GCSE

Specimen Papers and Mark Schemes

Edexcel GCSE
Design & Technology: Systems & Control Technology (Electronics/Mechanisms) Short course (3974)

For First Examination

Summer 2003

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Autumn 2000

Publications Code UG 009339

Contents

Centre Number						Paper Reference	Surname
Candidate Number						Candidate Signature	Other Names

For Examiner's use only

For Team Leader's use

3974/2F

Edexcel GCSE

Design and Technology: Systems and Control Technology (Electronics) (Short Course)

Paper 2F

FOUNDATION TIER

Specimen Paper

Time: 1 hour

N0000

Materials required for the examination

None

Items included with these question papers

None

Instructions to Candidates

In the boxes above, write your centre number, candidate number, the paper reference, your signature, your surname and other names. The paper reference is shown in the top left hand corner.

Attempt ALL questions using the spaces provided in the Question Paper.

Information for Candidates

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Advice to Candidates

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Include diagrams where these are helpful.

Question Number	Leave Blank
1	
2	
3	
Total	

Turn over

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Attempt ALL questions in the spaces provided.

Leave blank

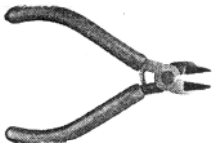
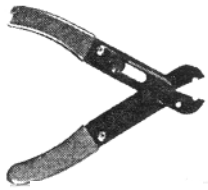
1. The table below shows either some tools or components or equipment.

(a) Complete the table by:

(i) naming each tool or component or equipment;

(ii) describing its use.

The first one has been done for you.

TOOL / COMPONENT / EQUIPMENT	NAME	USE
	Electric soldering iron	Used to permanently fix components into circuits.
		
		
		

(6)

(b) The soldering iron in the table is used in a school workshop.

(i) Give **one** reason why the bit of the soldering iron is made from copper.

.....

(1)

(ii) Give **one** safety precaution to take when using an electric soldering iron.

.....

(1)

(c) Explain how a good soldered joint should be produced using an electric soldering iron and multicore solder.

Leave blank

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.....

.....

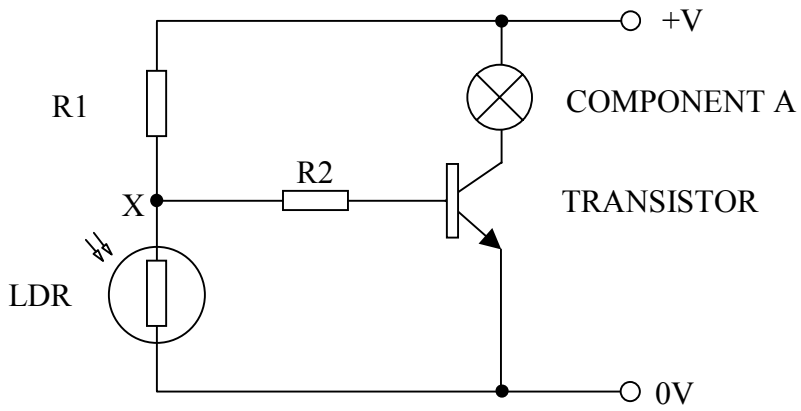
(3)

(Total 11 marks)

Turn over

Leave blank

2. (a) A circuit that switches on a light automatically in dark conditions is shown below.

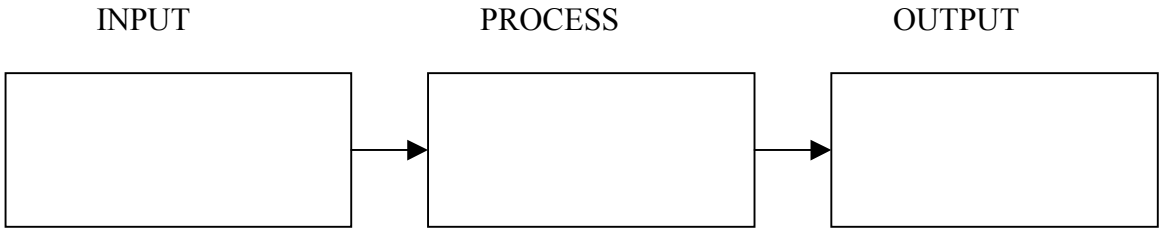


(i) Name the component labelled 'COMPONENT A' in the diagram above.

.....

(1)

(ii) Complete the systems diagram for the circuit.



(3)

(iii) Explain why resistor R2 is needed in the circuit.

.....

.....

.....

(2)

(iv) Explain how a reduction in light level affects the voltage at the point "X".

.....

.....

.....

(3)

(v) Describe how the sensitivity of the circuit could be made adjustable.

Leave blank

.....

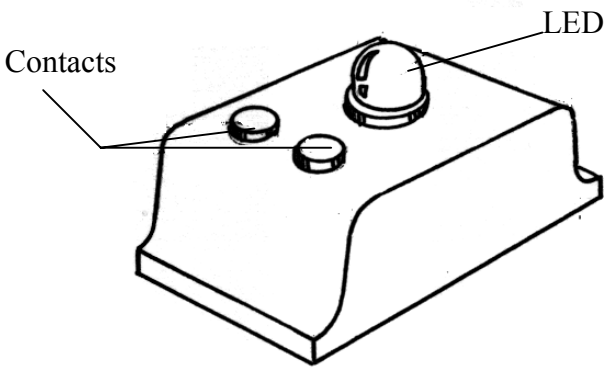
.....

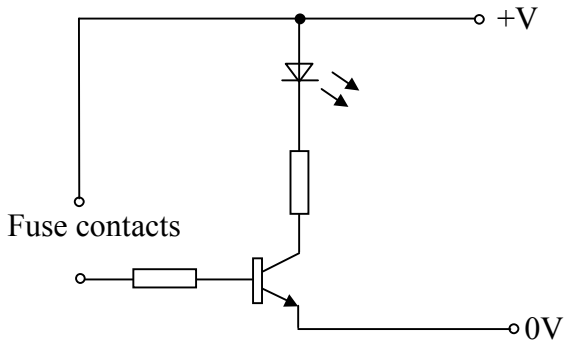
(2)

(Total 11 marks)

Leave blank

3. The diagram below shows the circuit and the case for a simple fuse tester.





ADDITIONAL INFORMATION

The case is made from plastic.
The contacts are made from metal.
The product is aimed at the DIY market.
A fuse is placed across the two metal contacts. The LED lights if the fuse is in good condition.

(a) Two specification points for the fuse tester are:

- its battery must be easily changed;
- the case must be no larger than 80 x 60 x 30.

Give **three** more points that could be included in the specification of the fuse tester. For each point, give a reason why it should be included.

1 .....

Reason .....

2 .....

Reason .....

3 .....

Reason .....

(6)

(b) Name the specific type of material suitable for making each of the following parts of the fuse tester:

Leave blank

(i) The body of the case.

.....

(ii) The contacts.

.....

(iii) The bottom of the case.

.....

(3)

(c) Give **one** property associated with **one** of the materials you have named in (b) and explain how this property makes it suitable for this application.

Property .....

Explanation.....

.....

.....

.....

(4)

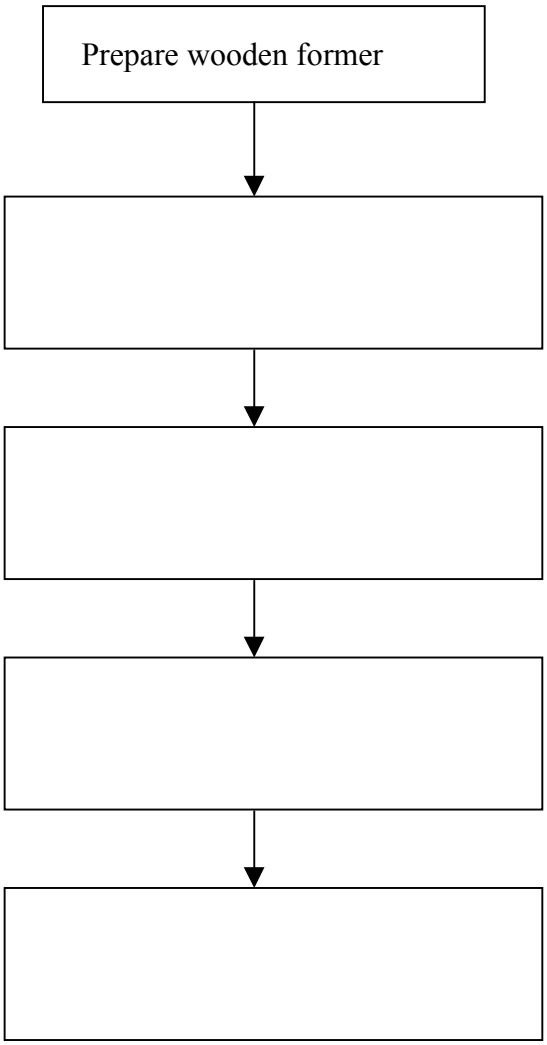
Turn over

Leave blank

(d) The body of the case is batch produced using the vacuum forming process.

Complete the diagram below to show the main stages in the vacuum forming process.

The first stage has been done for you.



(5)

(e) The purpose of the fuse tester is to test the condition of fuses.

Describe how the electronic circuit shown in the diagram achieves this.

Leave blank

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.....

.....

(4)

(Total 22 marks)

PAPER TOTAL 44 MARKS

END

Turn over

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3974/2H

Edexcel GCSE

Design and Technology: Systems and Control Technology (Electronics) (Short Course)

Paper 2H

HIGHER TIER

Specimen Papers

Time: 1 hour

N0000

Materials required for the examination

None

Items included with these question papers

None

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Question Number	Leave Blank
1	
2	
3	
Total	

Turn over

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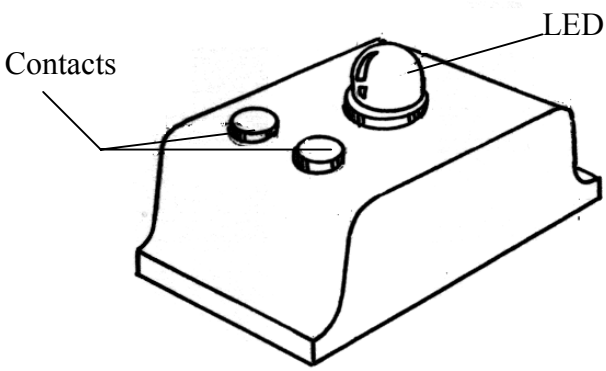
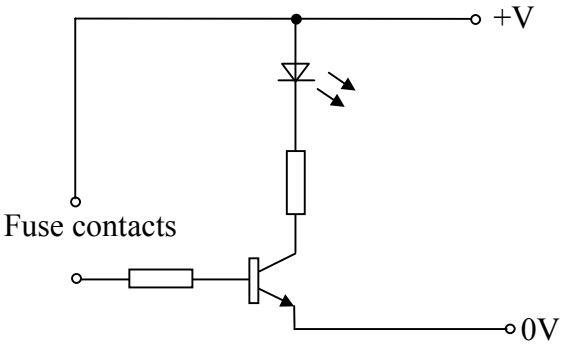
Success through qualifications

Attempt ALL questions in the spaces provided.

Leave blank

1. The diagram below shows the circuit and the case for a simple fuse tester.





ADDITIONAL INFORMATION

The case is made from plastic.
The contacts are made from metal.
The product is aimed at the DIY market.
A fuse is placed across the two metal contacts. The LED lights if the fuse is in good condition.

(a) Two specification points for the fuse tester are:

- its battery must be easily changed;
- the case must be no larger than 80 x 60 x 30.

Give **three** more points that could be included in the specification of the fuse tester. For each point, give a reason why it should be included.

1 .....

Reason .....

2 .....

Reason .....

3 .....

Reason .....

(6)

(b) Name the specific type of material suitable for making each of the following parts of the fuse tester:

Leave blank

(i) The body of the case.

.....

(ii) The contacts.

.....

(i) The bottom of the case.

.....

(3)

(c) Give **one** property associated with **one** of the materials you have named in (b) and explain how this property makes it suitable for this application.

Property .....

Explanation.....

.....

.....

.....

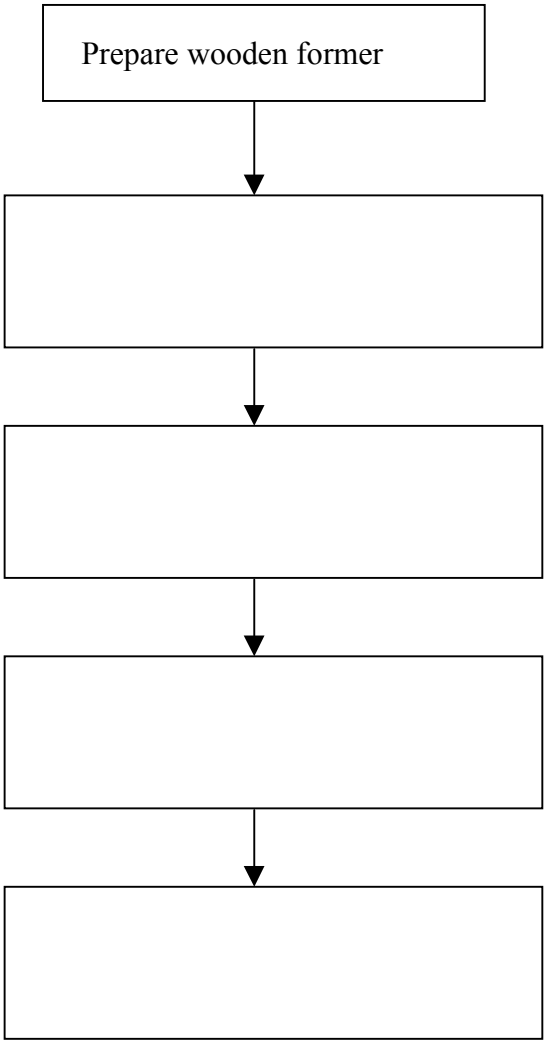
(4)

(d) The body of the case is batch produced using the vacuum forming process.

Complete the diagram below to show the main stages in the vacuum forming process.

The first stage has been done for you.

Leave blank



(5)

(e) The purpose of the fuse tester is to test the condition of fuses.

Describe how the electronic circuit shown in the diagram achieves this.

.....

.....

.....

.....

(4)

(Total 22 marks)

Leave blank

2. The picture below shows a circuit assembly aid.

Leave blank

(a) Give **three** reasons why the assembly aid is useful when soldering components into circuit boards.

1 .....

2 .....

3 .....

(3)

(b) Give **three** safety precautions to take when handling chemicals used in PCB making.

1 .....

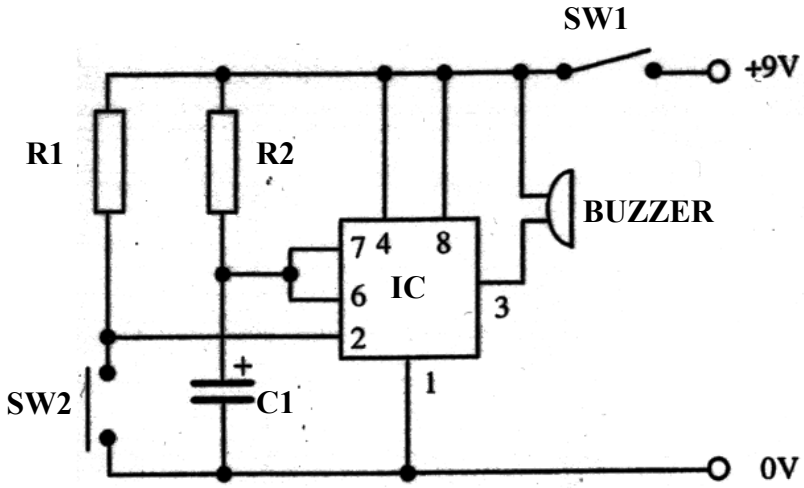
2 .....

3 .....

(3)

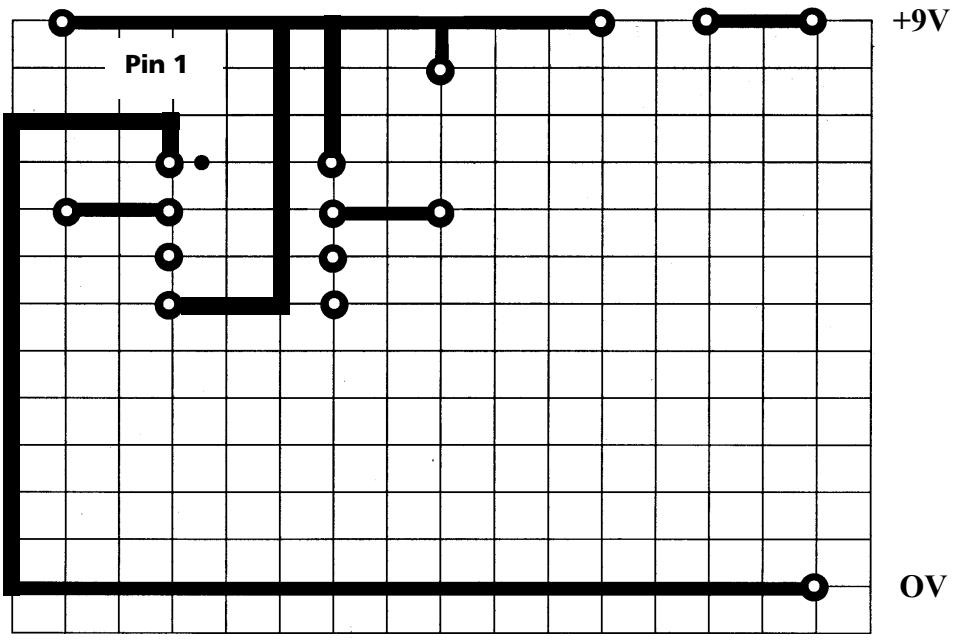
Leave blank

(c) The circuit diagram for a kitchen timer is shown below.



The circuit is to be converted into a PCB layout design.

An incomplete PCB track pattern for the timer, viewed from the component side, is shown below. Complete the PCB track pattern.

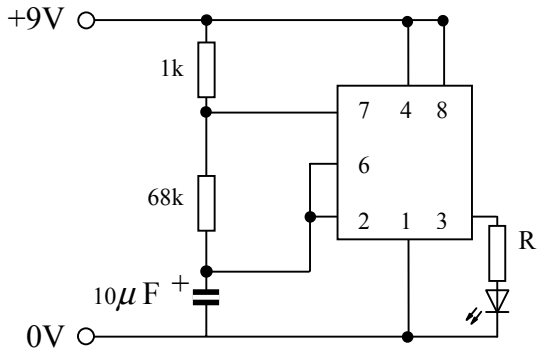


(5)

(Total 11 marks)

Leave blank

3. An astable circuit is shown below with an LED as its output.



LED = 2V @ 10mA

(a) (i) State the purpose of resistor R in the circuit.

.....

(1)

(ii) Calculate the value of R so that the LED functions properly.

(3)

(b) The LED must be placed in the circuit the correct way round or it will not light.

Make an annotated sketch of an LED to show **two** methods of identifying the negative leg.

(4)

Leave blank

(c) The astable circuit shown produces an equal mark/space ratio.

Use notes and sketches to explain the term *mark/space ratio*.

(3)

(Total 11 marks)

PAPER TOTAL 44 MARKS

END

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3974/4F

Edexcel GCSE

Design and Technology: Systems and Control Technology (Mechanisms) (Short Course)

Paper 4F

FOUNDATION TIER

Specimen Papers

Time: 1 hour

N0000

Materials required for the examination

None

Items included with these question papers

None

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1	
2	
3	
Total	

Turn over

Edexcel
Success through qualifications

Leave blank

Answer ALL questions in the spaces provided.

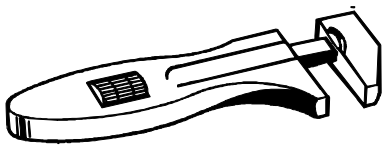
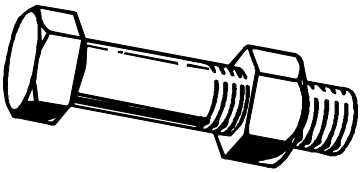
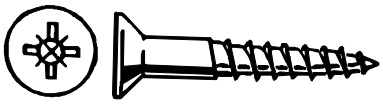
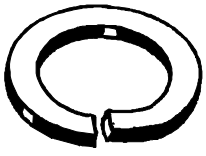
1. The table below shows either some common workshop tools or components or equipment.

(a) Complete the table by:

(i) naming each tool or component or equipment;

(ii) describing its use.

The first one is done for you.

TOOL / COMPONENT / EQUIPMENT	NAME	USE
	Adjustable spanner	Jaws of the spanner are adjusted to fit a range of nut sizes
		
		
		

(6)

Leave blank

(b) The adjustable spanner shown in the table can fit different size nuts.

(i) Describe how the mechanism of the spanner allows it to be adjusted to fit different size nuts.

.....

.....

.....

(3)

(iii) Explain why it is important to adjust the jaws of the spanner to be a close fit on the nut.

.....

.....

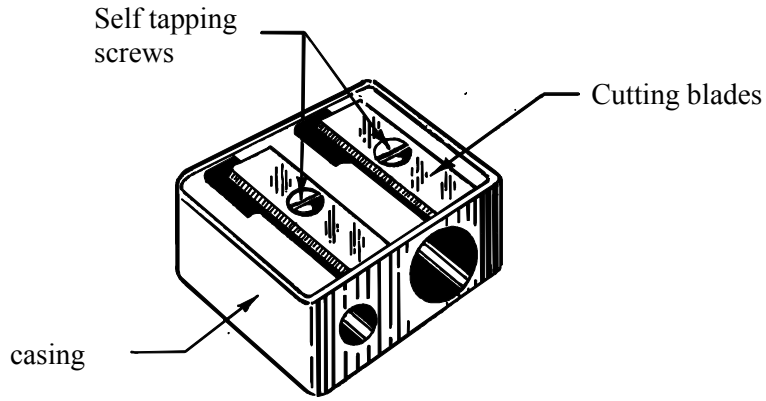
.....

(2)

(Total 11 marks)

Leave blank

2. The diagram below shows a pencil sharpener.



(a) (i) Name **two** suitable materials for the outer casing of the pencil sharpener.

1 .....

2 .....

(2)

(ii) Name a suitable material for the cutting blades of the pencil sharpener

.....

(1)

(iii) Name a property of the cutting blade that makes it suitable for this application.

.....

(1)

Leave blank

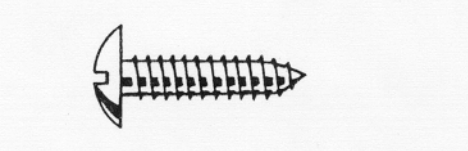
(b) The blade of the pencil sharpener is held in place by a self-tapping screw similar to the one shown below.

(i) Show on the drawing below the following:

1.The root diameter

2.The crest diameter

3.The pitch



(3)

(ii) Give **two** advantages for using self-tapping screws in the production process.

1 .....

2 .....

(2)

(iii) The self-tapping screw is made from hardened steel.

Explain why the screw must to be hard.

.....

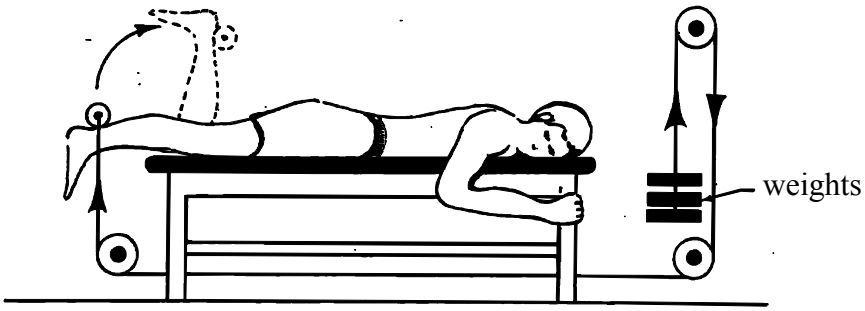
.....

(2)

(Total 11 marks)

Leave blank

3. The fitness device shown below uses a pulley and cable system to allow the user to carry out a leg curling exercise.



ADDITIONAL INFORMATION

Weights can be added and removed.

It is suitable for home use.

(a) Two specification points for the fitness device are:

- the fitness device must be suitable for a range of age groups;
- the fitness device must have a lightweight frame.

Give **three** more points of specification which could be included in the specification of the product. For each point, give a reason why it should be included.

1 .....

Reason .....

2 .....

Reason .....

3 .....

Reason .....

(6)

(b) Name the specific type of material suitable for making each of the following parts of the fitness device:

(i) The main framework .....

(ii) The weights .....

(iii) The bearings .....

(3)

Leave blank

(c) Give **one** property associated with **one** of the materials you have named in (b) and explain how this property makes it suitable for this application.

Property .....

Explanation .....

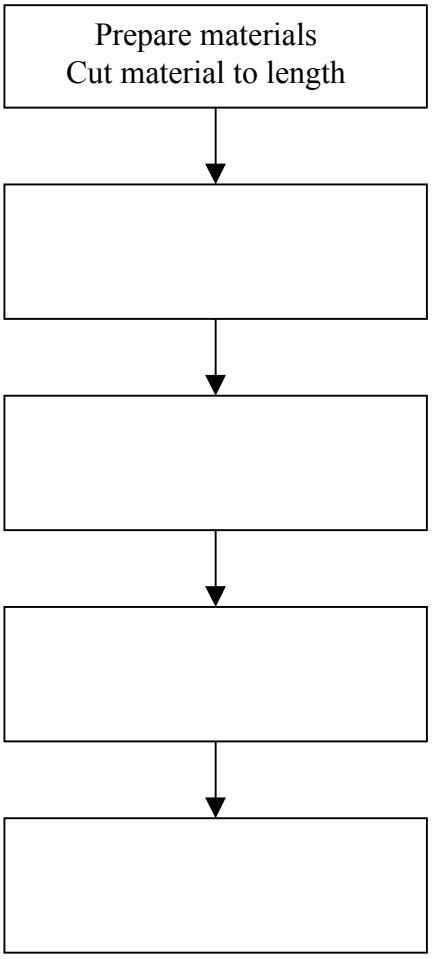
.....

.....

(4)

(d) The framework for a prototype of the exercise bench is to be made in a school workshop.

Complete the diagram below to show the main stages of making the frame.



(5)

(e) The purpose of this fitness device is to allow the user to carry out leg curling exercises.

Describe how the fitness device achieves this purpose.

.....

.....

.....

.....

(4)

(Total 22 marks)

Leave blank

PAPER TOTAL 44 MARKS

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Design and Technology: Systems and Control (Mechanisms) (Short Course)

Paper 4H

HIGHER TIER

Specimen Paper

Time 1 hour

N0000

Materials required for the examination

None

Items included with these question papers

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1	
2	
3	
Total	

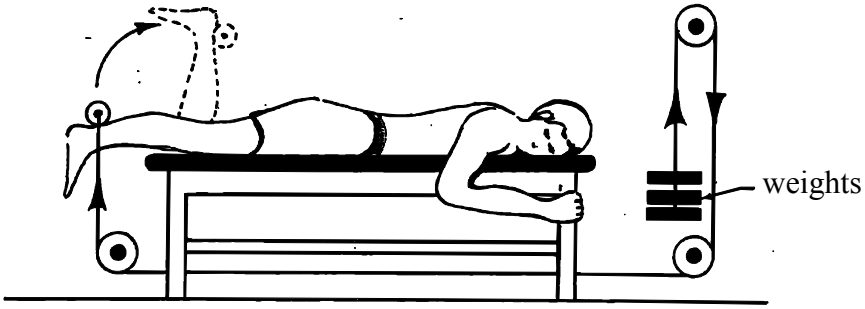
Turn over

Edexcel
Success through qualifications

Answer ALL questions in the spaces provided.

Leave blank

1. The fitness device shown below uses a pulley and cable system to allow the user to carry out a leg curling exercise.



ADDITIONAL INFORMATION

Weights can be added and removed.
It is suitable for home use.

(a) Two specification points for the fitness device are:

- the fitness device must be suitable for a range of age groups;
- the fitness device must have a lightweight frame.

Give **three** more points of specification which could be included in the specification of the product. For each point, give a reason why it should be included.

1 .....

Reason .....

2 .....

Reason .....

3 .....

Reason .....

(6)

(b) Name the specific type of material suitable for making each of the following parts of the fitness device:

(i) The main framework .....

(ii) The weights .....

(iii) The bearings .....

(3)

Leave blank

(c) Give **one** property associated with **one** of the materials you have named in (b) and explain how this property makes it suitable for this application.

Property .....

Explanation .....

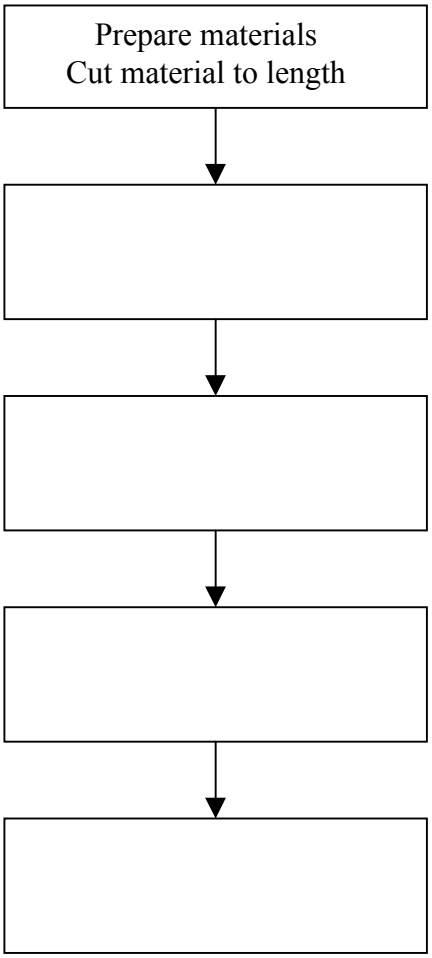
.....

.....

(4)

(d) The framework for a prototype of the exercise bench is to be made in a school workshop.

Complete the diagram below to show the main stages of making the frame.



(5)

Leave blank

(e) The purpose of this fitness device is to allow the user to carry out leg curling exercises.

Describe how the fitness device achieves this purpose.

.....

.....

.....

.....

(4)

(Total 22 marks)

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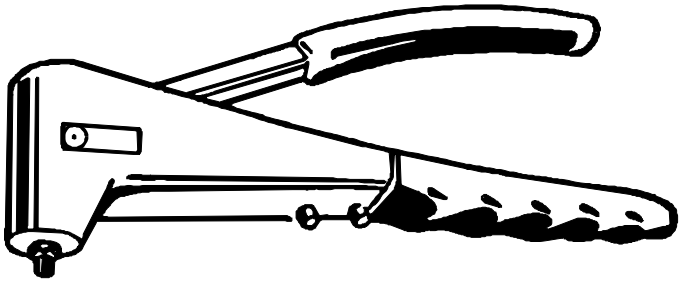
TURN OVER FOR QUESTION 2

Leave blank

2. The pictures below show a standard POP rivet and a POP rivet gun.

POP rivet



POP rivet gun

(a) In the space below use a simple line diagram to show the following parts of the lever mechanism used in the POP rivet gun:

(i) fulcrum;

(ii) direction and position of efforts.

(4)

(b) A force of 120N must be applied to the pop rivet to insert it into some sheet material. Along the handle, the distance from the fulcrum to the rivet is 50mm and the distance from the applied effort to the fulcrum is 150mm.

Leave blank

Calculate the effort needed to be applied to produce the desired force on the rivet.

(3)

(c) A small engineering company is considering buying a computerised system to order components from its suppliers.

Describe **two** ways in which this would help the company.

1 .....

.....

2 .....

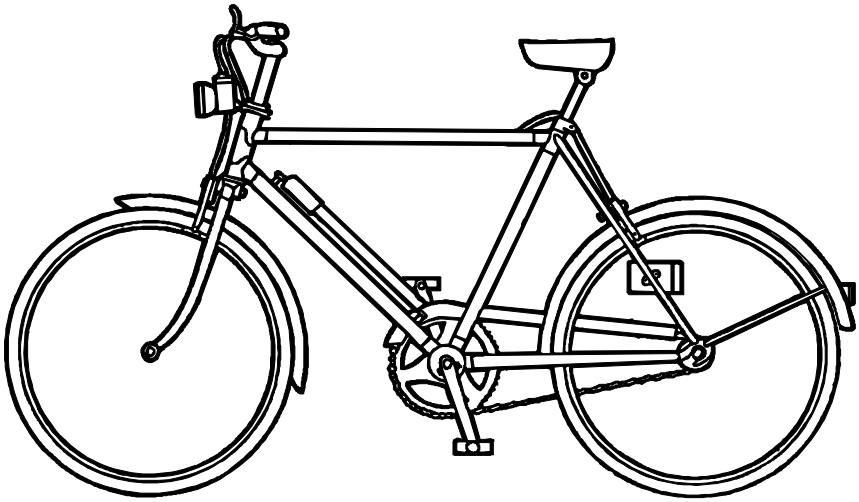
.....

(4)

(Total 11 marks)

Leave blank

3. The diagram below shows a bicycle.



(a) Name **one** place on the bicycle where friction occurs and is reduced by a mechanism and explain how this reduction is achieved.

Name.....

Explanation.....

.....

(3)

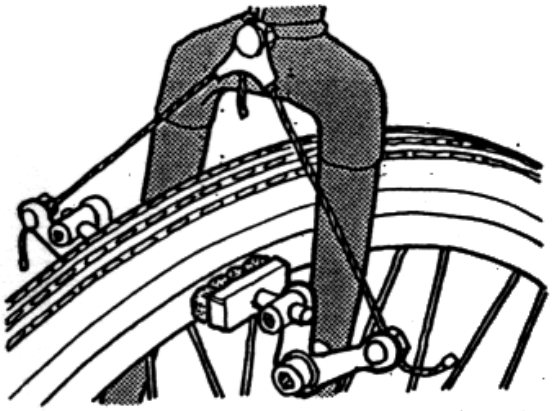
(b) The pedal sprocket has 100 teeth and the rear wheel sprocket has 20 teeth. The circumference of the rear wheel is 2.2 metres.

Calculate the distance the bicycle will travel for **one** rotation of the pedal sprocket. Show all your workings.

(4)

(c) The diagram below shows a braking arrangement for a bicycle wheel.

Leave blank



The type of lever used in the brake mechanism above is a bell crank.

Use notes and sketches to explain the operation of a bell crank lever.

(4)

(Total 11 marks)

PAPER TOTAL 44 MARKS

END

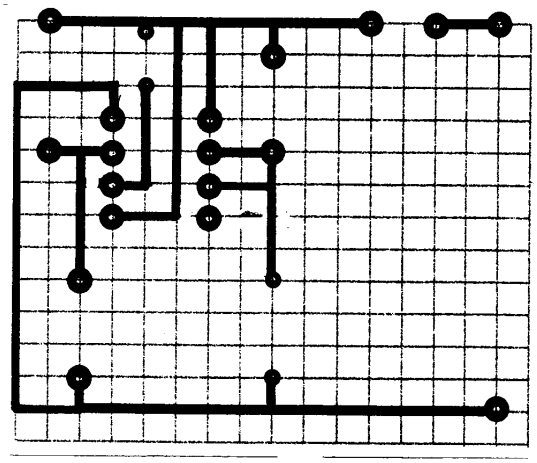
DESIGN & TECHNOLOGY: SYSTEMS & CONTROL TECHNOLOGY (ELECTRONICS) (3974/2F)
SHORT COURSE FOUNDATION TIER MARK SCHEME

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
1	**(a)**	**(i)**	Name: Side cutters Name: De-soldering Tool Name: Wire Strippers	**3 x 1**	
		(ii)	Use: Trimming and cutting component legs/wires to size Use: Removing unwanted solder from circuits Use: Removing plastic sheathing from wire	**3 x 1**	**(6)**
	(b)	**(i)**	Accept any appropriate answer: Copper is good conductor of heat Copper gives up heat easily	**1**	**(1)**
		(ii)	Accept any appropriate safety precaution: Use a soldering iron stand to prevent risk of burning Use a low voltage iron Avoid the flex being in contact with the bit	**1**	**(1)**
	(c)		Avoid soldering in draughts Heat the track and component leg together Feed solder into the joint not onto the bit Ensure joint is smooth and shiny	**3x1**	**(3)**
					(11)
2	**(a)**	**(i)**	Lamp	**1**	**(1)**
		(ii)	Light sensor LDR & resistor Potential Divider Transistor Lamp / Component A	**3x1**	**(3)**
		(iii)	Resistor R2 protects the transistor by limiting current flow into it. Award 1 mark for mention of protecting transistor	**2x1**	**(2)**
		(iv)	As darkness increases, the resistance of 'LDR' increases, causing the voltage at 'X' to rise	**3x1**	**(3)**
		(v)	Replace R1 with a potentiometer / variable resistor	**2**	**(2)**
					(11)

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
3	**(a)**		Accept any three relevant points of specification and reasons eg: Point: Must be comfortable to hold in one hand Reason: for ease of use Point: Must operate from a PP3 9V battery Reason: to keep size down/provide power Point: The LED must be large enough and bright Reason: for clear indicator Point: The back should detach easily Reason: for easy access to battery	**6x1**	**(6)**
	(b)	**(i)**	Any appropriate plastic eg ABS, polystyrene	**1**	
		(ii)	Any appropriate metal eg brass, aluminium, steel	**1**	
		(iii)	Any appropriate material eg acrylic, MDF	**1**	**(3)**
	(c)		Accept any appropriate property of the selected material – the description should relate to the specific application of the material in this instance: Eg Contacts made from brass – good electrical conductor, can be threaded for fixing to case or nut, will not rust, can be machined easily, retains a good finish.	**1 + 3**	**(4)**
	(d)		Place plastic sheet in vacuum forming machine – make airtight Heat plastic sheet until soft Form the required shape Cool the moulding Release moulding and trim Correct sequence	**4x1** **1**	**(5)**
	(e)		When ‘good’ fuse is placed across the contacts, the base of transistor is connected to +V. This causes it to turn on and the current flows through the LED making it light to indicate the fuse is in good condition. A broken fuse will not make a connection with +V so the LED will not light.	**2x2**	**(4)**
					(22)
			TOTAL FOR PAPER 44 MARKS		

DESIGN & TECHNOLOGY: SYSTEMS & CONTROL TECHNOLOGY (ELECTRONICS) (3974/2H)
SHORT COURSE HIGHER TIER MARK SCHEME

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
1	**(a)**		Accept any three relevant points of specification and reasons eg: Point: Must be comfortable to hold in one hand Reason: for ease of use Point: Must operate from a PP3 9V battery Reason: to keep size down/provide power Point: The LED must be large enough and bright Reason for clear indicator Point: The back should detach easily Reason: for easy access to battery	**6x1**	**(6)**
	(b)	**(i)**	Any appropriate plastic eg ABS, polystyrene	**1**	
		(ii)	Any appropriate metal eg brass, aluminium, steel	**1**	
		(iii)	Any appropriate material eg acrylic, MDF	**1**	**(3)**
	(c)		Accept any appropriate property of the selected material – the description should relate to the specific application of the material in this instance: Eg Contacts made from brass – good electrical conductor, can be threaded for fixing to case or nut, will not rust, can be machined easily, retains a good finish.	**1 + 3**	**(4)**
	(d)		Place plastic sheet in vacuum forming machine – make airtight Heat plastic sheet until soft Form the required shape Cool the moulding Release moulding and trim Correct sequence	**4x1** **1**	**(5)**
	(e)		When 'good' fuse is placed across the contacts, the base of the transistor is connected to +V. This causes it to turn on and the current flows through the LED making it light to indicate the fuse is in good condition. A broken fuse will not make a connection with +V so the LED will not light.	**2x2**	**(4)**
					(22)

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
2	**(a)**		Accept any 3 appropriate reasons eg: Allows both hands free for soldering Heavy base enables stability Adjustable for different sized boards	**3x1**	**(3)**
	(b)		Accept any 3 appropriate safety precautions eg: Wear goggles Wear gloves Work in good ventilation	**3x1**	**(3)**
	(c)		 Pin 3 to 1st Leg of Buzzer 2nd Leg of Buzzer to +V Pin 6 connected to pin 7 Pins 6 & 7 to 1st Leg of capacitor 2nd Leg of capacitor to 0V	 **1** **1** **1** **1** **1**	**(5)**
					(11)

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
3	**(a)**	**(i)**	Resistor R protects the LED / current limiting resistor	**1**	**(1)**
		(ii)	R = V/I R = 7/0.01 (Amp) R = 700R (answer must include units) Accept nearest preferred value	**1** **1** **1**	**(3)**
	(b)		Sketch of LED showing: One leg shorter than the other Flat on rim of LED Short leg next to 'flat' Correctly labelled	 **1** **1** **1** **1**	**(4)**
	(c)		Sketch showing mark/space ratio is the relationship between time on and time off of the astable	**3x1**	**(3)**
					(11)
			TOTAL FOR PAPER 44 MARKS		

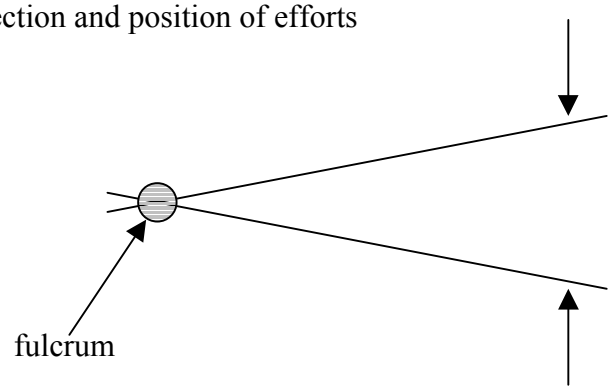
DESIGN & TECHNOLOGY: SYSTEMS & CONTROL TECHNOLOGY (MECHANISMS) (3974/4F)
SHORT COURSE FOUNDATION TIER MARK SCHEME

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
1	**(a)**	**(i)**	Name: Nut & bolt Name: posidriv woodscrew Name: locking/spring washer	**3x1**	
		(ii)	Use holding components together Use general woodworking joints Use: to prevent nuts from working loose due to vibration	**3x1**	**(6)**
	(b)	**(i)**	Description should provide information regarding the screw mechanism, how the rotary movement of the fixed nut allows the screw to travel in a linear direction	**3**	**(3)**
		(ii)	Answers such as: avoids spanner slipping off nut, causing damage and wear to corners of the nut, as well as possible injury to the spanner user.	**2**	**(2)**
					(11)
2	**(a)**	**(i)**	Plastic, thermoplastic, or named plastic, also accept aluminium	**2x1**	**(2)**
		(ii)	Steel or stainless steel	**1**	**(1)**
		(iii)	Hardness	**1**	**(1)**
	(b)	**(i)**	Drawing correctly identifies parts: root diameter, the crest diameter & the pitch of the thread.	**3x1**	**(3)**
		(ii)	Only requires a drilled hole, no tapping or screw thread required, fewer tools needed, reduced costs	**2x1**	**(2)**
		(iii)	Explanation which makes reference to: Allows screw to cut into material – hardened steel will not suffer any wear when cutting into other, softer materials.	**2x1**	**(2)**
					(11)

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
3	**(a)**		Accept any three related specification points and reason, examples given below: Point: Strong Reason: to withstand user weight Point: robust Reason: to be long lasting Point: portable Reason: to allow it to be moved easily	**6x1**	**(6)**
	(b)	**(i)**	steel or aluminium tube	**1**	
		(ii)	cast iron	**1**	
		(iii)	Nylon, bronze, also accept brass	**1**	**(3)**
	(c)		*1 mark for property, 3 marks for explanation* Answers linked to: Steel tube – toughness, durability, strong, lightweight Aluminium tube – strength to weight ration Cast iron – heavy Nylon – wearability, coefficient of friction. Positive frictional properties for sliding. Brass / Bronze – similar to nylon (frictional properties) also relating to wear, non-corrosive.	**1 + 3**	**(4)**
	(d)		Mark out and prepare joints Clamp corners in position Weld, braze or assemble corner joints Clean joint area and finish by painting *Consider other sensible stages of production* Correct sequence	**4x1** **1**	**(5)**
	(e)		Answer should describe how the machine and person interact during the exercise motion. Reference to load, fixed pulley and weights.	**2x2**	**(4)**
					(22)
			TOTAL FOR PAPER 44 MARKS		

DESIGN & TECHNOLOGY: SYSTEMS & CONTROL TECHNOLOGY (MECHANISMS) (3974/4H)
SHORT COURSE HIGHER TIER MARK SCHEME

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
1	**(a)**		Accept any three related specification points and reason, examples given below: Point: Strong Reason: to withstand user weight Point: robust Reason: to be long lasting Point: portable Reason: to allow it to be moved easily	**6x1**	**(6)**
	(b)	**(i)**	Steel or aluminium tube	**1**	
		(ii)	Cast iron	**1**	
		(iii)	Nylon, bronze also accept brass	**1**	**(3)**
	(c)		*1 mark for property, 3 marks for explanation* Acceptable answers linked to Steel tube – toughness, durability, strong, lightweight Aluminium tube – strength to weight ration Cast iron – heavy Nylon – wearability, coefficient of friction. Positive frictional properties for sliding. Brass / Bronze – similar to nylon (frictional properties) also relating to wear, non-corrosive.	**1+3**	**(4)**
	(d)		Mark out and prepare joints Clamp corners in position Weld, braze or assemble corner joints Clean joint area and finish by painting *Consider other sensible stages of production* Correct sequence	**4x1** **1**	**(5)**
	(e)		Answer should describe how the machine and person interact during the exercise motion. Reference to load, fixed pulley and weights.	**2x2**	**(4)**
					(22)

Qu.	Prt Qu.	Sub Qu.	Detailed Possible Answers	Mark Alloc.	Sub. Total
2	**(a)**		Diagram which shows: Fulcrum Direction and position of efforts  	 **2** **2**	**(4)**
	(b)		Calculation: 120 x 50 = F x 150 $F = \frac{120 \times 50}{150}$ = 40N (Unit = 1 mark)	**1** **1+1**	**(3)**
	(c)		Software can retain lists of order numbers for components, order forms ready to use and adapt. Orders can be made using electronic mail (e-mail). *Similar answers relating to efficiency in ordering and that time saves money.*	**2x2**	**(4)**
					(11)
3	**(a)**		Any appropriate part of bicycle eg Pedal to crank Front wheel Explanation which makes reference to ball bearings etc	**1** **2**	**(3)**
	(b)		Calculation: O/P Ratio = I/P / O/P O/P Ratio = 100/20 = 5 Distance = O/P Ratio x Circumference 5 x 2.2 = 11 metres	 **1** **1** **1** **1**	**(4)**
	(c)		Notes and sketches explaining operation with reference to load, effort and how effort converts movement through 90°.	**2x2**	**(4)**
					(11)
			TOTAL FOR PAPER 44 MARKS		

DESIGN & TECHNOLOGY: SYSTEMS & CONTROL TECHNOLOGY (ELECTRONICS/MECHANISMS) (3974) - SPECIFICATION GRID

ELECTRONICS

PAPER 2F				
Quest	**Assessment objective tested**	**Content covered by question**	**Question style/type**	**Marks**
1	AO1	Preparing, processing and finishing materials.	Structured question on a theme.	**Total 11**
2	AO1	Classification and selection of materials and components.	Structured question on a theme.	**Total 11**
3	AO3	Design and market influence.	Product analysis – candidates are asked to analyse a product following the analysis process.	**Total 22**
PAPER 2H				
Quest	**Assessment objective tested**	**Content covered by question**	**Question style/type**	**Marks**
1	AO3	Design and market influence.	Product analysis – candidates are asked to analyse a product following the analysis process.	**Total 22**
2	AO1	Preparing, processing and finishing materials.	Structured question on a theme.	**Total 11**
3	AO1	Classification and selection of materials and components.	Structured question on a theme.	**Total 11**

MECHANISMS

PAPER 4F				
Quest	**Assessment objective tested**	**Content covered by question**	**Question style/type**	**Marks**
1	AO1	Preparing, processing and finishing materials.	Structured question on a theme.	**Total 11**
2	AO1	Classification and selection of materials and components.	Structured question on a theme.	**Total 11**
3	AO3	Design and market influence.	Product analysis – candidates are asked to analyse a product following the analysis process.	**Total 22**
PAPER 4H				
Quest	**Assessment objective tested**	**Content covered by question**	**Question style/type**	**Marks**
1	AO3	Design and market influence.	Product analysis – candidates are asked to analyse a product following the analysis process.	**Total 22**
2	AO1	Preparing, processing and finishing materials.	Structured question on a theme.	**Total 11**
3	AO1	Classification and selection of materials and components.	Structured question on a theme.	**Total 11**

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Summer 2000

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