



Junior Certificate Examination, 2011

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**.

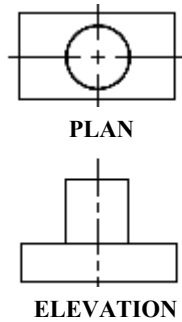
Centre Number

Examination Number

For Examiner	
Question	Mark
Section A	
Section B Q1 (a)	
(b)	
Q2 (a)	
(b)	
Section C Q3	
Q4	
Q5	
Q6	
Total	
Grade	

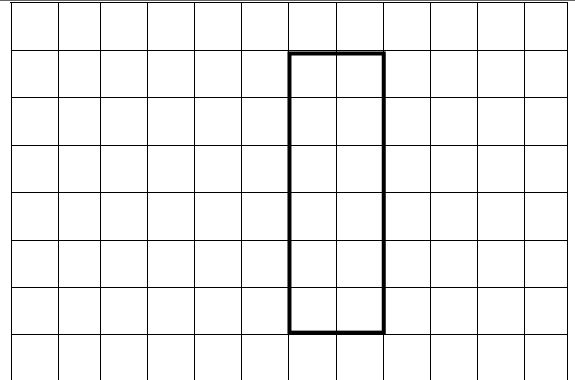
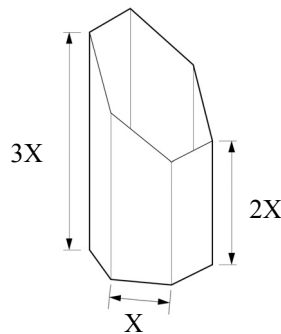
Write your examination number in the box provided on this page.

1. Name the type of drawing projection shown.



Projection: _____

2. Complete the development of the hexagonal container shown.



3. State **two** reasons why floppy disks are no longer in widespread use for data storage.



(i): _____

 (ii): _____

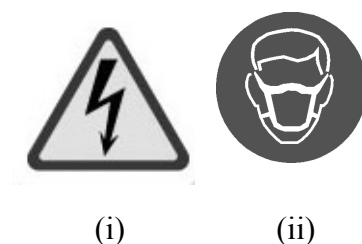
4. State **two** ways in which data on a computer can be protected from unauthorised access.



(i): _____

 (ii): _____

5. State the meaning of **each** of the safety signs shown.



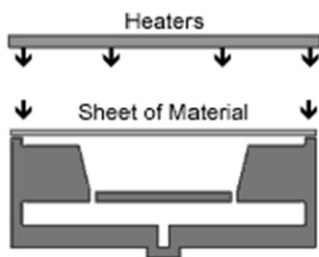
(i): _____

 (ii): _____

6. Name the plastic shaping process shown

and

explain why only a thin sheet of plastic can be used in the process.



Process: _____

Reason: _____

7. In relation to plastics, explain the term **thermoplastic**.

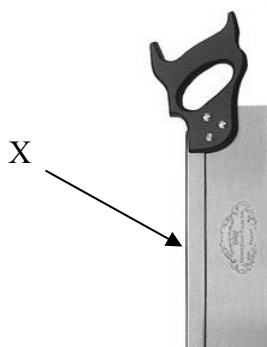


Thermoplastic: _____

8. Name the type of saw shown

and

explain the purpose of part X on the saw.



Saw: _____

X: _____

9. Name the tool shown

and

name a material which could be cut by the tool.



Name: _____

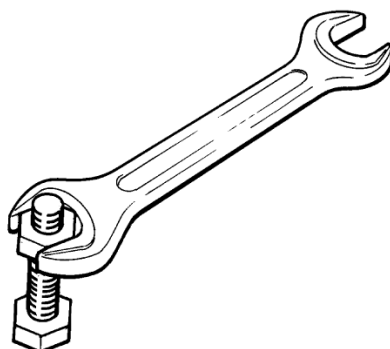
Material: _____

10. Indicate clearly on the sketch the location of:

(i) the fulcrum

and

(ii) the effort.



11. Name the electronic component shown

and

state the function of the component in a circuit.

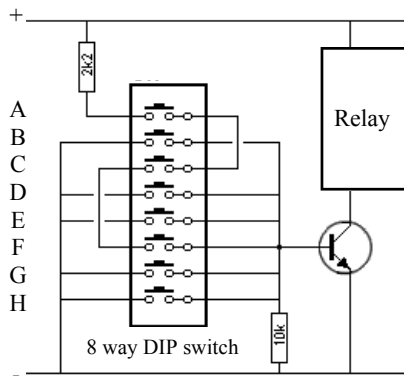


Name: _____

Function: _____

12. The relay, in the circuit shown, will only operate when a certain set of switches are closed.

Indicate if the switches listed should be 'open' or 'closed' to activate the relay.



SWITCH	OPEN	CLOSED
A		
C		
E		
G		

13. State the units used to measure:

(i) Current

and

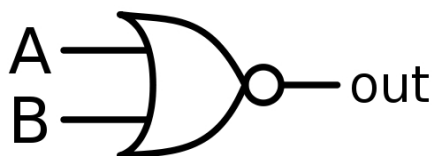
(ii) Potential Difference.



Current: _____

Potential Difference: _____

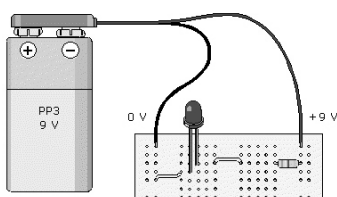
14. Complete the truth table for the logic gate shown.



Truth Table

A	B	out
1	1	
0	1	

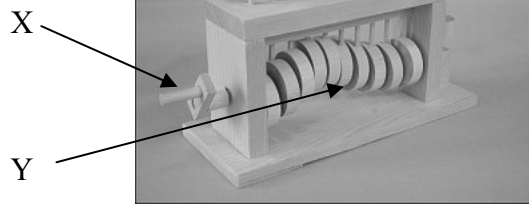
15. Assuming all components are in working order, give **two** reasons why the LED in the circuit shown might not light.



(i): _____

(ii): _____

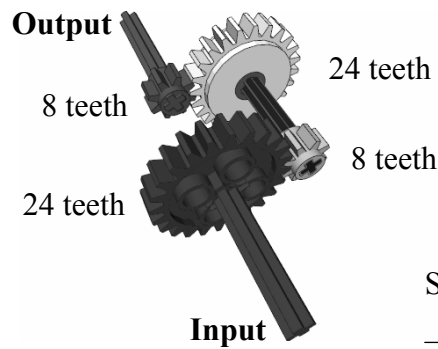
16. Name the mechanisms shown at **X** and **Y**.



X: _____

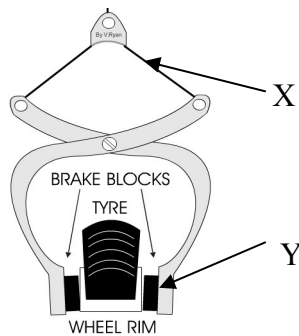
Y: _____

17. If the input shaft is turning at 180 RPM, calculate the speed of the output shaft.



Speed: _____

18. Name the forces acting at **X** and at **Y** on the bell-crank mechanism shown.



X: _____

Y: _____

19. State **two** advantages of the pulley and belt system shown over a chain and sprocket system.



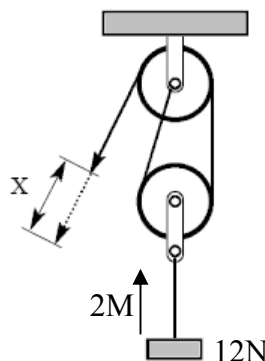
(i): _____

(ii): _____

20. How much effort is required to lift the 12 N load shown?

and

how many metres of rope **X** will have to be pulled to lift the load 2 metres?



Effort: _____

Metres: _____

21. Name **two** safety features found in modern cars.



(i): _____

(ii): _____

22. State **two** energy conversions taking place when an electric motor is running.



(i): _____

(ii): _____

23. State **two** safety precautions which should be observed when using a jig saw.



(i): _____

(ii): _____

24. Name the technology which allows 'SatNav' devices to determine a location.



Technology: _____

25. State **two** ways in which technology has changed the music industry in recent years.



(i): _____

(ii): _____

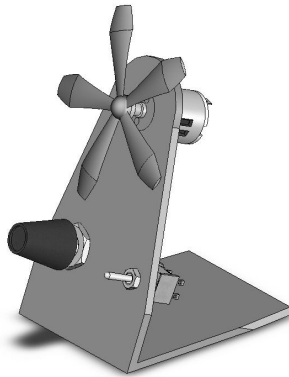
26. State **two** reasons why it is important to invest in renewable energy.



(i): _____

 (ii): _____

27. State **two** reasons why a completed task project (such as the desk fan shown) should be evaluated.



(i): _____

 (ii): _____

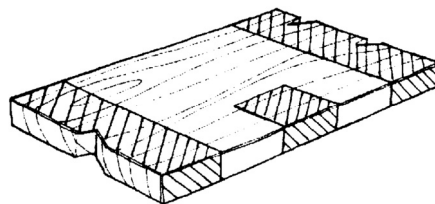
28. In relation to manufactured boards, explain the terms **MDF** and **Veneer**.



MDF: _____

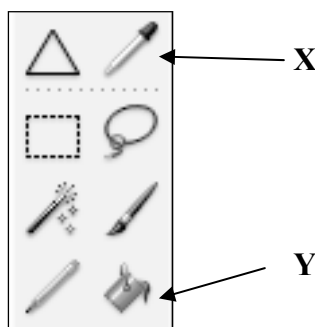
 Veneer: _____

29. Explain the meaning of the hatched lines in the sketch shown.



Meaning: _____

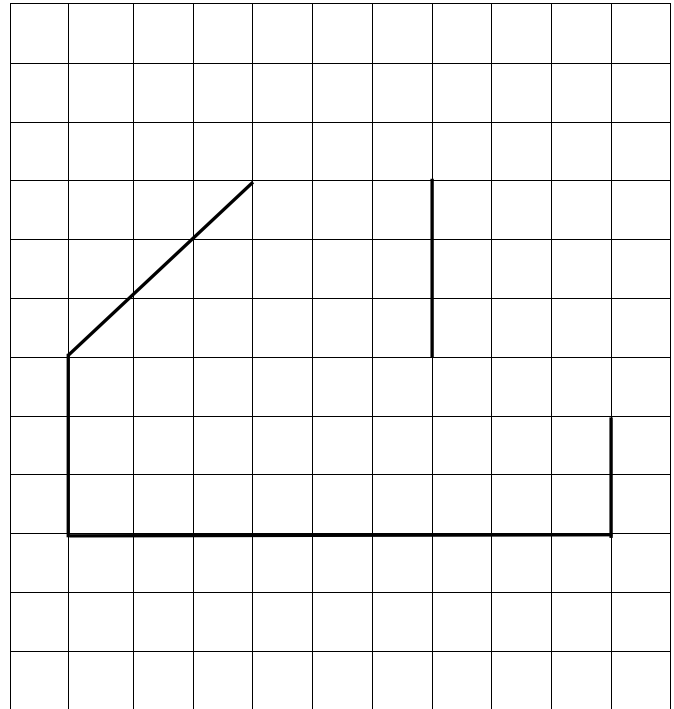
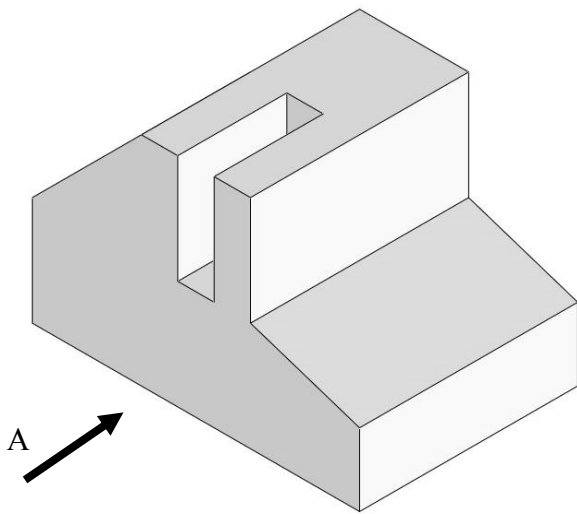
30. Explain the function of the symbols **X** and **Y** shown, found in a graphics application menu.



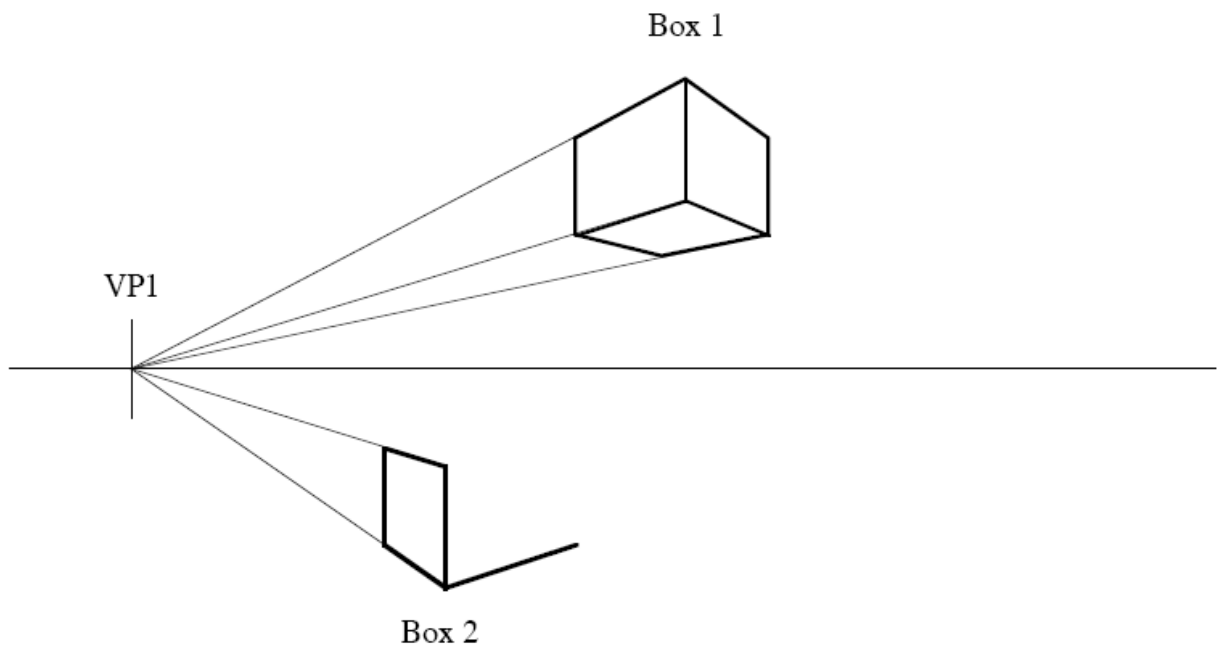
X: _____

 Y: _____

31. Complete the elevation of the object shown when viewed in the direction of arrow A.



32. Locate the second vanishing point VP2 and complete the perspective of Box 2.





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Section B and Section C

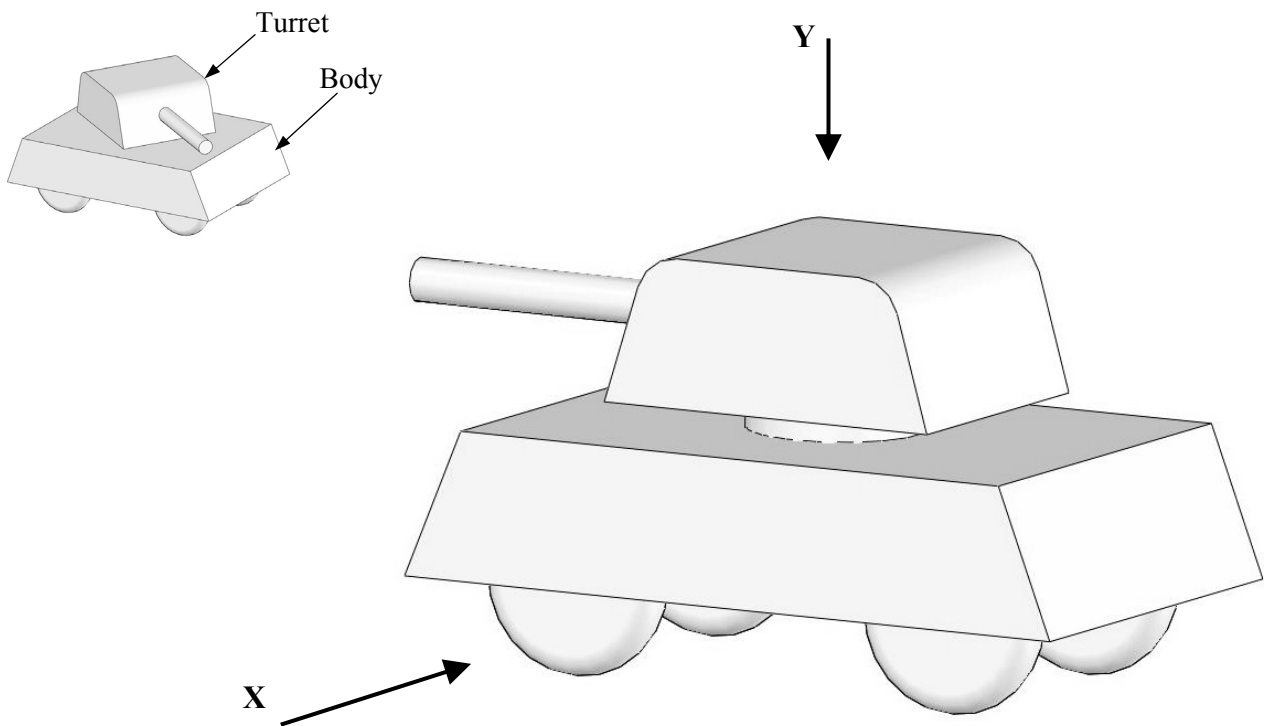
Section B - 50 marks

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 graphics show a design for a model tank.



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

1. An elevation in the direction of arrow **X**.
2. A plan in the direction of arrow **Y**.

10 marks

- (ii)
1. Describe, using suitable sketches, the steps required to make the acrylic lower section (body) of the model.
 2. Describe, using suitable sketches, a method to attach the wheels to the body.

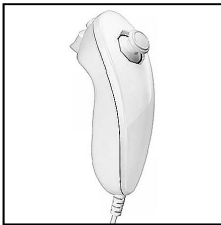
10 marks

- (iii) Sketch and name a suitable mechanism which will allow the turret to rotate through 360° .

5 marks

- OR -

- 1 (b) The graphics show a design of a holder for two video game controllers. The design is to be made from one piece of acrylic.

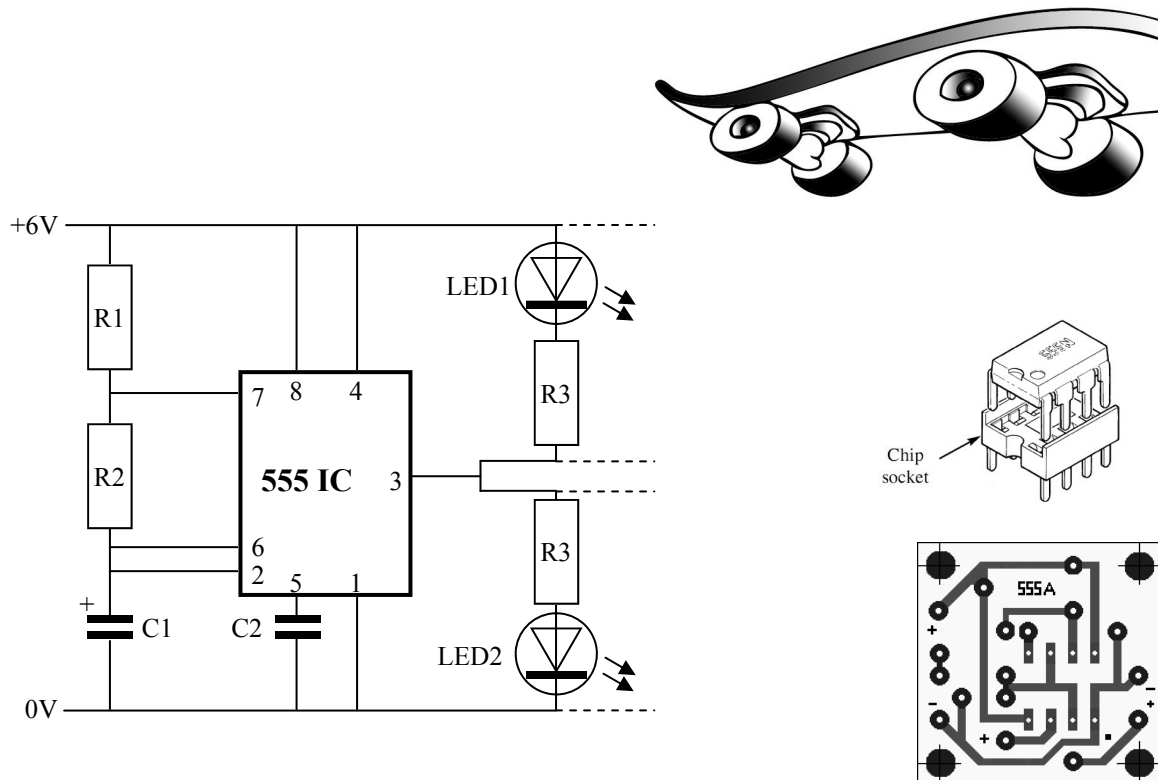


Nunchuck
Controller



- (i) Make a well-proportioned sketch of the **development** of the holder. Indicate clearly on your sketch the position of all bend lines. 10 marks
- (ii) 1. Explain, using sketches, how the slots on the holder could be cut out.
2. The holder design is to be modified to hold the Nunchuck controller shown. Describe using sketches how this could be achieved. 10 marks
- (iii) When testing the completed holder, the back panel was found to break easily. Using sketches, suggest a suitable method to prevent this from occurring. 5 marks

- 2 (a) The sketch shows an electronic circuit for a flashing LED circuit to be mounted on the underside of a skateboard. (LED1 will flash, then LED 2 will flash, then the sequence will repeat).

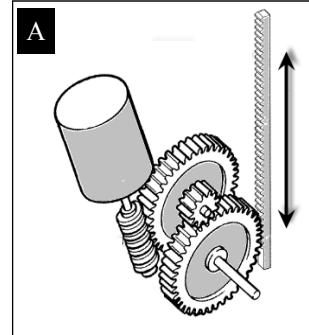


- (i) Using a sketch, explain how the pins 1 and 5 can be identified on the 555 IC.
- (ii) The circuit requires an on/off switch. Indicate clearly where this switch should be placed in the circuit.
- (iii) State **two** advantages to placing this circuit on a PCB instead of using copper stripboard.
- (iv) State **two** reasons why a chip socket should be used when mounting the 555 IC on a circuit board.
- (v) Blue LEDs will be used in this circuit (Blue LED: $V_f = 3V$, $I_{max} = 20mA$). Explain why protective resistors, R3, are required for the LEDs.
- (vi) Additional LEDs and resistors can be attached to the circuit in parallel with LED1 and LED2. Explain why these extra LEDs should be connected 'in parallel' and not 'in series'.

(25 marks)

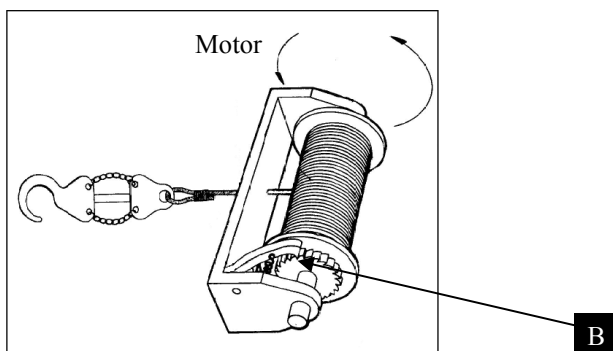
- OR -

- 2 (b) A student intends to build a model tipper-truck based on the graphic shown.
The combined mechanism, shown at **A**, will be used to raise and lower the tipper.



- (i) Name the **two** mechanisms attached to the motor at **A**.
- (ii) State **two** benefits of using this lifting mechanism to raise and lower the tipper.
- (iii) *Hydraulic systems* are used to raise and lower the tipper on commercial trucks. Explain the term 'hydraulic'.
- (iv) The pulling system shown below will be attached to the front of the truck. Name the mechanism at **B** and explain the function of this mechanism.
- (v) If the motor attached to the pulling system turns at 300 RPM, calculate the approximate distance moved by the hook in 1 minute. (Cable Drum Ø10 mm).

(25 marks)



Pulling System

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.**

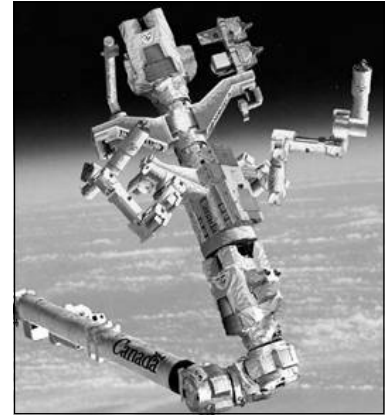


3. Technology and Society

- (a) Green technologies are very important in everyday life.
- (i) Explain, using **two** examples, why technologies should be “green”.
 - (ii) Explain, using **two** examples, where green technologies are used in modern homes.
 - (iii) Explain, using **two** examples, where green technologies are used in industry. (25 marks)
- (b) Outline **two** changes which technology has brought to **each** of the named activities in recent years:
- (i) intercity transport,
 - (ii) food production,
 - (iii) home-entertainment systems. (15 marks)
- (c) Explain, using **two** suitable examples, the positive impact which the Internet has on society. (10 marks)

4. Control Systems & Technology and Society

Robotic devices are commonly used in the manufacturing industry and in space exploration.



- (i) Explain, giving **two** reasons, why robotic devices are preferred in these situations.
- (ii) In relation to robotic arms, explain what is meant by 'degrees of freedom'.
- (iii) Explain how robotic devices are 'instructed' to perform a task.
- (iv) Explain why **sensors** are important in guiding robotic devices used for manufacturing.
- (vi) Explain, giving **two** reasons, why robotic manufacturing is more likely to be used in first world countries.
- (vii) Outline **two** other areas where robotic devices are commonly used.
In each case state **one** reason for the selection of a robot in the stated area.

(50 marks)

5. Design and Manufacture

A student is required to manufacture a working model of a motorised car-park barrier as shown in the diagram.
The barrier will be opened by a security keycard.



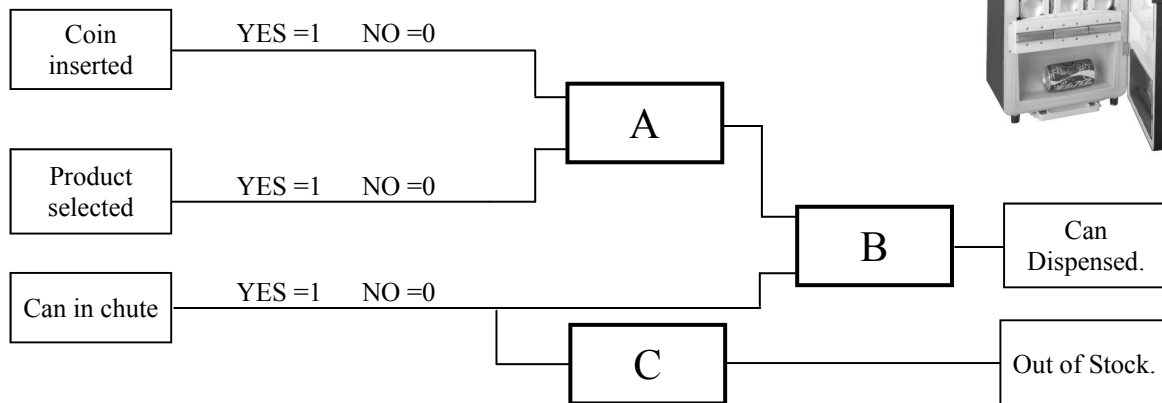
- (a)
 - (i) Describe, with the aid of sketches, the steps required to manufacture the barrier from acrylic. Name the tools and processes used.
 - (ii) Describe, with the aid of sketches, **two** suitable mechanisms to raise and lower the barrier. Name the mechanisms used.
 - (iii) Explain why a DPDT relay and limit switches are recommended in the design.
- (b)
 - (i) Explain briefly how a keycard system allows the barrier to open.
 - (ii) Explain **one** security limitation of this system.
 - (iii) Outline **one** other modern security system used to overcome the stated limitation.

(30 marks)

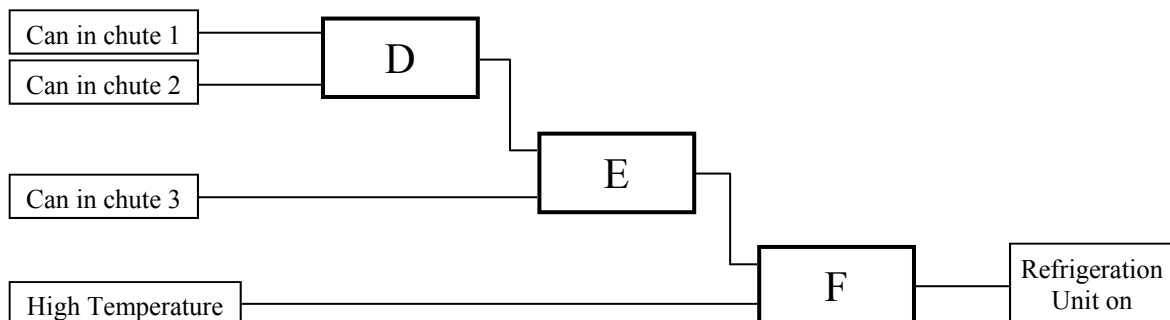
(20 marks)

6. Control Systems

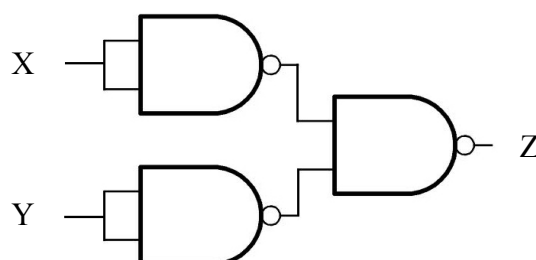
The system shown is used in a soft-drinks dispensing machine. A soft drink is dispensed if the correct coin is inserted, the type of soft drink is selected and the drink chute contains a can.



- (a)
 - (i) Identify the logic gates required at **A**, **B** and **C**.
 - (ii) Sketch and complete the truth tables for logic gates **A** and **C**.
- (b) An additional system is required which will activate a refrigeration unit if any one of the chutes contains a can and a high temperature is detected.



- (i) Name the component which will detect a high temperature.
 - (ii) Identify the gates required at **D**, **E** and **F**.
 - (iii) Sketch a modification to this system which will turn on an 'Out of Order' light if all three chutes are empty.
- (c) NAND logic gates can be combined to generate other logic gates. Use a truth table to determine the type of logic gate produced by the combination shown below.



(50 marks)