Coimisiún na Scrúduithe Stáit
State Examinations Commission

# TECHNOLOGY

Junior Certificate Examination, 2004
HIGHER LEVEL
200 Marks
Wednesday, 23rd June, Afternoon, 2:00 to 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 C.

Centre Number

Examination Number

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

MAKE SURE TO WRITE YOUR EXAMINATION NUMBER IN THE BOX PROVIDED ON THIS PAGE

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

1. Explain the function of each of these computer paint program icons.

(i) 

(ii) 

(i): _____

_____

_____

_____

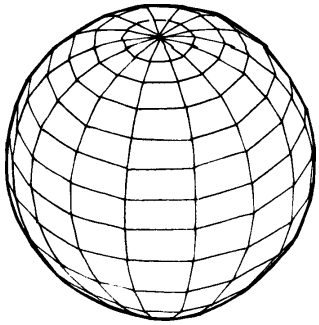
(ii): _____

_____

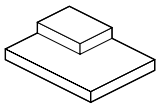
_____

_____

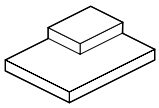
2. Shade the sphere shown to suggest a light source at X.

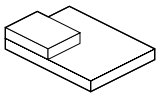


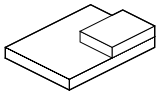

3. Which one of the figures labelled A, B or C is another view of figure X?



X

A 

B 

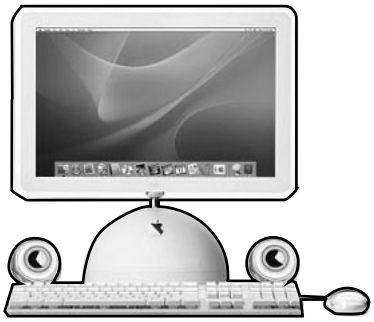
C 

Answer: _____

4. State the meaning of the following abbreviations:

(i) WWW

(ii) RAM



WWW: _____

_____

_____

_____

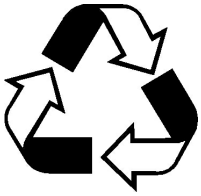
RAM: _____

_____

_____

_____

5. What does each of the symbols shown represent?

(i) 

(ii) 

(i): _____

_____

_____

_____

(ii): _____

_____

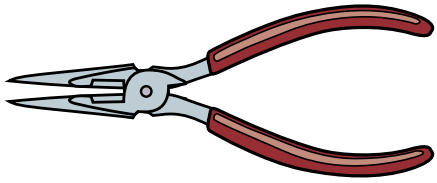
_____

_____

6. Name the material used on the handle of a pliers

*and*

state a reason for this choice of material?



Material: _____

_____

_____

_____

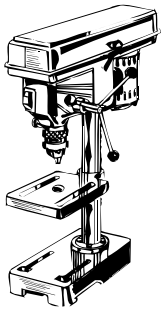
Reason: _____

_____

_____

_____

7. State **two** precautions which should be taken when drilling acrylic to prevent the material shattering.



(i): _____

_____

_____

_____

(ii): _____

_____

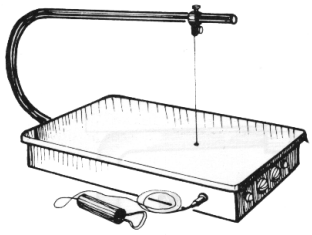
_____

_____

8. Name the tool shown

*and*

name a material which can be shaped using this tool.



Tool: _____

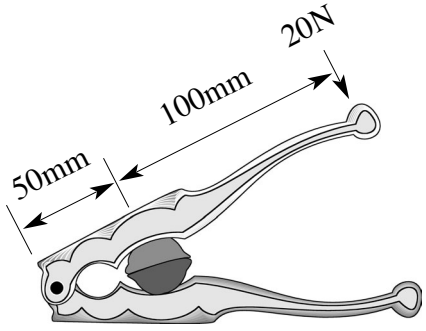
_____

Material: _____

_____

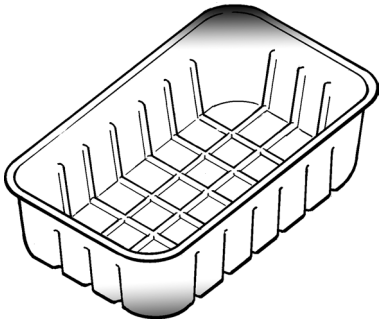
_____

9. Calculate the force applied to the nut in the nutcracker shown.




Force: _____

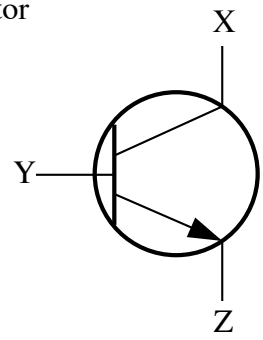
10. Name the manufacturing process used to make this plastic carton.



Process: _____

_____

11. Name the parts of the transistor labelled X, Y and Z.

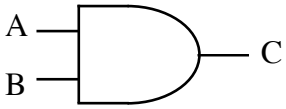



X: _____

Y: _____

Z: _____

12. Complete the truth table for the AND gate shown




| A | B | C |
|---|---|---|
| 1 | 1 | |
| 1 | 0 | |
| 0 | 1 | |
| 0 | 0 | |

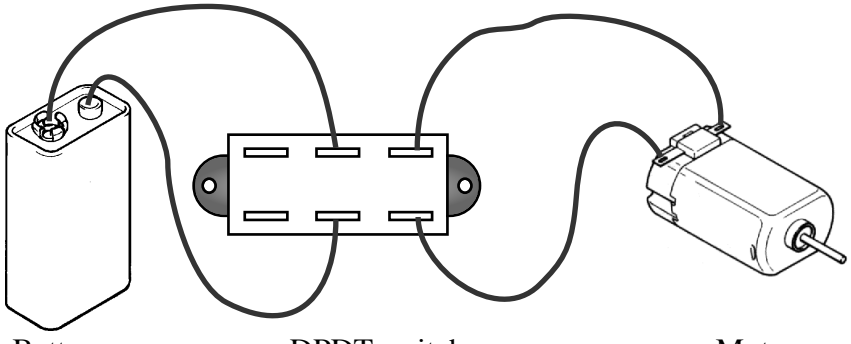
13. Name the electronic components represented by the symbols shown.

(i) (ii)


(i): _____

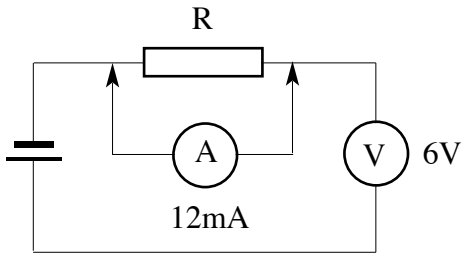
(ii): _____

14. Complete the wiring of the double pole double throw (DPDT) switch used to control the direction of rotation of the motor.



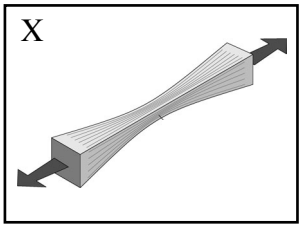
Battery DPDT switch Motor

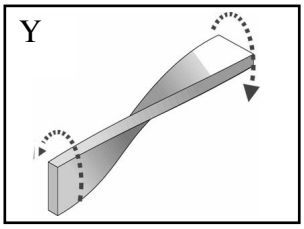
15. Calculate the resistance of R in the circuit diagram.




Resistance: _____

16. Name the forces applied to the beams in 'X' and 'Y' shown.




X: _____

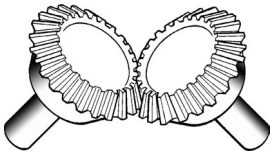
_____

Y: _____

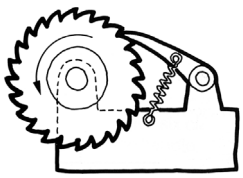
_____

17. Name the mechanisms shown.

(i)



(ii)



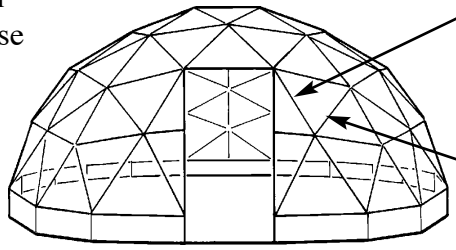
(i): _____

_____

(ii): _____

_____

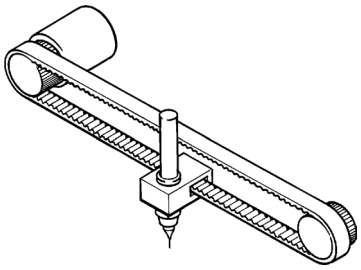
18. Sketch **two** possible cross sections for the members in the frame shown to minimise the load.



Cross section 1:

Cross section 2:

19. State **two** advantages of toothed belts over chains in computer printers and plotters.



Advantage1: _____

_____

_____

_____

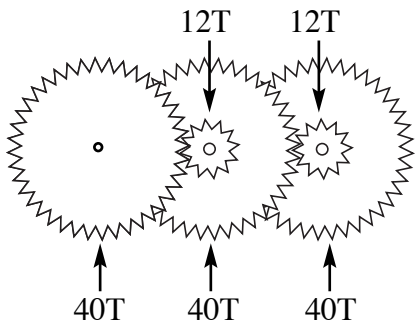
Advantage 2: _____

_____

_____

_____

20. Calculate the output speed in the gear train shown.




Driver
Input speed
18RPM

Driven
Output speed

Output speed: _____

21. State **two** ways in which technology can be used to help the disabled in the home.

(i): _____

_____

_____

_____

(ii): _____

_____

_____

_____

22. Name **one** synthetic material

*and*

name **one** natural material used in footware.

Synthetic: _____

_____

_____

_____

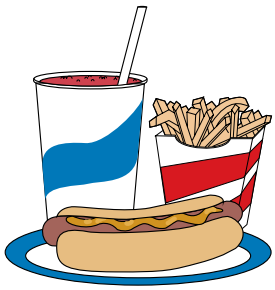
Natural: _____

_____

_____

_____

23. Give **two** reasons why additives are placed in processed food.



(i): _____

_____

_____

_____

(ii): _____

_____

_____

_____

24. State **two** ways in which a modern motorcar can be made 'eco-friendly'.

(i): _____

_____

_____

_____

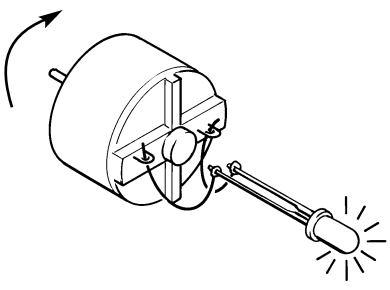
(ii): _____

_____

_____

_____

25. State **two** energy conversions taking place in the generator.



(i): _____

_____

_____

_____

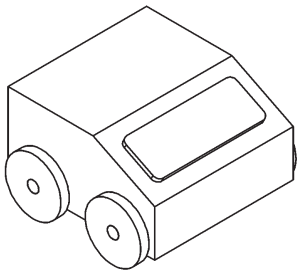
(ii): _____

_____

_____

_____

26. State **two** reasons why an '*investigation of possible solutions*' should be carried out as part of the design process for a toy.



(i): _____

_____

_____

_____

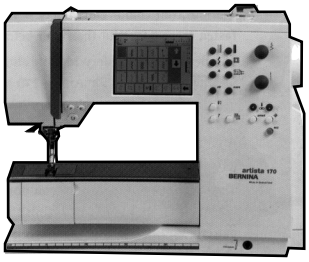
(ii): _____

_____

_____

_____

27. State **two** advantages of a microprocessor controlled sewing machine over a traditional sewing machine.




(i): _____

_____

_____

_____

(ii): _____

_____

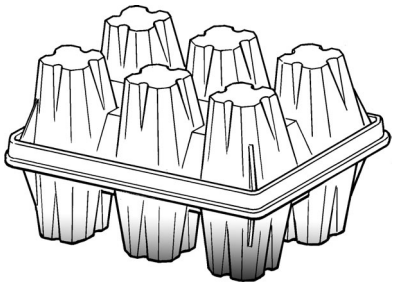
_____

_____

28. State **one** advantage

*and*

**one** disadvantage to the use of plastics in packaging.



Plastic egg carton

Advantage: _____

_____

_____

_____

Disadvantage: _____

_____

_____

_____

29. State the contribution made by any **two** of the following to the development of modern transport.

(a) Henry Ford
(b) Wright brothers
(c) George Stephenson

Name: _____
Contribution: _____

_____

_____

Name: _____
Contribution: _____

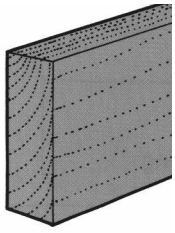
_____

_____

30. Name **two** manufactured boards

*and*

state **one** advantage to these boards over natural timber.



Board 1: _____

_____

Board 2: _____

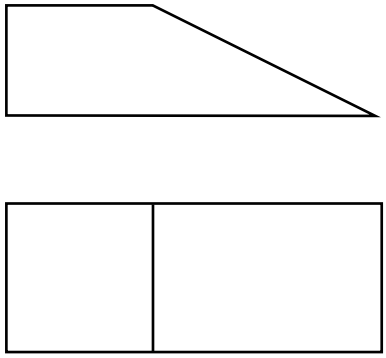
_____

Advantage: _____

_____

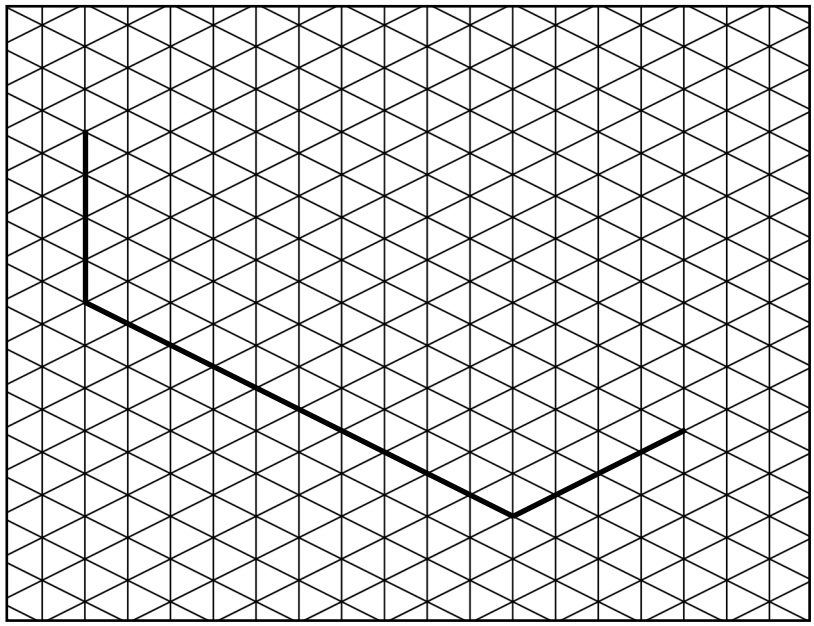
_____

31. Complete the isometric sketch of the door stopper shown.

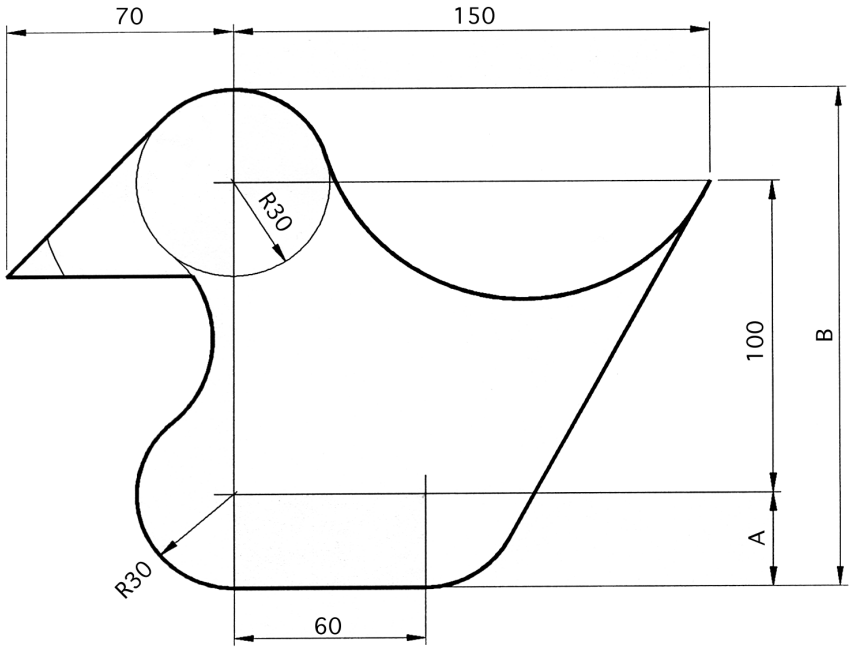


Orthographic view

Isometric view



32. What are the values of the dimensions 'A' and 'B' on the diagram below?




A: _____

B: _____

Coimisiún na Scrúduithe Stáit
State Examinations Commission

# TECHNOLOGY

Junior Certificate Examination, 2004

HIGHER LEVEL

200 Marks

Wednesday, 23rd June, Afternoon, 2:00 to 4:00

# SECTION B and SECTION C

SECTION B - 50 Marks

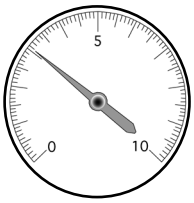
SECTION C - 50 Marks

## INSTRUCTIONS

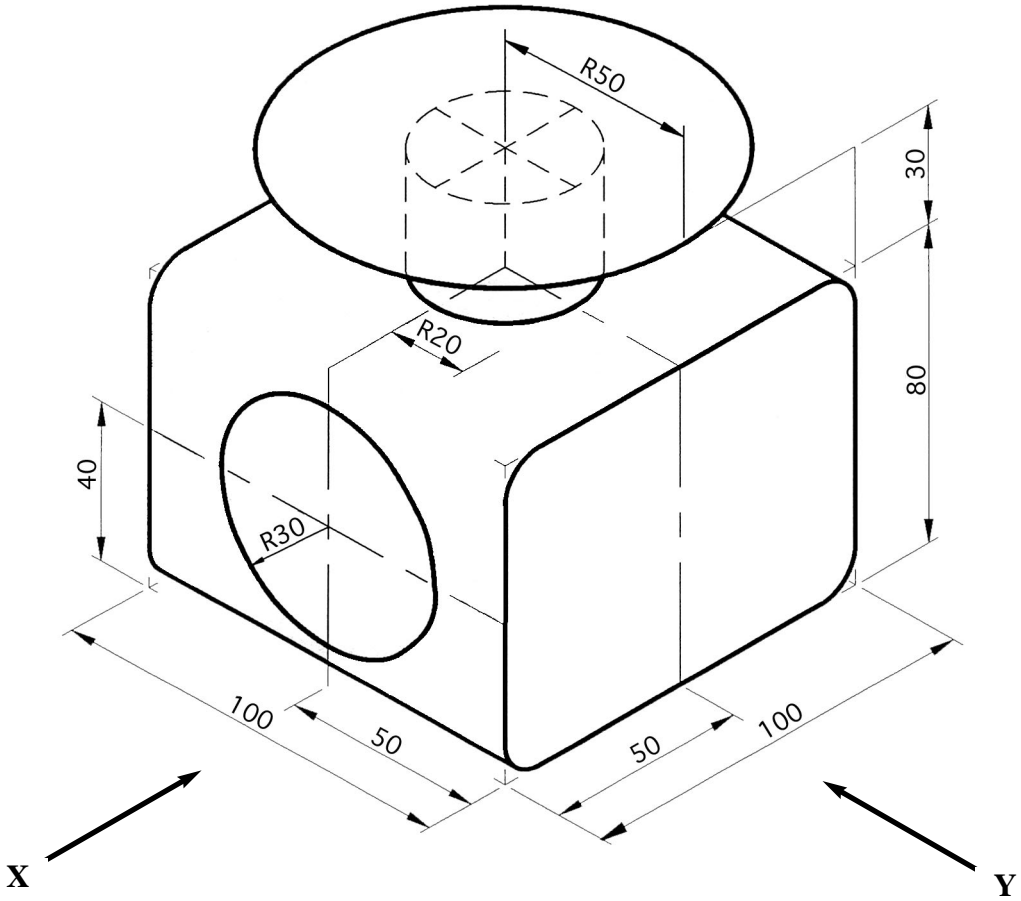
1. Answer either (a) or (b) from each question in Section B.
2. Answer one question from Section C.
3. Make sure to hand up Section A with your answer sheets to this paper.

**SECTION B - 50 Marks** **Question 1, answer either (a) or (b) from this question.**

**1 (a)** The sketch shows a design for a domestic weighing scales.
The scales will be manufactured from acrylic and hardwood.



Dial




*All dimensions are in millimeters*

(i) Using a suitable scale draw:

1. An elevation looking in the direction of arrow 'X'.

2. An end elevation looking in the direction of arrow 'Y'.

10 marks

(ii) 1. Sketch a suitable design, in isometric view, of a bowl to fit on the scales.

2. Indicate clearly on your design a feature which will prevent your bowl from slipping off the scales.

5 marks

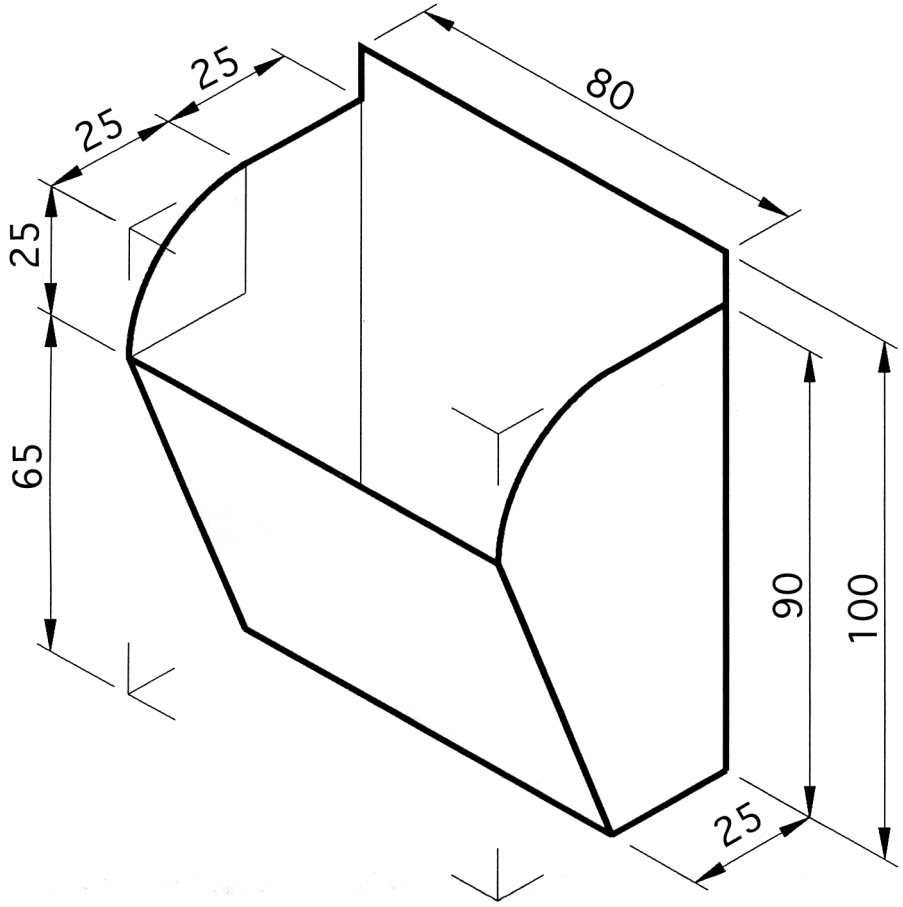
(iii) 1. Sketch a design for a mechanism which will move a dial attached to the front face to indicate the number of grammes on the bowl.

2. Include a mechanism in your design which will return the dial to the zero mark when the load in the bowl is removed.

10 marks

**- OR -**

**1 (b)** The sketch shows a design of a wall mounted acrylic box used to hold coupons.




*All dimensions are in millimeters*

(i) Using a suitable scale, draw a development of the coupon box. Indicate clearly all bend lines and show all dimensions.

10 marks

(ii) 1. State **two** reasons why acrylic is a suitable choice of material from which to manufacture the box.

2. Indicate clearly the steps you would take to manufacture the box from a sheet of acrylic. Name all equipment required.

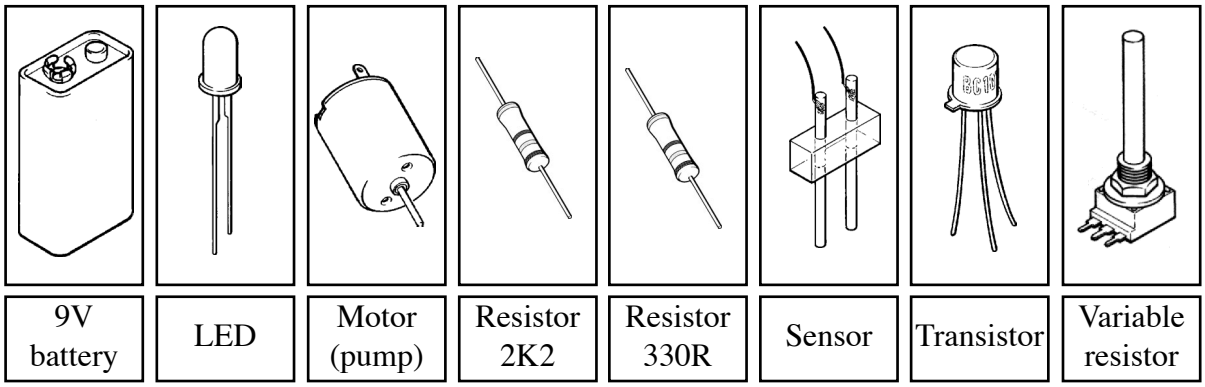
10 marks

(iii) Indicate clearly the steps you would take to produce a smooth polished edge to the acrylic.

5 marks

**SECTION B - 50 Marks** **Question 2, answer either (a) or (b) from this question**

**2 (a)** A student is required to produce a circuit which will turn on a water pump when low water levels are detected by a sensor.
The components listed below are available to construct the circuit.



| 9V battery | LED | Motor (pump) | Resistor 2K2 | Resistor 330R | Sensor | Transistor | Variable resistor |
|---|---|---|---|---|---|---|---|

(i) 1. Using the sensor and the variable resistor, sketch the circuit diagram for the potential divider required in this circuit.

2. Name and explain your choice of material for the sensor.

3. Explain why a variable resistor is used in the potential divider.

4. Indicate clearly which pins on the variable resistor should be used in the potential divider.

10 marks

(ii) 1. Using the appropriate component symbols, sketch the complete circuit diagram required to control the pump.

2. A lighting LED is required to show the circuit is active.
Include the LED in this circuit.

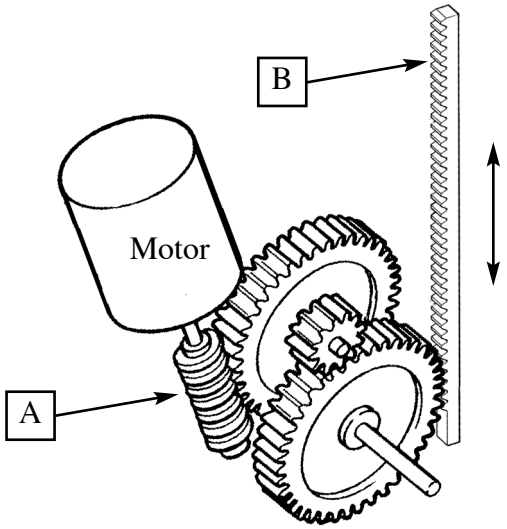
10 marks

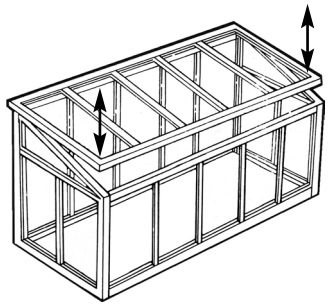
(iii) If the only water pump available contained a 12V motor, name the additional component required to turn on the pump.
Explain briefly how this component works.

5 marks

**- OR -**

**2 (b)** The sketch shows a student design for a mechanism to control the temperature in a coldframe by opening or closing the roof.



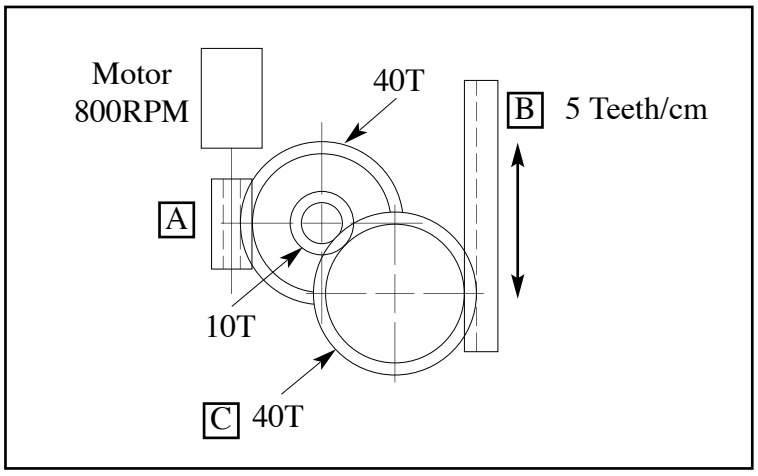
Coldframe

(i) 1. Name the mechanisms A and B.

2. State **two** advantages in using mechanism A in this situation.

3. Explain why limit switches should be used with this system.

10 marks




(ii) Using the information on the simplified sketch of the gear mechanism above:

1. Calculate the speed of gear C.

2. Calculate the distance moved by B in 15 seconds.

10 marks

(iii) Sketch and name the components of an alternative mechanism to open and close the coldframe roof.

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 and Society**

Mobile communications technologies (mobile phones, etc.) have increased in popularity in recent years.

(a) (i) Name **two** features available in mobile phones not found in older phones, as shown.

(ii) Explain any **two** technological developments which were necessary before mobile technology could be brought into general use.

(iii) State the role of **each** of the following in the development of mobile phones: designers, engineers and programmers.

20 marks

In Ireland, we have traditionally relied on fossil fuels as our main energy source.

(b) (i) Name **three** fossil fuels used in Ireland.

(ii) State **two** effects of fossil fuels on the environment.

(iii) Name **three** alternative sources of energy available in Ireland.

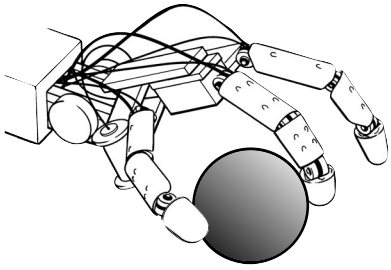
(iv) Name **two** ways in which technology can help reduce our energy consumption in the home.

20 marks

(c) Explain, using **two** suitable examples, how new technologies have changed home entertainment systems.

10 marks

**4. Control Systems & Technology and Society**



Pneumatic and robotic control are commonplace in modern manufacturing industries.

(i) Explain, using **two** examples, why robots are used in manufacturing industry.

(ii) Explain the function of **control software** and a **computer interface** in robotic control.

(iii) Explain why **feedback** is an important part of robotic control.

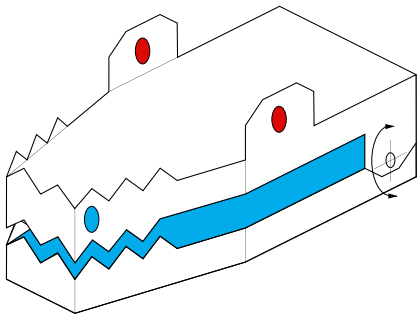
(iv) Explain what is meant by **pneumatic control**.

(v) Name **two** areas, other than manufacturing industry, where robotic control is used and outline the function of the robots.

(vi) Explain, giving **two** appropriate reasons, why computer controlled manufacturing is more likely to be found in First World countries.

50 marks

**5. Design and Manufacture**



The sketch shows a design for an animated dragon's head.

(a) (i) Name **two** materials from which the head could be manufactured.
State **one** advantage and **one** disadvantage to each material.

(ii) Outline the steps required to manufacture the head from **one** of these materials.

20 marks

(b) (i) Sketch a suitable mechanism which will allow the upper jaw of the head to open and close approximately once every minute.

(ii) Sketch a suitable circuit and mechanism which will activate red LEDs in the eyes and a green LED in the mouth when the jaw is fully open.

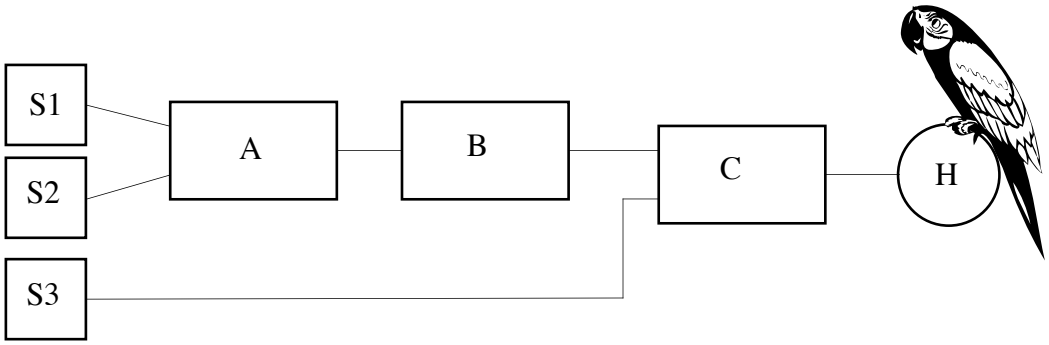
(iii) Sketch a design for a mechanism which will cause a fabric tongue to move when the mouth opens.

30 marks

## 6. Control Systems

A block diagram for a system to control a heater in a four cage tropical bird house is shown.

The system will turn on a heater (H), to keep the birds warm at night.
S1 will produce a logic state of '0' when cold and S2 will produce a logic state of '0' when dark.




(a) (i) Name the electronic components required at sensor S1 and at sensor S2.

(ii) Identify the logic gates required at A, B and C.

(iii) Explain what will happen in this system if switch S3 is in the 'off' position.

15 marks

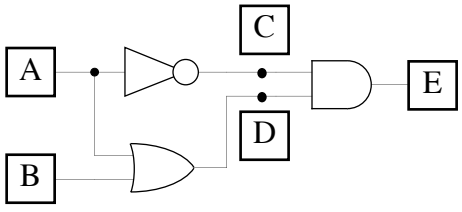
(b) Sketch a design for a modification to the system shown which will:

(i) sound an alarm if any one of the four cages is left open,

(ii) automatically turn off the heater if the cages are open.

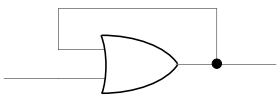
20 marks

(c) (i) Copy and complete the truth table for the gate arrangement shown below.




| A | B | C | D | E |
|---|---|---|---|---|
| 1 | 1 | | | |
| 1 | 0 | | | |
| 0 | 1 | | | |
| 0 | 0 | | | |

(ii) Name the gate arrangement shown below and suggest one use for this arrangement.



15 marks