CAMBRIDGE
INTERNATIONAL EXAMINATIONS

JUNE 2002

GCE Advanced Level

MARK SCHEME

MAXIMUM MARK : 60

SYLLABUS/COMPONENT :9705 /3

DESIGN AND TECHNOLOGY (WRITTEN 2)

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

Section A

Part A – Product Design

1 (a) appropriate materialincluding:
- aluminium
- acrylic / PVC
- appropriate wood laminate — 1

Reasons including:
- weather resistance
- easy to form — 2 [3]

(b) description to include:
- appropriate method;
- forming;
- holding;
- securing to base.

quality of description:
- fully detailed — 3 - 6
- some detail, — 0 - 2

quality of sketches — up to 2 [8]

(c) explanation could include:
- change in process;
- change in materials;
- use of templates, jigs, formers;
- simplification of design.

quality of explanation:
- logical, structured — 4 - 7
- limited detail, — 0 – 3

quality of sketches — up to 2 [9]

[Total: 20]

2 (a) description to include:

kits
- easy to assemble;
- re-use
- quick;

mock – ups
- quick;
- fairly realistic;
- cheap materials

scale prototypes
- very realistic;
- functional;
- accurate test results.

Quality descriptions 4 x 2 [8]

(b) explanation could include:

- simple 2D representation;
- 3D viewing;
- simulation;
- realistic presentation;

quality of explanation:
- logical, detailed 7 - 9
- clear, structured 4 - 6
- limited detail, 0 - 3

use of examples up to 3 [12]

[Total: 20]

3 (a) description of process

- fully detailed 3 - 5
- some detail, 0 - 2

quality of sketches up to 2 7 x 2 [14]

(b) injection moulding
- simple mould;
- huge production runs
- little waste.

Turning
- speed;
- accuracy;
- high quality finish.

Milling
- appropriate for material
- accurate;
- speed; 3 x 2 [6]

[Total: 20]

Part B – **Practical Technology**

4 (a) elastic limit - point at which elasticity begins to disappear 2

yield point - extension increases by metal yielding 2

limit of proportionality - load and extension cease to be proportional 2

ultimate stress - maximum reached, sample 'necks' 2 [8]

(b) description could include:

- pulling method; 2
- gripping method; 2
- standard samples; 2
- comparative measurement method. 2

quality of communication 4 [12]

[Total: 20]

5 (a) (i) reed switch - description of magnetically operated switch 3
- alarm 1 [4]

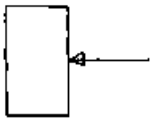
(ii) relay - description of device that can be used to separate two circuits 4
- headlights 1 [5]

(iii) Darlington pair - description of a method of using two transistors to give increased current gain and input impedance 4
- light sensor circuit 1 [5]

(b) $\frac{R2}{R1 + R2} \times V = \frac{6.8 \times 9}{16.8}$ 2

3.64V 2 [4]

(c) Potentiometer 1



1 [2]

[Total: 20]

6 (a) $1000 \times 200 = E \times 1000 \therefore E = 200\,N$ [2]

(b) 20 N [2]

(c) velocity ratio = $\frac{\text{distance moved by effort}}{\text{distance moved by load}}$ 2

relationship to mechanisms 1

efficiency = $\frac{\text{work out}}{\text{work in}} \times 100\%$ 2

relationship to mechanisms 1 [6]

(d) (i) eg. brakes
belt drives 2 x 2 [4]

(ii) eg. lubricants
bearings 3 x 2 [6]

[Total: 20]

Part C – **Graphic Products**

7	correct pictorial projection		1
	approx twice full size		1
	quality of linework		3
	overall shape / proportion		6
	rendering	base (wood)	3
		stem (matt steel)	3
		shade (polished plastic)	3

[Total; 20]

8 discussion could include;

design of products
- speed
- testing
- databank

manufacture of products

- stock availibility / management
- accuracy / repetition
- automation
- quality control

business / communication

- marketing / advertising
- stock control
- overall speed up of lead time

overall comprehension and interpretation 2

for each section up to 6 marks

examination of issues	1 mark	
quality of explanation	up to 4 marks	
supporting examples / evidence	1 mark	6 x 3

[Total: 20]

9	(a)	description of function of cams –transfer of motion	3	
		applications	3	
		communication	2	[8]
	(b)	given data to include:		
		- rotation	1	
		- follower	2	
		- minimum diameter	1	
		- lift	2	
		- angular displacement	3	
		- - linear displacement	3	[12]
				[Total: 20]

discretion to be awarded conceming breakdown of marks,
very good answer missing minor points should not be penalised.