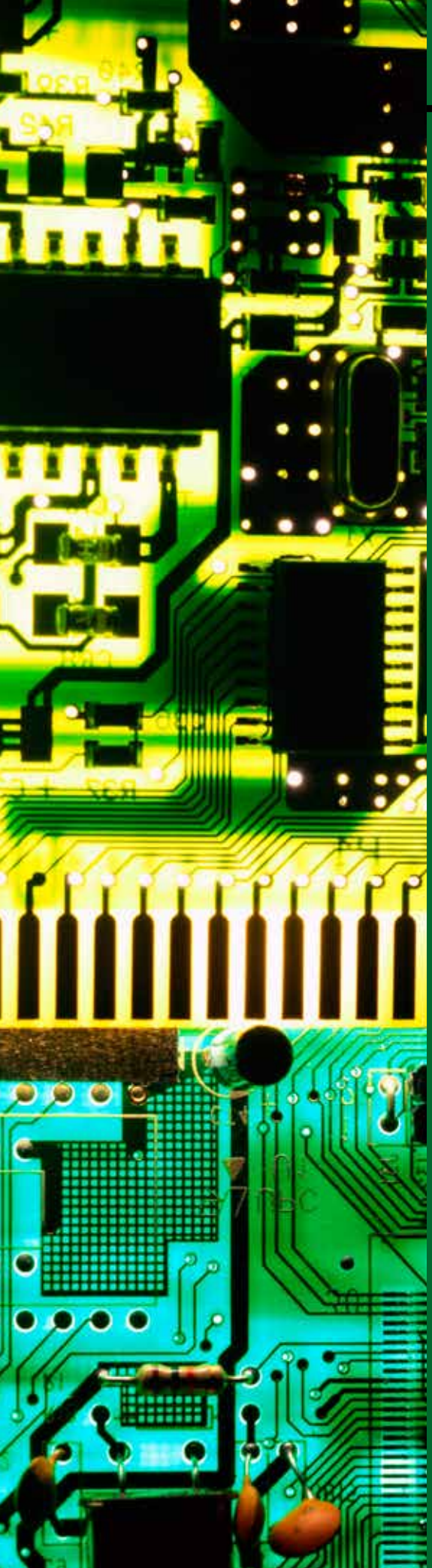


Electronics

Student Workbook

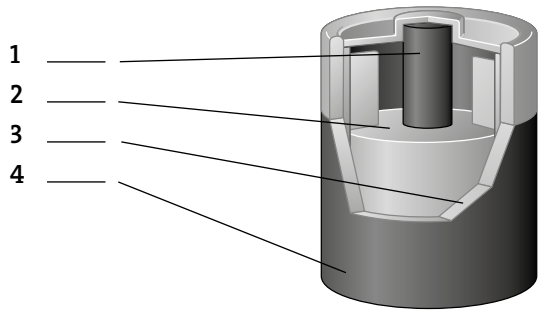
OXFORD

Contents

1

1 **Label the diagram of a zinc-carbon cell (1–4) with these terms (a–d).**

a current collector
b jacket
c positive electrode
d electrolyte



2 **Each verb has a related noun ending in *–r* which refers to an instrument or component. Complete the column of nouns.**

Verb	Noun
1 record	
2 transmit	
3 transform	
4 charge	
5 rectify	
6 process	
7 amplify	
8 collect	
9 detect	
10 tune	

3 **Complete the text with the words listed below.**

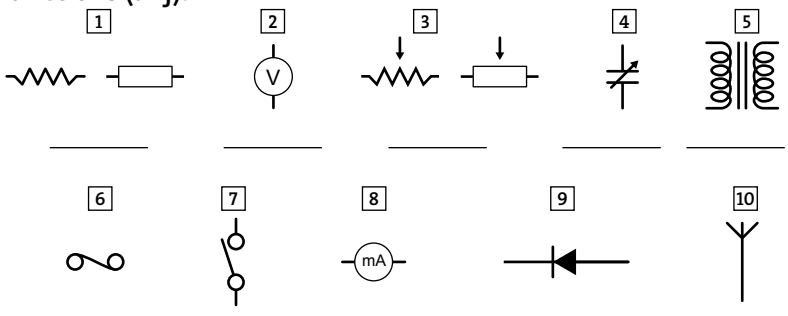
electrode	rod	occasional	collector	negative

Zinc-carbon cell

It has a zinc _____[1] electrode, a manganese dioxide positive _____[2], and the electrolyte is a solution of ammonium chloride. The carbon _____[3] is in contact with the positive electrode (but is not involved in the chemical reaction) and is called the current _____[4]. The EMF is 1.5. This is the most popular cell for low-current or _____[5] use, e.g. in torches.

4 **Match the circuit symbols with the functions (a–j).**

a varies capacitance in a circuit
b measures very small currents
c adds resistance to a circuit
d measures very small circuits
e breaks a circuit
f protects a circuit
g varies the current in a circuit
h steps AC voltages up or down
i receives RF signals
j measures voltages



2

1 Match each component or unit (1–8) with its function in a battery charger (a–h).

Component/ Unit	Function in a battery charger
1 transformer	**a** steps down the AC mains voltage
2 double-pole switch	**b** prevents the output from changing when the load varies
3 neon lamp	**c** keeps the diodes from overheating
4 fuse	**d** shows when the charger is on
5 rectifier	**e** removes the fluctuations in the DC output of the rectifier
6 aluminium heatsink	**f** protects the transformer
7 smoothing circuit	**g** converts an AC voltage to a DC voltage
8 stabilizing circuit	**h** switches the charger on and off

2 Find the eight words relating to electronics. The words read from left to right (→) and top to bottom (↓).

cell electrode negative positive voltage zinc-carbon charger current

c	e	s	t	u	i	p	o	n	a
e	l	e	c	t	r	o	d	e	s
l	o	u	u	e	a	s	s	g	h
l	t	x	r	i	h	i	o	a	t
i	a	s	r	k	c	t	a	t	u
u	o	r	e	e	t	i	w	i	x
e	s	a	n	i	z	v	u	v	o
v	o	l	t	a	g	e	q	e	i
o	a	c	h	a	r	g	e	r	e
z	i	n	c	c	a	r	b	o	n

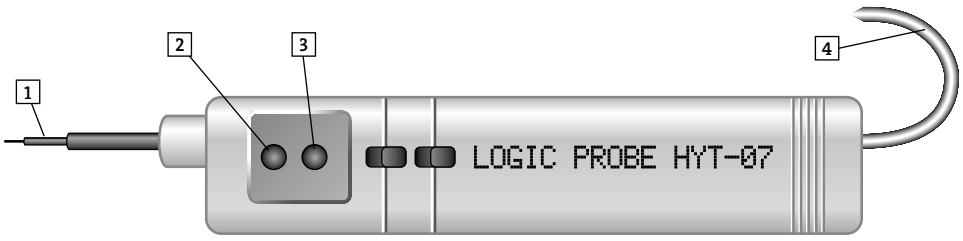
3 Match the test and repair instruments (1–4) with their use (a–d).

1 Multimeter	**a** This is used to measure a number of different electrical quantities such as voltage, current and resistance.
2 Logic probe	**b** This is used to measure fast moving signals.
3 Oscilloscope	**c** This instrument is used for measuring voltage levels and pulses in digital logic circuits.
4 Function generator	**d** This instrument contains a triangular wave oscillator which can be switched to produce triangular, square or sine waves over a range of frequencies.

4 Label the diagram of a logic probe with the words and phrases listed below.

powered by circuit under test probe red LED green LED

1 _____
2 _____
3 _____
4 _____

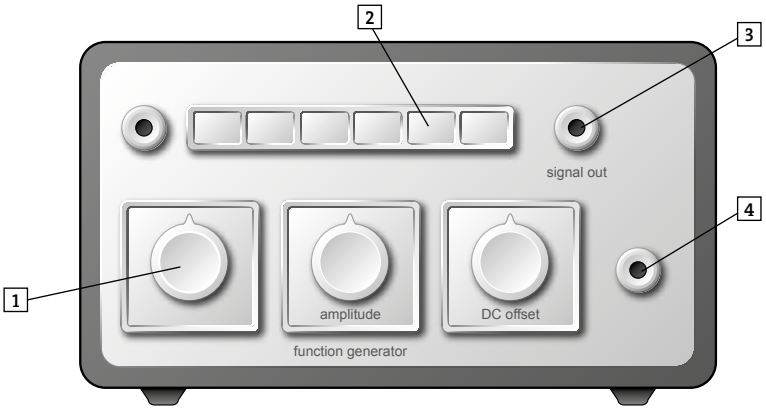


3

1 **Label the diagram of a function generator with the words and phrases listed below.**

function selector BNC connector frequency adjust frequency range selector switches

1 _____
2 _____
3 _____
4 _____



2 **Complete the text with the words listed below.**

levels	circuits	coloured	low	pulse	instrument

Logic probe

This _____[1] is used for measuring voltage _____[2] and pulses in digital logic _____[3]. When the probe is placed on the pin of a logic IC, small _____[4] LEDs light up to indicate if a _____[5] is detected or whether the pin is at a high or _____[6] logic level.

3 **Complete the text with the words listed below.**

signal	frequencies	equipment	contains	test	switched

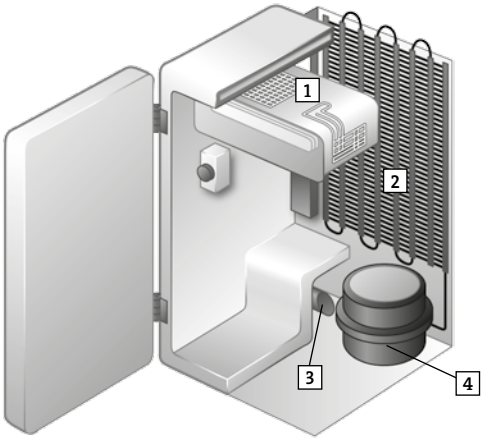
Function generator

This instrument _____[1] a triangular wave oscillator which can be _____[2] to produce triangular, square or sine waves over a range of _____[3]. It is used to _____[4] and adjust a variety of electronic _____[5] such as audio amplifiers. The function generator provides a known _____[6] which can be injected into a circuit.

4 **Label the diagram with the components listed below.**

compressor	condenser
capillary tube	evaporator

1 _____
2 _____
3 _____
4 _____



4

1 Link each pair of events to make one complex sentence. Use the clue in the brackets to help you.

Example: A relay is an electro-mechanical switch. It uses an electromagnet. (relative cause)
A relay is an electro-mechanical switch which uses an electromagnet.

1 An electrolytic capacitor is connected wrongly. The capacitor will be damaged. (condition)

_____

2 You touch memory chips. Make sure you are earthed. (time)

_____

3 D-type connectors come in a variety of sizes. D-type connectors are widely used for linking devices to computers. (relative cause)

_____

2 Match each engineering sector (1–9) with its related counterpart (a–i).

1	marine	**a**	air-conditioning
2	aeronautical	**b**	roads and bridges
3	heating and ventilating	**c**	body scanners
4	electricity generating	**d**	cables and switchgear
5	automobile	**e**	communications and equipment
6	civil	**f**	ships
7	electronic	**g**	planes
8	electrical installation	**h**	cars and trucks
9	medical	**i**	power stations

3 Match the verbs (1–4) with the definitions (a–d).

1	absorb	**a**	to change from a liquid to a gas or vapour
2	compress	**b**	to take in from the surrounding surface or space
3	condense	**c**	to press or squeeze into a smaller space
4	evaporate	**d**	to change from gas or vapour to liquid

4 Complete the sentences with the words listed below.

capacitor	relay	transformers	oscillator	induces	diodes	amplify

1 While the _____ charges up, the current flows.
2 _____ only allow current to flow one way.
3 A transistor can be used to _____ a signal.
4 _____ change the voltage in a power line.
5 If the _____ is activated, its contacts close.
6 A moving magnetic field _____ a current.
7 The _____ generates a series of pulses.

5

1 Link each pair of events to make one complex sentence. Use the clue in the brackets to help you.

Example: A relay is an electro-mechanical switch. It uses an electromagnet. (relative clause)
A relay is an electro-mechanical switch which uses an electromagnet.

1 A milliammeter is a device. It measures very small currents. (relative clause)

_____

2 A residual current device trips. An excess current passes through a circuit. (time)

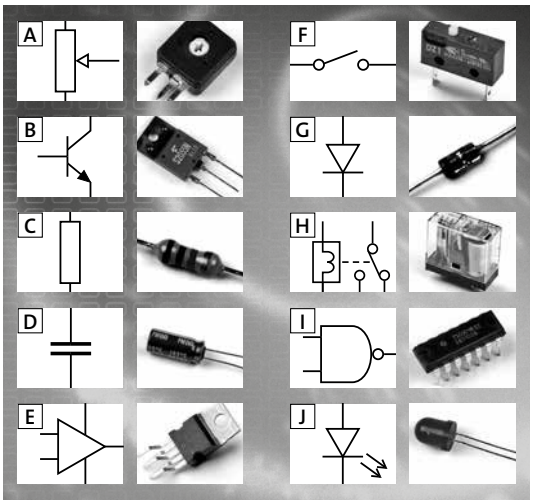
_____

3 Light strikes the solar cell. This generates a voltage. (relative clause)

_____

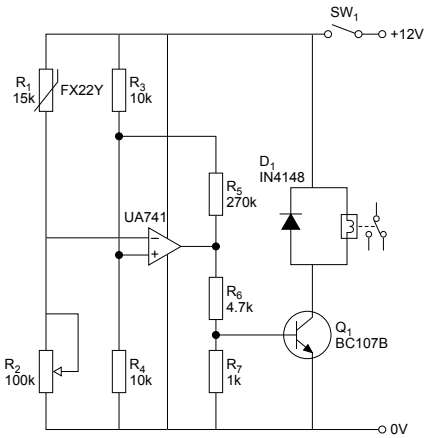
2 Match the items (1–10) with the circuit symbol diagrams (a–j).

1 amplifier ____
2 capacitor ____
3 diode ____
4 resistor ____
5 light-emitting diode ____
6 NAND logic gate ____
7 relay ____
8 NPN transistor ____
9 switch (single-pole, single-throw) ____
10 potentiometer (pot) ____



3 Study this circuit. Make a component list with the numbers, names, and values of each component. Say what the circuit is used for.

Component	Type	Value/reference number
R1		
R2		
R3		
R4		
R5		
R6		
R7		
D1		
Q1		
SW1		
	operational amplifier	UA741



6

1 Match the phrasal verbs listed below with the definitions (1–6).

chase up	carry out	catch up	get on with	fall behind	hold up

1 lose time on a schedule _____
2 perform a task _____
3 cause a delay _____
4 contact somebody in order to remind them to do something _____
5 spend extra time doing something because you haven't done it earlier _____
6 make progress _____

2 Link each pair of events to make one complex sentence. Use the clue in the brackets to help you.

Example: A relay is an electro-mechanical switch. It uses an electromagnet. (relative clause)
A relay is an electro-mechanical switch which uses an electromagnet.

1 The input signal to an inverter is 1. The output signal will be 0. (condition)
_____

2 A signal is detected. It is amplified. (time)
_____

3 A logic probe is a test instrument. It provides an easy way of checking simple logic circuits. (relative clause)
_____

3 Complete the sentences about jobs in technology with the correct form of the verbs listed below.

do	measure	connect	maintain	repair	cut	make	design	manufacture	turn

1 Maintenance Technicians are responsible for _____ and _____ equipment in a factory.
2 Estimators calculate the costs of _____ and _____ a product.
3 Research Engineers find new and better ways of _____ things.
4 Fitters are responsible for _____ new equipment to the network.
5 Design Engineers aim _____ ideas into plans.
6 Control Engineers attempt _____ and regulate all the variables in a system.
7 Production Engineers plan _____ things in the most efficient way.
8 They look at ways of _____ production costs.

4 Find eight words relating to electronics. The words read from left to right (→) and top to bottom (↓).

capacitor	current	diode
frequency	oscillator	pulse
relay	switch	

e	n	i	s	p	u	o	t	d	o
f	r	e	q	u	e	n	c	y	s
s	o	e	q	l	n	i	s	k	c
w	i	u	t	s	z	c	e	o	i
i	y	s	o	e	w	u	h	u	l
t	n	e	d	l	b	r	i	t	l
c	r	e	l	a	y	r	s	o	a
h	i	d	i	o	d	e	g	e	t
u	o	e	s	t	x	n	n	i	o
c	a	p	a	c	i	t	o	r	r

7

1 Complete the text with the words listed below.

magnet	switches	coil	flows	circuits	core

Relays

Relays are electromagnetic _____[1]. They consist of an iron _____[2] with a copper _____[3] wound round it. When current _____[4] through the coil, the coil becomes a _____[5] and pulls a moveable contact arm towards it. This can make or break _____[6] just like a switch.

2 Make sentences by matching the information in columns A–C and then linking it together using a relative clause with *which* or *who*.

Example: *Silicon, which comes from sand, is an important component of some semiconductors.*

A	B	C
Subject	**Additional information**	**Important information**
Silicon	It is short for binary digit.	He was one of three inventors of the transistor.
1 Digital electronics	He worked at Bell laboratories.	They are remembered in the basic units of electricity.
2 Walter Brattain	This means light-emitting diodes.	They are used in watches and many electronic displays.
3 A bit	It is used in everything from watches to computers.	They can provide a higher current than other batteries.
4 Lithium batteries	They were pioneers in the study of electricity.	It is an important component of some semiconductors.
5 LEDs	It comes from sand.	It is concerned with electrical systems made up of a series of switches.
6 Ohm, Volta, and Ampere	They are often used in cameras.	It is a single unit of information.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

3 Complete the text with the words listed below.

electricity	discharged	power	connected	energy	high

Capacitors

Capacitors store electrical _____[1]. They can be charged and _____[2] very quickly. They are particularly important in _____[3] frequency devices such as radios. Electrolytic capacitors are usually larger. They can be _____[4] in one way only and are used to store _____[5] and to smooth out pulsating signals, for example in _____[6] supplies.

8

1 In electronics the verbs on the left commonly occur with one of the nouns on the right. Match a verb (1–7) to a noun (a–g).

1	actuate	**a**	a capacitor
2	adjust	**b**	a circuit
3	boost	**c**	a control
4	complete	**d**	frequency
5	discharge	**e**	a relay
6	induce	**f**	a signal
7	change	**g**	a voltage

2 Complete each sentence using the correct form of a verb from question 1.

1 _____ the control so the meter reads zero.
2 When the circuit is switched off, the capacitor keeps it operating until it _____.
3 The changing magnetic flux _____ a voltage in the secondary of the transformer.
4 Changing the capacitor will _____ the frequency of the oscillator.
5 Pressing the switch _____ the circuit, allowing the current to flow.

3 Complete the text with the words listed below.

computers	off	NAND	digital	circuits

Logic gates

Logic gates are integrated _____[1] which provide the basic logic functions used in _____[2] and other devices which use _____[3] electronics. Signals in digital circuits are either on (1) or _____[4] (0). Basic logic gates include AND, OR, _____[5], and NOR.

4 Complete the explanation of a circuit with the words listed below.

off	thermistor	collector	activates	temperature	circuit
on	switch	current	contacts	value	rises

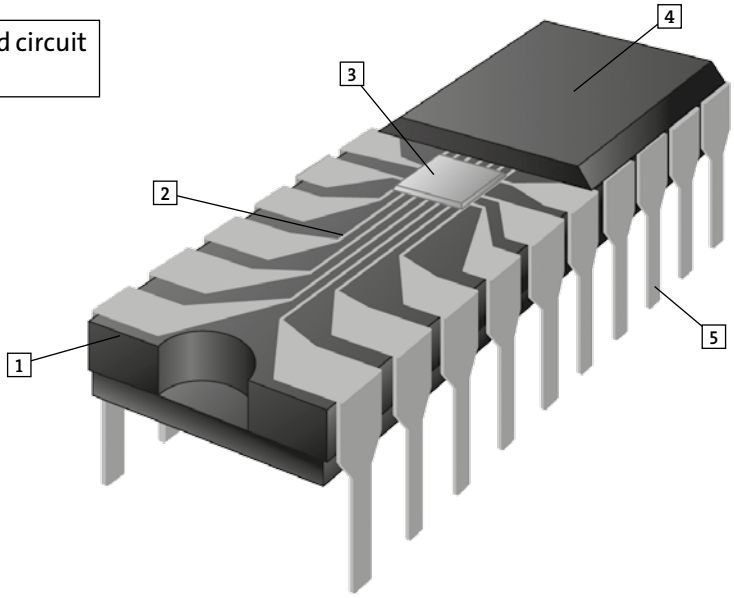
This is a thermostat to control the operation of a central-heating system. The _____[1] changes in resistance with the _____[2] in the room. This alters the voltage in the base-emitter _____[3], turning the transistor _____[4] if the temperature falls below a pre-set _____[5]. This allows a _____[6] to flow in the _____[7]-emitter circuit which _____[8] the relay, closing its _____[9] and switching on the system. If the temperature of the room _____[10] above the pre-set value, the thermistor will _____[11] the transistor and the heating system _____[12] in the same way.

9

1 **Label the diagram with the parts listed below.**

connection pin	lid	integrated circuit
wire	dual-in-line package	

1 dual in-line package
2 wire
3 integrated circuit
4 lid
5 connection pin



2 **Complete the explanation of a circuit using the words listed below.**

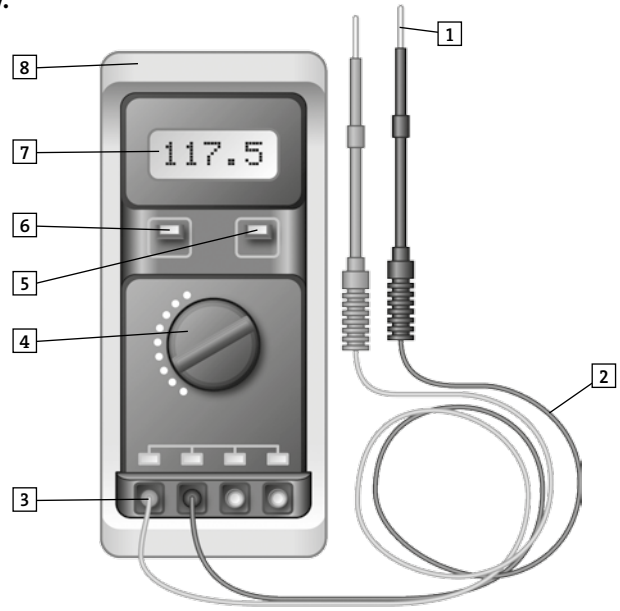
light	transistor	battery	buzzer	diode	flow	resistor	conduct	probes	if

This is a device to detect moisture. The components are: junction transistor[1], light-emitting diode[2], 2.2k resistor[3], a buzzer, two probes, and a 9 volt battery[4]. No current flows in the base-emitter circuit when there is air between the two probes[5], so the transistor is turned off. if[6] the probes are placed on a damp surface, the moisture will conduct[7] a current. A current will flow[8] to the base, turning the transistor on. Current then flows from the battery to the light[9]-emitting diode and the buzzer[10], giving both visible and audible warning.

3 **Label the diagram with the parts listed below.**

cord	selector switch	input terminal
probe	auto/ manual range	data hold
housing	digital display	

1 probe
2 cord
3 input terminal
4 selector switch
5 data hold
6 auto/manual range
7 digital display
8 housing



10

1 Find eight words relating to electronics. The words read from left to right (→) and top to bottom (↓).

actuate	adjust	boost
charge	induce	complete
amplify	detect	

a	r	a	s	n	i	o	a	q	z
c	o	n	c	b	p	r	m	a	s
t	s	i	z	o	e	w	p	i	o
u	a	r	q	o	x	p	l	z	i
a	d	j	u	s	t	h	i	s	n
t	o	s	e	t	i	a	f	r	d
e	p	n	a	c	u	o	y	n	u
r	d	e	t	e	c	t	i	a	c
o	a	q	c	c	h	a	r	g	e
c	o	m	p	l	e	t	e	s	r

2 Complete the text with *who*, *which*, *when*, or *if*.

Jack Kilby, who[1] was born in 1923, worked for Texas Instruments in America. He discovered how to make more than one transistor in a material, which[2] was called germanium. He found he could connect transistors without wires when[3] he 'grew' them together at the same time. Robert Noyce, who[4] was working for Fairchild Semiconductors at the same time, made a similar microchip from silicon, which[5] became the standard material for making microchips.

The first microprocessor chip, which[6] had 2300 transistors, was small, but chips which[7] are made today can have more than 30 million.

People who[8] make and test microchips have to work in dust-free rooms. Air contains impurities, which[9] could damage the microchip, so microchips are made in a vacuum. if[10] the microchip works when it is tested, it can be soldered onto a circuit board.

3 Read the text in question 2 and answer the questions (1–5).

1 What is the name of the material that Jack Kilby used for his invention? The material he used is germanium
2 Robert Noyce developed a similar microchip from which material? He developed it from silicon
3 Which material became the standard for making microchips? The standard material is the silicon
4 The rooms in which microchips are made are free from which impurity? Yes, they are
5 How is the microchip attached to a circuit board? It's attached by soldering it

4 Join each of the two sentences into one complex sentence. Use the clue in the brackets to help you.

Example: Resistors are sometimes made from a length of nichrome wire. Resistors can be used to reduce the current in a circuit. (relative clause)
Resistors, which are sometimes made from a length of nichrome wire, can be used to reduce the current in a circuit.

1 Potentiometers are used in radios as volume controls and tone controls. Potentiometers are often circular. (relative clause)
Potentiometers, which are often circular, are used in radios as volume controls and tone controls.

2 More current flows. The thermistor gets hotter. (time)
The thermistor gets hotter when more current flows.

3 You touch memory chips. Make sure you are earthed. (time)
Make sure you are earthed when you touch memory chips.

11

1 **Rearrange the words to make a sentences.**

1 standard resistors fixed values have
fixed resistors have standard values

2 one only direction diodes current flow allow through to in
diodes only allow current to flow through one direction

3 contain semiconductor of chips tiny transistors materials
chips contain transistors of semiconductor materials

2 **Join each of the two sentences into one complex sentence. Use the clue in the brackets to help you.**

1 Special diodes called LEDs give out light. Current passes through LEDs. (condition)

2 LEDs are often used as indicator lamps. LEDs are small, reliable, and need only a small current. (relative clause)

3 Light shines on a semiconductor. A semiconductor conducts electricity more easily. (time)

3 **Join each of the two sentences into one complex sentence. Use the clue in the brackets to help you.**

Example: A relay is an electro-mechanical switch. It uses an electromagnet. (relative clause)
A relay is an electro-mechanical switch which uses an electromagnet.

1 A lamp is marked 60 W. This means it is converting electricity to heat and light at the rate of 60 joules per second. (condition)

2 X-rays were discovered by Rontgen in 1895. X-rays can be used in industry to inspect metal castings. (relative clause)

3 Radios and computers could be damaged. The power supply is connected the wrong way round. (condition)

4 **Rearrange the words to make sentences.**

1 is measures small a very millammeter device a which currents

2 generating light cell voltage strikes solar the a

3 amplified after is signal a detected is it

12

1 Read the text and answer the questions.

Risk of injury

Injury can occur when live electrical parts are exposed and can be touched, or when metalwork, which is meant to be earthed, becomes live at a dangerous voltage. The likelihood of touching live parts is increased during electrical testing and fault-finding, when conductors at dangerous voltages are often exposed. This risk can be minimized if testing is done while the equipment is isolated from any dangerous source of supply, although this cannot always be done, and care must also be taken to prevent contact with any hazardous internally produced voltages.

1 When can injury occur?

_____

2 When is the likelihood of touching live parts increased?

_____

3 How can the risk of injury be minimized?

_____

2 Complete the text with the words listed below.

conductor	hazardous	shocks	reduced	injury	voltages

Electric _____[1] occur when contact with a live _____[2] causes sufficient current to pass through the body to cause an injury. As a rough guide, _____[3] exceeding 50 V AC or 120 V ripple free DC should be considered _____[4] in a dry, unconfined, non-conductive location. These voltage values must be _____[5] if the location is wet, confined, or conductive. Where there is an adverse environment, those in charge of the work and those doing the work should be aware of the probable increase in _____[6] risk.

3 Read the text and answer the questions.

Industrial electricians install, inspect, and test wiring systems and components in all types of buildings and machinery. They typically work in the construction, engineering, and manufacturing industries. An industrial electrician would usually work in one of four areas:

- panel building – putting together control panels that operate a building's lighting, heating, and ventilation systems
- repair and rewind – fixing faults in machinery, for example replacing the motors in a lift system
- instrumentation – installing and maintaining manufacturing systems that measure the efficiency of a production line
- maintenance – testing and servicing electromechanical equipment found in manufacturing and construction.

1 Name three typical things an industrial electrician is required to do.

_____

2 Which industries do industrial electricians typically work in?

_____

3 What are the four areas in which an industrial electrician would typically work?

_____

13

1 Complete the text with the words listed below.

chip	CPU	discrete	bits	engineers	powerful

A microprocessor, also known as a _____[1] or central processing unit, is a complete computation engine that is manufactured on a single _____[2]. The first microprocessor was introduced in 1971. The Intel 4004 was not very _____[3]; it could only add and subtract 4 _____[4] at a time. However, it was remarkable that everything was on a single chip. Prior to the 4004, _____[5] built computers either from collections of chips or from _____[6] components (transistors wired one at a time).

2 Match the words (1–11) with the words (a–k) to make word pairs.

1	integrated	**a**	sensor
2	circuit	**b**	cell
3	alternating	**c**	switch
4	primary	**d**	supply
5	zener	**e**	diode
6	remote	**f**	circuit
7	reed	**g**	current
8	surface	**h**	bias
9	vibration	**i**	control
10	reverse	**j**	diagram
11	mains	**k**	wave

3 Match the measurements of electricity (1–7) to the descriptions (a–g).

1	volt	**a**	electrical resistance between two points of a conductor carrying a current of 1 ampere when the difference in potential between them is 1 volt
2	ohm	**b**	energy transfer of 1 joule during 1 second
3	coulomb	**c**	frequency of a periodic phenomenon whose period is 1 second
4	joule	**d**	constant current of 1 joule per second in a conductor
5	watt	**e**	amount of electricity carried in 1 second by a current of 1 ampere
6	hertz	**f**	amount of energy released by the force of 1 newton acting through a distance of 1 meter
7	ampere	**g**	difference in potential between two points of a conductor carrying a constant current of 1 ampere when the power between these points is 1 watt

4 Complete the sentences with the correct form of the verbs *generate*, *induce*, or *detect*.

1 The magnetic field _____ an electric current in the metal object.
2 A microphone may be used to _____ sound.
3 The oscillator _____ pulses at a fixed frequency of 32 768 Hz.
4 The magnetic field _____ a voltage in the search coil.
5 Noise is also _____ by the low-frequency mains supply.
6 Motion sensors may use microwave energy to _____ movement within their range.

14

1 Choose the correct word to complete the sentences.

1 Electronics is the study and utilization of systems that function by guiding electron flow in _____ such as semiconductors.

a devices **b** pieces **c** servers **d** contraptions

2 Designing and building electronic circuits to solve _____ problems is the mandate of electronic engineering.

a parallel **b** practical **c** political **d** product

3 Electronic circuits are mainly used to control, process, and distribute information, and for the _____ and distribution of electric power.

a conversation **b** communication **c** conversion **d** collection

2 Complete the sentences with the *to infinitive* or *-ing* form of the verbs in brackets.

1 Last year he decided _____ (leave) school and _____ (do) an apprenticeship in Electrical Engineering.
2 We must avoid _____ (waste) valuable raw materials.
3 He's responsible for _____ (check) all the safety systems before the aircraft is allowed to take off.
4 During the course, students will study ways of _____ (find) faults in equipment.

3 Choose the correct word to complete the sentences.

1 This _____ is broken so please call a _____ to repair it.
mechanic / mechanical / mechanism

2 A _____ is someone who has been trained in _____.
technical / technology / technician

3 After the _____ installation, the building will have _____.
electricity / electrical / electrician

4 Study _____ at university if you want to become an _____.
engine / engineer / engineering

5 He has a diploma in _____ and now he repairs _____ equipment.
electron / electronics / electronic

4 Complete the interview using the Present Simple or Present Continuous form of the verbs in brackets.

I _____[1] (be) a student and I _____[2] (study) Electronic Engineering. Normally we _____[3] (attend) lectures and _____[4] (carry out) experiments in the laboratory. But this week we _____[5] (do) real work with electronic engineers in various different companies. I _____[6] (work) in a company called TeleNorth, which _____[7] (install) radio-based local area networks. I _____[8] (help) an engineer, Fred Johnson, to assess where to put the transmitters. Today we _____[9] (visit) a company that _____[10] (build) a new factory and wants to use TeleNorth technology for its networks.

15

1 Complete the sentences about a brother and a sister, Roberto and Renata, using the Present Perfect or Past Simple form of the verbs in brackets.

1 Roberto _____ (be) a computer technician for the last three years.
2 During this time, he _____ (set up) five networks for large companies.
3 Before becoming a computer technician, he _____ (be) a computer repair man in a shop for four years.
4 During those four years, he _____ (repair) hundreds of computers.
5 Since 2006, he _____ (work) for Dynatron, the biggest company in the region.
6 Roberto and Renata both _____ (become) interested in computers while they were at school.
7 In September 2006, Renata _____ (begin) a university course in computer science.
8 Over the last three months, Renata _____ (take) three exams.

2 Complete the sentences with *if*, *unless*, *as soon as*, *before*, or *when*. Use each word only once.

1 There's a green light and a red light. You can operate the machine _____ the green light is illuminated.
2 This is the emergency warning bell. _____ it sounds, everyone must leave the building.
3 We won't be able to complete the project _____ we get more funding.
4 The alarms must be activated. The last person to leave should check they're all switched on _____ they lock the doors and leave the building.
5 _____ the inventor can get permission to fly, he will put his M200G flying car on sale.

3 Complete the sentences with the correct form of the words in brackets. Add prepositions or articles where necessary.

1 The driver-condition-detection sensor shakes the driver's seat, which _____ (prevent / driver / fall / asleep).
2 The road-surface sensor detects when the road is icy, which _____ (cause / ice warning / appear) on the instrument panel.
3 If the fuel sensor detects the fuel is contaminated, the supply to the engine is cut, which _____ (stop / engine / work).
4 The seatbelt sensor detects the driver has not fastened his / her seatbelt, _____ (prevent / car / start).

4 Underline and correct the mistake in each of the sentences.

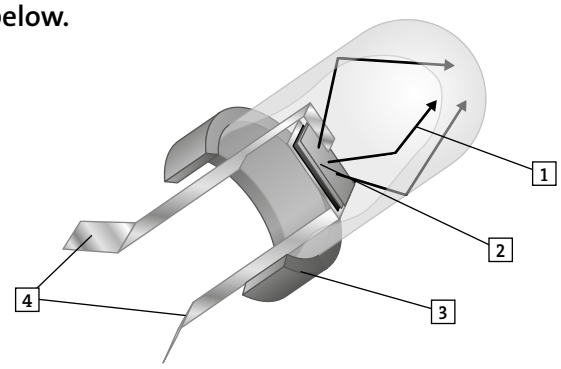
1 Could you sending me the latest catalogue, please? _____
2 I wonder if you could tell me can cardboard be used to make furniture. _____
3 I like to know if the glass has been toughened. _____
4 Would you mind to confirm the measurements by return? _____
5 I'd like you work in the machining department next week. _____
6 I wondering if you could find a replacement screen? _____

16

1 **Label the diagram with the parts listed below.**

emitted light beams	terminal pins
diode	transparent plastic case

1 _____
2 _____
3 _____
4 _____



2 **Complete the text with the words listed below.**

diodes	protects	blocks	direction	electronics

A device that _____[1] current in one direction while letting current flow in another _____[2] is called a diode. _____[3] can be used in a number of ways. A device that uses batteries often contains a diode that _____[4] the device if you insert the batteries back to front . The diode simply blocks any current from leaving the battery if it is reversed – this protects the sensitive _____[5] in the device.

3 **Choose the correct word to answer the questions.**

1 What do capacitors store?
a protons **b** neutrons **c** electrons

2 What separates the two terminals inside a capacitor?
a metal **b** water **c** nonconductive material

3 What types of devices do Mylar capacitors usually power?
a radio tuning circuits **b** timing circuits **c** antennas

4 If you charge a capacitor using a 1.5-Volt battery, how much voltage will the capacitor gain?
a 0 Volts **b** 1.5 Volts **c** 3 Volts

4 **Read the text and answer the questions.**

Integrated circuits

There are two basic types of integrated circuit (IC) – monolithic and hybrid. Monolithic ICs include the entire circuit on a single silicon chip. They can range in complexity from a few transistors to millions of transistors on a computer microprocessor chip. A hybrid IC has a circuit with several chips enclosed in a single package. The chips in a hybrid IC may be a combination of transistors, resistors, capacitors, and monolithic IC chips. A printed circuit board, or PCB, holds an electronic circuit together.

1 What are the two basic types of integrated circuits?
_____

2 Which type of IC includes the entire circuit on a single silicon chip?
_____

3 The chips in a hybrid IC may be a combination of which components?
_____

4 What is PCB an abbreviation of?
_____

17

1 Below is the Health and Safety policy of a small electronics firm. Put the words in order to form a sentence.

1 operates a health and safety policy / employees, trainees, contractors, and visitors / Electronics Specialists / aimed at protecting all

_____

2 is safe / and without risk / the workplace / to health

_____

3 under control / dust, fumes, and noise / all / are kept

_____

4 meet the safety standards / required / all / plant and machinery must

_____

5 all/ are handled / articles and substances / and used safely / stored

_____

6 are given / health and safety / all staff / sufficient information, training, and supervision / to perform their job / to enable them / and ensure their

_____

2 Match the expressions (1–5) with the definitions (a–e).

1 circuit breaker
2 force majeure
3 power outage
4 power surge
5 substation

a a unit which increases or decreases voltage levels
b a sharp, temporary rise in current or voltage levels which can cause damage to electrical equipment
c equipment which protects electrical apparatus from a sharp rise in current levels by switching off electrical current automatically
d loss of electrical power to an area
e an unexpected loss or uncontrollable event; nobody is at fault or responsible for subsequent damage

3 Complete the table with the correct word or expression.

Noun	Verb	Company/Person
1 generation		generator
2 transmission		
3 sales		
4	to distribute	
5	to regulate	
6 supply		

4 Complete the table.

Verb	Noun
to	adaptation
to	approval
to assemble	
to conceive	
to	design
to develop	
to produce	
to	specification

18

1 Complete the dialogue with *will* or *would* or the reduced forms of *'ll* and *'d* where appropriate.

A What _____[1] you do when you finish your diploma?

B I _____[2] like to take a course in multimedia.

A How long _____[3] that take?

B If I choose the certificate, it _____[4] take 6 months but if I chose the master's, it _____[5] take a full year.

A What _____[6] be the advantage of the master's?

B I guess I _____[7] have better job prospects.

2 Look at the table to find a metal for each of the properties listed below. More than one answer is possible.

1 ductile _____

2 malleable _____

3 corrosion-resistant _____

4 good conductor _____

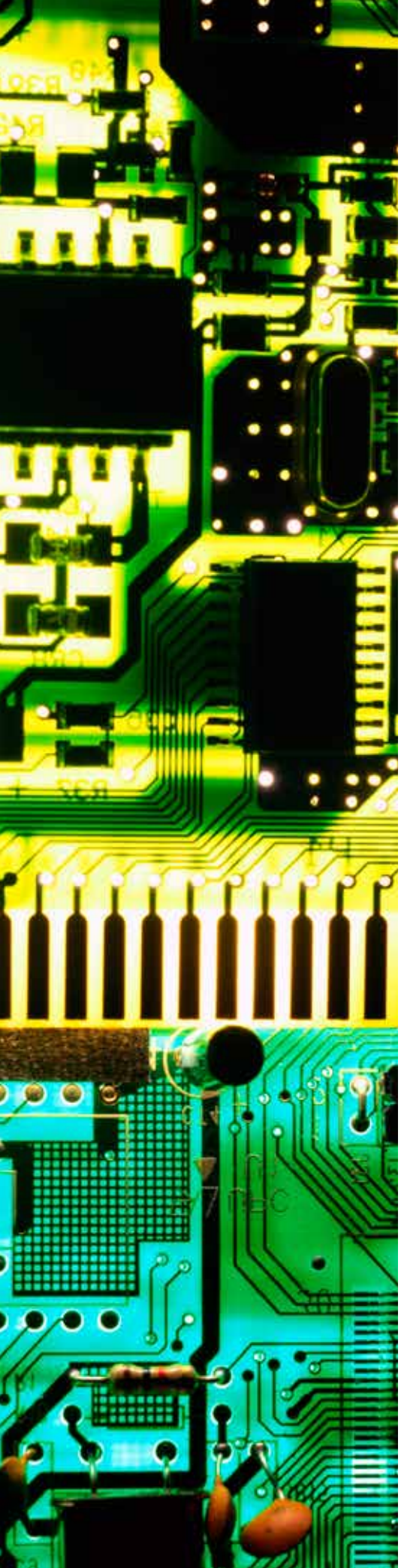
Metals	Properties	Uses
Aluminium	Light, soft, ductile, highly conductive, corrosion-resistant.	Aircraft, engine components, foil, cooking utensils
Copper	Very malleable, tough and ductile, highly conductive, corrosion-resistant.	Electric wiring, PCBs, tubing
Brass (65% Copper, 35% Zinc)	Very corrosion-resistant. Casts well, easily machined. Can be work hardened. Good conductor.	Valves, taps, castings, ship fitting, electrical contacts
Mild Steel (Iron with 0.15% to 0.3% Carbon)	High strength, ductile, tough, fairly malleable. Cannot be hardened and tempered. Low cost. Poor corrosion resistance.	General purpose

3 Match the beginnings of the words (1–8) with the endings (a–h) to form nouns.

1	compress-	**a**	-ee
2	corro-	**b**	-ian
3	equip-	**c**	-ics
4	fric-	**d**	-sion
5	logist-	**e**	-ment
6	supervis-	**f**	-or
7	technic-	**g**	-or
8	train-	**h**	-tion

4 What are the adjectives from these nouns? Complete the table.

Noun	Adjective
1 width	
2 height	
3 length	
4 depth	
5 weight	



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