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Mark Scheme (Results)
Summer 2007

GCSE

GCSE Design and Technology: Systems & Control (Electronics) Foundation Tier (1974/3974)

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Marking Guidance

Give / State / Name
Normally a one or two word answer, at the very most a short sentence.

Describe
Normally, one or two sentences which form a description, making reference to more than one point. All points must be linked for a complete answer.

Explain
Normally, one or two sentences which form an explanation. This requires a clear or detailed account of something and includes a relevant justification, reason or example.

Evaluate
Normally one or two sentences where the quality, suitability or value of something is judged. This can include both positive and negative points, with each point normally requiring a relevant justification.

The mark scheme contains a range of possible answers for all questions. For some questions it is possible to provide a finite number of acceptable answers. However, in some instances it is not possible to provide every conceivable answer. In these instances objective guidance is provided.

For all answers candidates are not expected to give the exact wording contained in this mark scheme. However, to gain credit their answer must demonstrate the same meaning as detailed in the mark scheme.

It is the examiner's responsibility to apply their professional judgement in determining if what the candidate has written has the same meaning as the answer detailed in the mark scheme. For all answers the *'Key words'* have been written in bold text.

For describe and explain questions, candidates may give a different combination of the marking points listed in the mark scheme. In such instances candidates can be rewarded for the marking points provided that they are suitably linked. However, candidates cannot be rewarded for the same point repeated in two different combinations.

Examiners must mark in red pen using ticks and crosses in the body of the script.

Design & Technology: Systems & Control (Electronics) (1974/2F)
Full Course Foundation Tier Mark Scheme

Question Number	Question		
1974_2F_Q01a	**The table below shows some tools, equipment and components used in the making of electronic circuits.** **Complete the table by:** **(i) naming each tool, component or piece of equipment** **(ii) describing its use**		
	Answer	Part Mark	Total Mark
	Name: bulb / lamp **Task:** indication/signal / signal indicator / light / shows 'ON' / shows 'OFF'	**1** **1**	
	Name: seven segment display / seven part LED **Task:** numerical output / shows numbers	**1** **1**	
	Name: transistor / Thyristor **Task:** part of process / amplifier / switch / latch / driver	**1** **1**	
	Name: mouse / input peripheral / input device **Task:** input information into computer / click/move cursor / scroll	**1** **1**	
	Name: strippers / cutters **Task:** remove sleeve/insulation from wire/cable / trimming wire/cable/component legs	**1** **1**	**(10)**

Question Number	Question		
1974_2F_Q01bi	**The drawing below shows a soldering iron.** **One safety measure to be taken when using a soldering iron is to use a soldering iron stand.** **Give <u>two</u> different safety measures that should be taken when using a soldering iron.**		
	Answer	Part Mark	Total Mark
	Two safety measures **given**: • good ventilation • keep away from clothes • hold by handle • don't point /wave • wear safety goggles	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q01bii	**Give <u>one</u> reason for using a soldering iron stand when soldering.**		
	Answer	Part Mark	Total Mark
	One reason **given**: • stops tabletop being burnt • stops cable being burnt • smoke from solder free to disperse • clothes don't burn • no chance of accidentally burning others	**1**	**(1)**

Question Number	Question		
1974_2F_Q01c	**The drawing below shows the side view of a component soldered to a circuit board.** **Describe how the waste of the component leg, as shown in the diagram, should be removed.**		
	Answer	Part Mark	Total Mark
	One way **described:** • **cutters/strippers/pliers** are used and the legs trimmed **close to the joint/solder.** *(only acceptable answers)*	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q01d	**The diagram below shows a basic time delay circuit that is to be produced in high volume.** **From the list below complete the sentences.** **Each term can be used <u>once</u> or <u>not at all.</u>**		
	Answer	Part Mark	Total Mark
	Each sentence completed • Prototype • PCB • Production line	**1** **1** **1**	**(3)**

Question Number	Question		
1974_2F_Q01e	**The time delay circuit is to be manufactured in high volume.** **Give <u>two</u> advantages for using computer testing of each time delay circuit.**		
	Answer	Part Mark	Total Mark
	Two advantages **given:** • fast/saves time • saves money • works 24/7 • repeatable / reliable • no specialist skills/knowledge needed	**2x1**	**(2)**
Question Number	Question		
1974_2F_Q01f	**Electronic circuit designs may be found on the internet.** **Describe <u>one</u> way that the design for an alternative time delay circuit may be found on the internet.**		
	Answer	Part Mark	Total Mark
	One way **described**: • **electronic timing circuits / keywords** should be typed into a **search engine/Google (etc.)** • **on-line electronic books may be read / specialist websites looked at** and **circuits copied**	**2x1**	**(2)**
			(Total 22 marks)

Question Number	Question		
1974_2F_Q02a	**The diagram below shows a simple locker alarm.** **Name components A,B,C and E.**		
	Answer	Part Mark	Total Mark
	Each component named: A – Battery / cells B – Switch / SPST C – LDR E – Buzzer	**4x1**	**(4)**

Question Number	Question		
1974_2F_Q02b	**Give <u>one</u> reason for using R3 in the circuit.**		
	Answer	Part Mark	Total Mark
	One reason **given**: • protection / protects • current control / reduces/limits current	**1**	**(1)**

Question Number	Question		
1974_2F_Q02c	**Give <u>one</u> reason for using VR1 in the circuit.**		
	Answer	Part Mark	Total Mark
	One reason **given**: • change sensitivity • so circuit can sense at different light levels • set circuit to sense at a light level • alter/adjust/change the base voltage	**1**	**(1)**
Question Number	Question		
1974_2F_Q02d	**The diagram below shows the simplified circuit of component C and VR1 connected in series.** **If the resistance of component C is 800K and VR1 is adjusted to its maximum value, calculate their combined resistance. Use the formula: Rtotal = R1 + R2**		
	Answer	Part Mark	Total Mark
	Resistance calculated is 900 *(Only answer)*	**1**	**(1)**
Question Number	Question		
1974_2F_Q02e	**Describe the action of the circuit when the base of the transistor passes the switch-on voltage.**		
	Answer	Part Mark	Total Mark
	The action **described**: • **transistor conducts** and **the buzzer sounds** • **buzzer connected** and **sounds**	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q02f	**Explain <u>one</u> reason for using the diode (D1) in the circuit.**		
	Answer	Part Mark	Total Mark
	One reason **explained**: • **short circuits** the **back emf/voltage** • **protects the transistor** from **the back emf/voltage** • **buzzer is a wire wound** component that creates a **back emf/voltage**	**2x1**	**(2)**
Question Number	Question		
1974_2F_Q02gi	**PCBs for commercial products are batch produced. These PCBs can use many transistors or dedicated integrated circuits(ICs). The drawing below shows an 8 pin dedicated IC.** **Give <u>three</u> advantages of using dedicated ICs rather than transistors for complex circuits.**		
	Answer	Part Mark	Total Mark
	Three advantages **given**: • less complicated • smaller circuit • easier to fault find • less to go wrong • fewer components • cheaper	**3x1**	**(3)**

Question Number	Question		
1974_2F_Q02gii	**Explain <u>one</u> disadvantage of using ICs rather than transistors for <u>simple</u> circuits.**		
	Answer	Part Mark	Total Mark
	One disadvantage **explained**: • **ICs are more expensive** than **discrete components** • **ICs are difficult to replace** if **they go wrong** • **ICs are larger than discrete component** and **could take up more space**	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q02h	**Computer aided manufacture (CAM) could be used to manufacture complex circuits.** **Give <u>two</u> reasons for using CAM to manufacture complex circuits.**		
	Answer	Part Mark	Total Mark
	Two reasons **given**: • cheaper than manpower • faster when set up / when making batches • work 24/7 • uniform / all the same / repeatable • can be more compact *(Do not accept 'faster' / 'cheaper' on their own)*	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q02i1	**When electronic products stop working they are often more expensive to repair than replace.** **Give <u>two</u> disadvantages of throwing away broken electronic products.**		
	Answer	Part Mark	Total Mark
	Two disadvantages **given**: • waste / not recycling useable resources • fills land-fill sites • bad for the environment	**2x1**	**(2)**
Question Number	Question		
1974_2F_Q02i2	**Describe <u>one</u> way that electronic products can be recycled.**		
	Answer	Part Mark	Total Mark
	One way **described**: • **components may be reused** in **new circuits** • **bits may be dismantled** and **used in different products** • **parts may be burnt** for **use a fuel**	**2x1**	**(2)**
			(Total 22 marks)

Question Number	Question		
1974_2F_Q03a	**A company is designing a handheld emergency alarm.** **The company requires a case to be designed for the handheld emergency alarm.** **The specification for the emergency alarm case is that it must:** • **fit easily into a small adult hand** • **have a quick way of switching on the power** • **allow a high volume sound output to attract attention** • **be made from materials and processes suitable for batch production** **In the spaces opposite, use sketches and, where necessary, brief notes to show <u>two different</u> design ideas for the emergency alarm case which meet this specification.**		
	Answer	Part Mark	Total Mark
	Design Idea 1 Each point of the specification has two marking points. 1 mark should be awarded for evidence of each point of specification resolved in the design. For each specification point with both elements viably satisfied 2 marks For each specification point with only one element viably satisfied 1 marks Where an answer does not viably answer a specification point 0 marks Candidates may answer any specification point in either graphical form or by annotation. **No marks are awarded for quality of communication.** Each specification resolved in design: **Have a method of fitting easily into a small adult hand** • Evidence that it will fit into a small adult hand **1** eg Scale / drawing of hand / dimensions / labels • Evidence of fitting easily **1** eg shape / strap or fitting / attachment (glove)		

Have a quick way of switching on the power

- Evidence of being able to switch on **1**

eg Slide switch / PTM switch / light hole / PTB / Rocker

- Evidence of it being quick to switch on **1**

eg position / operate one-handed / operate on release of pressure

Allow a high volume sound output that attracts attention.

- Evidence of high volume device

eg Buzzer / Bell / speaker / klaxon / siren **1**

- Evidence that the sound output will attract attention

eg Any indicators: holes / grill / sound not obstructed **1**

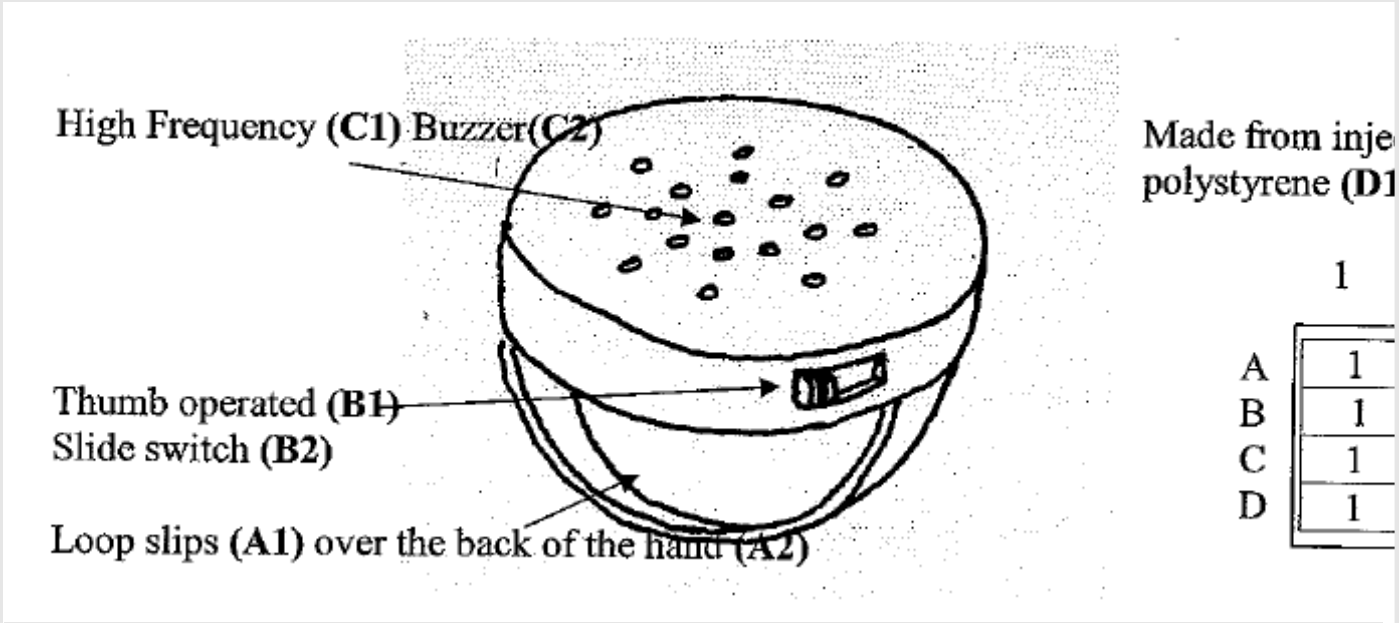
Be made from materials and processes suitable for batch production

- Evidence of suitable material **1**

eg Acrylic / polystyrene / aluminium / other named polymer

- Evidence of suitable process(must be correct for shape) **1** **(8)**

eg Injection moulding / vacuum forming / blow moulding / die casting



	Design Idea 2 To score a mark for Design Idea 2, each specification point must be resolved again in the second design idea **but** the second design **must be technically / conceptually different in design and construction** from the first and simply not a variation on a theme to score a mark Use exactly the same criteria as design idea 1 to mark design idea 2. Each specification resolved in design: • A **different** method that it will fit into a small adult hand • A **different** method of fitting easily • A **different** method of being able to switch on the power • A **different** method of it being quick to switch on • A **different** method of high volume sound output • A **different** method that it will attract attention • A **different** suitable material • A **different** suitable process	**1** **1** **1** **1** **1** **1** **1** **1**	**(8)**

Question Number	Question		
1974_2F_Q03b	**Three of the original specification points are repeated below.** **Evaluate how <u>one</u> of your design ideas succeeds or fails to meet each of these specification points.** **(i) The emergency alarm case must fit easily into a small adult hand.** **(ii) The emergency alarm case must have a quick way of switching on the power.** **(iii) The emergency alarm case must be made from materials and processes suitable for batch production.**		
	Answer	Part Mark	Total Mark
	Each point clearly evaluated If a candidate has indicated design Idea 1 and then evaluates design idea 2 for all or part of (i), (ii), & (iii) then the idea in greater evidence should be marked. The evaluation of the design must contain reference to either positive or negative aspects not simply a description of the design.		

Award 1 mark for a correct evaluation / justification relating to each design feature and how it succeeds or fails. *At foundation level two evaluation points on one design feature is acceptable.*

Repetition of original spec scores 0.

(i) **Evaluation of: Must fit easily into a small adult hand**. **2x1**

Positive or negative statements relating to:

- Reference to size
- Reference to how easily it fits in the hand

eg The golf ball size is fine for a larger hand but not for a small hand(1) but it would be comfortable to hold for long periods(1).

(ii) **Evaluation of: Have a quick way of switching on the power.** **2x1**

Positive or negative statements relating to:

- Reference to method of switching on the power
- Reference to quick method of switching on

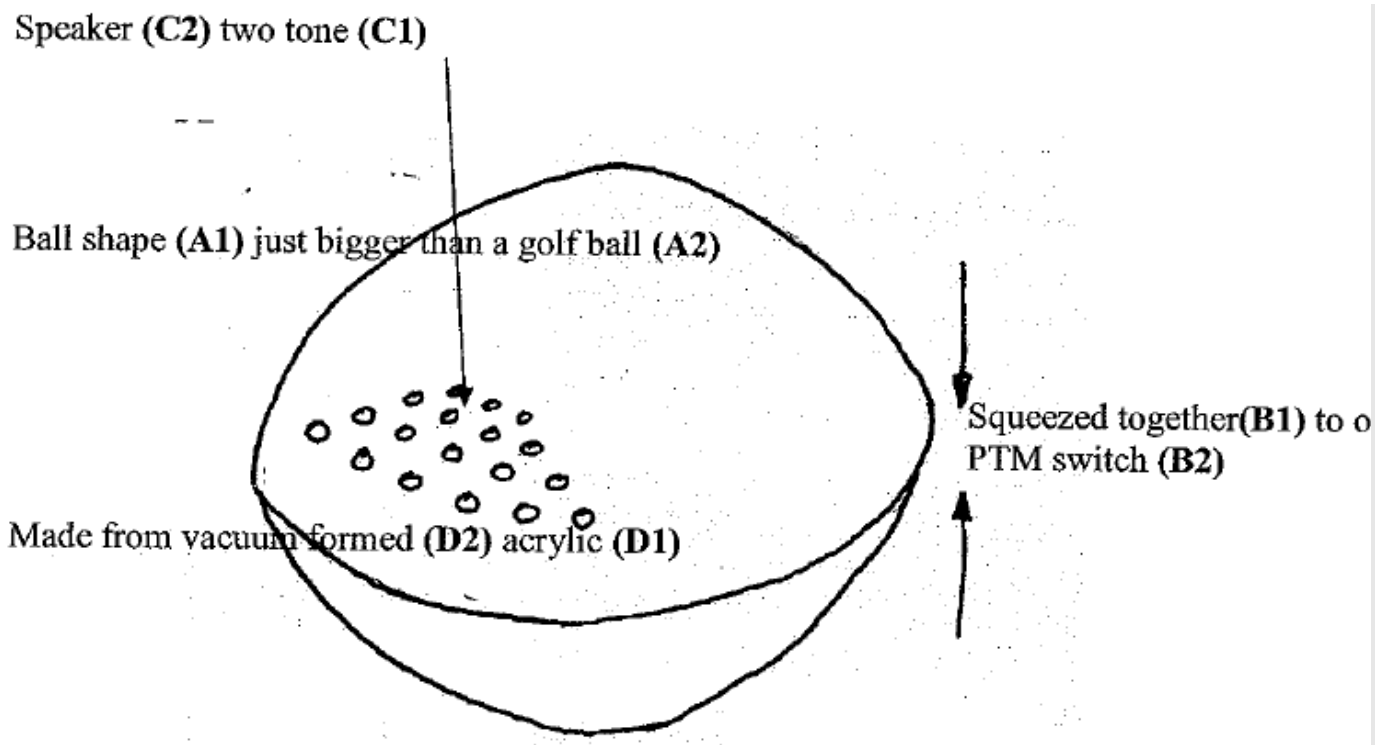
eg The slide switch is common and easily understood (1)but if it is in the hand the wrong way round it will not be easy for the thumb to reach it.(1)

(iii) **Evaluation of: Must be made from materials and processes suitable for batch production.** **2x1** **(6)**

Positive or negative statements relating to:

- Reference to the suitability of the material
- Reference to the suitability of the process

eg Polystyrene will easily vacuum form into the required shape(1) but with constant pressure it would crack (1).



(Total 22 marks)

Question Number	Question		
1974_2F_Q04a	**The drawings below show details of a garden lamp. It is powered by solar energy and has a supporting metal stake.** **Two specification points for the garden lamp are that it must:** • **automatically turn on when it is dark** • **be able to be installed anywhere in a garden** **Under each of the following headings, give <u>one</u> more specification point which should be included in the specification for the garden lamp.** **For each point, give <u>one</u> reason why it should be included.**		
	Answer	Part Mark	Total Mark
	Three each of the following, one under each heading: Specification points Reasons *(Do not accept repetition of the specification points given)* **<u>Market</u>** **Point**: it must be cost effective / cheap **Reason**: so that more people buy them **Point**: it must be appropriate in the garden **Reason**: so it fits the surroundings / aesthetically pleasing **Point**: it must be small / take apart **Reason**: so that it may be stored in the winter **<u>Quality</u>** **Point**: it must give a good light **Reason**: to illuminate a large area **Point**: the case must have smooth edges **Reason**: to stop cuts to the user	**3x1** **3x1**	**(6)**

Point: must have low power consumption
Reason: to keep alight for long periods

Point: must be made from waterproof/weatherproof materials
Reason: To be used outside

Point: must be durable/tough
Reason: to withstand outside knocks

<u>Environment</u>
(must relate to materials, components and processes not the environment in which it is to be used)
Point: it must use rechargeable batteries / use materials that can be recycled
Reason: To save on waste/landfill sites

Point: it must use solar power
Reason: to save on other forms of energy

Point: use materials that do not pollute the ground
Reason: flowers may not grow

Some flexibility should be given as some points may cross over descriptions.

Question Number	Question		
1974_2F_Q04b	**The reflecting dome of the garden lamp is made from clear acrylic. It is waterproof.** **Give <u>two</u> other reason why clear acrylic is a suitable material from which to make the reflecting dome.**		
	Answer	Part Mark	Total Mark
	Two reasons **given**: • light shines out • rigid • easily moulded to shape • inexpensive	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q04c	**The reflecting dome is manufactured by blowing moulding.** **Give <u>two</u> reasons why blowing is a suitable process to manufacture the reflecting dome.**		
	Answer	Part Mark	Total Mark
	Two reasons **given**: • dome shape easy to produce / simple mould • repeatable • little waste • cheaper than injection moulding *(Do not accept 'cheap' on its own)*	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q04d	**The electronics housing and battery case is made from rigid polystyrene using injection moulding.** **Give <u>two</u> properties of rigid polystyrene that made it suitable for the electronic housing and battery case.** **For each property give <u>one</u> reason why it makes rigid polystyrene suitable.**		
	Answer	Part Mark	Total Mark
	Two properties and **two** reasons **given**: **Point**: low melting point **Reason:** easy to mould **Point**: electrical insulator **Reason:** prevents short circuits **Point**: waterproof **Reason:** keeps electronics away from weather **Point**: tough **Reason:** will withstand knocks / will not crack	**2x1** **2x1**	**(4)**

Question Number	Question		
1974_2F_Q04e	**The electronic housing and battery case is made using black polystyrene.** **Explain <u>one</u> reason, other than looks, why black polystyrene is used to make the electronic housing and battery case.**		
	Answer	Part Mark	Total Mark
	One reasons **explained**: • the black case is **between the ultra bright LED and the LDR** and therefore **stops one affecting the other** *(only answer)*	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q04f	**The mild steel supporting stake for the garden lamp is finished using plastic dip coating.** **Explain <u>one</u> reason why plastic dip coating is used to finish the supporting stake.**		
	Answer	Part Mark	Total Mark
	One reason **explained**: • mild steel is **liable to rust** and plastic dip coating **helps to prevent this** • dip coating in **black plastic** makes the stake **match the rest of the lamp** • steel may **contaminate the ground** and the dip coating **forms a barrier to stop this**	**2x1**	**(2)**

Question Number	Question		
1974_2F_Q04g	**Two purposes of the garden lamp are that it must** • **automatically turn on when it is dark** • **be able to be installed anywhere in a garden** **Explain under the following headings, how the garden lamp achieves these purposes.**		
	Answer	Part Mark	Total Mark
	One purpose explained**: automatically turn on when it is dark** • the LDR **senses the amount of light** and **switches the circuit on** when the light intensity decreases *(only answer)* **One** purpose **explained: be able to be installed anywhere in a garden** • having **solar power and rechargeable batteries** it does **not need to be connected to mains/**does **not need connecting wires** • as the **supporting stake is made from steel** it is strong enough to **go into the hardest ground**	**2x1** **2x1**	**(4)**
			(Total 22 marks)
			TOTAL FOR PAPER: 88 MARKS

Design & Technology: Systems & Control (Electronics) (3974/2F)
Short Course Foundation Tier Mark Scheme

Question Number	Question		
3974_2F_Q01a	**The table below shows some tools, equipment and components used in the making of electronic circuits.** **Complete the table by:** **(iii) naming each tool, component or piece of equipment** **(iv) describing its use**		
	Answer	Part Mark	Total Mark
	Name: bulb / lamp **Task:** indication/signal / signal indicator / light / shows 'ON' / shows 'OFF' **Name:** seven segment display / seven part LED **Task:** numerical output / shows numbers **Name:** transistor / Thyristor **Task:** part of process / amplifier / switch / latch / driver	**1** **1** **1** **1** **1** **1**	**(6)**
Question Number	Question		
3974_2F_Q01bi	**The drawing below shows a soldering iron.** **One safety measure to be taken when using a soldering iron is to use a soldering iron stand.** **Give <u>two</u> different safety measures that should be taken when using a soldering iron.**		
	Answer	Part Mark	Total Mark
	Two safety measures **given**: • good ventilation • keep away from clothes • hold by handle • don't point /wave • wear safety goggles	**2x1**	**(2)**

Question Number	Question		
3974_2F_Q01bii	**Give <u>one</u> reason for using a soldering iron stand when soldering.**		
	Answer	Part Mark	Total Mark
	One reason **given**: • stops tabletop being burnt • stops cable being burnt • smoke from solder free to disperse • clothes don't burn • no chance of accidentally burning others	**1**	**(1)**
Question Number	Question		
3974_2F_Q01c	**The drawing below shows the side view of a component soldered to a circuit board.** **Describe how the waste of the component leg, as shown in the diagram, should be removed.**		
	Answer	Part Mark	Total Mark
	One way **described:** • **cutters/strippers/pliers** are used and the legs trimmed **close to the joint/solder.**	**2x1**	**(2)**
			(Total 11 marks)

Question Number	Question		
3974_2F_Q02a	**The diagram below shows a simple locker alarm.** **Name components A,B,C and E.**		
	Answer	Part Mark	Total Mark
	Each component named: A – Battery / cells B – Switch / SPST C – LDR E – Buzzer	**4x1**	**(4)**
Question Number	Question		
3974_2F_Q02b	**Give <u>one</u> reason for using R3 in the circuit.**		
	Answer	Part Mark	Total Mark
	One reason **given**: • protection / protects • current control / reduces/limits current	**1**	**(1)**
Question Number	Question		
3974_2F_Q02c	**Give <u>one</u> reason for using VR1 in the circuit.**		
	Answer	Part Mark	Total Mark
	One reason **given**: • change sensitivity • so circuit can sense at different light levels • set circuit to sense at a light level • alter/adjust/change the base voltage	**1**	**(1)**

Question Number	Question		
3974_2F_Q02d	**The diagram below shows the simplified circuit of component C and VR1 connected in series.** **If the resistance of component C is 800K and VR1 is adjusted to its maximum value, calculate their combined resistance.** **Use the formula: Rtotal = R1 + R2**		
	Answer	Part Mark	Total Mark
	Resistance calculated is 900 *(Only answer)*	**1**	**(1)**
Question Number	Question		
3974_2F_Q02e	**Describe the action of the circuit when the base of the transistor passes the switch-on voltage.**		
	Answer	Part Mark	Total Mark
	The action **described**: • **transistor conducts** and **the buzzer sounds** • **buzzer connected** and **sounds**	**2x1**	**(2)**
Question Number	Question		
3974_2F_Q02f	**Explain <u>one</u> reason for using the diode (D1) in the circuit.**		
	Answer	Part Mark	Total Mark
	One reason **explained**: • **short circuits** the **back emf/voltage** • **protects the transistor** from **the back emf/voltage** • **buzzer is a wire wound** component that creates a **back emf/voltage**	**2x1**	**(2)**
			(Total 11 marks)

Question Number	Question		
3974_2F_Q03a	**The drawings below show details of a garden lamp. It is powered by solar energy and has a supporting metal stake.** **Two specification points for the garden lamp are that it must:** • **automatically turn on when it is dark** • **be able to be installed anywhere in a garden** **Under each of the following headings, give <u>one</u> more specification point which should be included in the specification for the garden lamp.** **For each point, give <u>one</u> reason why it should be included.**		
	Answer	Part Mark	Total Mark
	Three each of the following, one under each heading: Specification points Reasons *(Do not accept repetition of the specification points given)* **<u>Market</u>** **Point**: it must be cost effective / cheap **Reason**: so that more people buy them **Point**: it must be appropriate in the garden **Reason**: so it fits the surroundings / aesthetically pleasing **Point**: it must be small / take apart **Reason**: so that it may be stored in the winter **<u>Quality</u>** **Point**: it must give a good light **Reason**: to illuminate a large area **Point**: the case must have smooth edges **Reason**: to stop cuts to the user	**3x1** **3x1**	**(6)**

	Point: must have low power consumption **Reason**: to keep alight for long periods **Point**: must be made from waterproof/weatherproof materials **Reason**: To be used outside **Point**: must be durable/tough **Reason**: to withstand outside knocks **<u>Environment</u>** *(must relate to materials, components and processes not the environment in which it is to be used)* **Point**: it must use rechargeable batteries / use materials that can be recycled **Reason**: To save on waste/landfill sites **Point**: it must use solar power **Reason**: to save on other forms of energy **Point**: use materials that do not pollute the ground **Reason**: flowers may not grow *Some flexibility should be given as some points may cross over descriptions.*		
Question Number	Question		
3974_2F_Q03b	**The reflecting dome of the garden lamp is made from clear acrylic. It is waterproof.** **Give <u>two</u> other reason why clear acrylic is a suitable material from which to make the reflecting dome.**		
	Answer	Part Mark	Total Mark
	Two reasons **given**: • light shines out • rigid • easily moulded to shape • inexpensive	**2x1**	**(2)**

Question Number	Question		
3974_2F_Q03c	**The reflecting dome is manufactured by blowing moulding.** **Give <u>two</u> reasons why blowing is a suitable process to manufacture the reflecting dome.**		
	Answer	Part Mark	Total Mark
	Two reasons **given**: • dome shape easy to produce / simple mould • repeatable • little waste • cheaper than injection moulding *(Do not accept 'cheap' on its own)*	**2x1**	**(2)**

Question Number	Question		
3974_2F_Q03d	**The electronics housing and battery case is made from rigid polystyrene using injection moulding.** **Give <u>two</u> properties of rigid polystyrene that made it suitable for the electronic housing and battery case.** **For each property give <u>one</u> reason why it makes rigid polystyrene suitable.**		
	Answer	Part Mark	Total Mark
	Two properties and **two** reasons **given**: **Point**: low melting point **Reason:** easy to mould **Point**: electrical insulator **Reason:** prevents short circuits **Point**: waterproof **Reason:** keeps electronics away from weather **Point**: tough **Reason:** will withstand knocks / will not crack	**2x1** **2x1**	**(4)**

Question Number	Question		
3974_2F_Q03e	**The electronic housing and battery case is made using black polystyrene.** **Explain <u>one</u> reason, other than looks, why black polystyrene is used to make the electronic housing and battery case.**		
	Answer	Part Mark	Total Mark
	One reasons **explained**: • the black case is **between the ultra bright LED and the LDR** and therefore **stops one affecting the other** *(only answer)*	**2x1**	**(2)**

Question Number	Question		
3974_2F_Q03f	**The mild steel supporting stake for the garden lamp is finished using plastic dip coating.** **Explain <u>one</u> reason why plastic dip coating is used to finish the supporting stake.**		
	Answer	Part Mark	Total Mark
	One reason **explained**: • mild steel is **liable to rust** and plastic dip coating **helps to prevent this** • dip coating in **black plastic** makes the stake **match the rest of the lamp** • steel may **contaminate the ground** and the dip coating **forms a barrier to stop this**	**2x1**	**(2)**

Question Number	Question		
3974_2F_Q03g	**Two purposes of the garden lamp are that it must:** • **automatically turn on when it is dark** • **be able to be installed anywhere in a garden** **Explain under the following headings, how the garden lamp achieves these purposes.**		
	Answer	Part Mark	Total Mark
	One purpose explained**: automatically turn on when it is dark** • the LDR **senses the amount of light** and **switches the circuit on** when the light intensity decreases *(only acceptable answer)* **One** purpose **explained: be able to be installed anywhere in a garden** • having **solar power and rechargeable batteries** it does **not need to be connected to mains/**does **not need connecting wires** • as the **supporting stake is made from steel** it is strong enough to **go into the hardest ground**	**2x1** **2x1**	**(4)**
			(Total 22 marks)
			TOTAL FOR PAPER: 44 MARKS