



Junior Certificate Examination, 2016

Technology

Higher Level

Wednesday, 22 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):			

1. State the meaning of each of the graphics shown.



(i)



(ii)

(i): _____

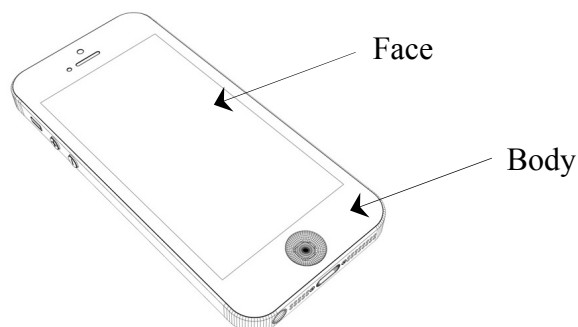
(ii): _____

2. Use appropriate rendering techniques on the sketch shown to suggest that:

(a) the face is made of glass,

and

(b) the body is made of wood.



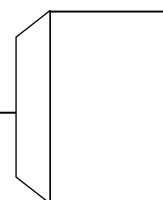
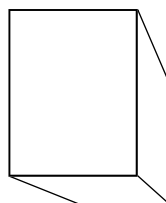
3. State **two** advantages of using a QR code as shown.



(i): _____

(ii): _____

4. Shown is a single-point perspective. Locate the vanishing point.



5. Sketch a development of the light shade shown, which is in the shape of a cone.



6. State **two** properties of carbon fibre that make it suitable for the manufacture of bicycle frames.



(i): _____

(ii): _____

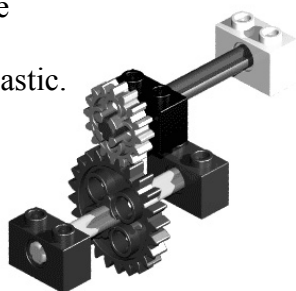
7. State **two** properties of solder that make it suitable for joining electrical components.



(i): _____

(ii): _____

8. Indicate clearly on the table shown whether each of the named materials is thermosetting or thermoplastic.



Plastic	Thermosetting	Thermoplastic
Acrylic		
Nylon		
Bakelite		
Polystyrene		

9. State **two** reasons why a finish should be applied to wooden products.



(i): _____

(ii): _____

10. Name **two** properties of synthetic fabrics which make them suitable for use in sports wear.



(i): _____

(ii): _____

11. In relation to the switch shown, explain the terms:

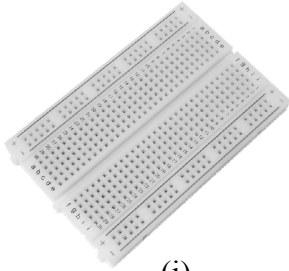
NO and COM.



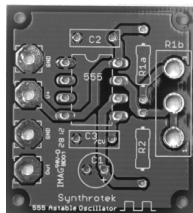
NO: _____

COM: _____

12. Name the **two** types of electronic board shown.



(i)

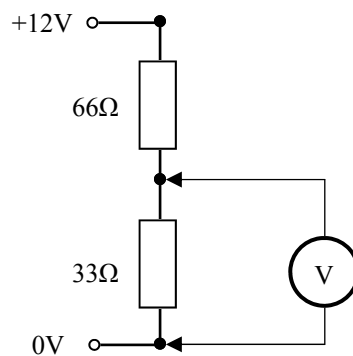


(ii)

(i): _____

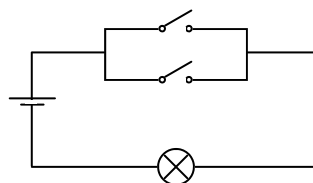
(ii): _____

13. Calculate the value of **V** in the circuit shown.



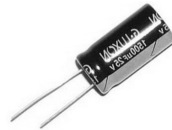
Voltage (V): _____

14. Name the logic gate represented by the circuit shown.



Answer: _____

15. Sketch the symbol for **each** electronic component shown.

Component	Symbol
	
	

16. Name the gear system used on the drill chuck and key shown.

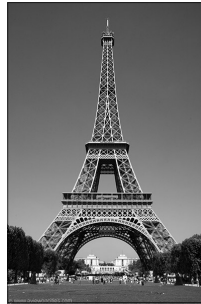


Gear system: _____

17. Name the types of structure shown at (i) and at (ii).



(i)



(ii)

(i): _____

(ii): _____

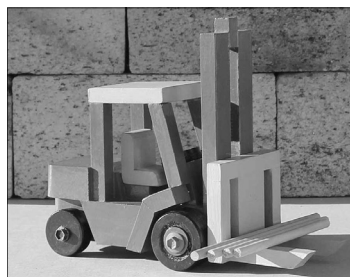
18. Give **two** reasons why toothed belts are used instead of chains in printers.



(i): _____

(ii): _____

19. Give a reason why a chain and sprocket system instead of a pulley system is used in a forklift.



Reason: _____

20. Name the types of saw shown at (i) and at (ii).



(i)

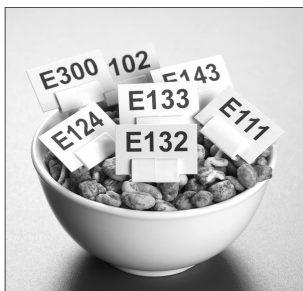


(ii)

(i): _____

(ii): _____

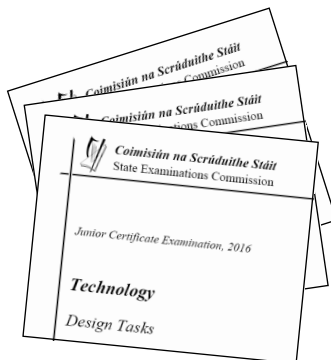
21. Give **two** reasons why additives are used in processed foods.



(i): _____

(ii): _____

22. In relation to the technology task folder, give **two** reasons why it is important to sketch a number of solutions to your chosen task.



(i): _____

(ii): _____

23. State the purpose of the button shown, commonly found in technology workshops.



Answer: _____

24. Give **two** practical uses of voice recognition technology.



(i): _____

(ii): _____

25. Name **two** types of pollution caused by jet aircraft.



(i): _____

(ii): _____

26. Name the technology represented by the icon shown

and

state **one** use of that technology.



Name: _____

Use: _____

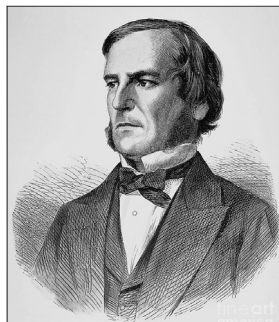
27. Give **two** important features which must be considered when designing food packaging.



(i): _____

(ii): _____

28. Name the professor of mathematics at Queen's University, Cork (now UCC) whose work paved the way for digital computing and modern electronic devices.



1815 - 1864

Name: _____

29. State the function of each of the symbols labelled (i) and (ii) shown, found in the menu of a graphics application.



← (i)

(i): _____



← (ii)

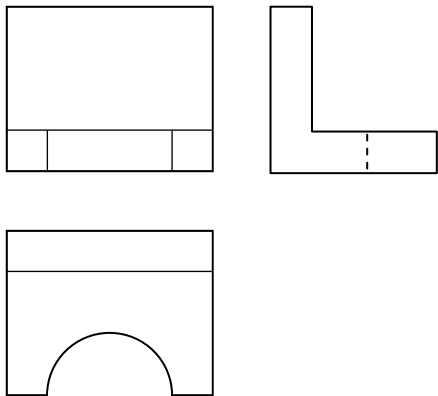
(ii): _____

30. State **one** reason why wind generators are not 100% efficient in converting wind energy to electrical energy.

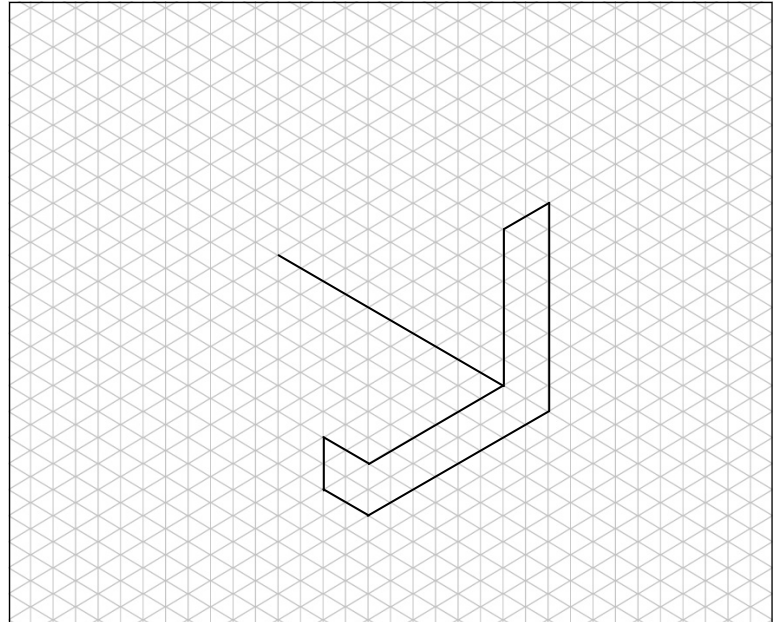


Reason: _____

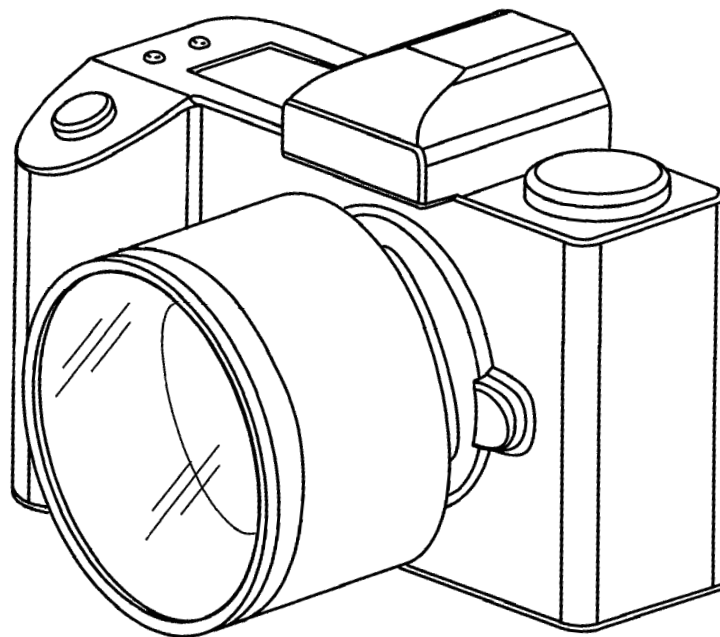
31. An orthographic projection of a bracket is shown.
On the grid provided, complete the isometric view of the bracket.



Orthographic projection



32. Insert **four** key dimensions on the sketch provided.





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Section B and Section C

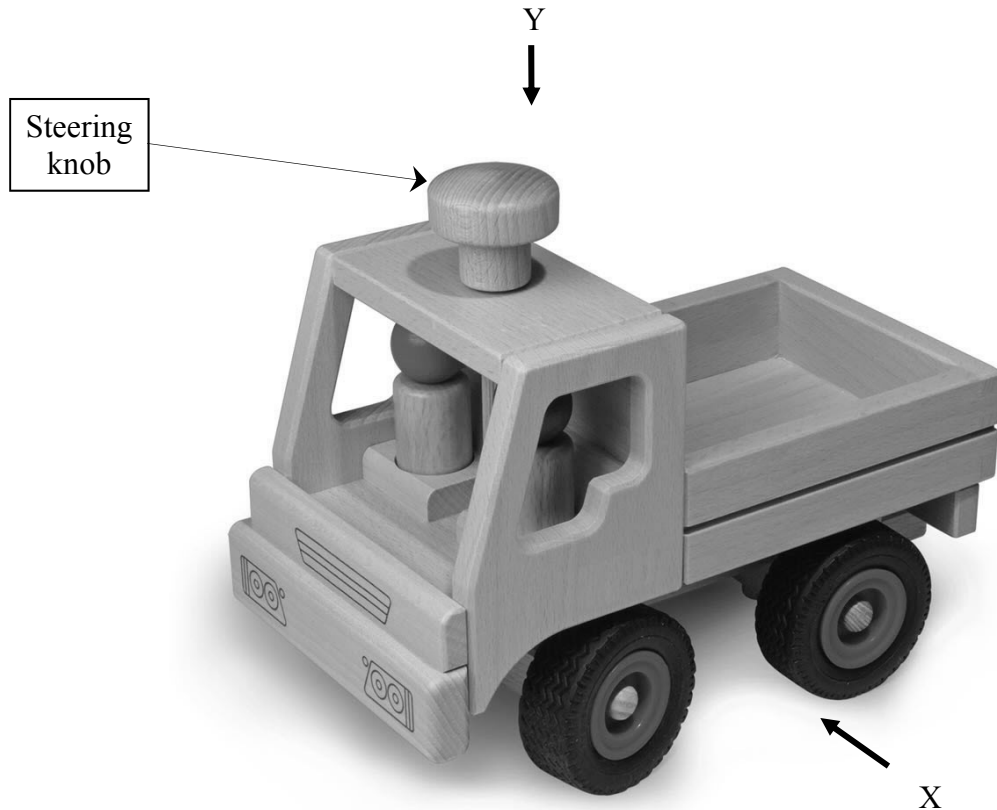
Section B - 50 marks

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 toy truck. The truck is 150 mm long and is made from oak.



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

1. An **elevation** in the direction of arrow **X**.
Note: The driver and passenger need not be included.
2. A **plan** in the direction of arrow **Y**.

(10 marks)

- (ii)
1. Describe, using suitable sketches, how the side window openings could be formed.
Name any tools required and state the processes used.
 2. A windscreen is required for the front of the cab.
Describe, using suitable sketches, how to manufacture the windscreen and attach it to the cab.

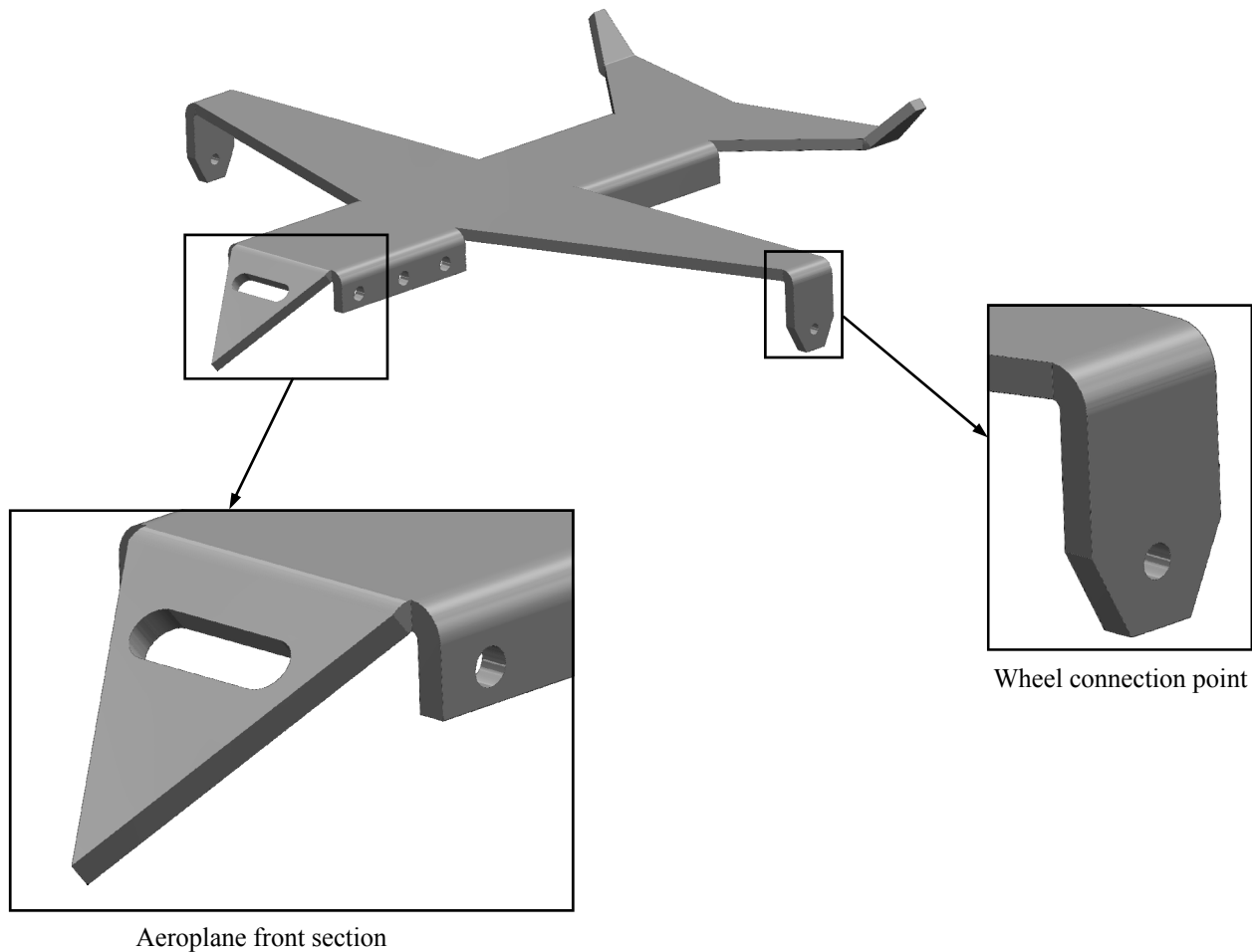
(10 marks)

- (iii) The truck steering is controlled by turning the knob on the roof of the cab. Describe, using suitable sketches, how this steering can be achieved.
Name any mechanism required.

(5 marks)

- OR -

- 1 (b) The graphics show a design for a toy aeroplane.
The toy is to be manufactured from a single sheet of 3 mm acrylic.

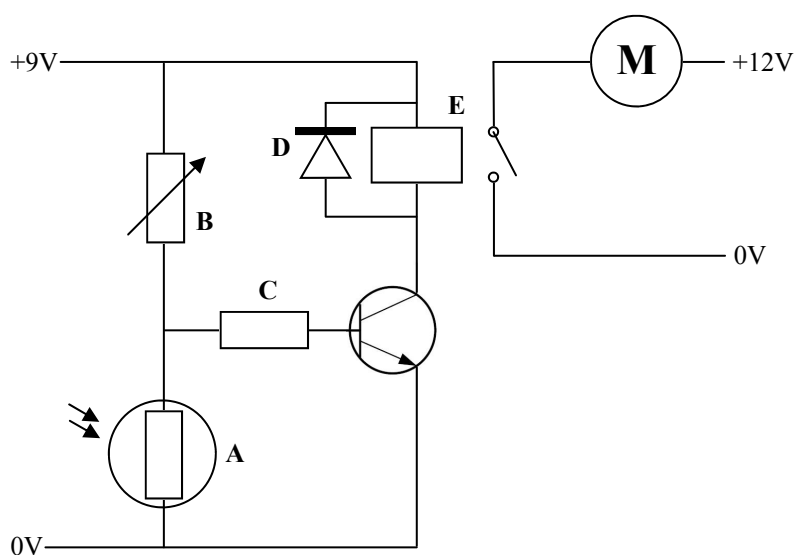


- (i) Make a well-proportioned sketch of a **development** of the aeroplane.
Indicate clearly on your sketch the position of all cutting and bend lines. (10 marks)
- (ii) 1. Explain, using sketches, the steps required to manufacture the aeroplane front section from the 3 mm acrylic sheet.
Name any tools required and state the processes used.
2. Describe, using sketches, how a suitable wheel could be attached to the aeroplane at the wheel connection point shown. (10 marks)
- (iii) A design modification is required to prevent damage to the nose of the aeroplane, when the aeroplane is pushed along the ground.
Describe, using sketches, a suitable nose skid to solve this problem. (5 marks)

2 (a) The circuit design shown is to be used in a novelty money box.

The following actions will be performed by the circuit when a coin is placed on the sensor:

- Sensor circuit activated,
- Motor turns,
- Arm of toy cat (attached to motor) draws coin into box,
- Sensor circuit deactivated,
- Motor stops.



Coin

Sensor

Resistor C



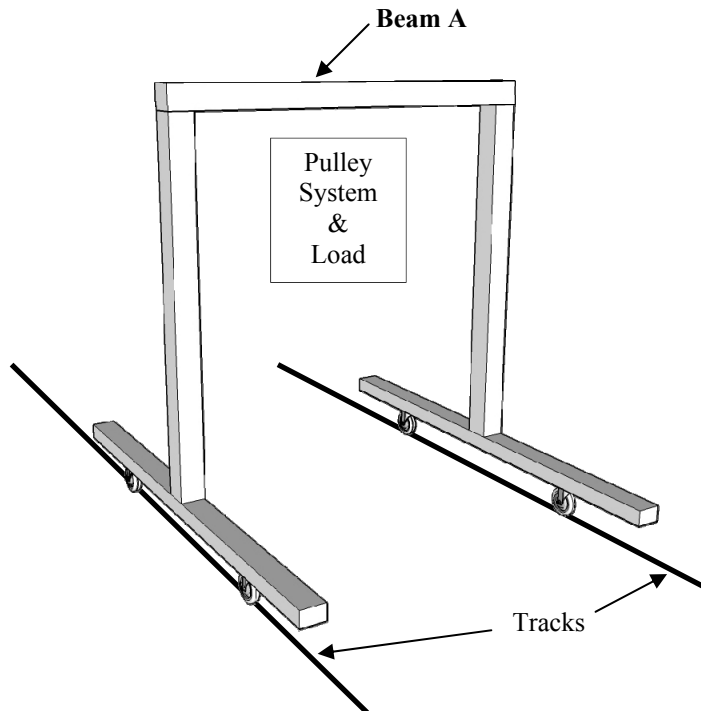
Resistor Colour Codes

Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9

- Name the components labelled **A** and **D** in the circuit. (6 marks)
- Explain why components **B** and **E** are required in the circuit. (6 marks)
- Resistor **C** has coloured bands as shown above.
Using the resistor colour-code table, calculate the value of this resistor and state its tolerance. (6 marks)
- State **one** function of the transistor in this circuit. (7 marks)

- OR -

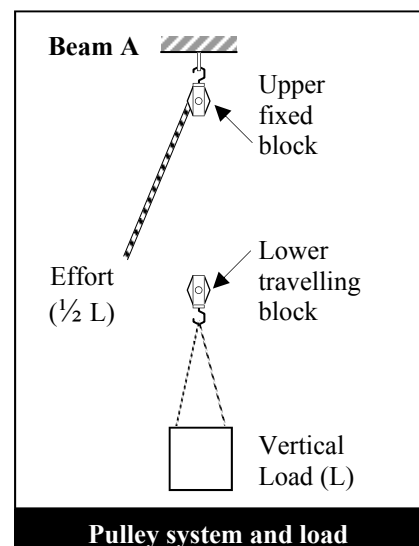
- 2 (b) The graphic shows a design for a working model of a lightweight workshop gantry crane. The crane will allow small loads to be lifted and moved around a workshop.



- (i) Sketch **two** possible cross sections for beam A to support a vertical load. Your design must ensure the beam is lightweight and will resist bending. (6 marks)
- (ii) Copy the crane design shown and sketch clearly additional members to:
- (a) further support beam A
 - and
 - (b) increase the stability of the crane. (6 marks)
- (iii) Sketch and name the parts of a suitable motorised mechanism to move the crane slowly forward and backward along tracks in the workshop. (6 marks)
- (iv) The design will use a pulley system to lift small loads.

- (a) Sketch a design for a pulley system which will require an effort of $\frac{1}{2}$ of the load
- and
- (b) includes a mechanism to hold the raised load at a fixed height.

(7 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) ‘Bike-rental schemes have become popular in many large cities. Registered users can collect bikes from, and return bikes to, a number of secure locations around the city. These schemes are encouraged by local authorities and are supported by a smart phone app’.
- (i) Outline **two** reasons why local authorities encourage people to use these bikes.
 - (ii) Outline **two** ways in which a smart phone app might support this scheme.
 - (iii) Outline **two** technologies needed to operate these schemes.

(30 marks)

- (b) Many consumer products are advertised as including ‘Green Technologies’.
- Outline **two** ‘Green Technologies’ which might be included in consumer products.

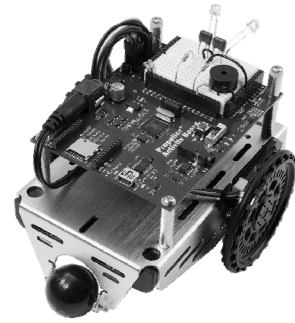
(10 marks)

- (c) Outline **two** ways in which technology is used by today’s consumers when buying products.

(10 marks)

4. Control Systems and Technology & Society

- (a) The robot shown can be assembled from a kit containing a programmable microcontroller, suitable sensors, two geared motors with drive wheels, a free turning wheel, a battery and a frame.



- (i) Outline the purpose of the microcontroller.
- (ii) Outline how the microcontroller is programmed.
- (iii) Briefly outline how the robot can perform **each** of the following actions:
 - move forward and turn right
 - avoid an obstruction.
- (iv) Sketch a design change necessary to allow the robot to travel over soft ground.

(30 marks)

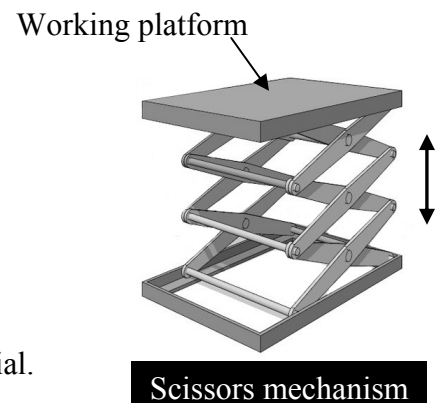
- (b) Robotic devices are available to perform a variety of tasks.

- (i) Using suitable examples, outline **two** tasks for which robots are well suited.
- (ii) Outline **two** impacts which the increased use of robotic machines could have on society.

(20 marks)

5. Design & Manufacture

A student intends to manufacture a working model of a scissor platform based on the image shown.



- (i) Describe, with the aid of sketches, the steps required to manufacture the scissor mechanism from a suitable material.
Name any tools required and state the processes used.
(15 marks)

- (ii) Describe, with the aid of sketches, a mechanism to raise and lower the platform.
Indicate clearly how to prevent the platform collapsing under load.

(15 marks)

- (iii) When the platform was fully raised the model was found to be unstable.
Describe **two** modifications to prevent this happening.

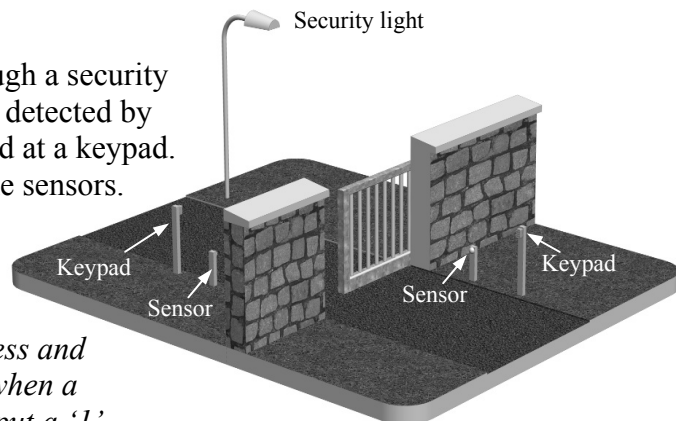
(10 marks)

- (iv) Outline **two** safety features which should be included in the design of the model.

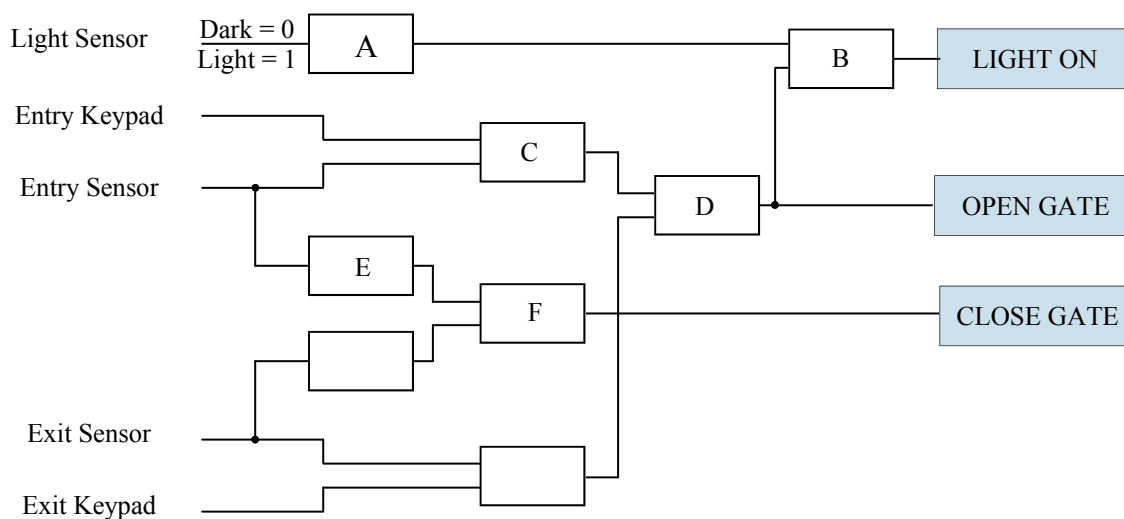
(10 marks)

6. Control Systems

- (a) A system diagram, to control entry and exit through a security gate, is shown. The gate will open if a vehicle is detected by the entry or exit sensor and a valid code is entered at a keypad. The gate will close if no vehicle is detected by the sensors. A security light will switch on at night while the gate is opening.



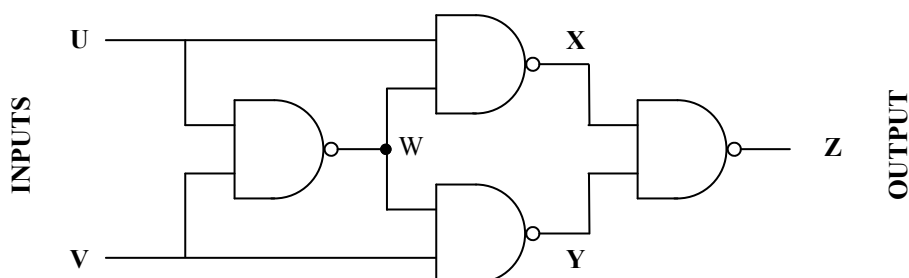
Note: The light sensor will output a '0' in darkness and a '1' in daylight. The keypads will output a '1' when a valid code is entered. The entry sensors will output a '1' if a vehicle is detected.



- Name the logic gates required at A, B, C, D, E and F.
- Draw a truth table for the logic gates at C and at D.

(26 marks)

- (b) A NAND gate is a combination of an AND gate and a NOT gate. NAND gates can be combined to form other logic gates.



Copy the truth table below into your answerbook.
Complete the table for the inputs shown.

Input U	Input V	W	X	Y	Output Z
1	1				
1	0				

(24 marks)