



Junior Certificate Examination, 2012

Technology

Higher Level

Wednesday, 20th June
Afternoon, 2:00 - 4:00

Section B and Section C

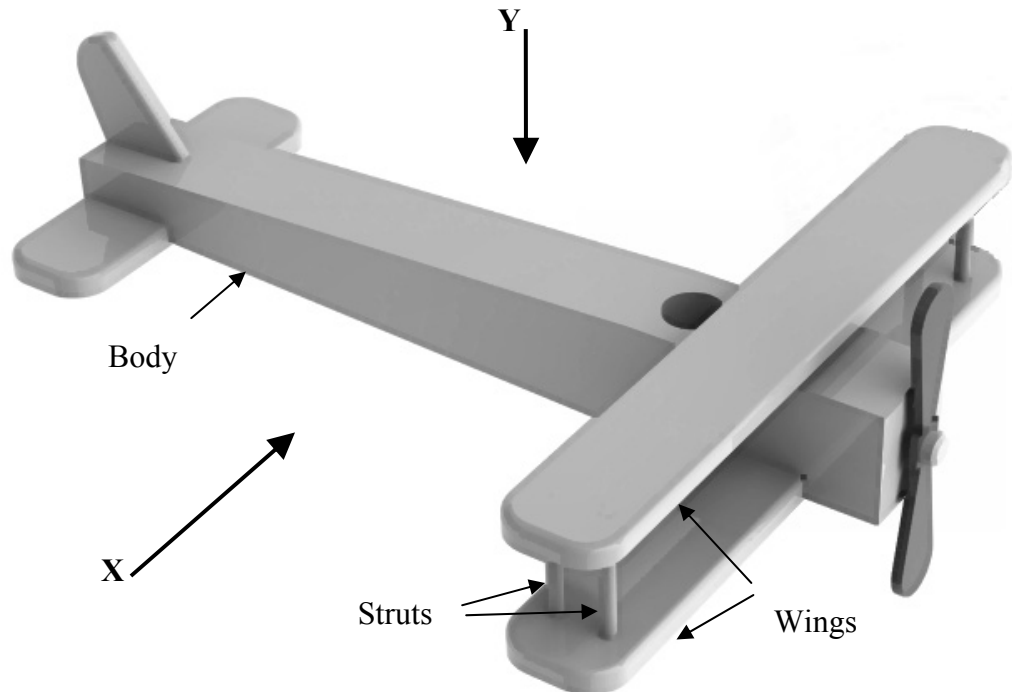
Section B - 50 marks

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.

- 1 (a) The graphic shows a design for a toy plane. The body is made from $30 \times 30\text{mm}$ red deal. The wings are made from 30mm wide strips of 6mm acrylic.



- (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 body of the plane.
 2. Design, using suitable sketches, a suitable undercarriage for the toy. Explain how the undercarriage will be attached to the body of the plane.

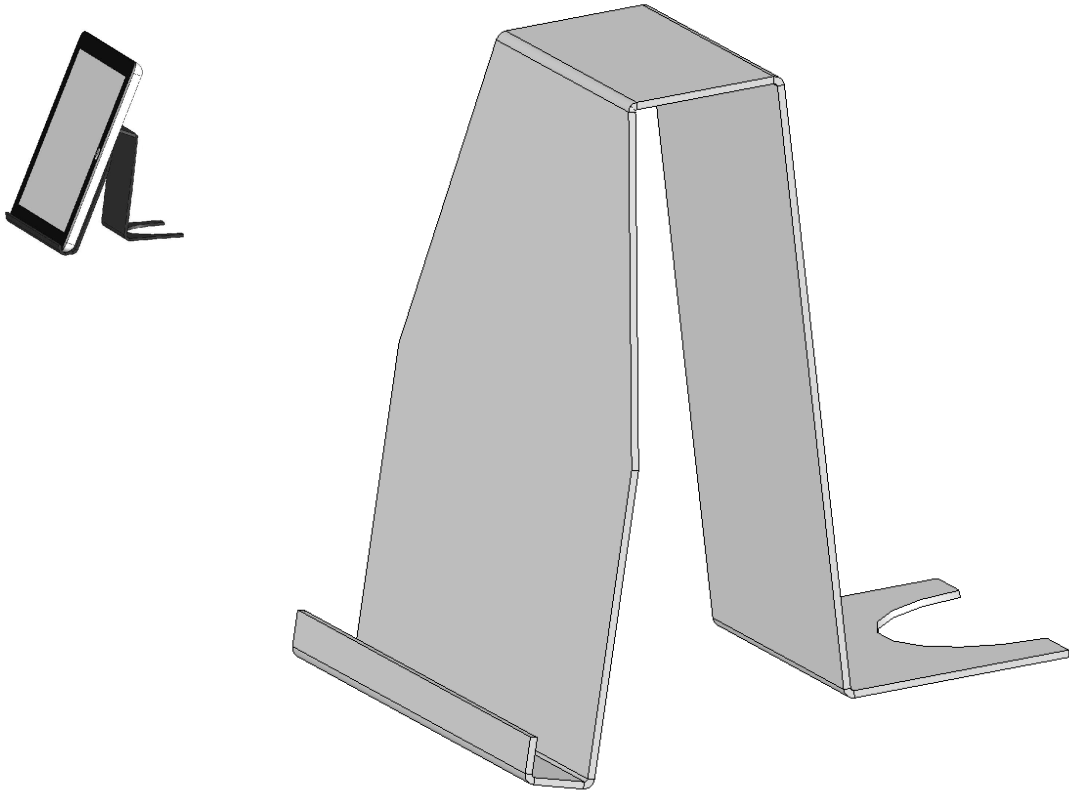
10 marks

- (iii) Describe the steps required to manufacture the wings and struts.

5 marks

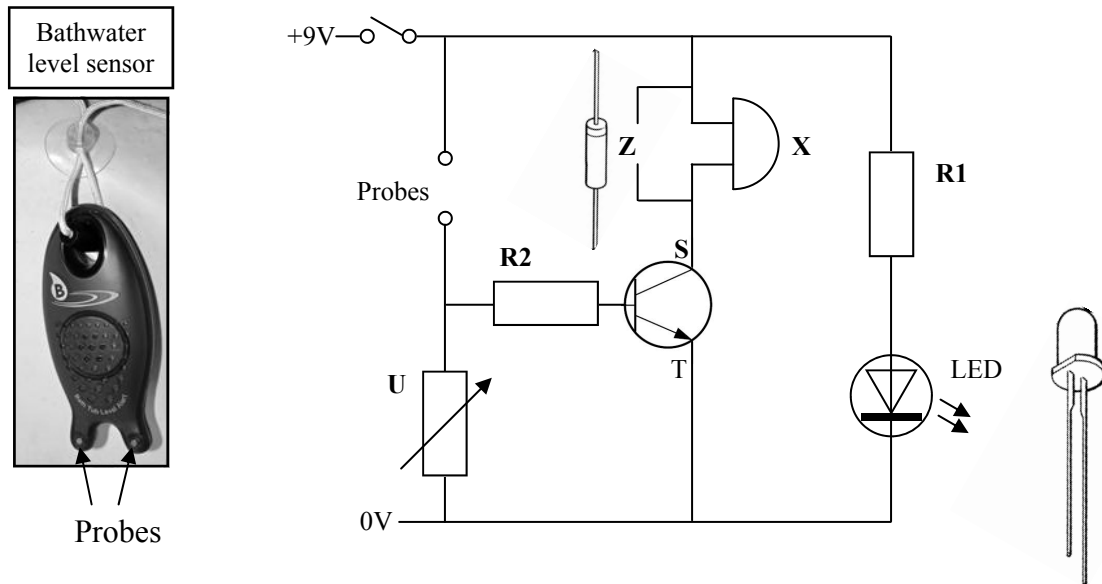
- OR -

- 1 (b) The graphics show a design for an iPad stand.
The design is to be made from **one** piece of acrylic sheet.



- (i) Make a well-proportioned sketch of a **development** of the stand.
Indicate clearly on your sketch the position of all bend lines. 10 marks
- (ii)
 1. Explain, using sketches, how the stand could be made from the acrylic sheet.
 2. Explain, using sketches, how the edges of the acrylic should be finished.10 marks
- (iii) When testing the design, the iPad was found to slip out the side of the stand.
Using sketches, suggest a suitable method of preventing this. 5 marks

- 2 (a) Shown is an electronic circuit for a bathwater level sensor, and a housing for the completed device. The device will alert the user when the water level in a bath reaches a set height.



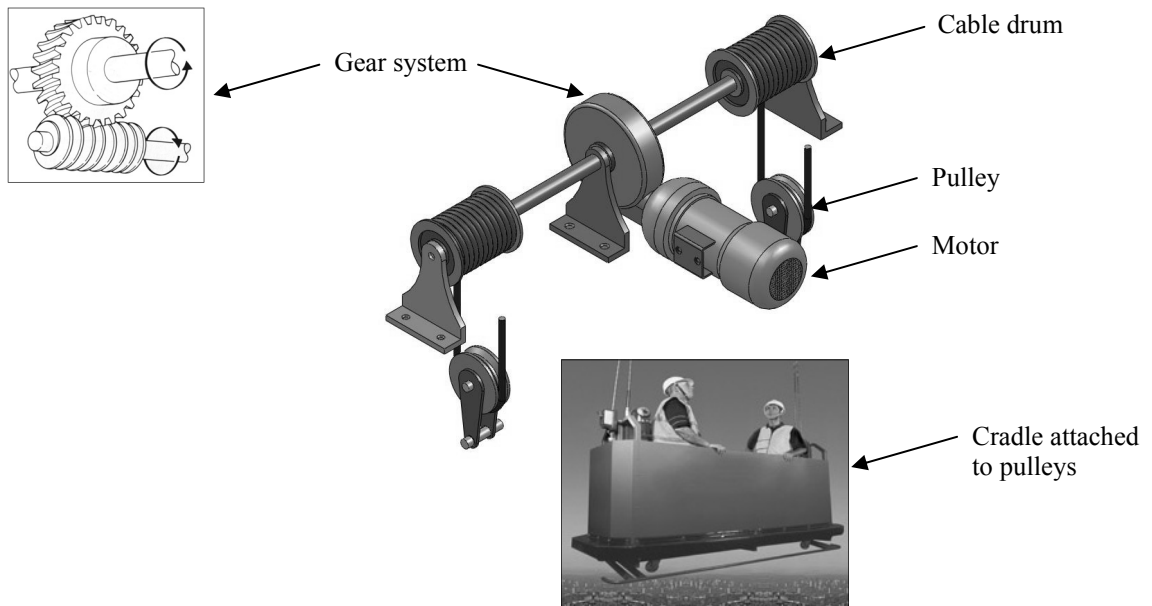
- Identify the component at **X**.
- Name, and sketch the symbol for, the additional component required at **Z** to prevent component **X** from damaging the transistor.
- Name the legs of the transistor, labelled **S** and **T**.
- State **two** ways in which the cathode of the LED can be identified on the component.
- Explain why component **U** is required in the circuit.
- A 330Ω resistor is required at **R1** and a $2k2$ resistor is required at **R2**. Using the colour code table below, state the colour codes for **each** of these resistors.

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

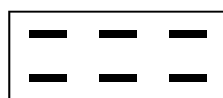
25 marks

- OR -

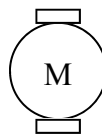
2 (b) The graphics show a mechanism used to raise and lower a two-person maintenance cradle on the outside of a tall building.



- (i) Name the mechanism shown in the gear system and state **two** advantages of using this gear system in this situation.
- (ii) Name and sketch an alternative gear system which could be attached to the motor and used to power the cable drums.
- (iii) A working model of the controls for raising and lowering the cradle uses a DPDT switch and a motor. Copy the symbols for the switch and motor into your answerbook and show how they should be connected to allow the motor to turn both clockwise and anticlockwise.



DPDT switch



- (iv) The cradle is intended to remain outdoors in all types of weather. Name a suitable material from which the cradle could be manufactured and state **two** reasons for your choice.

25 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

- (a) Web-based social networking sites have become an important part of the internet.
- Outline, using **two** examples, some of the services provided by these sites.
 - Explain, using **two** examples, the impact these services have had on society.
 - In relation to these services explain any **two** of the following terms:
 - Profile
 - Blog
 - Identity theft
 - Privacy.

30 marks

- (b) WiFi technology has become very common in recent years.



- Explain what is meant by WiFi technology.
- In relation to WiFi explain the term 'access point' (hotspot).
- Outline, using **two** examples, some of the benefits of WiFi technology.

20 marks

4. Control Systems & Technology and Society

The Mars Science Laboratory ‘Curiosity’ is a mobile robot intended to explore the surface of Mars.

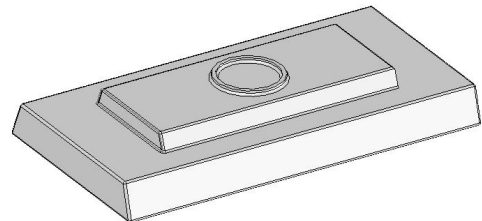


- (a) (i) Explain, giving **two** reasons, why a robot is needed to explore the surface of Mars.
- (ii) A nuclear power source will generate electricity for the robot. Explain briefly, why this is the most appropriate energy source for use on Mars.
- (iii) An on-board computer will monitor and control the robot’s operations. Explain briefly, what is meant by **each** of the terms **monitor** and **control** in the context of this robot.
- (b) (i) Robots are commonly used in industry. Outline, using **two** examples, where robots are used in industry.
- (ii) Outline **two** areas of expertise, required by operators, in order to service and maintain industrial robots.
- (iii) Outline **one** example of the use of a robotic device in the home.

50 marks

5. Design and Manufacture

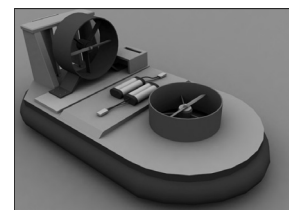
A student is required to manufacture a working model of a hovercraft using the vacuum forming mould shown.



- (a) (i) Describe, with the aid of sketches, the steps required to manufacture the mould. Name the materials, tools and processes used.
- (ii) Describe, with the aid of sketches, **two** modifications to improve the mould design.
- (iii) Describe, with the aid of sketches, the steps required to vacuum form the body of the hovercraft from a sheet of 3mm acrylic.

25 marks

- (b) (i) Describe, with the aid of sketches, the steps required to motorise the hovercraft for lift.
- (ii) Describe, with the aid of sketches, the steps required to motorise the hovercraft for forward motion.
- (iii) Sketch a suitable circuit diagram to operate the hovercraft’s motors from a single power source.



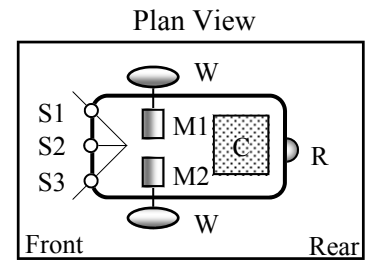
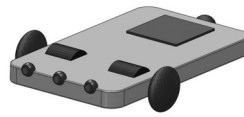
25 marks

6. Control Systems

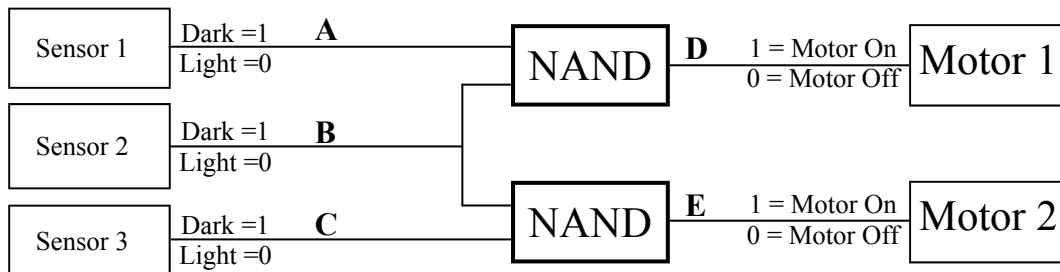
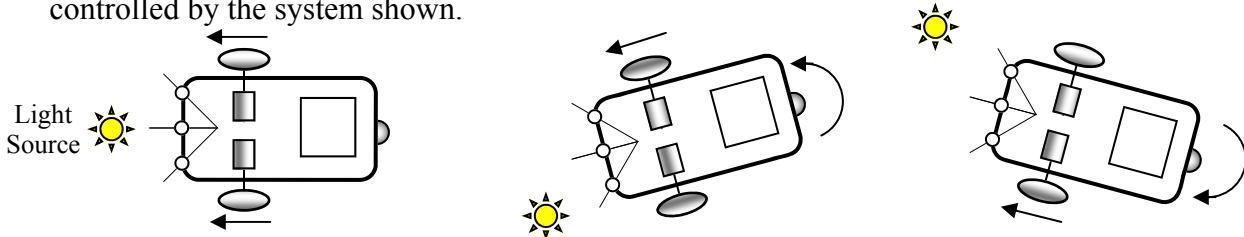
The graphics show a student design for a light-sensing buggy.

The buggy contains the following parts:

- 3 light sensors (S1, S2 & S3)
- two motor-driven wheels (W)
- one free turning rear wheel (R)
- a suitable control circuit (C).



The buggy is designed to move forward or turn towards a light source by running one or both motors, controlled by the system shown.



- (a) (i) Name a suitable component for use at S (light sensor).
- (ii) What property of this component changes with changing light levels?
- (iii) The light sensors will be placed in a 'potential divider' in the circuit. Explain what is meant by a 'potential divider' and outline why a potential divider is required.

- (b) (i) Shown is an incomplete truth table for the buggy control system. The system uses NAND gates (AND followed by NOT). In your answerbook, copy and complete the truth table for the system shown.

A	B	C	D	E
1	1	1		
1	1	0		
1	0	0		
0	0	1		
0	0	0		

- (ii) From the truth table identify the sensor states (light or dark) which will cause the buggy to turn left or right.
- (c) Outline a suitable modification to this system which will turn on a flashing LED only when both motors are turned off.

50 marks