Centre No.					Pape	er Refer	ence			Surname	Initial(s)
Candidate No.			1	9	7	4	/	3	F	Signature	

Paper Reference(s)

1974/3F

Edexcel GCSE

Design and Technology: Systems & Control Technology (Mechanisms)

(Full Course – 1974)

Paper 3F

Foundation Tier

Monday 9 June 2008 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination

Items included with question papers

- <u>i</u>

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper. Some questions must be answered with a cross in a box (\boxtimes) .

If you change your mind about an answer, put a line through the box (\boxtimes) and then mark your new answer with a cross (\boxtimes) .

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 4 questions in this question paper. The total mark for this paper is 88. There are 16 pages in this question paper. Any blank pages are indicated.

You may use drawing equipment. If pencil is used for diagrams/sketches, it must be dark (HB or B). Coloured pens, pencils and highlighter pens must not be used.

All measurements are in millimetres (mm) unless otherwise stated.

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers. Include diagrams in your answers where these are helpful.

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Examiner's use only

Team Leader's use only

Question Number Blank

1
2
3
4

Turn over

Answer ALL the questions. Write your answers in the spaces provided.

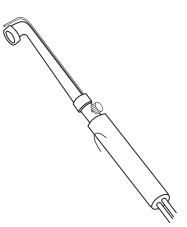
- 1. The table below shows some tools, equipment and mechanisms.
 - (a) Complete the table by
 - (i) naming each tool, piece of equipment or mechanism
 - (ii) describing its use

The first one has been done for you.

Tool/Equipment/Mechanism	Name	Use
	Brazing torch	Hard soldering metals together

(10)

(b) The drawing below shows a brazing torch. It is used for hard soldering or brazing.



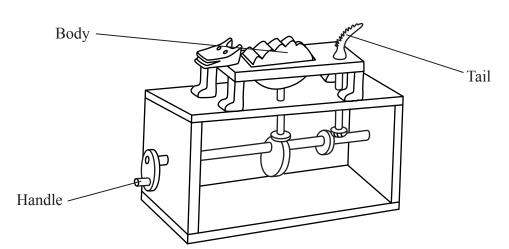
One safety precaution when using a brazing torch is 'do not wave the torch around'.

Give **two other** safety precautions when using a brazing torch.

2		
	(2)

(c) The drawing below shows a child's mechanical toy.

The body and tail of the animal move when the handle is turned.



A mechanical system can be divided into three stages:

${\bf INPUT-PROCESS-OUTPUT}$

Using the terms INPUT, PROCESS and OUTPUT, clearly label on the drawing

- one INPUT
- one PROCESS
- one OUTPUT

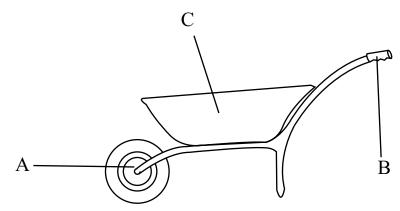
(3)



3

(d)	A barcode on the	nackage o	of a mechanical product	stores different pieces of di	igital
(4)	information about An EPOS till is us	the produ	ct.	stores different process of di	. 5 . tw.
	A barcode is show	n below.			
			5 060091 351318 >		
			e pieces of information values to be scanned and rea	which are stored within a bar ad by an EPOS till.	code
	Store name	\times	Battery size	Selling price	×
	Product descript	ion 🗵	Components	Stock control number	(3)
e)			-	Stock control number before it is batch produced.	
e)	A prototype of a n	nechanical	-	pefore it is batch produced.	
e)	A prototype of a n	nechanical	I product will be made by ping a mechanical product	pefore it is batch produced.	(3)
(e)	A prototype of a non-	nechanical	I product will be made by ping a mechanical product.	before it is batch produced.	<u>(3)</u>
	A prototype of a non-	nechanical for prototy	I product will be made by ping a mechanical product.	before it is batch produced.	(3)
	A prototype of a non- Give two reasons 1	for prototy ted Manucts.	I product will be made by ping a mechanical product product will be made by ping a mechanical product	before it is batch produced.	(3)
	A prototype of a modern Give two reasons 1	for prototy ted Manucts.	I product will be made by ping a mechanical product product will be made by ping a mechanical product	before it is batch produced.	(3)
	A prototype of a modern Give two reasons 1	for prototy ted Manucts.	I product will be made by ping a mechanical product product will be made by ping a mechanical product	before it is batch produced.	(3)
	A prototype of a modern Give two reasons 1	for prototy ted Manucts.	I product will be made by ping a mechanical product product will be made by ping a mechanical product	before it is batch produced.	(3)

2. (a) The drawing below shows a wheelbarrow.



(i) In the table below, mark with a cross (⋈) the correct term for parts A, B and C.

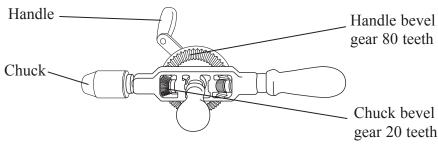
Part	Term					
A	Effort	×	Load	×	Fulcrum	\boxtimes
В	Effort	X	Load	×	Fulcrum	X
С	Effort	\boxtimes	Load	×	Fulcrum	×

(3)

(ii) Identify the class of lever used in the wheelbarrow.

(1)

(b) The drawing below shows a hand drill.



(i) The hand drill uses bevel gears to drive the chuck.

Describe how the bevel gears drive the chuck when the handle is turned.

.....

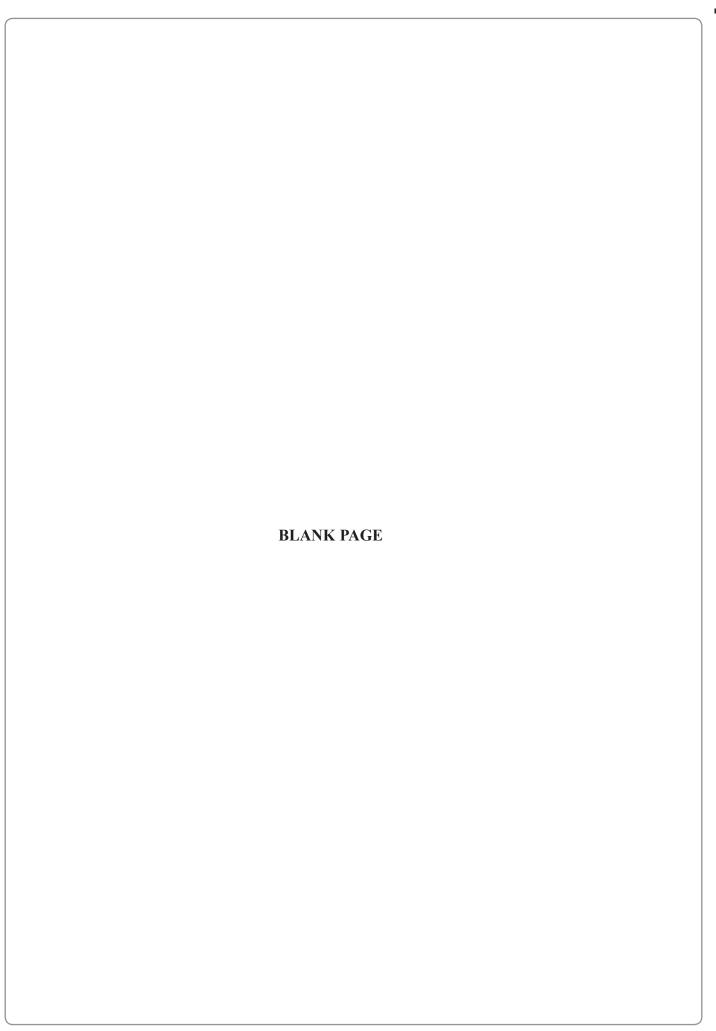
(2)

(1)

(ii) Calculate the speed of the chuck gear if the handle is turned at 100 rpm. There are 80 teeth on the handle gear and 20 teeth on the chuck gear.	
Use the formula	
chuck speed = handle speed \times $\frac{\text{number of teeth on handle gear}}{\text{number of teeth on chuck gear}}$	
Chuck speed = Number Unit	(2)
t) The drawing below shows a gear system used in a pillar drill. The gear system to move the chuck up and down.	is used
Handle	
(i) Name the gear system used to move the chuck up and down.	
	(1)
(ii) The handle is used to give the input to the gear system.	
Give the technical term for this motion.	
	(1)
(iii) The up and down movement of the chuck is the output of this gear system	n.

Product reliability and safety are important for mechanical toys.	
(i) Not being able to over-wind a clockwork toy is an example of where produce reliability is important.	ct
Give one reason why not being able to over-wind a clockwork toy is important for the user.	nt
(1	 1)
(ii) Safety must be considered when designing a clockwork toy.	
Give one function of a clockwork toy where safety is important for the user.	
Function	
Give one reason why the safety of this function is important for the user.	
Reason	 2)
	,
Give three advantages of using fibreglass to make cases for mechanical toys.	
1	
2	
3	3)
	reliability is important. Give one reason why not being able to over-wind a clockwork toy is importation the user. (ii) Safety must be considered when designing a clockwork toy. Give one function of a clockwork toy where safety is important for the user. Function Give one reason why the safety of this function is important for the user. Reason (iii) Safety must be considered when designing a clockwork toy. Give one function of a clockwork toy where safety is important for the user. Reason (iv) Using fibreglass to make the cases for mechanical toys has many advantages. Give three advantages of using fibreglass to make cases for mechanical toys.

(f)	Nev	w mechanical toys come onto the market when the older versions still work		Leave blank
(-)			•	
		rk with a cross (☒) the term that completes each of the sentences below.		
	Eac	ch term may be used once or not at all.		
	(i)	Mechanical toys are often updated by the manufacturer when the older vestill work.	ersions	
		This is known as:		
		changing fashion □ planned product □ product evolution obsolescence	1	
		obsolescence	(1)	
	(ii)	Consumers often replace their current mechanical toys with new ones be they want the latest model.	ecause	
		This is known as:		
		changing fashion planned product product evolution obsolescence	n 🔀	
		obsolescence	(1)	
(g)	Old	I mechanical toys are often thrown away instead of being recycled.		
	(i)	Give one environmental disadvantage of throwing away old mechanical to	bys.	
			(1)	
	(ii)	Describe one way in which old mechanical toys can be recycled.		
			(2)	Q2
			(-)	





3. A company makes pull-along toys for children.

A new design is needed.

The specification for the new pull-along toy is that it must:

- have axles that rotate smoothly
- have a figure that moves up and down when the toy is pulled along
- have wheels fixed securely to the axles
- be made from materials and processes suitable for one-off production
- (a) In the spaces opposite, use sketches and, where necessary, brief notes to show **two different** design ideas for the new pull-along toy that meet this specification.

Do **not** evaluate your designs in part (a).

Candidates are reminded that if pencil is used for diagrams/sketches, it must be dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.

PLEASE DO NOT WRITE OR DRAW IN THIS SPACE.

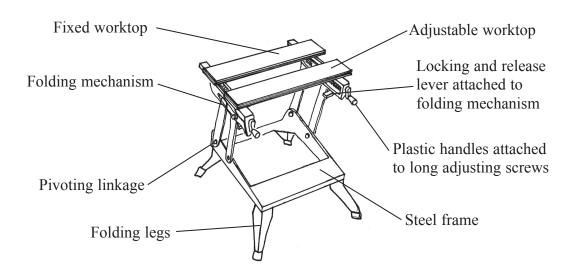
PLEASE USE THE SPACES OPPOSITE FOR YOUR DESIGNS.



Design Idea 1		Leave blank
	(8)	
Design Idea 2		
	(8)	

	Leave
these	
(2)	
(2)	
r one-	
(2)	Q3
arks)	
	(2) or one-

4. The drawing below shows details of a DIY workbench.



- (a) Two specification points for the DIY workbench are that it must:
 - fold for storage
 - be able to clamp different sizes of material

Under each of the following headings, give **one** more point that should be included in the specification for the DIY workbench.

For each point, give **one** reason why it should be included.

(i)	Market	
	Point	
	Reason	
		(2)
(ii)	Quality	, ,
	Point	
	Reason	
		(2)
(iii)	Environment	
	Point	
	Reason	
		(2)

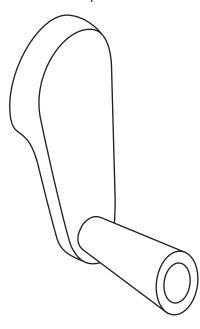


(b)	One reason for using steel is that it can be finished using a plastic coating.
	(i) Give two other reasons why steel is a suitable material from which to make the frame.
	1
	2(2)
	(ii) Give two reasons why plastic coating is a suitable finish for the frame.
	1
	2(2)
(c)	The worktops are made from 20 mm thick plywood. Plywood is made from several layers of wood glued together.
	Give two properties of plywood that make it more suitable for the worktops than a single piece of solid wood. For each property, give one reason why it makes plywood suitable.
	Property
	Reason
	Property
	Reason(4)
(d)	Quality control checks are carried out at important stages during the manufacture of the DIY workbench.
	Name two important quality control checks that should be carried out during the manufacture of the DIY workbench.
	1
	2
	(2)

(e) The plastic handles are made in high volume from a thermoplastic using the injection moulding process.

The shape of the handles makes them suitable to be made from a thermoplastic.

The drawing below shows a thermoplastic handle.



Describe **one** way in which the shape of the handle makes it suitable to be made from a thermoplastic.

.....

(2)

TURN OVER FOR QUESTION 4(f)

(f)	Tw	o purposes of the DIY workbench are that it must:	blank
	•	fold for storage	
	•	be able to clamp different sizes of material	
		plain, under the following headings, how the DIY workbench achieves these poses.	
		Fold for storage.	
		(2)	
	(ii)	Be able to clamp different sizes of material.	
		(2)	Q4
		(2) (Total 22 marks) TOTAL FOR PAPER: 88 MARKS	Q4
		(Total 22 marks)	Q4
		(Total 22 marks) TOTAL FOR PAPER: 88 MARKS	Q4
		(Total 22 marks) TOTAL FOR PAPER: 88 MARKS	Q4
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