UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Level

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

9705 DESIGN AND TECHNOLOGY

9705/33 Paper 3, maximum raw mark 120

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, which would have considered the acceptability of alternative answers.

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UNIVERSITY of CAMBRIDGE
International Examinations

Section A

Part A – Product Design

1 **(a)** description of process
- fully detailed 3–5
- some detail, 0–2

quality of sketches up to 2

7 × 2 [14]

(b) riveting
- permanent fixing
- quick process
- minimal interference when cooking/hygienic

Compression moulding
- use with thermosetting plastic
- good final finish
- minimal wastage

Mortice and tenon joint
- structurally strong
- good gluing area
- visually OK – no gaps 3 × 2 [6]

[Total: 20]

2 **(a)** suitable material including:
- Acrylic
- HIPS (other suitable thermoplastics)
- appropriate hardwoods
- Aluminium/copper 1

reasons including:
- quality of finish – colour/attractive grain/texture
- easy to bend
- strong in small section 2 × 1 [3]

(b) description to include:
quality of description:
- fully detailed 3–7
- some detail, 0–2

quality of sketches up to 2 [9]

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

quality of explanation:
- logical, structured 4–6
- limited detail, 0–3

quality of sketches up to 2 [8]

[Total: 20]

3 (a) natural seasoning
- off floor
- protective cover
- spacers / stickers to allow air circulation
- ends of timber protected/painted
- change stack after period of time/ measure MC
- can be attacked bugs/fungus
- 25mm – 1 year

kiln seasoning
- enclosed
- on trolley
- same stacking system as natural
- precise MC control
- kills off bugs/fungus
- very quick 2–3 weeks or less

quality of description/including communication:
- fully detailed 3–5
- some detail, 0–2

5 × 2 [10]

(b) Discussion could include:
- cost
- dimensional stability
- quality control/visual appearance
- size limits

examples / evidence could be
- Specific boards/properties
- Specific design issues – table top size etc

examination of issues 4
quality of explanation 4
supporting examples / evidence 2 [10]

[Total: 20]

Part B – Practical Design

4 **(a)** reinforcement – definition should include reference to the strengthening of material/ component by additional material/features
e.g.
– glass reinforced plastic (or carbon/graphite)
– steel reinforced concrete

quality of definition:
– fully explained/detailed 3–4
– some correct detail, 0–2
quality of sketches up to 2 [6]

(b) alloying – must have reference to the processing of mixing two or more metals together to get better characteristics than sole metal e.g.
Steel – engineering products, tools – Iron and Carbon (0.1 – 2.1 %) specialist steels may also contain manganese, chromium, vanadium, and tungsten
Duralumin – aircraft – 4.4% copper, 1.5% magnesium, 0.6% manganese and 93.5% aluminium by weight.
Brass – musical instruments, bearings – copper and zinc (varying ratios for different uses)
Bronze – bearings, cast sculptures – copper and tin (phosphorus, manganese, aluminium, or silicon may also be added).
Electrical solder – joining circuits – tin (60 – 70%) and lead (30 – 40%)

importance to designer:
– Expands range of available materials
– Specific alloys can be generated for specific requirements
– Expands range of properties of materials e.g. Toughness, lightness etc

quality of explanation
– logical, structured/detailed 4–8
– limited detail, 0–3

supporting examples
product 1 × 2
materials 2 × 2 [14]

[Total: 20]

5 (a)

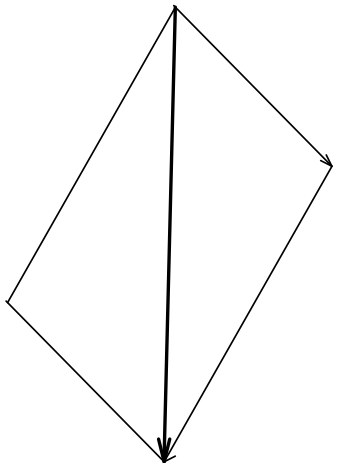


diagram		1	
direction		1	
Magnitude (80N)		1	[3]

(b) (i) $R_2 \times 8 = 2 \times 10 + 6 \times 16$

$= \frac{116}{8}$ 2

$R_2 = 14.5$ kN

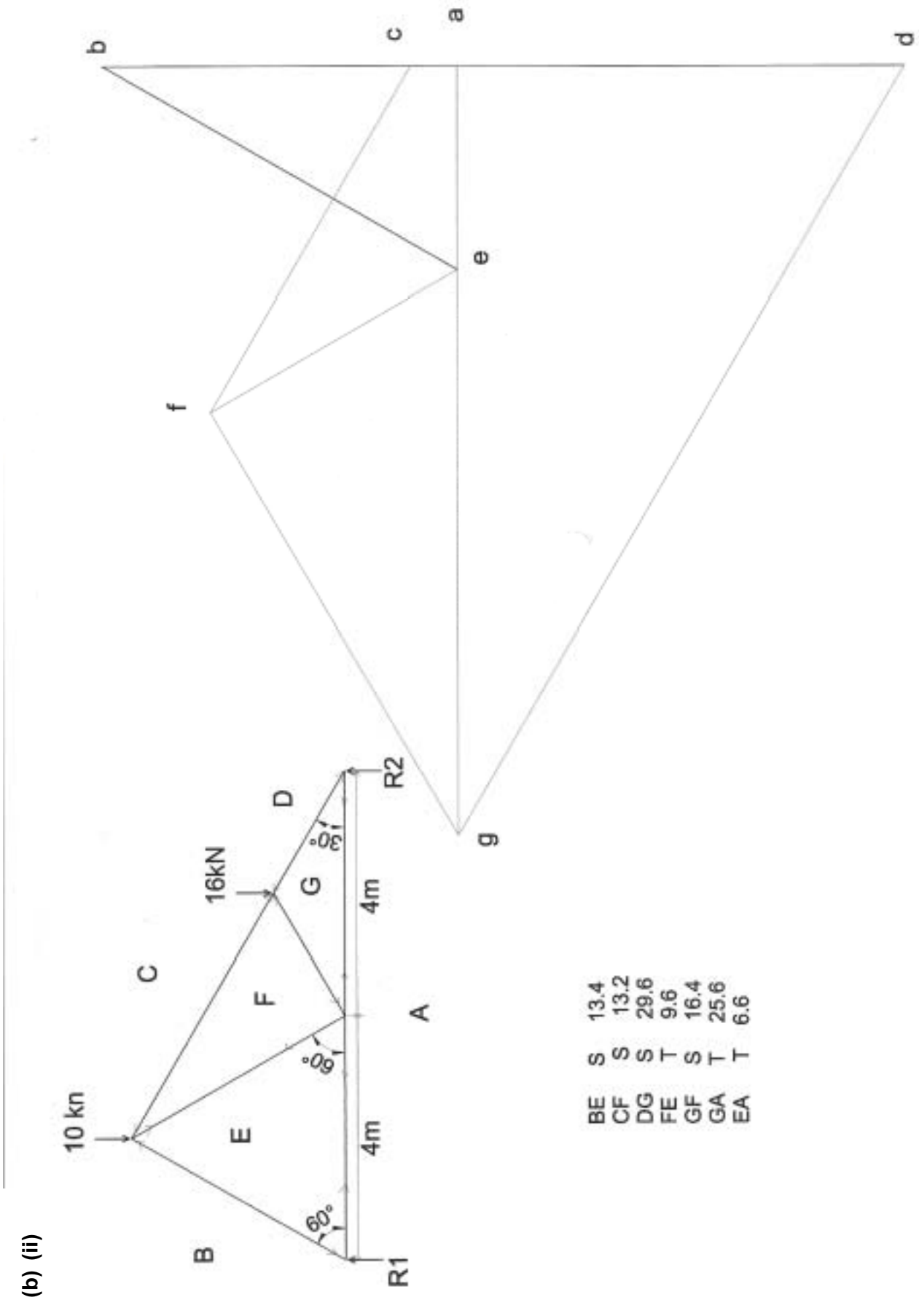
$R_1 = 11.5$ kN 1 [3]

(ii)

accurate truss/notation	2	
accurate force diagram	2	
magnitude of members (.5 tolerance)	7	
strut / ties (all correct up to 3)	3	[14]

[Total: 20]

5 (b) (ii)



BE	S	13.4
CF	S	13.2
DG	S	29.6
FE	T	9.6
GF	S	16.4
GA	T	25.6
EA	T	6.6

6 Discussion could include:

Invention – new device/product/process – need to create new products/cost of design teams
Innovation – may be radical or incremental improvement in products– usually significant changes
Evolution – products slowly developing to meet consumer needs, small incremental changes over time
– competitive markets
– consumer needs/fashion/trends
– legal protection

examination of issues
– wide range of relevant issues 5–9
– limited range 0–4
quality of explanation
– logical, structured 4–7
– limited detail, 0–3

supporting examples / evidence
– dust pan brush – vacuum cleaner
– phone development
– specific 'new' product 4

[Total: 20]

Part C – Graphic Products

7

Scale	2
Correct orthographic	2
Assembly	2
Part 1 detail	3
Part 2 detail	3
Part 3 detail	3
Part 4 detail	2
Machine screws	1
Accuracy/line quality	2

[Total: 20]

8 **one–off architectural model**

Hand skills/studio tools
Time taken
Net / intersection
Hand applied bought finish

50000 credit cards

Plastic (PVCA) rolled
Silk screen / magnetic print
Add components / chips
Lamination / cut / emboss

1000 A4 presentation folders

Card size/colour selected
Press forme created
Folding machine

quality of description/including communication:

– fully detailed	5–8	
– some detail	0–4	8 × 2
Comparisons / contrasts	4	

[Total: 20]

9

correct 1 point perspective	3
window	2
work surface fridge / freezer	3
work surface / cooker	3
wall cabinet	3
table	3
overall accuracy	3

[Total: 20]