Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						3	9	7	4	/	3	F	Signature	

Paper Reference(s)

3974/3F

Edexcel GCSE

Design and Technology: Systems & Control Technology (Mechanisms)

(Short Course – 3974)

Paper 3F

Foundation Tier

Tuesday 22 June 2010 – Morning

Time: 1 hour

Examiner's use only		

Team Leader's use only		

Question Number	Leave Blank
1	
2	
3	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

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

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 3 questions in this question paper. The total mark for this paper is 44.
There are 12 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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Leave blank

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

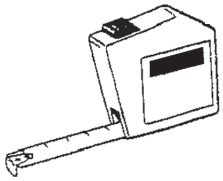
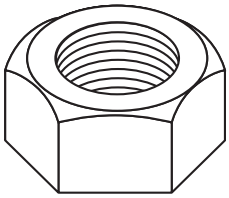
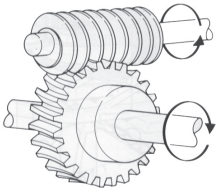
1. The table below shows some tools, components and equipment.

(a) Complete the table by:

(i) naming each tool, component or piece of equipment

(ii) describing its use.

The first one has been done for you.

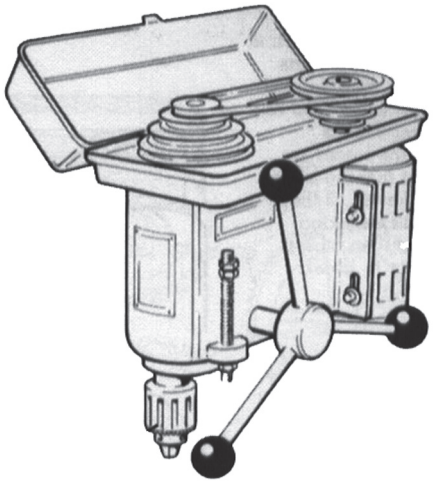
Tool / Component / Equipment	Name	Use
	Pillar drilling machine	For drilling holes
		
		
		

(6)

Leave blank

(b) The drawing below shows part of the pillar drilling machine.

The chuck rotates when the motor turns.



A mechanical system can be divided into three stages:

INPUT – PROCESS – OUTPUT

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

- one INPUT
- one PROCESS
- one OUTPUT.

(3)

(c) Give **two** safety precautions that must be taken when using a pillar drilling machine.

1 .....

2 .....

(2)

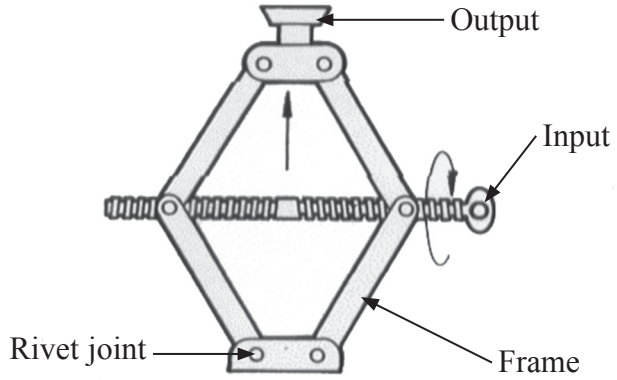
Q1

(Total 11 marks)

Leave blank

2. The drawing below shows a car scissor jack.

As the input is turned, the output moves up or down.



(a) The frame is made from a ferrous metal.

Mark with a cross (☒) **one** ferrous metal which is suitable for the frame.

brass ☒ **lead** ☒ **mild steel** ☒ **aluminium** ☒

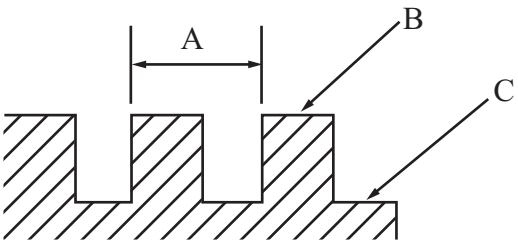
(1)

(b) Name the type of motion that is made by the input.

.....

(1)

(c) The type of screw thread used in the car scissor jack is a square thread.



Name the parts labelled A, B and C.

A .....

B .....

C .....

(3)

Leave blank

(d) Name the type of screw thread shown below.

.....

(1)

(e) A lubricant is used on the rivet joint.

Give **two** reasons for using a lubricant on the rivet joint.

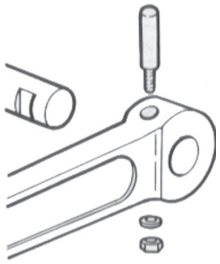
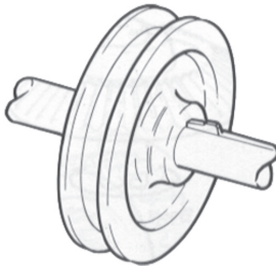
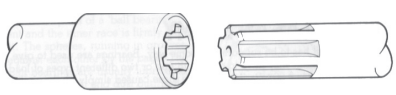
1 .....

2 .....

(2)

(f) The table below shows three different methods of fixing components to shafts.

In the table below, mark with a cross (☒) the correct name for the fixing methods shown.

Fixing method	Fixing name
	**Keyway** ☒ **Cotter pin** ☒ **Splined shaft** ☒ **Grub screw** ☒
	**Keyway** ☒ **Cotter pin** ☒ **Splined shaft** ☒ **Grub screw** ☒
	**Keyway** ☒ **Cotter pin** ☒ **Splined shaft** ☒ **Grub screw** ☒

(3)

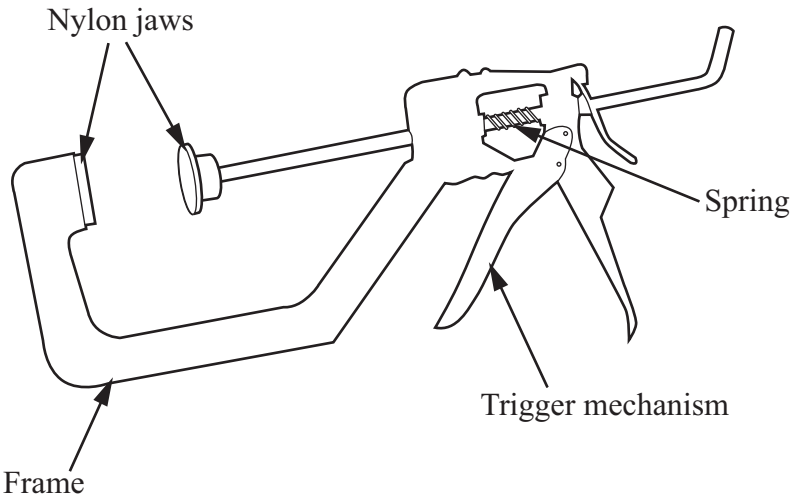
Q2

(Total 11 marks)

Leave blank

3. The drawing below shows a workshop clamp.

It is sold in do-it-yourself stores.



(a) Two specification points for the workshop clamp are that it must:

- be able to be used with only one hand
- not cause damage to the work that is being clamped.

Leave blank

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

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

(i) **Quality**

Point .....

Reason .....

.....

.....

(2)

(ii) **Environment**

Point .....

Reason .....

.....

.....

(2)

(iii) **Safety**

Point .....

Reason .....

.....

.....

(2)

(b) The frame is made from mild steel.

One reason for making the frame out of mild steel is that it can be easily joined by welding.

Give **two** other reasons why mild steel is a suitable material from which to make the frame.

1 .....

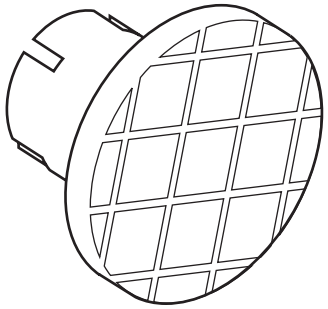
2 .....

(2)

Leave blank

(c) The diagram shows one of the nylon jaws.

The nylon jaws are manufactured using the injection moulding process.



Give **two** reasons why the injection moulding process is suitable for manufacturing the nylon jaws.

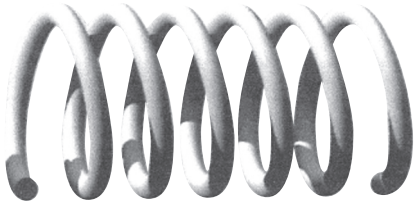
1 .....

2 .....

(2)

(d) The diagram shows a spring.

The spring is made from hardened steel.



Give **two** properties of hardened steel that make it suitable for the spring.

For each property give **one** reason why it makes hardened steel suitable for the spring.

Property 1 .....

Reason .....

.....

Property 2 .....

Reason .....

.....

(4)

Leave blank

(e) The manufacturer of the workshop clamp uses sampling during production.

Explain **one** reason for sampling during the manufacture of the workshop clamp.

.....

.....

(2)

(f) The frame is finished by plastic coating.

Explain **one** reason why the frame is finished by using plastic coating.

.....

.....

(2)

(g) Two purposes of the workshop clamp are to:

- be able to be used with only one hand
- not cause damage to the work that is being clamped.

Explain under the following headings, how the workshop clamp achieves these purposes.

(i) Be able to be used with only one hand.

.....

.....

.....

.....

(2)

(ii) Not cause damage to the work that is being clamped.

.....

.....

.....

.....

(2)

Q3

(Total 22 marks)

TOTAL FOR PAPER: 44 MARKS

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