Coimisiún na Scrúduithe Stáit
State Examinations Commission

TECHNOLOGY

Junior Certificate Examination, 2008
HIGHER LEVEL

200 Marks

Wednesday, 18th 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.

1 (a) The sketch shows a student design, in plan, elevation and end view, for a laser pen display pack. The pack is manufactured from paper board and holds 12 laser pens.
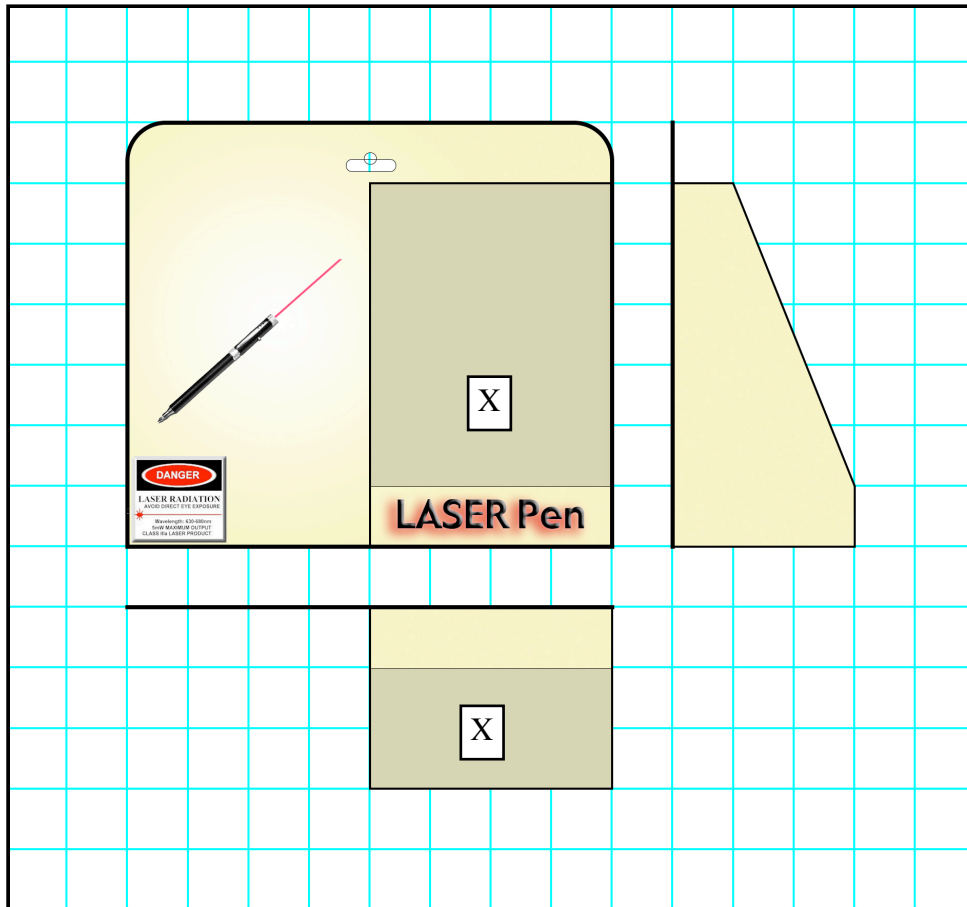

(i)   Sketch a well proportioned isometric view of the display pack on isometric grid paper.

10 marks

(ii)   1.   Sketch a design for a paper board tray, at 'X', to hold 12 laser pens upright in the display pack.

2.   State **two** reasons why paper board is a suitable material for the manufacture of display packs.
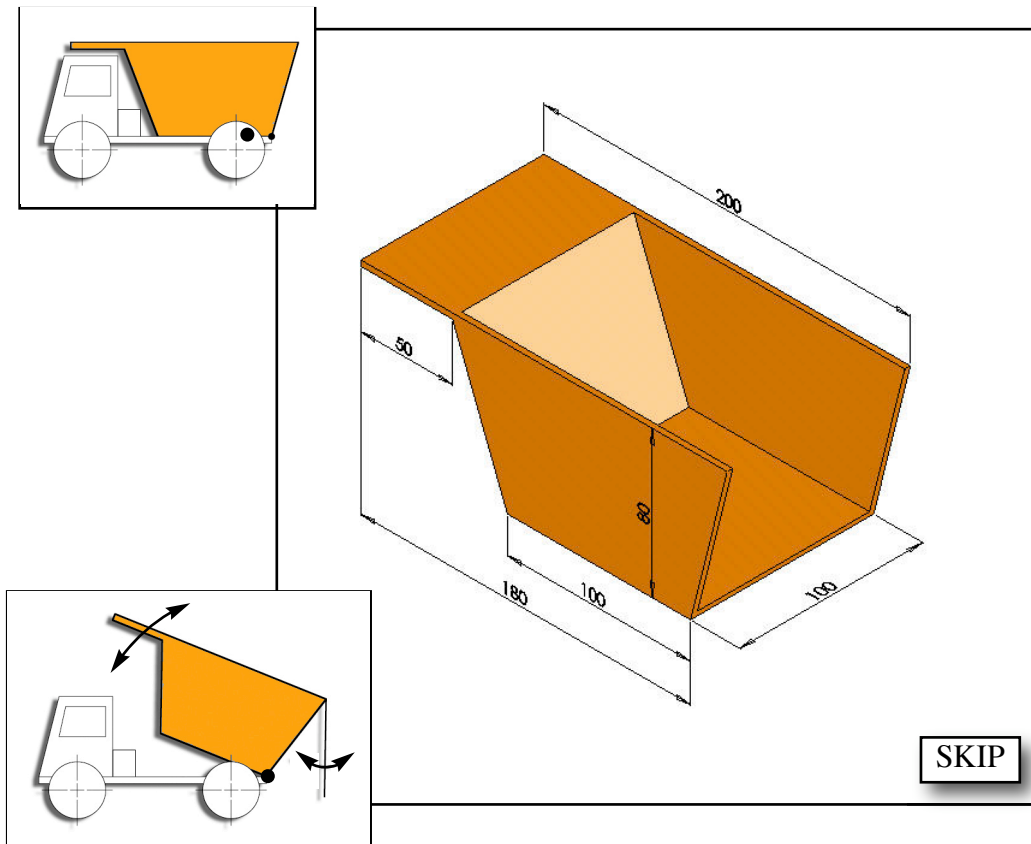
10 marks

(iii) When hung at the attachment point, the display pack swung away from the vertical. Using a sketch, show how this design fault could be corrected.
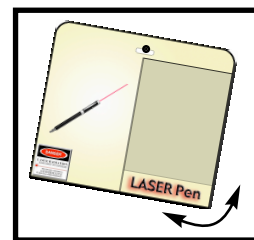

5 marks

- OR -

1 (b)   The sketch shows a student design for a toy tipper truck, with a skip.
The skip will be manufactured from acrylic.


SKIP

All dimensions are in millimeters

(i)   Using a suitable scale, sketch a development of the material required to
manufacture the skip from a single sheet of acrylic.
Indicate clearly all bend lines and show the overall dimensions.

10 marks

(ii)   1.   Name and sketch a suitable method of attaching a swing door
to the rear of the skip.

2.   Name and sketch a suitable mechanism to raise and lower the
skip on the truck.

10 marks

(iii)   Sketch **two** safety features which should be included in this student design.

5 marks

2 (a) The circuit shown is designed to turn on a water pump if low water levels are detected in a fish tank.
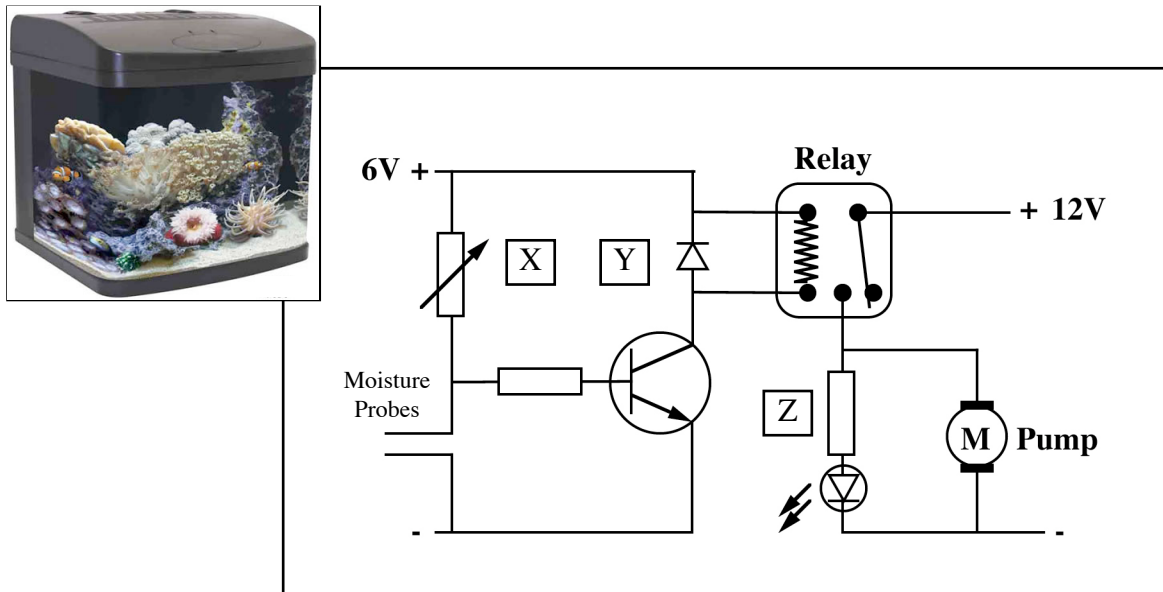
(i)   1.   Identify the component labelled 'X' and state the function of this component in the circuit.

       2.   Explain how the circuit would function if component 'X' and the moisture probes were interchanged in the circuit.

       3.   Identify the component labelled 'Y' in the circuit.

(ii)   1.   Which one of the pins labelled 'R', 'S' or 'T' is the emitter of the transistor shown?
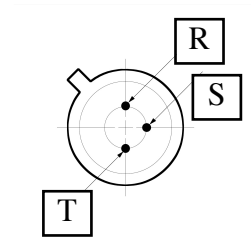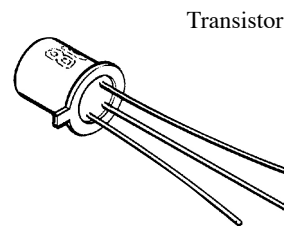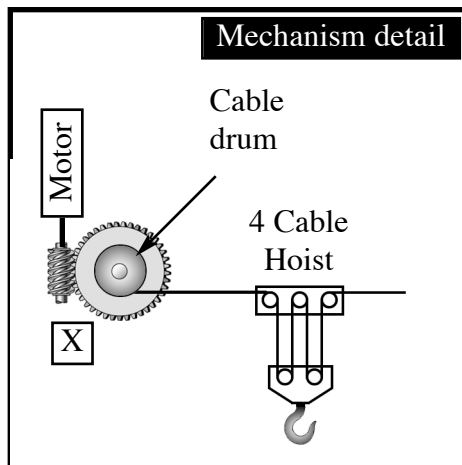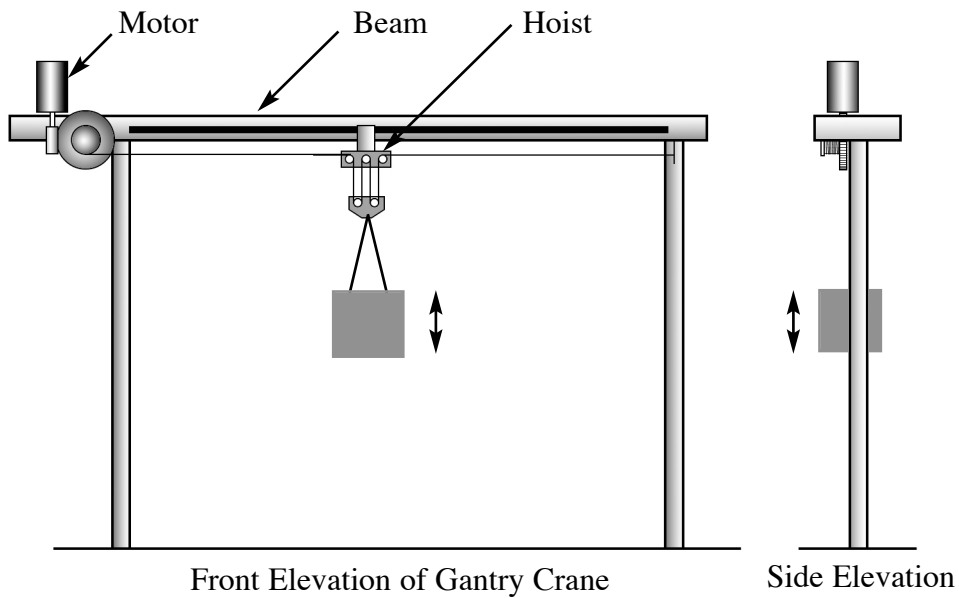
       2.   Name the type of relay shown in the circuit above and explain why a relay is required in the circuit.

       3.   Calculate the required value for resistor 'Z' from the following LED data: LED V_f = 2V and LED I_{max} = 20mA.

                                                                                     25 marks

2 (b)   The sketch shows a student design for a motorised hoist on a gantry crane.

Motor   Beam   Hoist

Front Elevation of Gantry Crane   Side Elevation

Mechanism detail

Cable
drum

Motor

4 Cable
Hoist

X

(i)   1.   Name the mechanism attached to the motor at 'X'.

2.   State **two** advantages to the mechanism at 'X' over a compound gear system.

3.   State **two** advantages of using the **four cable** hoist, as shown above.

15 marks

(ii)   Sketch a mechanism which will move the hoist along the beam.

5 marks

(iii)   The gantry crane structure shown above is unstable.

Sketch **two** structural features which will increase the stability of the crane.

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**

The design of modern mobile phones has changed dramatically
since they were first introduced.

(a)   (i)   Describe **one** technological advance which made these design changes possible.

        (ii)   Describe **one** additional function available only in modern mobile phones.

                                                                                                    10 marks

The technologies of GPS, GSM, Sat Nav, DVD, MP3 and USB are in common use.

(b)   (i)   Explain the meaning of any **two** of these technological terms.

        (ii)   For each of the **two** selected terms, outline the advantages of
                these new technologies.

   20 marks

Scientists have warned that fossil fuels are a dwindling resource.

(c)   Outline **two** other problems associated with the continued use of fossil fuels.

                                                                                                    10 marks

(d)   Outline the alternative fuel sources which could be used to provide for the following:

        (i)   public and private transport,

        (ii)   electrical supply to industry and homes.

                                                                                                    10 marks

4.   Control Systems & Technology and Society

Robots are commonly used in industry
and in planetary exploration.
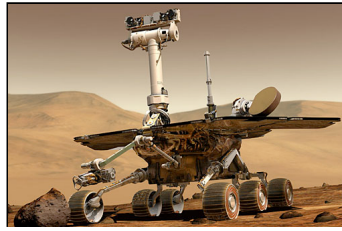
(a)   (i)   Explain **where** and **why** robots are used in industry.

(ii)   Explain how the actions of industrial robots are **controlled** and **modified**.

(iii)   Outline **two** differences between robots used in industry and in planetary
exploration.

(iv)   Outline **two** other applications of robotics.

40 marks

Manufacturing jobs in Ireland are frequently lost to developing countries.

(b)   (i)   Explain why jobs are being transferred to other countries.

(ii)   Outline the type of skills required by the Irish workforce to maintain
employment in Ireland.

10 marks

5.   Design and Manufacture

Microswitch

A student is required to manufacture a
model lighthouse with a flashing light
based on the design shown.
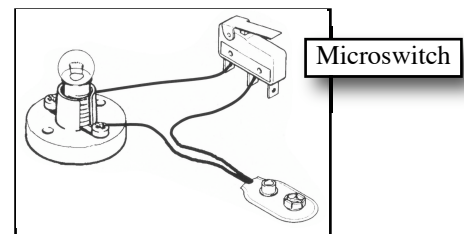
(a)   Describe, with the aid of suitable sketches, the steps required
to manufacture the main lighthouse structure from a suitable material.
Name **three** tools and processes required to manufacture the lighthouse structure.

20 marks

(b)   (i)   Describe, with the aid of suitable sketches, a motorised mechanical system
to activate the flashing light by opening and closing the microswitch.

(ii)   Explain how this mechanical system could be modified to change the
number of light flashes per minute.

(iii)   Describe, with the aid of suitable sketches, how this motorised mechanical
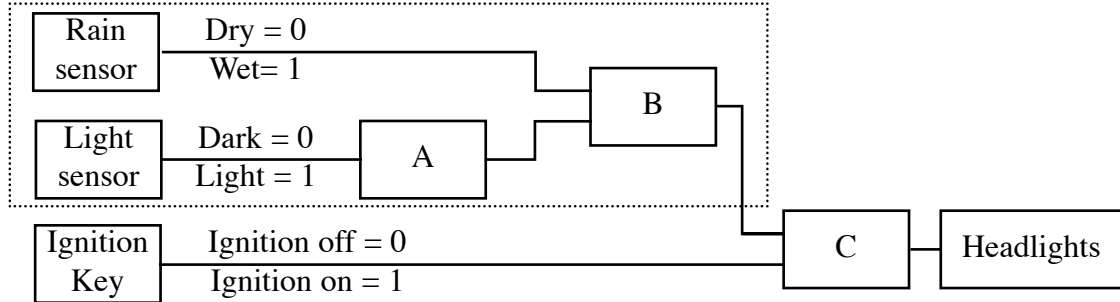system could be activated automatically at nightfall.

30 marks

6. Control Systems

A block diagram for a motor car safety system is shown.

The system will automatically switch on the car headlights when it is dark or when it rains. The system will operate only when the ignition key is turned on.
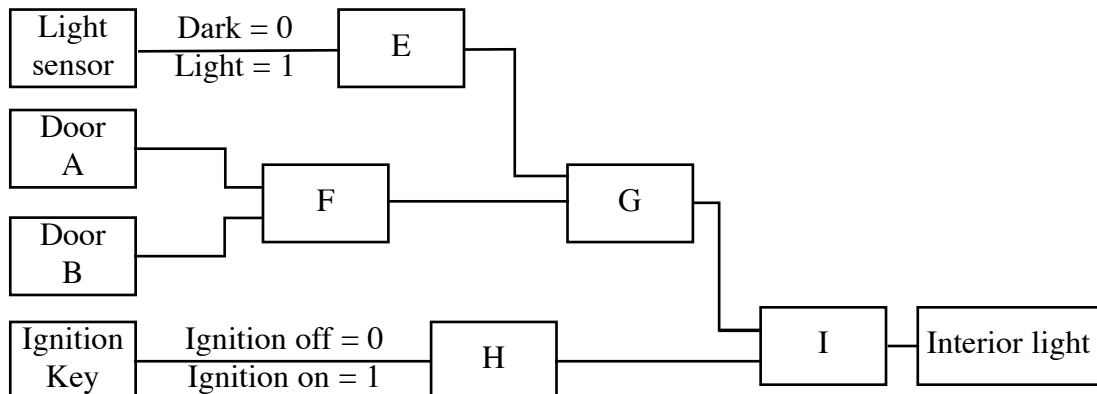
Rain sensor	Dry = 0 Wet= 1			
Light sensor	Dark = 0 Light = 1	A	B	
Ignition Key	Ignition off = 0 Ignition on = 1		C	Headlights

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

(ii)   Sketch and complete a truth table for logic gates A and C.

(iii)   The block diagram below shows a modification to this system to allow the driver switch on the lights when required.

Ignition Key	Ignition off = 0 Ignition on = 1	C		
Over ride switch			D	Headlights
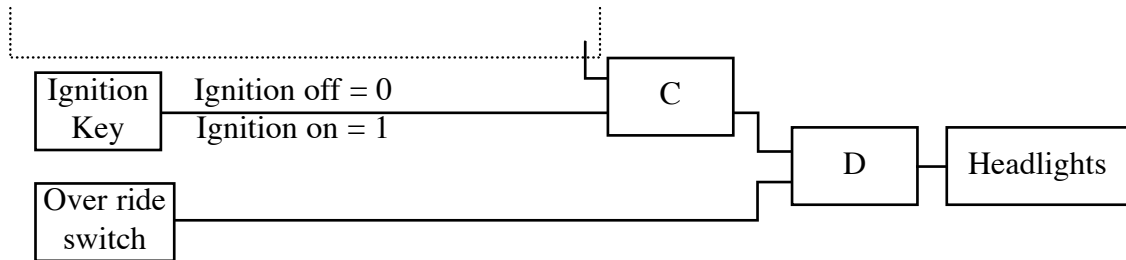
(iv)   Name the gate required at 'D' and explain why the system will work with the selected gate.

30 marks

(b)   A second system is required to turn on the interior light at night, if either the driver door or the passenger door is opened. The interior light must turn off if the ignition key is turned on.

Light sensor	Dark = 0 Light = 1	E			
Door A		F	G		
Door B					
Ignition Key	Ignition off = 0 Ignition on = 1	H		I	Interior light

Name the gates required at E, F, G, H and I for this system.

20 marks