



Leaving Certificate Examination, 2016

Technology

Ordinary Level

Friday, 24 June
Morning, 9:30 - 11:30

There are **three** Sections in this paper. Attempt **all three** Sections.

Section A: Core - Short-answer questions.

Section B: Core - Long-answer questions.

Section C: Options - Long-answer questions.

Section A - Core (72 marks)

Instructions:

- (a) Answer **any nine** questions in the spaces provided.
All questions in Section A carry 8 marks.
- (b) Draw all sketches in pencil.
- (c) Hand up this booklet at the end of the examination.
- (d) Write your examination number in the box provided
and on all other pages used.

Examination Number:

Centre Number

Section	Mark
Section A	
Section B	
Section C	
Total	
Grade	

Section A. Answer **any nine** questions. All questions carry 8 marks.

1. Wearable devices such as the activity tracker shown have become very popular. Some of these devices make use of *GPS* technology.

- (i) Suggest **two** health benefits for a person who uses a smart device such as an activity tracker.

1. _____
2. _____

- (ii) Explain the abbreviation GPS.



2.



The image shows a unique bike rack in Roanoke, Virginia, USA.

- (i) Name a suitable *wood* for the bike rack.

Wood: _____

- (ii) Describe how the wood chosen above could be treated to help prolong its life outdoors.

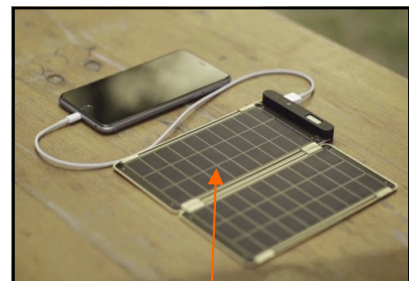
3.

Solar Paper® is one of the thinnest and lightest personal solar chargers in the world. A standard smart phone can be fully charged in about two hours using this device.

Give **two** advantages of using Solar Paper.

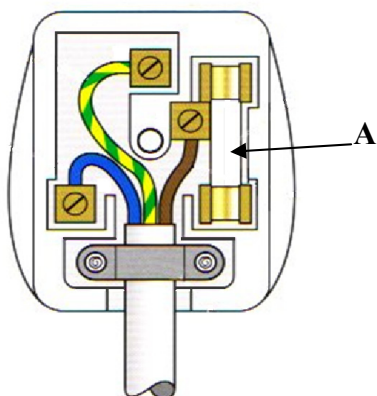
1. _____

2. _____



Solar Paper®

4. The graphic shows the wiring of a domestic 3-pin plug.



- (i) State the colour coding of the *earth wire* and the *neutral wire*.

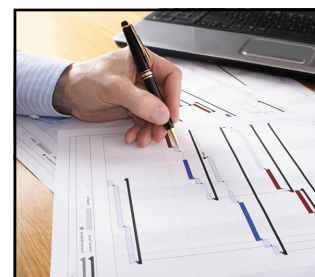
Earth wire: _____

Neutral wire: _____

- (ii) What is the purpose of fuse A?

5. Students often construct a *Gantt chart* during the planning stage of a project task.

- (i) Explain what is meant by a Gantt chart.



- (ii) Give **one** benefit for a road building company which uses Gantt charts when planning its work.

6. The image shows a bike frame that has been *prototyped* using a 3D printer.

Give **two** advantages of producing a prototype before manufacturing a product.

1. _____

2. _____



7. In the box provided, make a well proportioned 2D sketch of the chair shown when viewed in the direction of the arrow A.



8. The image shows an LED mounted on a *PCB*.
(i) Explain the abbreviation *PCB*.



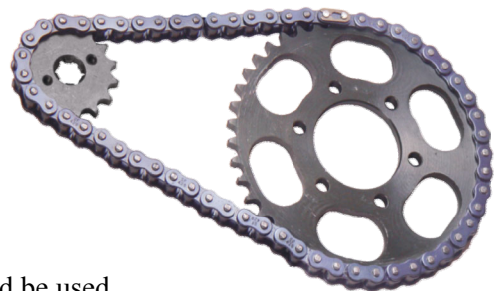
- (ii) Calculate the value of the *voltage* across the LED if the current is 0.012 amps and the resistance of the LED is 200 ohms.

Note: $V = I \times R$

Calculation:

9. The image shows a mechanism commonly used to transmit rotary motion from one shaft to another.

- (i) Name the mechanism shown.



- (ii) Give **one** example of where this mechanism could be used.

10. The image shows a machine commonly used in Technology workshops.

(i) Name the machine shown.

(ii) Give **two** specific safety precautions which should be observed when using this machine.

1. _____

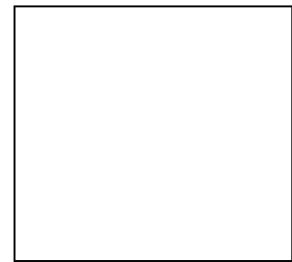
2. _____



11. Steel beams are often used to construct the frame structure of buildings.



(i) In the box provided, sketch the profile (cross-section) of **one** steel beam used in frame structures.



(ii) Name **one** *permanent* and **one** *semi-permanent* joint used to assemble beam structures.

Permanent joint: _____

Semi-Permanent Joint: _____

12. Use **two** graphic techniques to enhance the graphic representation of the claw hammer shown.



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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 image at **2(b)** below shows a water and food dispenser for use by pet animals such as dogs. The height of the water container can be adjusted to suit the pet.

- (i) Outline **two** reasons why plastics are popular in the manufacture of products like the water and food dispenser shown.
- (ii) Describe using notes and annotated sketches how the height of the water container **B** could be adjusted on the column **C**.

2(b) The base **A** of the product has been manufactured using a *thermoplastic* material.

- (i) Briefly describe what is meant by a thermoplastic material.
- (ii) Suggest a suitable plastic for the base **A**.
- (iii) An electronic circuit is required to activate a light which illuminates the feeder when darkness falls.
Draw a labelled diagram of a suitable circuit to activate the light as required.



Answer 2(c) or 2(d)

2(c) A manufacturer has issued a *product recall* for a pet feeder similar to the one shown at **2(b)** above.



- (i) Outline **two** reasons why a product might be recalled by a manufacturer.
- (ii) Describe **two** consequences for a manufacturer when a product has to be recalled.

OR

2(d) The image shows a model in card, produced by a student when developing a response to a design brief.

- (i) Describe **two** ways in which producing a card model can benefit a student when developing a design.
- (ii) Give **one** example of how the environmental impact of producing a technology task can be reduced.



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

3(a) In 2015, *drones* (Unmanned Aerial Vehicles) and other modern technological devices were used to enhance the television coverage of the U.S. Open Golf Championship.

- (i) Give **two** advantages of using drones in television coverage of sporting events.
- (ii) Give a brief outline of **two** other uses of new technologies in sporting events.



3(b) The images show a drone with a 14 megapixel camera attached. Images from the camera are stored on a 32 GB SD card.

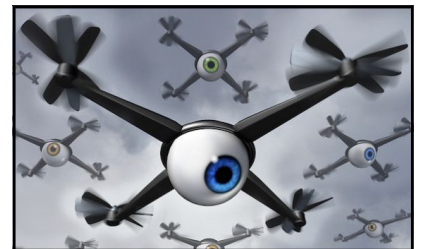


- (i) Name **one** energy conversion that takes place when a drone is in flight.
- (ii) Using notes and annotated sketches, suggest a suitable method of rotating the camera while in use.
- (iii) Explain what is meant by '32 GB SD card' when referring to data storage.

Answer 3(c) or 3(d)

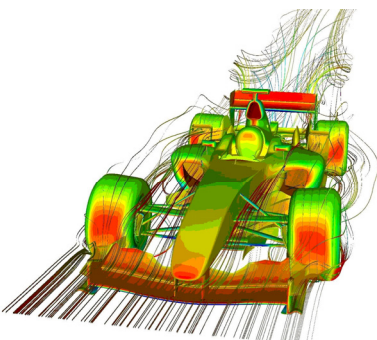
3(c) The increased use of drones has raised concerns among the general public.

- (i) Outline **two** problems for the general public arising from the increased use of drones.
- (ii) The use of drones can also be of benefit to society.
Give **one** example where the use of drones might benefit society and the general public.



OR

3(d) Computer *simulation* software is often used during the design stage of a new product.



- (i) Suggest **two** benefits of using computer simulation to improve the design of cars such as a Formula One racing car.
- (ii) Briefly describe **one** other situation where computer simulation software is used in everyday life.

Section C - Options - Answer any two of the Options

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

1(a) The image shows a *Furby*® toy which includes a microcontroller chip.

- (i) When a switch is pressed, a tune plays and then the eyes light up for ten seconds before turning off again.

Complete a flowchart programme to satisfy these conditions.

- (ii) Name **two** household items that use microcontrollers.



1(b) The image shows a robotic arm. The arm has six *degrees of freedom*.

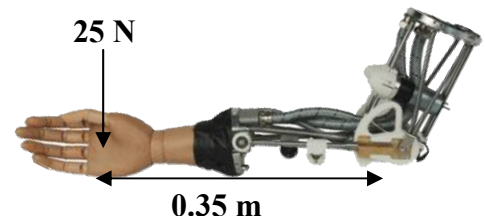


- (i) Describe, using notes and annotated sketches, what is meant by 'degrees of freedom'.
- (ii) Give **two** applications of robots in mass production systems.
- (iii) *In time, robots will outsmart human beings and rule the world!*
Indicate whether you agree or disagree with this statement and briefly justify your answer.

Answer 1(c) or 1(d)

1(c)

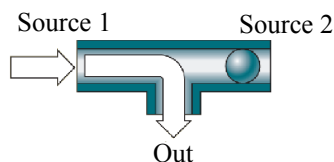
- (i) With reference to the robotic arm shown, describe what is meant by the term *end effector*.
- (ii) Calculate the moment acting about the elbow of the robotic arm if a load of 25 N is acting on the hand.



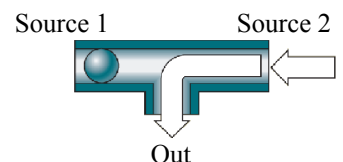
OR

1(d)

- (i) Briefly outline how a pneumatic *shuttle valve* operates with reference to the images shown. Draw the pneumatic symbol for a shuttle valve.



Shuttle Valve



- (ii) Give **two** advantages of using a mini air compressor, similar to that shown.



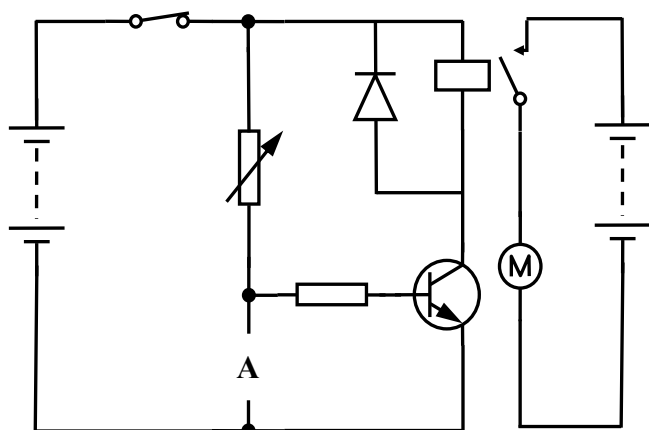
Option 2 - Electronics and Control - Answer 2(a) and 2(b)

2(a) The image shows a universal 2000 mA AC/DC adapter with 3-12 V output.

- Explain what is meant by the abbreviations 'AC' and 'DC'.
- Briefly explain why an adapter, like the one shown, has multiple voltage output options.



2(b) The circuit shown operates a motorised cooling fan when activated by a sensor at A.

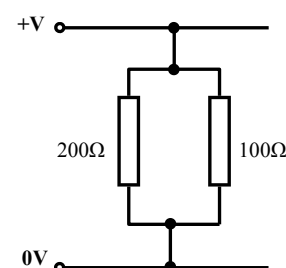


- Suggest a suitable sensor that could be placed at A.
- Redraw the circuit diagram to include the electronic symbol for your chosen sensor.
- Describe why a relay is used in this circuit.

Answer 2(c) or 2(d)

2(c) The graphic shows two resistors connected in *parallel* in a circuit.

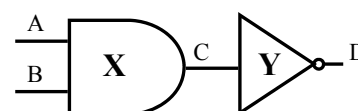
- Calculate the **total resistance** of the two resistors in parallel.
- Other components, such as lights, are often wired in parallel. State **one** advantage of wiring lights in parallel.



OR

2(d) The graphic shows a combination of two logic gates.

- Name the logic gates labelled X and Y.
- In your answerbook, draw and complete the truth table for the combination of logic gates shown.



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

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

3(a) Tablet computers have become very popular in recent times.



- (i) Outline **three** important factors that should be considered when purchasing a tablet computer.
- (ii) Describe **two** ways in which data can be transferred between a tablet and another electronic device.

3(b) Streaming music services typically offer a huge library of songs that users can listen to on a variety of devices. Many people now prefer to listen to music in this way rather than listening to music on CDs.

- (i) Suggest **one** reason why music streaming has become popular with users.
- (ii) Name **one** sound file *extension* commonly used by media companies when recording music.
- (iii) Explain what is meant by *file compression* in relation to audio files.



Answer 3(c) or 3(d)

3(c) Manufacturers continue to improve computers through hardware and software development.



- (i) Explain what is meant by the terms *processor* and *memory* in relation to computer hardware.
- (ii) Give **two** reasons why computer operating systems *automatically update* on a regular basis.

OR

3(d)

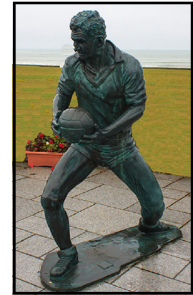
- (i) Give **one** advantage and **one** disadvantage of purchasing goods from *internet auction sites*.
- (ii) Describe **three** ways in which ICT could be used to help a person plan a short break to a European city.



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

4(a) The quantity of a product required can influence the manufacturing system used to produce it. The images show two products which have been made using different manufacturing systems.

- Select an appropriate manufacturing process for **each** of the items shown.
- Outline the reasons for your choice of manufacturing process in **each** case.



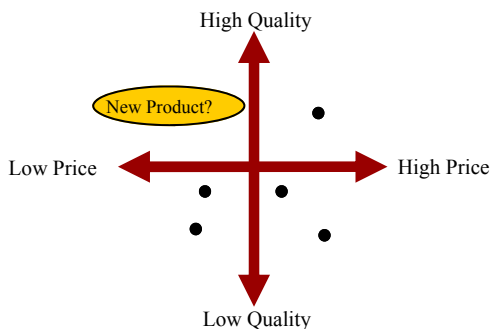
4(b) The table below records the reasons why customers were unhappy with a particular restaurant.

	Overpriced	Wait time	Unfriendly staff	Food not fresh	Too noisy
Percent(%)	50	30	9	7	4

- Draw a Pareto bar chart to represent the data in the table above.
- Plot the cumulative total distribution curve on the graph.
- From the graph, determine the **two** main reasons for customer complaints.

Answer 4(c) or 4(d)

4(c) *Perceptual Mapping* is a technique used by companies when generating ideas for new products.



- Briefly describe how this technique works.
- Explain what is meant by the term *reverse engineering*.

OR

4(d) To maximise repeat sales and build customer loyalty, manufacturers strive to make high quality products.

- Explain what is meant by the term *durability* when referring to the quality of a product.
- Suggest **two** other factors which would indicate that a pair of headphones are of high quality.



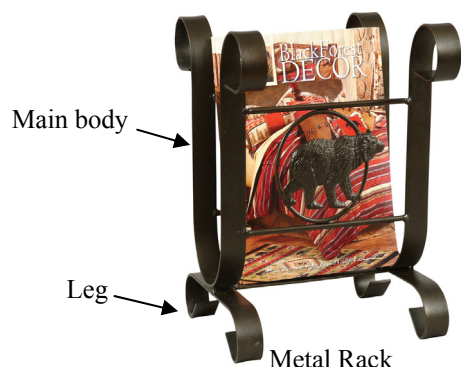
Option 5 - Materials Technology - Answer 5(a) and 5(b)

5(a) Natural wood is generally classified as either *hardwood* or *softwood*.



- (i) Outline the main differences between hardwoods and softwoods.
- (ii) Name a *native hardwood* suitable to manufacture the bowl shown. Briefly describe how the bowl could be produced.

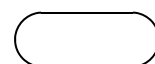
5(b) The images show two magazine racks. One is made from metal and the other from plastic.



Metal Rack



Plastic Rack



Detail of slot A

- (i) Give **two** reasons why products with a similar function are sometimes manufactured from different materials.
- (ii) Using notes and annotated sketches, describe how slot A on the plastic rack could be processed in a Technology room.
- (iii) Suggest **two** appropriate safety precautions that should be observed when drilling metals.

Answer 5(c) or 5(d)

5(c)

- (i) Using notes and annotated sketches, suggest a suitable method of joining the leg to the main body of the metal magazine rack in **5(b)** above.
- (ii) Some materials are prone to *corrosion*. Explain what is meant by the term corrosion.

OR

5(d) Designers and manufacturers are utilising *smart materials* to create new products, often making the products simpler or safer to use.
The baby feeding spoons shown change colour when hot.

- (i) Explain what is meant by the term 'smart material'.
- (ii) Suggest **one** other use for the smart material used to make the temperature sensitive spoons shown.



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