

Candidate Name	Centre Number	Candidate Number



**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**General Certificate of Secondary Education**

**D&T: SYSTEMS AND CONTROL TECHNOLOGY 1957/2**  
**CORE**

**PAPER 2 (HIGHER TIER)**

Thursday                      **25 MAY 2006**                      Morning                      1 hour 15 minutes

Candidates answer on the question paper.  
 Additional materials:  
 Formulae sheet: OCR (TABLES) 2 (inserted).

**TIME**    1 hour 15 minutes

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page.  
 Answer **all** questions.  
 Write your answers in the spaces provided on the question paper.  
 Show all working out for calculations.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question.  
 Dimensions are in millimetres unless stated otherwise.  
 Marks will be awarded for the use of correct conventions.

FOR EXAMINER'S USE	
Q1	
Q2	
Q3	
Q4	
Q5	
<b>TOTAL</b>	

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**This question paper consists of 11 printed pages, 1 blank page and an insert.**

1 Fig. 1 shows a pair of sunglasses used by sports people.



Fig. 1

The lenses react to the level of light by going darker when the level of light increases.

(a) Explain one advantage of wearing these glasses compared to wearing glasses that remain dark all of the time.

.....

.....

.....

.....[2]

(b) State the name that is given to materials which react in an intelligent way to an input.

.....[1]

(c) Shape memory alloy could be a material for the frames of glasses used by sports people.

(i) Explain **one** advantage to the sports people of having the frames made from shape memory alloy.

.....  
.....  
.....  
.....[2]

(ii) Give **two environmental** advantages of using a metal for the frames compared to plastic.

advantage 1 .....  
.....[1]

advantage 2 .....  
.....[1]

(d) The sunglasses are to be sold worldwide.

From the list of words below **circle** the most appropriate commercial production method to produce 10,000 identical sunglasses every day.

**job production**                      **batch production**                      **repetitive flow**                      [1]

(e) Global products are made in developing countries. Give **two** reasons why developing countries are chosen.

Reason 1 .....  
.....[1]

Reason 2 .....  
.....[1]

- 2 For some sports, boots with screw-in studs are worn.  
Fig. 2 shows detail of a stud.

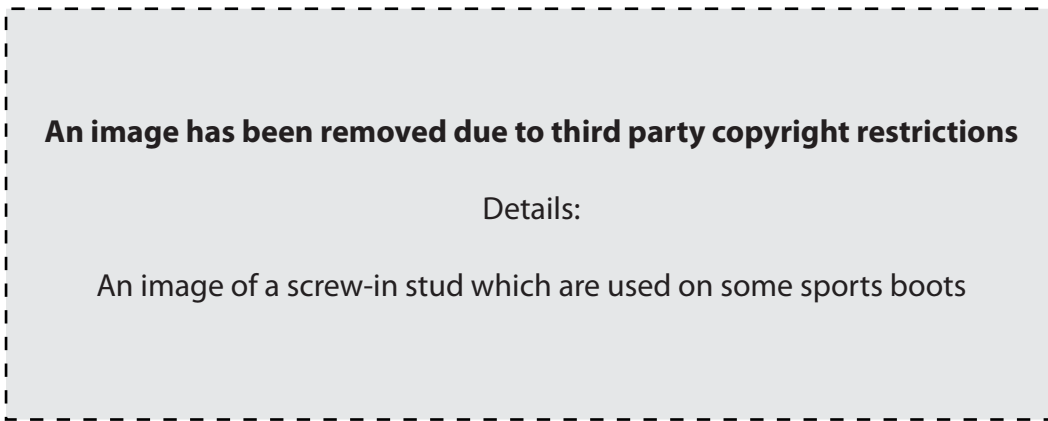


Fig. 2

- (a) The brass thread insert is machined using a C.N.C. machine.
  - (i) Name the type of C.N.C. machine needed to produce this thread.  
.....[1]
  - (ii) Give one advantage to the manufacturer of using a C.N.C. machine rather than a manually operated machine.  
.....[1]
- (b) The lower part of the stud is made from nylon.
  - (i) State a suitable process for forming the nylon body of the stud.  
.....  
.....[1]
  - (ii) Give one reason why this process is suitable.  
.....  
.....[1]
- (c) Quality control checks are made during manufacture.  
Give two quality control checks for the stud shown in Fig. 2.
 

Check 1 .....  
.....[1]

Check 2 .....  
.....[1]

Fig. 3 shows a specially shaped tool used to secure the screw-in studs.

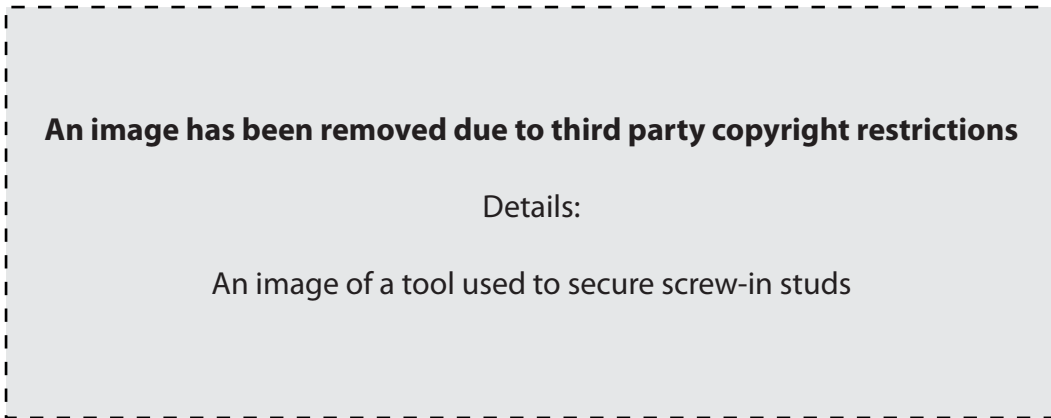


Fig. 3

(d) Give two advantages of using this tool compared to a standard spanner.

Advantage 1 .....

.....[1]

Advantage 2 .....

.....[1]

A prototype tool is made using a CAD/CAM system.

(e) Give two benefits to the designer of using a CAD/CAM system to make the prototype.

Benefit 1 .....

.....[1]

Benefit 2 .....

.....[1]

- 3 In sports such as tennis, it is difficult to see the ball if the level of light is low. Fig. 4 shows a product to measure the level of light.



Fig. 4

- (a) State two ergonomic factors which should have been taken into consideration in the design of the light meter.

Factor 1 .....

.....[1]

Factor 2 .....

.....[1]

Fig. 5 shows the circuit for the light meter.

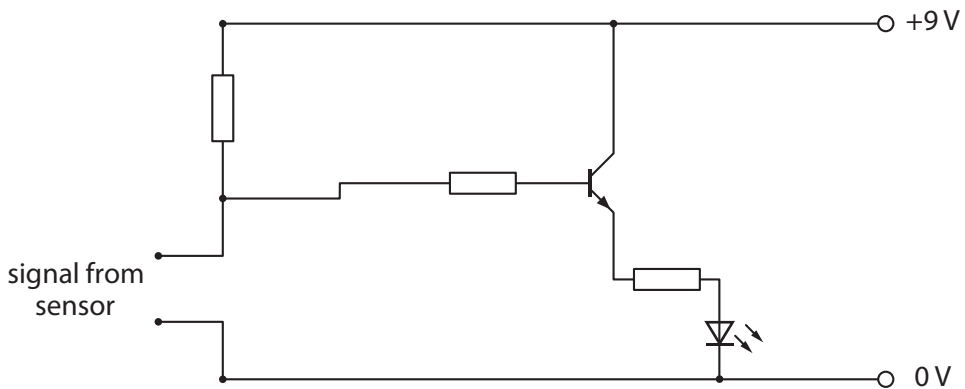


Fig. 5

- (b) Name a component that could be used to sense the level of light.

.....[1]

(c) The circuit in Fig. 5 uses an L.E.D. to indicate when the light level is too low.

Complete the table below to name **two** alternative components that could be used as an output indicator. Draw the circuit symbol for each component chosen.

alternative output component	circuit symbol

[4]

(d) Explain how the circuit in Fig. 5 could be modified to switch on at different light levels.

.....

.....

.....

.....[2]

(e) When all the components in the circuit were soldered onto a PCB the circuit was found not to work when the battery was connected.  
Give **one** possible fault.

.....

.....

.....[1]

4 Fig. 6 shows the mechanical system used to adjust the height of a tennis net.



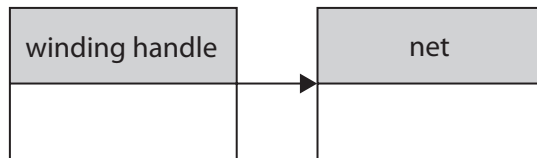
Fig. 6

(a) (i) One force which acts on the pulley must be kept as small as possible.  
State the name of that force.

.....[

1]

(ii) Complete the block diagram naming the two motions taking place in Fig. 6.



[2]

(b) The handle is fabricated from brass.  
Give two reasons why the fabrication process is suitable.

Reason 1 .....

.....[1]

Reason 2 .....

.....[1]

(c) The design needs to be developed so that the winding handle can be detached after use.

(i) Give **one** reason for this development.

Reason .....

.....[1]

(ii) Use sketches and notes to show an improved handle design that:

- gives positive drive;
- is easily attached;
- is secure in use;
- can be detached without the need for tools.

[4]

5 Fig. 7 shows an incomplete diagram of a basket stand made of the following:

- ring – 10mm diameter solid steel rod;
- backboard – 15mm thick exterior plywood;
- main stand – diameter 90mm x 3mm mild steel tube.



Fig. 7

- (a) The ring and main stand are made from mild steel.  
Give two disadvantages of using mild steel rather than aluminium for these parts.

Disadvantage 1 .....

.....[1]

Disadvantage 2 .....

.....[1]

- (b)** In the space provided use sketches and notes to show:
- (i)** a method of securely attaching and supporting the ring at 90 degrees to the backboard.
  
  - (ii)** details of a suitable base which:
    - uses a minimum amount of material;
    - allows the structure to be easily moved;
    - gives appropriate stability.

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