

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
GCE Ordinary Level

MARK SCHEME for the October/November 2008 question paper

6043 DESIGN AND TECHNOLOGY

6043/01

Paper 1 (Technology), maximum raw mark 95

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Part A – All questions to be answered.

1 sketch of

(a) marking knife = 2

(b) scribe = 2 (2 × 2) [4]

2 **two** reasons such as – easy to form shape, colour, clean, hygienic, lightweight, etc. (1 × 2) [2]

3 annealing – process of **heating metal** to allow structure to change and become **softer** for working. (1 × 2) [2]

4 (a) name – corner bloc [or knock down fitting] = 1

(b) used as a quick 90° joining system in slab construction such as chipboard = 2 (1 × 3) [3]

5 Flow charts

(a) Key features in the form of symbols such as rectangles, diamonds, squares, joined by direction arrows = 2

(b) operation such as wiring a plug = 1 (1 × 3) [3]

6 cooling plastic – soapy water, compressed air, soluble oil, paraffin (1 × 2) [2]

7 (a) pine will be affected by weather and rot = 1

(b) paint, outdoor varnish, oil-based products, etc. = 2 (1 × 3) [3]

8 draw filing = this the process of carefully removing all the surface marks from a piece of metal by drawing a fine file across it. (1 × 2) [2]

9 Protection

(a) rubber gloves = 1

(b) face mask = 1

(c) leather gloves = 1

(d) face shield = 1 (1 × 4) [4]

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10 (a) the plastic just crumbles when pencil or pen is applied = 1

(b) hot wire cutter = 1

(1 × 2)

Part B

11 (a) Three marking out tools identified and purpose explained.

A – odd leg callipers used to mark lines parallel to a true edge or find the centre of a round bar, used mainly in metalwork.

B – marking gauge is used on timber to mark lines parallel to the face side and face edge along the grain.

C – spring dividers are used to mark out circles and arcs, and to step off equal lengths along a line. (2 × 3) [6]

(b) **A** – The stepped leg is put on the zero end of the steel ruler and the callipers are opened out until the scriber point is against the correct mark.

B – The thumbscrew is released and the zero end of a steel ruler is placed against the stock. The stock is then slid along the stem until the marking spur is against the correct measurement. The thumbscrew is now tightened.

C – One foot of the dividers is placed on the correct mark on the steel ruler [which has a small groove], the knurled thumbscrew is now slowly opened until the tip of the other leg meets the end of the ruler. (2 × 3) [6]

(c) (i) The surface plate provides a **true flat surface** from which **measurements** can be taken, **lines scribed**, flats tested.

(ii) The sliding bevel is used to **mark or check angles** which are **not at 90°** to a true edge.

(1 × 5) [5]

12 (a) **Template** – When a complex shape or a large number of similar items are to be marked out, it is easier to produce a template. This can be drawn around easily and saves time. It also means the best use of space and less waste material.

(b) **Pattern** – When a complex item is to be made in metal, it is easier to make a copy of the final object in wood. This is then used to make an impression in sand, into which molten metal can be poured, rather than cutting the item from solid material.

(c) **Former** – When a material has to be bent to a shape it is normal to make up an exact copy of the bend or bends. The material can be formed around this shape with pressure or by building up laminates. The former can be used over and over again.

(d) **Jig** – This is used in the manufacture of items, such as drilling holes in the correction position. Work is placed in the jig, providing exact location and position of holes without marking out.

(e) **Mould** – These can vary from the sand impression mould in metal casting to two-part moulds used in injection moulding. In most cases a mould is in two parts or halves, with the shape cut or made on one. The material is either poured or forced into the mould to form the shape. Any **four** explained plus 1 for extra detail such as material, accuracy, batch production =

(4 × 4 = 16 plus + 1 mark) [17]

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13 (a) **one** reason for selecting, **one** reason for rejecting

- (i) **brass** – good colour, ductile, does not rust, quite easy to work, polishes well. Can be easily hardened, hardens quickly, may have sharp corners.
- (ii) **teak** – natural oil, good colour, very durable, hard, strong, fire resistant. Works well, but blunts tools quickly, difficult to glue.
- (iii) **acrylic** – range of colours, glass clear, very durable, easily machined, cleaned. Stiff, hard and brittle, splinters and scratches easily.

(2 × 3) [6]

(b) (i) Brass when made has been work-hardened and needs to be softened if it is to be formed into the handle shape. This is done by heating the brass to a dull red and allowing it to cool slowly in air. This process relieves the internal stresses.

(ii) Teak is a hard material, but at this size has a natural ability to bend to a limited degree. For a more complex bend, such as the handle, the timber must be placed in a steam chamber and be subjected to 100 °C. After about 45 minutes the timber is pliable and is quickly held around a former and left to cool.

(iii) Acrylic is a thermoplastic so its state can be changed by heat, and it will also return to its original shape if heated. Heating may be done in an oven, or with a strip heater depending on the shape, etc. Once the acrylic is softened it can be pressed into shape and left to cool.

(2 × 3) [6]

(c) (i) so that marking out can take place, as acrylic has a wax like surface

(ii) pumice powder is a very fine abrasive and helps to clean the surface

(iii) oil would provide a natural matt finish to the teak surface and restore its natural colour

(1 × 3 + 2 extra detail) [5]

14 (a) Material named and reason given – such as MDF – with good strength at this thickness, takes colour well, easy to work, etc. (1 × 2) [2]

(b) Processes described must relate to material in (a), the material could be wood, metal or plastic. Must involve tools, equipment, stages in the process. (1 × 8) [8]

(c) (i) Sketch of design on wings, must be mirror image. (1 × 2) [2]

(ii) Design applied to surface explained – may be inlay, paint, transfer, etc. Details of tools, method, etc. (1 × 5) [5]

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- 15 (a) (i) any suitable material that can withstand the different weather conditions, and the shape letters e.g. aluminium
- (ii) this can be vacuum forming, casting, pressing, built-up, etc. (1 × 2) [2]
- (b) notes and sketches describing the process in (a), all the **major** stages e.g. casting, making the pattern, material, boxes, sand, sieve, ramming, etc. (1 × 10) [10]
- (c) design for holding sign to pole – must allow sign to be positioned – bracket system, fixing to sign, devices, etc. (1 × 5) [5]
- 16 notes and sketches on **two** of the following:
- (a) beaker cleaned, flux, area fluxed, soft iron, wired, hearth, brazing torch, spelter, types, heating, temp, etc.
- (b) holding upright in vice, angle position, saw, cutting, removing centre waste, trimming, etc. holding rail, sawing, removing waste, fitting.
- (c) male and female formers, material, heated, temp, oven, tongs, clamping, action, etc. (1 × 8 × 2 + 1 for outstanding detail) [17]
- 17 (a) Tracing is a method of copying another drawing by placing a blank piece of paper over it and drawing the outline. (1 × 2) [2]
- (b) Two properties – clear, transparent, easy to clean, not easily broken. (1 × 2) [2]
- (c) Stages explained – must be made as a pair, one marked out, tools, clamped together, cutting, saws, files, chisels, action, etc. (1 × 8) [8]
- (d) Sketches showing linked system, may be rail or bar, joints, threaded rod, etc. (1 × 5) [5]
- 18 (a) Notes and sketches showing the processes
- (i) threading rods – taper ends, die and holder, holding, angle, turning, back, forward, lubrication, etc.
- (ii) working as a pair, clamp, drilling table set up, drill, holding work, speed, action, etc.
- (iii) holding work in vice or on bench, cutting waste, shaping corner, tools, finishing, etc. (1 × 5 × 3) [15]
- (b) Sketch of hand tightening device such as a wing nut, knurled handle, finger grip system, tommy bar system, to apply the pressure. [2]