MARK SCHEME for the October/November 2007 question paper

0445 DESIGN AND TECHNOLOGY

0445/04

Paper 4 (Technology), maximum raw mark 50

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	Section A			
1 Tensile			[1]	

- 1 Tensile
- Electrolytic (1) capacitor (1) 2 Time delay circuit (1)

3

Name	Diagram	Use
Pear cam and flat follower	(1)	Valve operation
Sprocket and Chain (Chain drive) (1)		Bicycle transmission

4 Second

An example: Wheelbarrow/Nutcrackers/Brake pedal





[2]

[1]

[2]

[3]

[3]

[1] [1]

- (b) Linear
- (c) Change direction (1) without change of value (1)

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6 Complete the table below:

Name	Diagram	Use
Honeycomb cells		Door panel inner (1)
(Reinforced) beam (1)		Lintel (1)
'l' Section beam		Steel framed buildings

7 NOT gate/Inverter

8	(a)	Sense change in light level (1)	
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	I	Total Section A: 25]
10	Gusset plate (1) Braces (1)	[2]
9	Deflection of a aircraft wing (1)	[1]
	(b) Burglar alarm (1)	[2]

[1]

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Section B

Answer **one** question from this section.

11	(a)			1	[]	
		Ro pla	otary motion in one ane (1)		Rotary motion in second plane @ 90° (1) at faster speed (1)	
		L		J	[Ma	x 2]
	(b)	(i)	Bevel			[1]
		(ii)	Gives greater VR (1) a	and increases the speed of the	e drill chuck (1)	[2]
		(iii)	Keeps the driver whee	el level (1) & makes the motion	n smoother (1)	[2]
	(c)	Gre	eater MA (2) thus makes	s turning the drill bit easier (1)		[3]
	(d)	(i)	Driver to driven (1) 60 : 12 (1) 5 : 1 (1)			[3]
		(11)	300 rpm × 5 = output spee 300 rpm = Output spee Units (1)	ed (1)		[3]
	(e)	(i)	Positive drive system	(1)/where there is little slip (1)	1	[1]
		(ii)	Over time the belt will	stretch and lose its elasticity ((1) thus efficiency will suffer (1)	[2]
		(iii)	Timing belt/plotter driv	e		[1]
		(iv)	VR is the ratio (1) of teeth on the driver whe	the number of teeth on the d eel (1)	riven wheel (1) to the number of	[3]
	(f)	Fla Vee Ro	t (1) Record player turn e (1) Drillling machine p und (1) Mecanno toy pu	table (1) ulley system (1) Illey belt (1)		[2]

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12	(a)	(i)	Crar	ne/bridge/pylons/building framework			[1]
		(ii)	Tanl	ker/car bodies/aircraft fuselage			[1]
	(b)	Fra the	me h skin (as members (1) which distribute the forces shell d of the shell (1)	istributes the force	es through	[2]
	(c)	1	Sup	port: Carries its own mass (1) and any applied load	(1)		[2]
		2	Spa	n: Bridges a gap (1) carrying a load over it (1)			[2]
		3	Con	tain: Holding a load (1) inside (1)			[2]
	(d)	A ro dyn	oof tru iamic	uss carries a static load of the mass of the tiles (1) to loads such as winds (1) or other moving forces suc	out it also needs to h as work men (1)	withstand	[3]
	(e)	(i)	Nam 1 2 3	ne the parts numbered 1 to 3. Column Beam Brace			[1] [1] [1]
		(ii)	Show	ws compressive forces (1) sketch (1)			[2]
		(iii)	Triar	ngulation in structures promotes rigidity (1) it reduce	es the tendency to a	distort (1)	[2]
		(iv)					



[2]

(f) A member that, if removed (1), has no effect (1) on the structure Sketch (1)[3]

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[4]

- (b) (i) Relay [1]
 (ii) Interfacing (1) between low current circuit (1) and higher current circuit (1) [3]
 (iii) Protection (1) for the transistor (1) from back emf (1) [2]
 (iv) Varies (1) the sensitivity (1) of the LDR and the triggering of the 741 (1) [3]
 (v) Sets voltage for the bulb [1]
- (c) The pair of resistors slits the voltage across pin 3 (1) and thus controls the gain of the 741 (1) this determines the triggering of the relay (1) [3]
- (d) By changing the position of LDR (1) and the $47k\Omega VR$ (1) the function is reversed (1) [3]
- (e) (i) Complete the truth table below for this logic circuit.

Pad P On/Off	Pad Q On/Off	Counter state On/Off
Off	Off	Off
Off	On	OFF
On	Off	OFF
ON	ON	On

(ii) AND circuit

[4]

[1]