B
27	C
28	A
29	A
30	A
31	D
32	C
33	B
34	B
35	C
36	D
37	B
38	B
39	D
40	B