



*Leaving Certificate Examination, 2010*

# *Technology*

## *Ordinary Level*

*Friday, 25 June*  
*Afternoon, 2:00 - 4:00*

### *Section B - Core* (48 marks)

*Answer both questions.*

*Each question in Section B carries 24 marks.*

### *Section C - Options* (80 marks)

*Answer two of the five options presented.*

*All questions in Section C carry 40 marks.*

#### ***Instructions:***

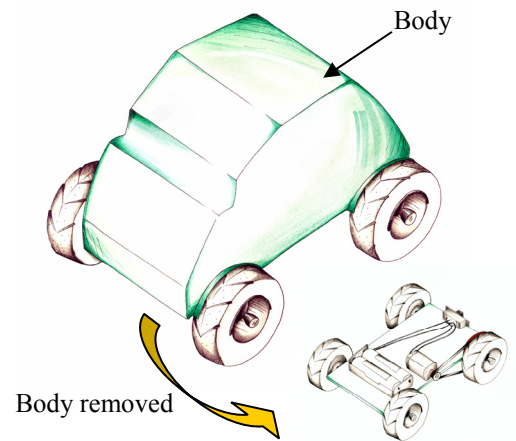
- (a) Answer these questions in the answerbook provided.*
- (b) Write your examination number on the answerbook.*
- (c) Draw all sketches in pencil.*
- (d) Hand up the answerbook at the end of the examination.*

## Section B - Core *Answer Question 2 and Question 3.*

### Question 2 - Answer 2(a) and 2(b)

2(a) The 3D graphics show a model of a four-wheel buggy.

- (i) Choose a suitable material for the manufacture of the **body** of the buggy.  
Give **one** reason to justify your selection.
- (ii) Suggest a suitable manufacturing process for making the **body** and outline the key stages of this manufacturing process.



2(b) The buggy is to be able to move both forward and in reverse. A green LED indicates when the buggy is moving forward and a red LED indicates when the buggy is reversing.

- (i) Sketch an LED and identify on your sketch the *anode* and the *cathode*.
- (ii) Draw a circuit diagram which will allow the buggy to move as outlined in 2(b) above.  
Include the green and the red LEDs in your circuit diagram.
- (iii) Outline using notes and annotated sketches a suitable method of joining the body of the buggy to the chassis. This method must facilitate the removal of the body when the batteries need to be changed.

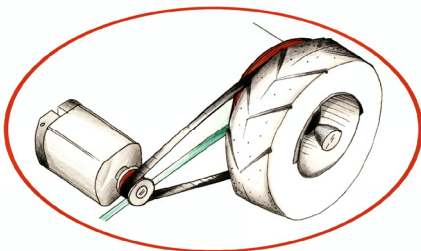
### Answer 2(c) or 2(d)

2(c)

- (i) A student has produced design sketches of a buggy. Describe how these sketches could be captured electronically and incorporated into a design portfolio.
- (ii) The use of ICT can greatly enhance the presentation of a design portfolio.  
Outline **two** software applications that could be used for this purpose.

OR

2(d)

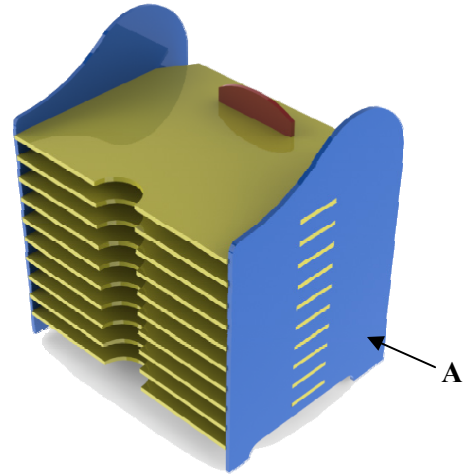


- (i) The pulley system used to drive the buggy was found to slip frequently.  
Outline, using notes and an annotated sketch, a modification to the pulley system which would resolve this problem.
- (ii) Suggest an alternative drive mechanism that might be used in place of the pulley system. Give **one** advantage and **one** disadvantage of your suggested mechanism.

**Question 3 - Answer 3(a) and 3(b)**

**3(a)** The 3D graphic shows a student's design for a DVD holder. The holder will be made from acrylic.

- (i) List **three** manufacturing processes that could be used in making this DVD holder.
- (ii) Sketch a well-proportioned plan view of the DVD holder. Apply suitable rendering to your sketch.



**3(b)**

- (i) Describe, using notes and annotated sketches, how the side **A** of the holder could be manufactured.
- (ii) When manufacturing the DVD holder, all the shelves should be exactly the same size and shape. Outline how this could best be achieved.
- (iii) Suggest a suitable adhesive for joining acrylic. Give **one** reason why the adhesive you have chosen is suitable.

**Answer 3(c) or 3(d)**

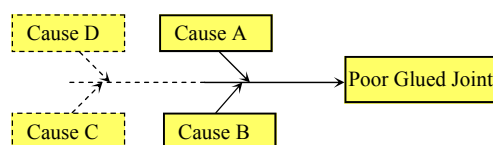
**3(c)**

- (i) Describe how making a scale model of a proposed design can assist a student in finding the best solution to a design problem.
- (ii) Construct a Work Breakdown Structure (WBS) for the tasks associated with the manufacture of the DVD holder.

**OR**

**3(d)**

- (i) Outline what any **two** parts of the **PDSA** Deming Cycle refer to in relation to quality management.
- (ii) Having glued together two pieces of acrylic for the DVD holder above, the quality of the glued joint was very poor. Using a *cause and effect diagram* identify possible causes of this problem.



# Section C - Options - Answer any two of the Options

## Option 1 - Applied Control Systems - Answer 1(a) and 1(b)

1(a)



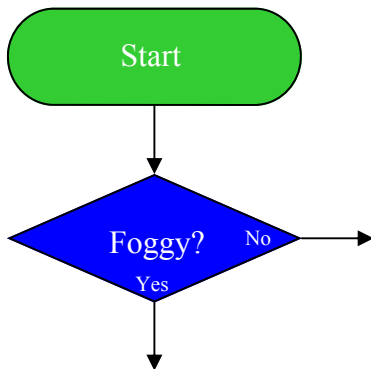
- (i) Describe using a simple sketch, how *pin no.1* can be identified and located on a Peripheral Interface Controller (PIC).
- (ii) Outline briefly why PICs are used in the manufacture of interactive toys such as the toy dog shown.

1(b)

- (i) Outline what is meant by the term *Robotics*.
- (ii) Explain **one** of the following terms: *Humanoid Robot*; *Cartesian Robot*.
- (iii) For hundreds of years, lighthouses have served as beacons in the night for both navigators and those lost at sea. Countless ships and lives have been saved due to the use of warning lights and foghorns.



Draw a flowchart to control the following output devices for a model lighthouse in the following sequence:

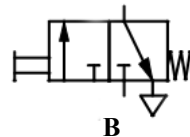
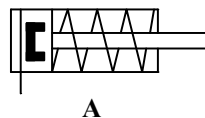


- If conditions become foggy, sound the buzzer for 5 seconds and then switch it off for 2 seconds.
- Repeat this process continuously.
- If conditions are not foggy, switch the light on for 2 seconds, and then switch it off for 1 second.
- Repeat this process continuously.

Answer 1(c) or 1(d)

1(c)

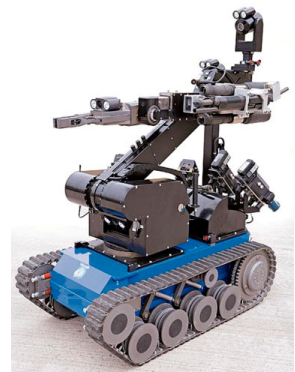
- (i) Give **two** examples of the use of pneumatics in the food handling/production industry. Suggest **one** reason why pneumatics are suitable for **each** of the examples you have given.
- (ii) The graphics at **A** and **B** show the symbols for two pneumatic components. Name the components **A** and **B** and describe how **one** of them works.



OR

1(d)

- (i) Suggest **two** reasons why robots might be used instead of soldiers to dispose of bombs.
- (ii) *Work Envelope* is a term used in robotics. Outline what is meant by the term *Work Envelope*.



## Option 2 - Electronics and Control - Answer 2(a) and 2(b)

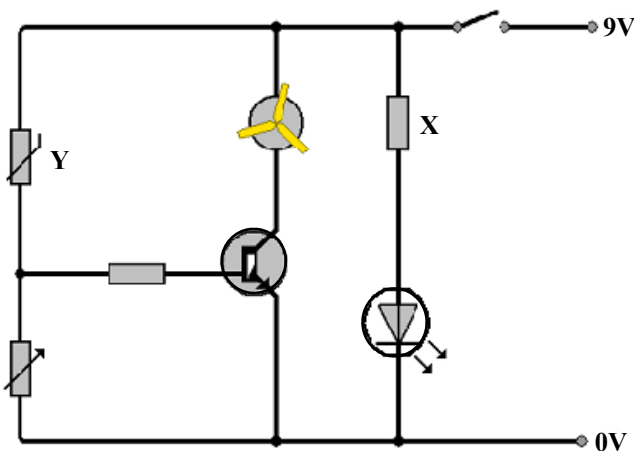
2(a)

- (i) The graphic shows a common transistor. Using a simple sketch show the pin arrangement for the *collector*, *base* and *emitter*.
- (ii) State **two** functions of transistors in circuit design.



2(b)

The transistor circuit shown is used to activate a motorised fan when a high temperature is detected.



- (i) What is the function of the resistor **X**?
- (ii) Name component **Y** and explain its function in the circuit.
- (iii) When the circuit was built it was found that the single transistor did not supply enough current to power the motor. Redraw the circuit replacing the single transistor with a *Darlington Pair* of transistors.

Answer 2(c) or 2(d)

2(c)

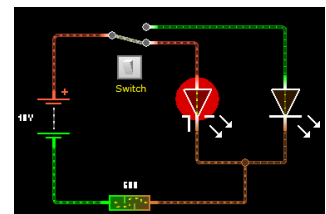
- (i) A relay is an example of an electro-mechanical switch. Give **two** examples of where relays could be used in everyday life.
- (ii) Outline why a relay is used in **one** of the examples you have given in 2(c)(i) above.



OR

2(d)

- (i) In producing circuits, students often prefer to use printed circuit boards (PCBs) rather than copper stripboard. Give **two** reasons why this might be the case.
- (ii) When designing a circuit, outline the main advantages of using a circuit simulation software program.



**Option 3 - Information and Communications Technology - Answer 3(a) and 3(b)**

3(a)



- (i) Name **two** peripheral devices that can be connected to a computer.
- (ii) List **two** functions of a computer operating system (OS).

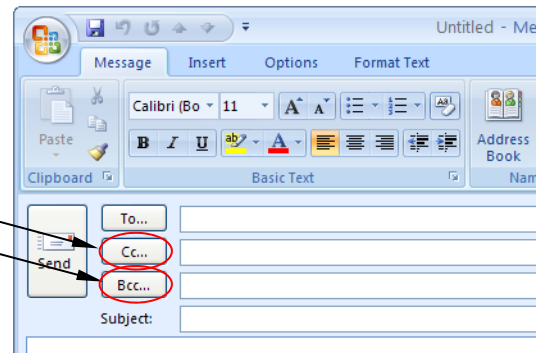
3(b)

- (i) Outline **two** advantages for companies of using email, rather than the traditional postal service, when contacting customers.
- (ii) Explain what any **two** parts of the email address shown represent:



[darraghm@gmail.com](mailto:darraghm@gmail.com)

- (iii) Outline the difference between *CC* and *BCC* when sending an email to numerous recipients.



**Answer 3(c) or 3(d)**

3(c)



The graphic shows a computer *motherboard*.

- (i) Explain the meaning of the term motherboard.
- (ii) Name **two** components found on the motherboard.
- (iii) Explain the function of **each** component you have named.

**OR**

3(d)

- (i) When working on a computer, important files and programmes should be *backed up* regularly. Explain why regular back up is an important part of file management.
- (ii) Outline **two** methods which can be used to provide back up for your files.

## Option 4 - Manufacturing Systems - Answer 4(a) and 4(b)

4(a)

Market research is a fundamental process which should be carried out before a new product is manufactured.



- (i) Give **two** reasons for carrying out market research prior to the manufacture of a new product.
- (ii) Outline **two** techniques that might be used to gather information when conducting market research.

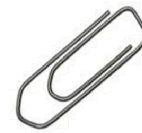
4(b)

Once-off, Batch and Mass Production are manufacturing processes used in producing everyday products.

- (i) The graphics show three manufactured products. Select an appropriate manufacturing process for **each** of the items shown.



Washing Machine



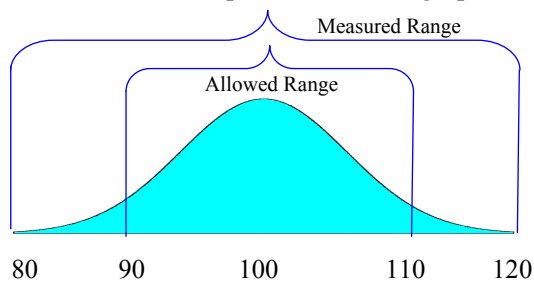
Paper Clip



Satellite

- (ii) Outline the reasons for your choice of manufacturing process in **each** case.

- (iii) A company conducted a *process capability survey* on how well their paper clips were being packed into boxes for distribution. Each box should contain approximately 100 clips. The results were presented in the graph shown below.



Outline briefly what the graph indicates to the company about the process of packing the boxes.

Answer 4(c) or 4(d)

4(c)

Just-In-Time (JIT) manufacturing was developed by the Toyota car company in the 1950s.

- (i) Describe what is meant by Just-In-Time manufacturing.
- (ii) Outline **two** benefits of JIT manufacturing for an aircraft manufacturer such as Boeing.

OR

4(d)

Stage productions such as U2's 360° tour can have large operational costs, as well as presenting huge logistical challenges in moving the production to new venues in foreign countries.



- (i) A *quality characteristic* of the stage production is sound quality. Describe **one quality attribute** of the sound system which would have an effect on this.
- (ii) Working as a team is essential in ensuring that the stage is completed on time at each new venue.  
Outline **two** elements of team work that you consider most important in achieving this task.

## Option 5 - Materials Technology - Answer 5(a) and 5(b)

5(a)

- (i) The graphics show a gear and a bicycle frame.  
Name a suitable material for the manufacture of **each** item.
- (ii) In **each** case, outline **two** properties of the material that make it suitable for the product.



Gear



Bicycle Frame

5(b)

The graphic below shows a spiral staircase.

- (i) Choose **two** materials that would be suitable for the production of the handrail for such a staircase.
- (ii) Using annotated sketches, describe a suitable method of joining the steps to the frame.
- (iii) Strength and safety when in use are two key requirements of wooden steps in a staircase.
  - Sketch a plan of a step indicating the direction of the wood grain which would best meet these requirements.
  - Outline **one** consequence if the step is not designed and manufactured with the direction of the wood grain in mind.



Answer 5(c) or 5(d)

5(c)



- (i) *Smart Materials* have become an important category of materials for designers and manufacturers.  
What is meant by the term Smart Material?
- (ii) Give **two** examples of Smart Materials and for **each** of your examples suggest an appropriate use.

OR

5(d)

- (i) Some materials are prone to *corrosion*. Explain the term corrosion.
- (ii) Corrosion can be avoided by *choosing appropriate materials* or by *applying surface treatments*.  
Give **one** example of each of the methods of corrosion prevention mentioned above.





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