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## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

**International General Certificate of Secondary Education** 

## MARK SCHEME for the May/June 2008 question paper

## 0445 DESIGN AND TECHNOLOGY

0445/04

Paper 4 (Systems and Control), maximum raw mark 50

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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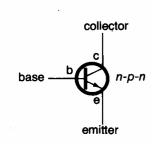
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## **Section A**

Answer all questions in this section.

- 1 Tension / tensile force / stretching [1]
- 2 (a) LDR / Light dependant resistor / Phototransistor [1]
  - (b) Burglar alarms, Counters [1]
- 3 Motor Eccentric cam Follower Rotary Reciprocating [3]

4

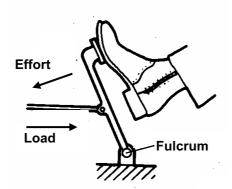


**5** (a) 2<sup>nd</sup> [1]

[3]

[3]

(b)



- 6 Movement energy is called **KINETIC** energy. [1]
- 7 (a) 1 Friction / Heat energy
  2 Badly made / inaccurately fitted components [2]
  - (b) (i) 1 Lubrication or low friction materials
    2 Greater accuracy in manufacturing [2]
    - (ii) Details given 2 x (1)
      Sketch (1)
      [3]

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8	R =	100	)kΩ			[1]
9	Wa	shin	g mad	chine control / alarm systems		[1]
10	To	take	into a	account (1) unforeseen extra loading (1)		[2]
						[Total: 25]
				Section B		
11	(a)			ng the switch turns on the 555 (1) / this ) which keeps the LED on (1) for the specifie		through the RC [4]
	(b)	Thi	s is a	current limiting resistor (1) / that protects the	e LED (1)	[2]
	(c)			uld mean that the LED would be on (1) un off for the specified time period (1)	til the switch was depre	essed (1) then it [3]
	(d)	If w	rongl	y connected the capacitor would blow.		[1]
	(e)	T =	1.1 x	R (ohms) x C (F) (1) 100,000 x 100 / 1000,000 (1) 10 (1)		
				econds (1)		[4]
	(f)	(i)	PTM	(Push to make)		[1]
	(g)	A b	attery	is a collection of cells which add up to the r	equired voltage.	[2]
	(h)	(i)	<b>Or</b> g	ate NO CARRY FORWARD E	RROR	[1]
		(ii)		A OR		[3]
	(	(iii)	Para	ıllel		[1]
	,	\ <i>j</i>				[,]

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(iv) Complete the truth table below for this logic circuit.

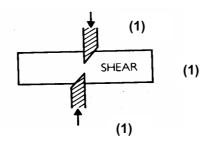
Input A	Input B	Output	
0	0	0	(1)
0	1	1	
1	(1) 0	(1) 1	

[3]

[Total: 25]

- **12 (a)** The ratio between the effort distance and the load distance from the pivot (1) makes it easier for the operator (1) to crush the can [2]
  - (b) For equilibrium RR = RL 1000mm x 100N = 300mm x F (1) 1000 / 300 x 100N = F (1) F = 333.33 N (1) [3]
  - (c) (i) Shear [1]
    - (ii) Pins in the linkage to the pressure plate [1]

(iii)



[3]

[1]

(d) Reduce the length of A to B / make handle longer

[1]

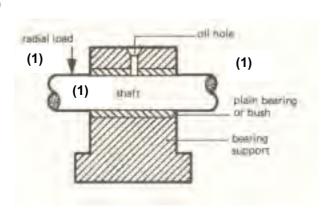
(f) (i) Reduce friction (1) make operation smoother (1) Reduce wear and tear (1)

[2]

(ii)

(e) (i)

2<sup>nd</sup>



[3]

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(g)

Bearing	Diagram	Use & Example
Ball (1)		Bicycle
Roller		Heavy loading. Vehicles. Printing press.

- (h) Lubrication is also needed in mechanical systems.
  - (i) Smooth running / reduce friction / reduce wear and tear increase machinery lifespan / cooling / increase efficiency [2]
  - (ii) Type 1: Oil (1)

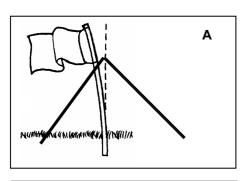
**Example:** Motor car engine (1) [2]

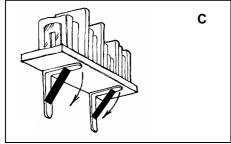
Type 2: Grease (1)

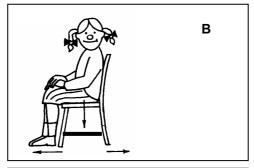
**Example:** Wheel bearings (1) [2]

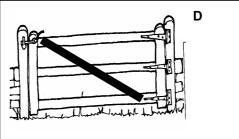
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13 (a)









[4]

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(b) Dynamic loads are moving loads (1) they create greater moment of force acting (1). [2]

(c) This allows for forces that are not normally present (1) and example would be the force of severe weather acting on a bridge (1) whereas in a chair the unforeseen forces are lesser (1) [3]

(d)

Joining method	Diagram	Use
Gusset plate	[2]	Roof trusses [1]
Sleeving [1]		Joining tent poles.
Nut and bolt		Joining temporary frame works

(e) (i)



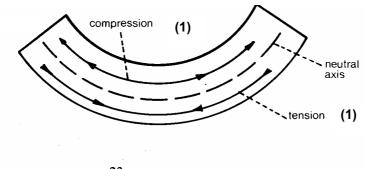
[2]

(ii) Alternating the wood grain (1) creates strength in all directions (1).

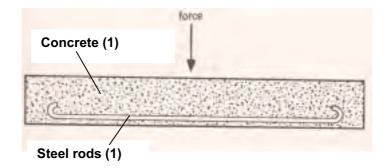
[2]

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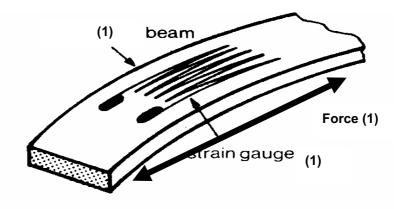
(f) (i)



[2] (ii)



[2] (iii)



[3]

[Total: 25]