Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination, 2019

Technology

Higher Level

Tuesday, 11 June
Afternoon, 2:00 - 4:00

Section B and Section C

Section B - 50 marks

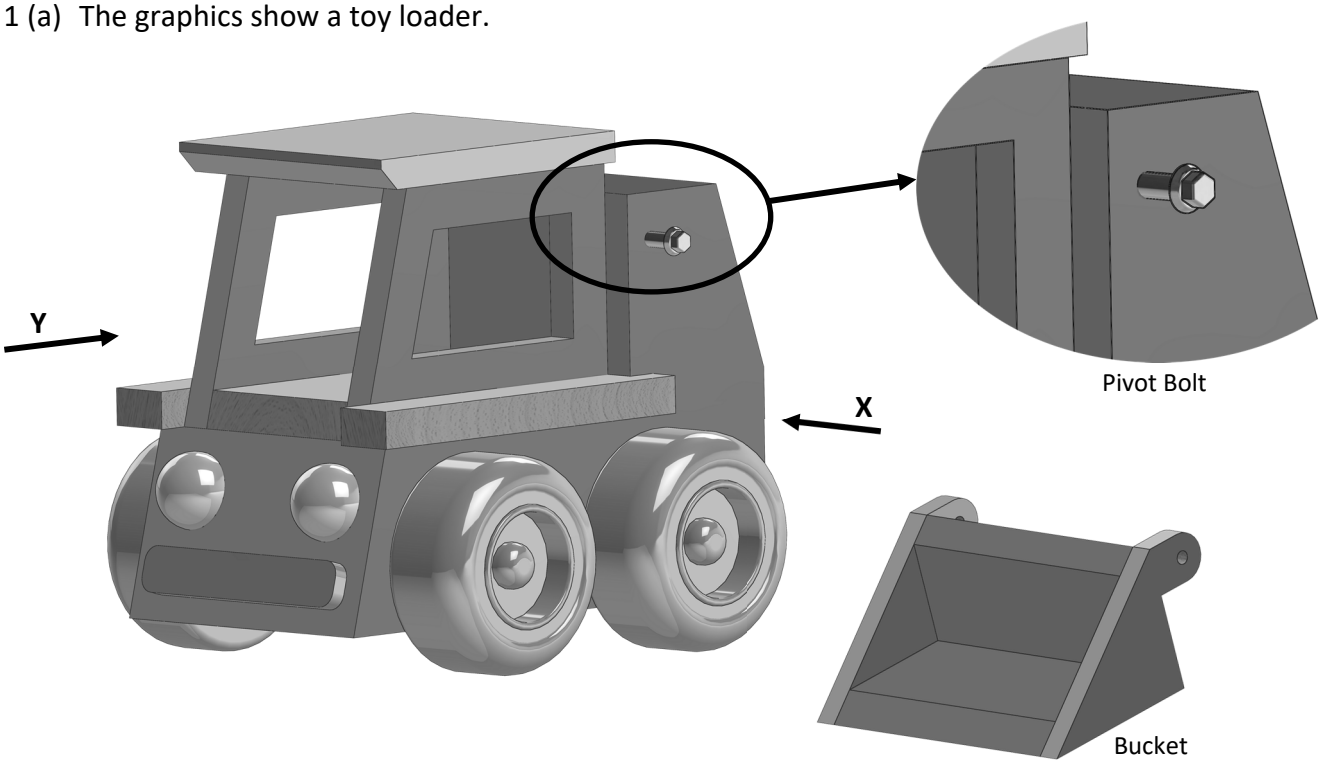
Section C - 50 marks

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.

Section B - 50 Marks **Question 1. Answer either (a) OR (b) from this question.**

1 (a) The graphics show a toy loader.



(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) A bucket for the loader, similar to that shown, is required.

1. Suggest a suitable **material** from which to manufacture the bucket and give **one** reason for your choice.
2. Describe, using notes and sketches, how to manufacture the bucket.

(10 marks)

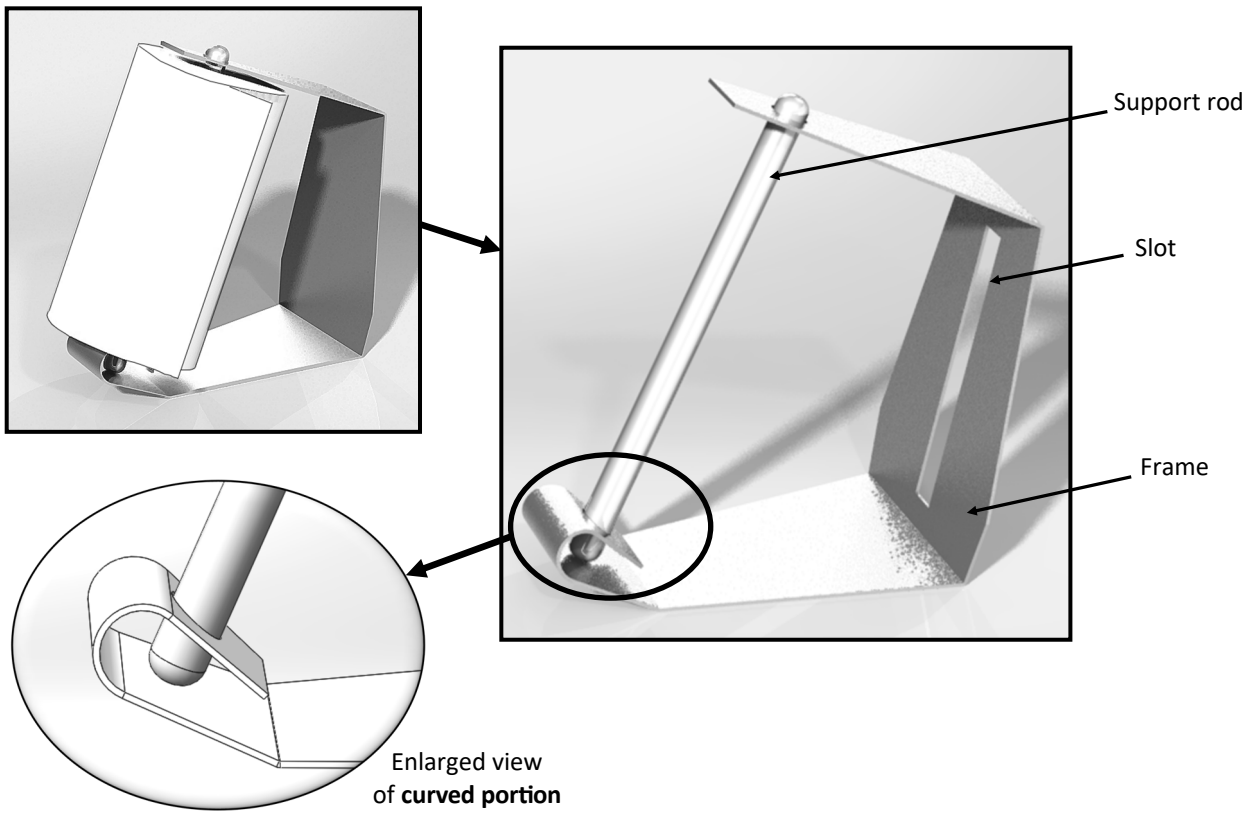
(iii) A connecting arm is required to attach the bucket to the body of the toy at the pivot bolt shown. The arm must allow the bucket to be raised and lowered using a suitable mechanism.

Sketch a design for a suitable connecting arm and mechanism.

(5 marks)

- OR -

1 (b) The graphics show a design for a free-standing paper roll holder.
The frame is manufactured from a single material.
The slot was added to allow the paper to exit the holder and be easily cut.



(i) Make a well-proportioned sketch of the **development** of the holder to include the slot and holes.
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 **holder** from a suitable **named** material.

2. Describe, using sketches, how to produce the **curved portion** shown above.

(10 marks)

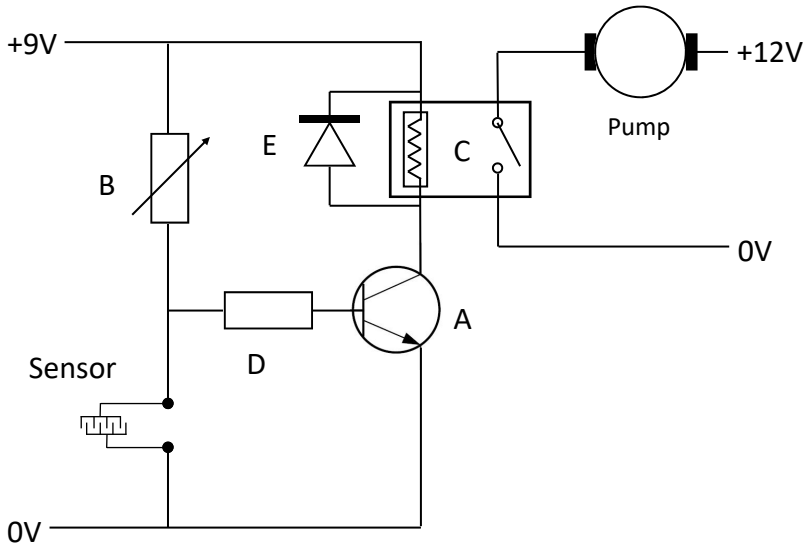
(iii) When testing the holder, it was found that it was difficult to remove and cut the paper through the slot shown.

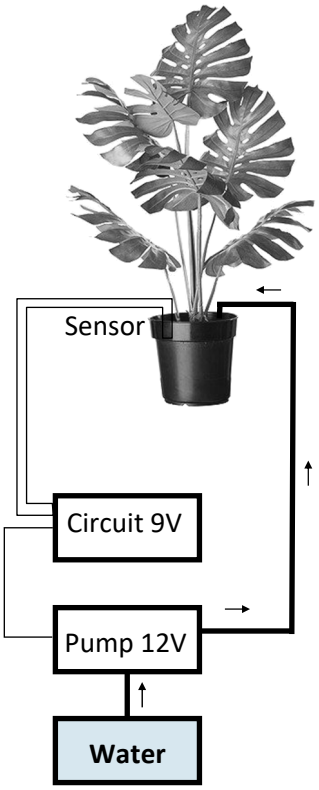
Describe, using sketches, a suitable modification to solve this problem.

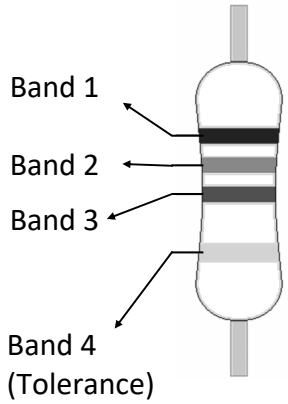
(5 marks)

Section B - 50 Marks **Question 2. Answer either (a) OR (b) from this question**

2 (a) The circuit shown will be used to automatically water a plant when dry soil is detected.







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

(i) Name the components labelled **B** and **C** in the circuit. (6 marks)

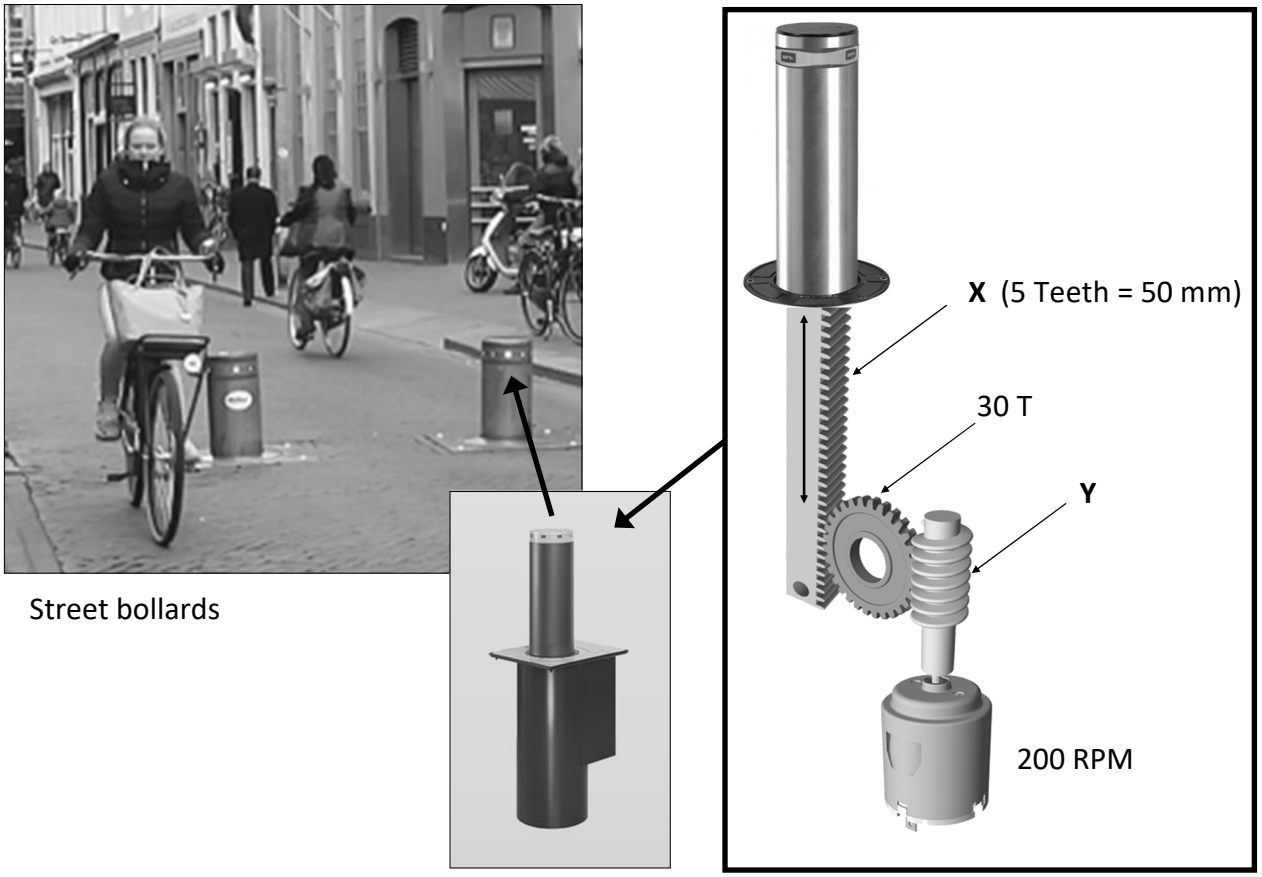
(ii) State the functions of components **A** and **B** in the circuit. (6 marks)

(iii) Resistor **D** has a value of 2200 Ω and a tolerance of +/- 5%.
Using the table provided, state the colours of the four bands on resistor **D**. (8 marks)

(iv) Name component **E** and explain why it is required in this circuit. (5 marks)

- OR -

2 (b) The graphic shows a mechanism to control a working model of a street bollard.



Street bollards

(i) Name the parts of the mechanism labelled **X** and **Y**.
State **one** advantage of using this type of mechanism to control the bollard.

(9 marks)

(ii) The mechanism shown changes the direction of motion by 90°.
Name and sketch another mechanism which could achieve this change of direction.

(6 marks)

(iii) Explain why limit switches should be used as part of the control circuit for this mechanism.
Name a suitable type of switch to act as a limit switch.

(6 marks)

(iv) If the motor attached to gear **Y** rotates at 200 RPM, calculate the time for which the motor must run to raise the bollard through 1 metre.

(4 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) '*To lead the transition to a low carbon future, we need creative and innovative problem solvers.*'
#GenerationTomorrow

(i) Outline **two** reasons why we must transition to a low carbon future.

(ii) Outline **two** technologies which will assist with this transition.

(20 marks)

(b) Technology impacts on the environment, people and society as a whole.

(i) Outline, using suitable examples, **two** positive impacts of technologies on elderly people in society.

(ii) Outline, using suitable examples, **two** negative impacts of the use of plastic technologies on the environment.

(iii) Outline, using suitable examples, **two** ways in which developments in communications technology have changed society.

(30 marks)

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



(a) Commercial drones use a range of technologies to operate correctly.
These include **GPS**, **remote control** and **live video feed**.

Explain the function of any **two** of these technologies in operating a drone. (10 marks)

(b) Modern fire alarms, security and heating services in schools are examples of advanced control systems.

(i) Outline the role of **sensors**, **feed back** and **control panels** in any **one** of these systems.

(ii) Outline **two** advantages in using a control system for these services. (20 marks)

(c) Modern factory production lines are now commonly operated by robotic machines. In the workforce, robotic machines are now replacing people.

(i) Outline **two** advantages of using robotic machines on production lines in place of people.

(ii) Outline **two** new skills required of the human workforce in such factories. (20 marks)

5. **Design & Manufacture**



'Iasc' are an import and distribution company, for fishing equipment, to shops around the country.
The company requires an animated, electro-mechanical, display sign based on the name and the company logo shown.

(i) Describe, with the aid of sketches, the steps required to manufacture a suitable display from a **named** material.
Name any tools required and state the processes used. (20 marks)

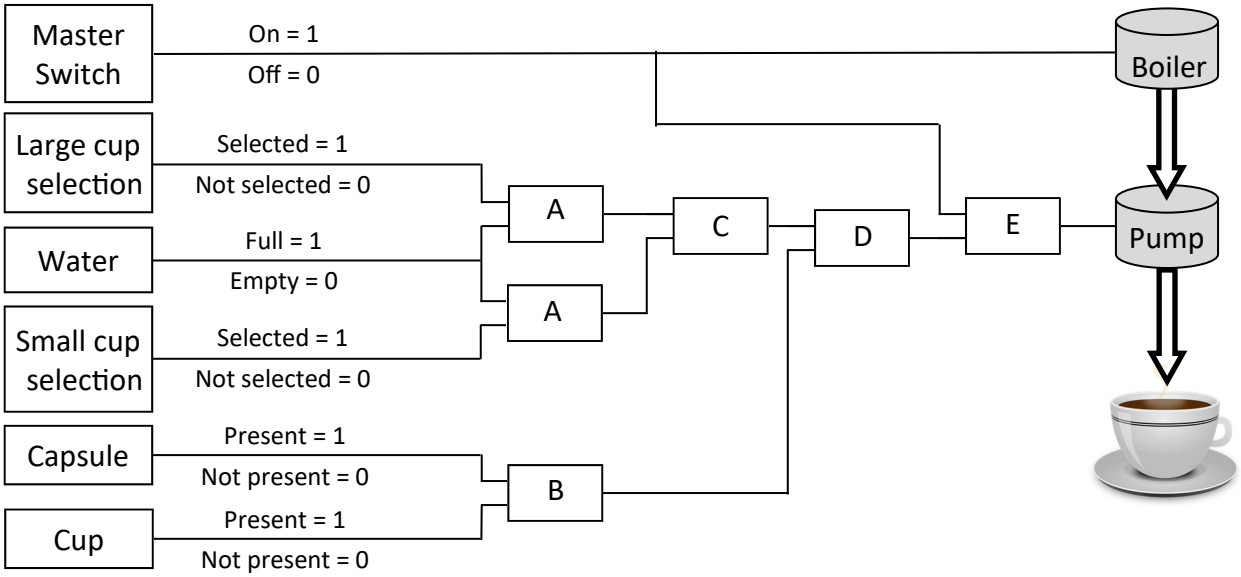
(ii) Describe the steps you would take to ensure that the final display is safe for use and is finished to a high standard. (15 marks)

(iii) Describe, with the aid of sketches, how the display could be animated.
Name any additional components required. (15 marks)

6. Control Systems



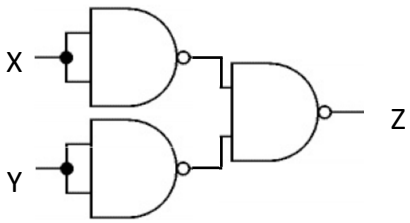
(a) A system diagram, to control the operation of a home coffee machine is shown. Coffee will be delivered if the machine is switched on, a cup, water and a coffee capsule are all present. The system has the following features:
A master on/off switch and two coffee selection buttons (large or small coffee).
A low water level, coffee capsule and cup detection sensors.



(i) Name the logic gates required at **A**, **B**, **C**, **D** and **E**.
(ii) Sketch a truth table for gate **E**.
(iii) Design a modification to the system to display a warning message if a coffee cup or a coffee capsule is not present.

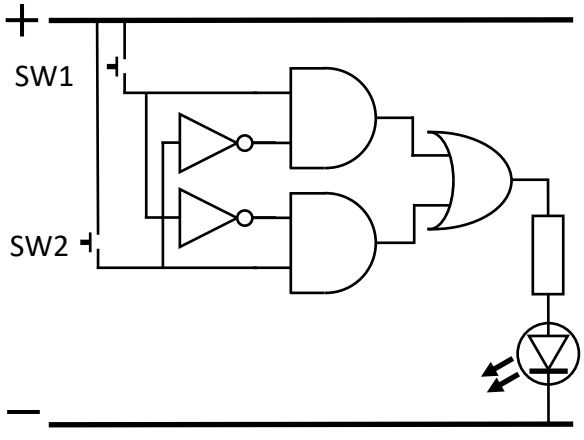
(30 marks)

(b) A NAND gate is a combination of an AND gate followed by a NOT gate. NAND gates can be combined to construct other gates. Use a truth table to determine which gate is represented by the NAND gate combination shown.



(10 marks)

(c) Draw a truth table to determine the conditions for switches SW1 and SW2 (on or off) in order to light the LED in the circuit shown.



(10 marks)