



Coimisiún na Scrúduithe Stáit

State Examinations Commission

Junior Certificate Examination, 2018

Technology

Higher Level

Wednesday, 20 June
Afternoon, 2:00 - 4:00

Section A

Instructions:

1. Answer **Section A** (short answer questions). 100 marks
2. Answer either **(a)** or **(b)** from each question in **Section B**. 50 marks
3. Answer **one** question from **Section C**. 50 marks
4. Hand up this paper at the end of the examination along with answer sheets for **Section B** and **Section C**.

Centre Number

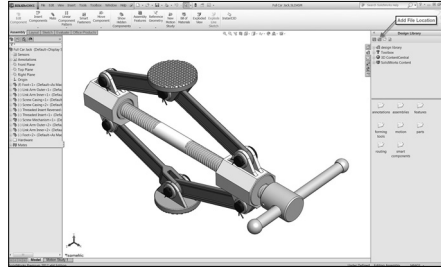
Examination Number

*Write your examination number
in the box provided on this page.*

SECTION A		For the Examiner	
No. of Questions		Mark	Total
	x	4	
	x	3	
	x	2	
	x	1	
	x	0	
	x	/	
Total (32)		Total 1:	
Disallowed		Mark	Total
	x	4	
	x	3	
	x	2	
	x	1	
Total (max 7)		Total 2:	
Section A Total (1-2):			

Section A Answer any 25 questions from this section - all questions carry equal marks. **100 marks**

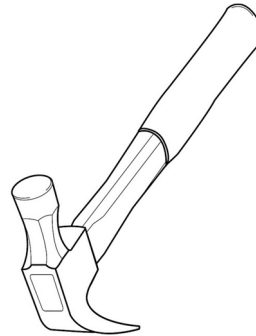
1. State **two** advantage of using CAD in design.



(i): _____

(ii): _____

2. Use **two** rendering techniques to enhance the claw hammer shown.
The handle is made from wood, the head is made from metal and the grip is made from rubber.



3. Explain the following computer abbreviations.

(i) USB,

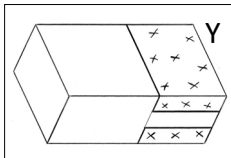
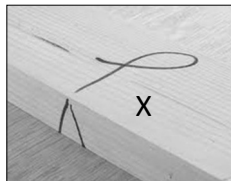
(ii) CPU.



USB: _____

CPU: _____

4. Explain the markings at **X** and at **Y** on the wooden work pieces shown.



X: _____

Y: _____

5. State the meaning of **each** of the graphics shown.



(i)



(ii)

(i): _____

(ii): _____

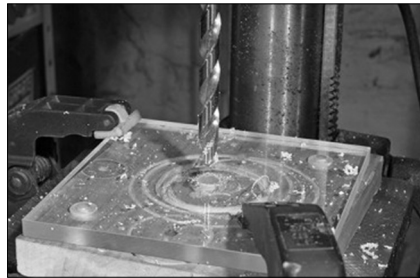
6. State **two** reasons why manufactured boards are more widely used than native timbers, in furniture manufacture.



(i): _____

 (ii): _____

7. State **two** specific precautions which should be observed when drilling acrylic.



(i): _____

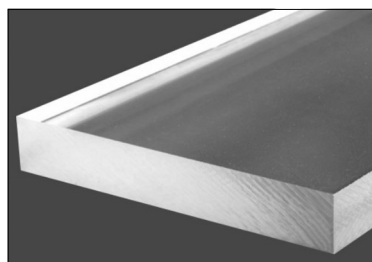
 (ii): _____

8. Indicate clearly in the table shown, if each named material is natural or synthetic.



Material	Natural	Synthetic
Linen		
Rayon		
Acrylic		
Hemp		

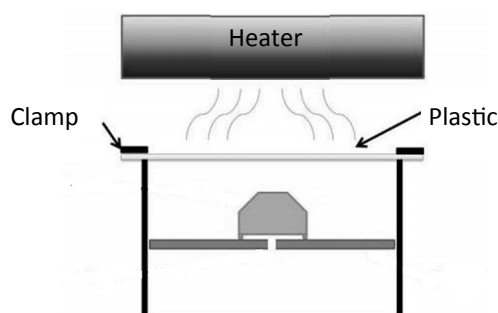
9. Name **two** processes which should be used to finish the edges on an acrylic work piece.



Process 1: _____

 Process 2: _____

10. Name the plastic-shaping process shown.



Process: _____

11. Name the electronic components shown.



(i)



(ii)

(i): _____

 (ii): _____

12. State the units used to measure:

(i) Power,

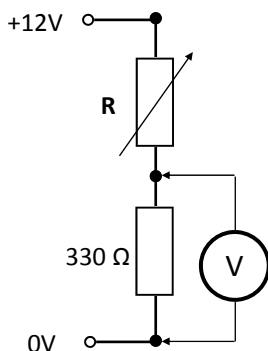
(ii) Current.



(i): _____

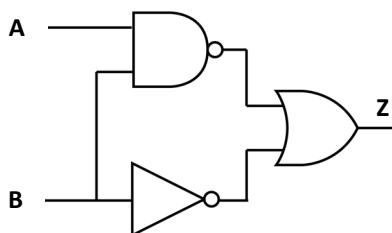
 (ii): _____

13. Calculate the required value of R in the circuit shown to produce a value $V = 3\text{ V}$.



Answer: _____

14. Complete the truth table for the logic gate arrangement shown.



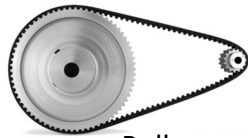
INPUT		OUTPUT
A	B	Z
		0

15. Electrical solder is an alloy.
 Explain the term **alloy**.



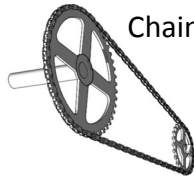
Alloy: _____

16. State **two** advantages of using the pulley and belt system shown instead of a chain drive.



Pulley and belt

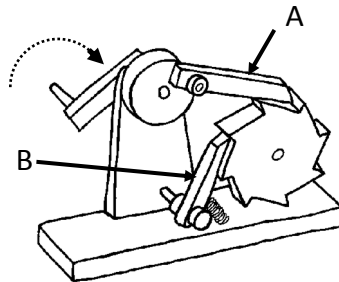
(i): _____



Chain drive

(ii): _____

17. State the purpose of each of the component parts labelled A and B in the mechanism shown.



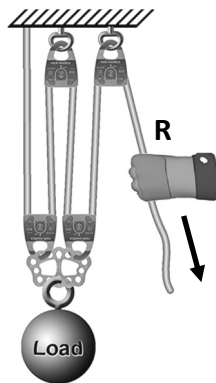
A: _____

B: _____

18. State the mechanical advantage of the block and tackle system shown,

and

calculate how far the rope **R** must travel to raise the load by 2 meters.



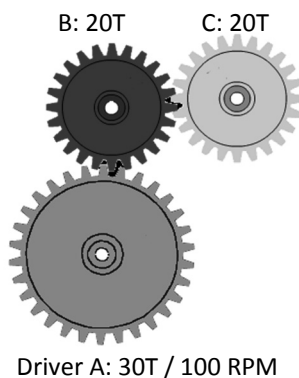
MA: _____

Distance: _____

19. In the gear train shown, state the purpose of gear **B**,

and

calculate the speed of rotation of gear **C**.



Driver A: 30T / 100 RPM

Gear B: _____

Gear C: _____

20. Name the gear shown,

and

Give a reason why the gears shown would be used in a gear train.



Name: _____

Reason: _____

21. State **two** precautions which should be taken to prevent 'malware' from infecting a computer.



(i): _____

(ii): _____

22. Name **two** ways in which technology has helped prolong the shelf life of food products.



(i): _____

(ii): _____

23. State **two** reasons why the mobile phone has commonly replaced the digital camera when taking photographs.



(i): _____

(ii): _____

24. The image shows a VR headset.

Explain the abbreviation VR,

and

state **one** beneficial use of this technology.



VR: _____

Use: _____

25. Name the mechanism used to animate the toy caterpillar shown.



Mechanism: _____

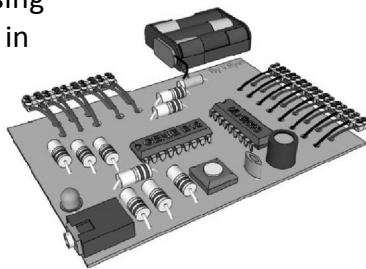
26. State **two** advantages of using a smart watch over a traditional watch.



Advantage 1: _____

Advantage 2: _____

27. State **one** advantage and **one** disadvantage of using a programmable board in producing a circuit for a student task.



Advantage: _____

Disadvantage: _____

28. From the list of hi-tech companies below, select the company associated with **each** named person.

Companies:

- Tesla
- Amazon
- Facebook
- Google



Mark Zuckerberg: _____



Elon Musk: _____

29. Give **two** reasons why people are encouraged to replace bulbs of type **A** with those of type **B**.



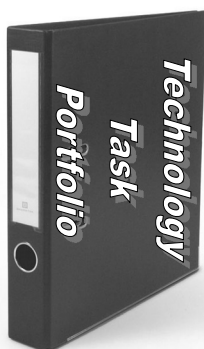
A

B

Reason 1: _____

Reason 2: _____

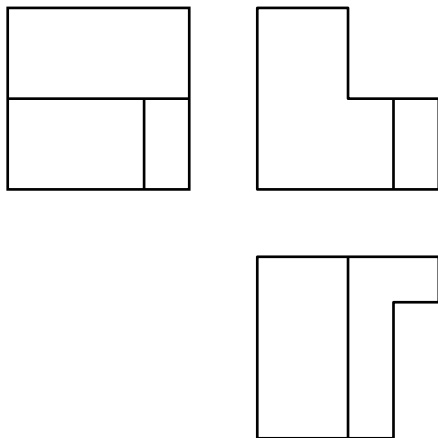
30. When writing a student Task Portfolio state **two** reasons why at least two design ideas should be included.



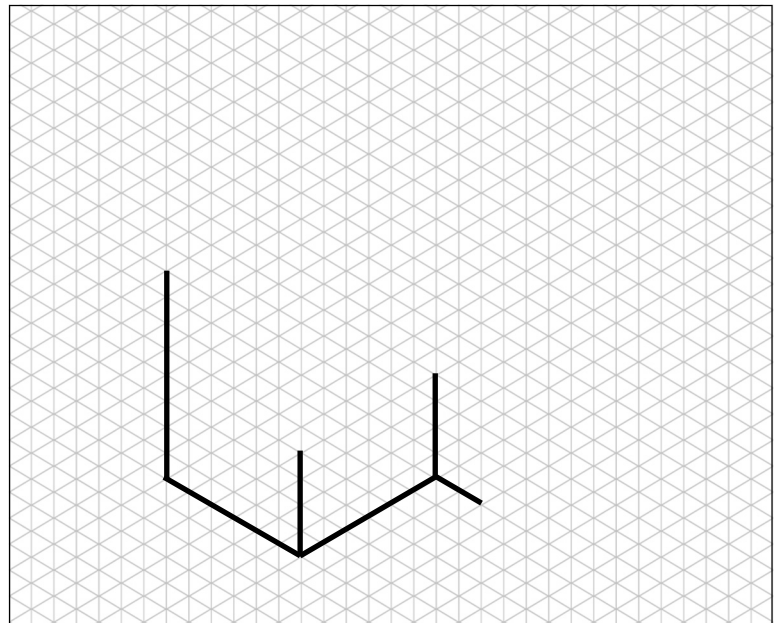
Reason 1: _____

Reason 2: _____

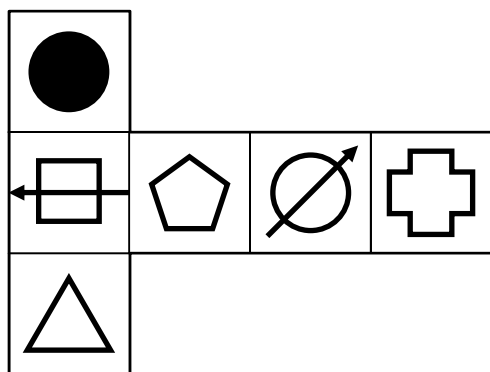
31. An orthographic projection of a component is shown.
On the grid provided, complete the isometric view of the component.



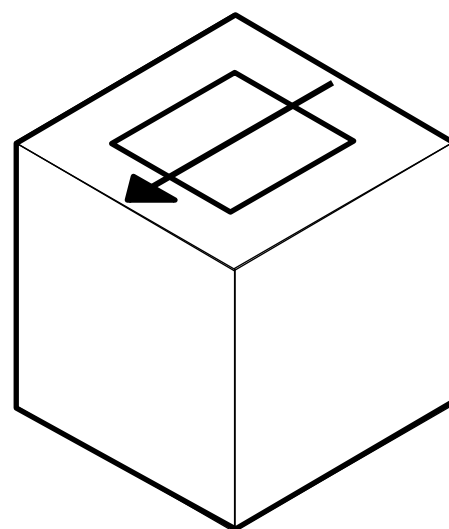
Orthographic projection



32. The sketch below shows a development of a cube.
Complete the isometric view of the same cube.



Development



Isometric View



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State Examinations Commission

Junior Certificate Examination, 2018

Technology
Higher Level

Wednesday, 20 June
Afternoon, 2:00 - 4:00

Section B and Section C

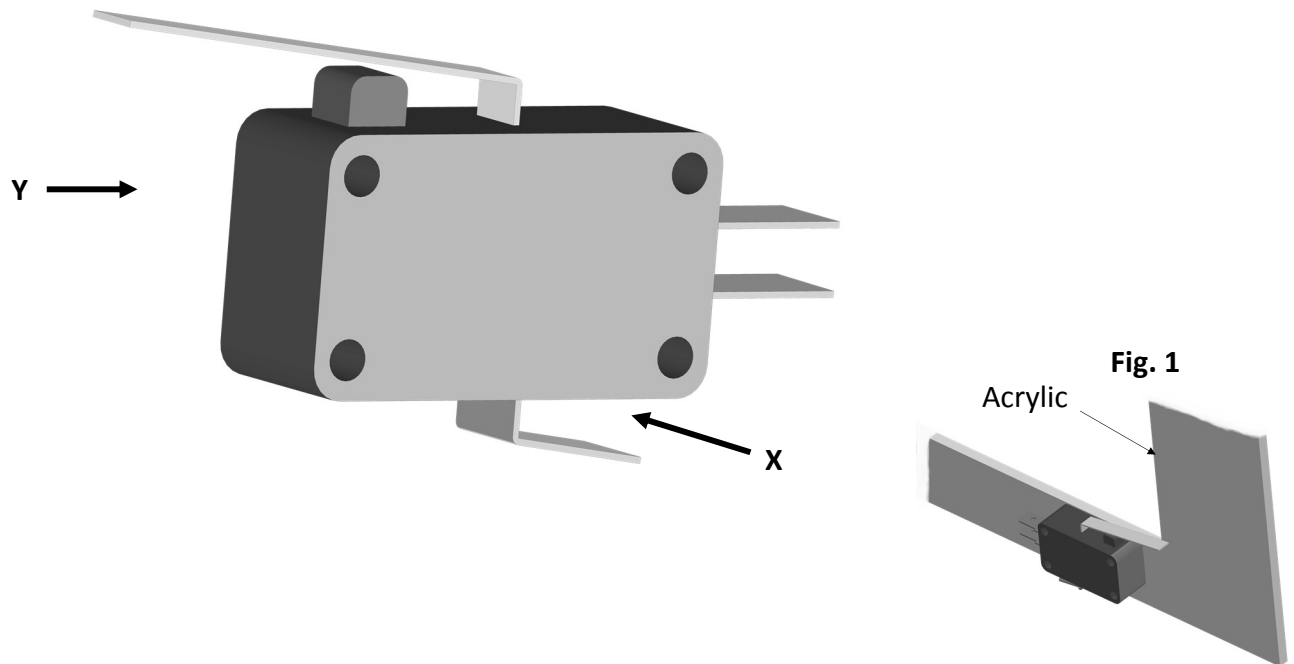
Section B - 50 marks

Section C - 50 marks

Instructions:

1. Answer either **(a)** or **(b)** from each question in **Section B**.
2. Answer **one** question from **Section C**.
3. Hand up **Section A** with your answer sheets to this paper.

1 (a) The graphic shows a lever micro switch.



(i) Make well-proportioned sketches of the following views:

1. An **elevation** in the direction of arrow **X**.
2. An **end view** in the direction of arrow **Y**.

(10 marks)

(ii) The micro switch, acting as a limit switch, will be mounted on acrylic in a student project as shown in **Fig. 1**.

1. Explain the function of a **limit switch** in a project.
2. Explain the advantage of the lever in a micro switch.
3. Explain how the micro switch should be mounted on the acrylic shown.
Name any tools required and state the processes used.

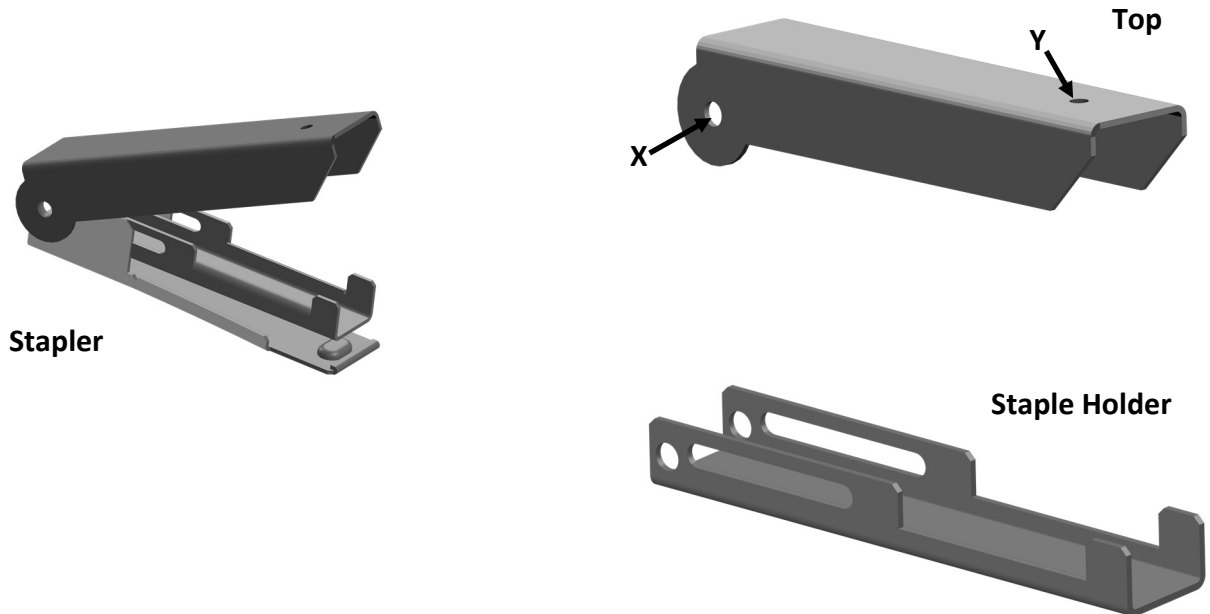
(10 marks)

(iii) The electrical contacts on the micro switch are labelled: NO, NC and COM. Explain the meaning of **each** of these abbreviations.

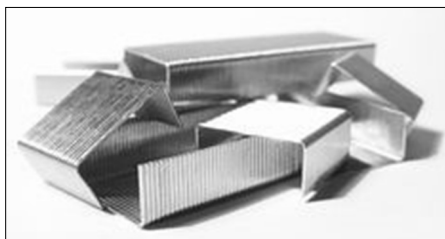
(5 marks)

- OR -

- 1 (b) The graphics show a design for parts of an office stapler.
The top is to be manufactured from 3 mm acrylic.
The staple holder and base are to be manufactured from steel.



- (i) Make a well-proportioned sketch of the **development** of the **staple holder**.
Indicate clearly on your sketch the position of all cutting and bend lines. (10 marks)
- (ii) Explain, using sketches, the steps required to manufacture the **top** from 3 mm acrylic sheet.
Name any tools required and state the processes used. (5 marks)
- (iii) Describe, using sketches, how to produce the holes marked X and Y, in the **top**.
Name any tools required and state the processes used. (5 marks)
- (iv) Staple strips are easily broken if not stored correctly.
Sketch a suitable design for a container to solve this problem. (5 marks)

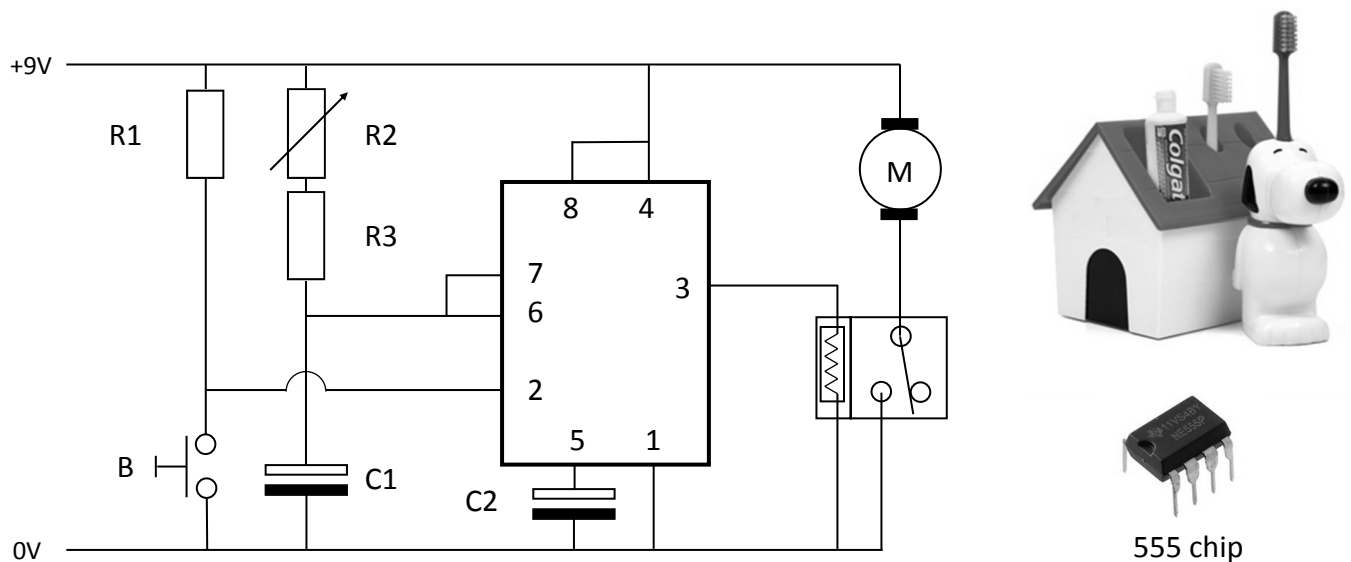


Broken staple strips

Section B - 50 Marks

Question 2. Answer either (a) OR (b) from this question

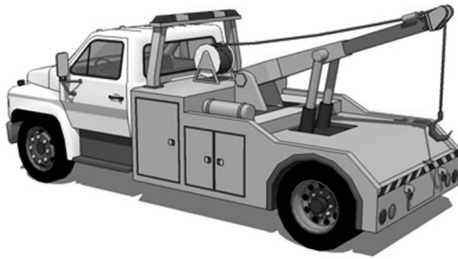
- 2 (a) The 555 timing circuit design shown is to be used in a novelty toothbrush holder. The circuit operates a motor, for a set time, to animate the novelty figure when the switch **B**, connected to pin 2, is pressed.



- (i) Two switches are available for use at **B**. One is labelled **PTM** and one is labelled **PTB**. Which one should be used in this situation? Explain the meaning of its label. (4 marks)
- (ii) Using a sketch, indicate how the pins 1 and 5 on the 555 chip are identified. (4 marks)
- (iii) Name the components which can be used to change the time delay in this circuit. (4 marks)
- (iv) The relay attached to pin 3 is labelled **SPDT**. Explain this label. Sketch the pin arrangements for a **DPDT** relay. (6 marks)
- (v) An additional component is normally connected across the coil of the relay to protect the chip. Name, and draw the symbol for this component. (4 marks)
- (vi) The resistors used in this circuit have a gold coloured fourth band. Explain the meaning of this band. (3 marks)

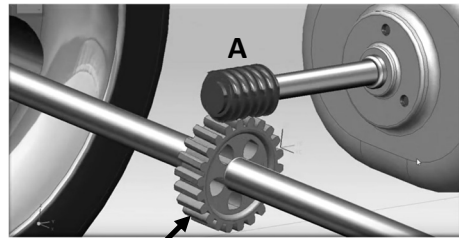
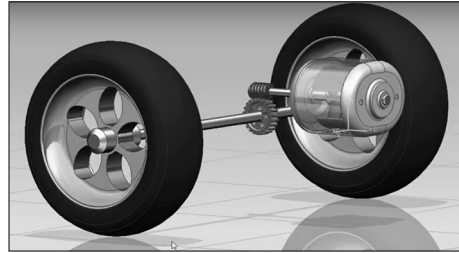
- OR -

2 (b) The graphics show mechanisms used in a model recovery truck.



Model Recovery Truck

Tyre circumference = 50×3.14 mm



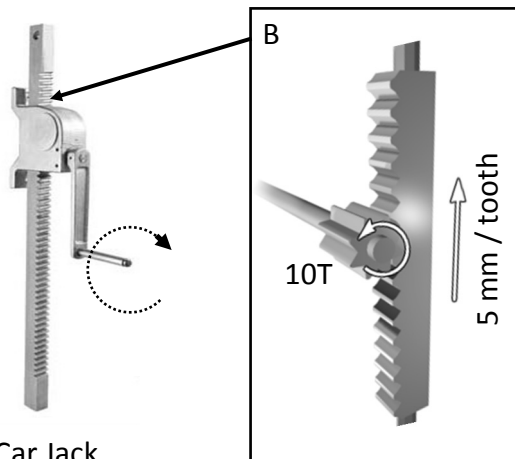
30 Teeth

- (i) Name the gear shown at **A**.
State **two** advantages of using this type of gear to move the truck. (6 marks)

- (ii) If the motor, attached to gear **A**, turns at 420 RPM and the tyres have a circumference of 50×3.14 mm, calculate the distance travelled by the truck in 1 minute. (6 marks)

- (iii) Name the mechanism **B** used in the car jack shown.

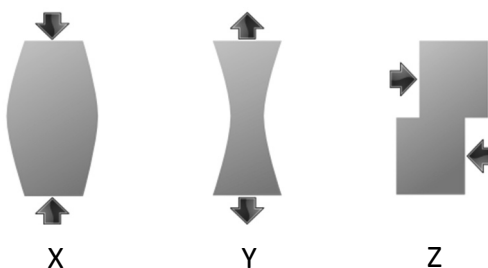
If the mechanism rises by 5 mm per tooth, calculate how many rotations of the handle is required to lift a car by 400 mm.



Car Jack

(8 marks)

- (iv) Name the forces, labelled X, Y and Z, which can be applied to mechanisms.



(5 marks)

Section C - 50 Marks

Answer **one** question from this section – all questions carry equal marks.

This section relates to **Technology & Society**, **Control Systems** and **Design & Manufacture**.

3. Technology & Society



- (a) (i) Outline **two** reasons why car manufacturers are phasing out engines which run on fossil fuel.
- (ii) Outline **two** technologies to replace fossil fuel engines and briefly describe how they operate.

(20 marks)



- (b) (i) Name **two** technologies required for the convenient and efficient operation of 'bike rental' schemes in large cities.
- (ii) Outline how these **two** technologies operate.

(15 marks)

- (c) The way in which we interact with computers has changed over time. We have changed from using keyboards (typed commands) **to** computer mice (point and click) **to** touch screens (multi-touch gestures) **to** voice command (Alexa/Echo).
- (i) Name **two** household systems which can be controlled by voice command.
- (ii) Outline **two** advantages of using this new technology in the home.

(15 marks)



4. Control Systems and Technology & Society



- (a) (i) Outline **two** reasons why robotic devices are now commonly used in industrial manufacture.
- (ii) Outline **two** ways in which robotic devices are particularly suitable for space and planetary exploration.

(20 marks)

- (b) Robotic devices require:
- mechanical components
 - sensing components
 - an operating programme.

Explain, using a suitable example, why **each** item listed above is required.

(15 marks)

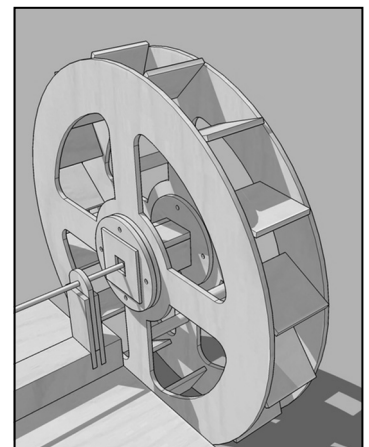
- (c) Driverless cars are complex robotic devices requiring a form of artificial intelligence (AI).

- (i) Outline **two** advantages of driverless cars.
- (ii) Explain why driverless cars are more complex than other robotic devices.

(15 marks)

5. Design & Manufacture

A student intends to manufacture a water wheel generator based on the design shown.



- (a) (i) Describe, with the aid of sketches, the steps required to manufacture the water wheel from a suitable material.
Name any tools required and state the processes used.
- (ii) Describe, with the aid of sketches, how the turning wheel could be supported with a suitable frame.
Name any additional components required.

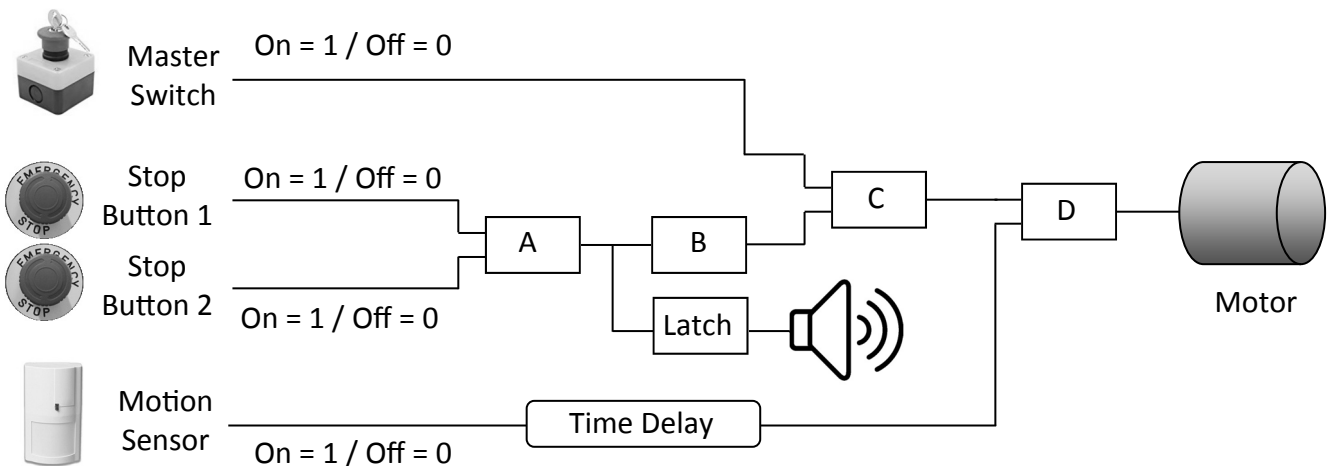
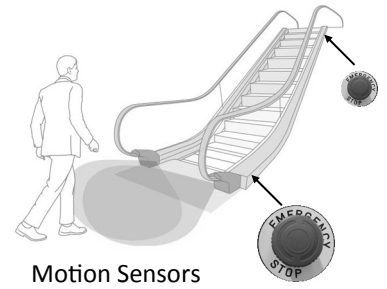
(25 marks)

- (b) A motor, two different sized pulley wheels, and a pulley belt are available.
- (i) Describe, with the aid of sketches, how the turning water wheel could be used to generate electric current.
- (ii) Describe, with the aid of a suitable circuit diagram, how the generator could power a number of LEDs.
- (iii) Describe, with the aid of sketches, **two** other methods of generating electricity using environmentally friendly resources.

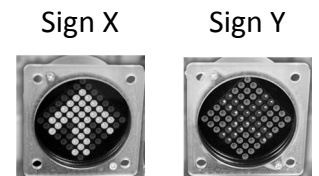
(25 marks)

6. Control Systems

- (a) A system diagram, to control the operation of an escalator is shown. The system has the following features: *A master on/off switch, two emergency stop buttons and a motion sensor to detect people approaching the escalator.* Once the motion sensor is activated, a time delay will keep the motor running to allow the person to reach the top of the escalator. The control system will stop the escalator if either of the stop buttons is pressed or if no one is approaching the escalator.

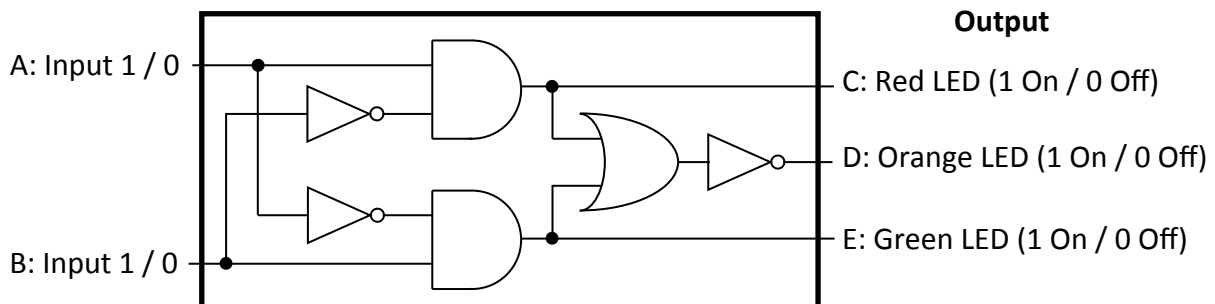


- Name the logic gates required at A, B, C and D.
- Draw a truth table for **each** of the logic gates at A and D.
- State the purpose of the 'Latch' in the system.
- Outline a modification to the system which will:
turn on sign X only, when the system is operating correctly,
turn on sign Y only, when the escalator has been switched off
or when a stop button has been pressed.



(34 marks)

- (b) Draw a truth table for the system below and hence state which LED (C, D or E) will light if:
- the input value of A is greater than B ($A > B$),
 - the input values are the same ($A = B$).



(16 marks)