UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

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

6043 DESIGN AND TECHNOLOGY

6043/01 Paper 1 (Design and Technology), maximum raw mark 95

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Part A

1 Any two of the following – will cause the timber to dry out, shrink, warp, crack, split, etc. (1 x 2) [2]

2 Sketched devices.

(a) countersunk rivet

(b) round head machine screw (2 + 2) [4]

3 The plastic forms stated.

(a) powder

(b) granules

(c) sheet (1 x 3) [3]

4 Most children put things in their mouths so any surface finish must not be poisonous or cause harm. (1 x 2) [2]

5 When a designer has decided to build a full scale model of his or her idea, so that it can be tested and evaluated. (1 x 2) [2]

6 **(a)** steamed

(b) annealed

(c) softened (1 x 3) [3]

7 Materials named.

(a) copper

(b) steel (1 x 2) [2]

8 Sketches of fittings.

(a) butt hinge

(b) tee hinge (2 x 2) [4]

9 **Two** forms of personal protection. From barrier cream, rubber gloves, apron, mask, etc. (1 x 2) [2]

10 Piece named – face plate = 1.

Use explained – for irregular shaped work that can be held by bolting to face plate = 2. (1 + 2) [3]

Part B

11 (a) Three tools identified and purpose stated.
A – dot punch – used to mark witness lines on metal.
B – marking knife – used to cut lines across the grain of wood.
C – try/engineering square – used to test that one surface is square to another [90 °] and marking out lines square to the face side or face edge. (2 x 3) [6]

(b) (i) The reason for the decoration on tool **A** – it is called knurling and provides a safe hand grip when the tool is hit with an engineering hammer.

(ii) The reason why the tool cutting blade **[B]** is bevelled or sharpened on one side is that when used with a try square, the flat side of the blade rests against the side of the square, and the bevelled blade cuts in the waste material.

(iii) The accuracy of the tool **[C]** be checked by placing it on a true edge and marking a 90 ° line. Then the tool is turned over and another line is marked. If accurate the lines should lap over each other, if not the tool is inaccurate. (3 x 3) [9]

(c) When marking out acrylic, only lines that need to be cut are scribed, any lines that will form bends or curves are marked with a pencil or marker. (1 x 2) [2]

12 (a) Copy of chart.

Material	Process	Reason for Use
Soft Solder	Joining together metals at low temperatures and in small areas.	Because the joining takes place at very low temperatures, such things as electrical components can be joined without damage.
Acid	Used when cleaning non-ferrous metal.	Before metal can be shaped it is heated to soften. This causes oxides to form, only a diluted sulphuric acid can clean the surface.
Plastics Cement	Used when joining acrylic to acrylic.	The Plastics cement is in fact an acrylic solvent. When applied to both surfaces they can be bonded and left to harden.
Wire Wool	Used when finishing the surface of wood.	The wire wool acts as a very fine abrasive, and is mainly used in the final stages of polishing.
Sand	Used in the casting of hot metals.	When mixed with a degree of water or oil, sand can be made to take up the shape of an object into which hot metal can be poured.

(3 x 5) [15]

(b) Most insect attacks are caused by beetles that lay eggs in cracks in timber. These hatch into larvae which feed on the wood making bore holes which weaken the timber, etc

(1 x 2) [2]

13 (a) **Two** properties named from – lightweight, flexible, easy to clean, colourful, hygienic, tough, etc. (1 x 2) [2]

(b) Unsuitable materials explained.

(a) expanded polystyrene – not flexible, very weak at this thickness, crumbles easily, burns easily, etc.

(b) mild steel – heavy, sharp edges, rusts, needs added colour, etc.

(c) chipboard – little strength , will be weak at this thickness, made from glued wooden chips which will break apart, difficult to colour, etc . (2 x 3) [6]

(c) Suitable material stated. (1 x 1) [1]

(d) Notes and sketches showing –

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(i) holding while drilling – work on drill table, supported by waste wood, held by g-cramp, with waste protection under cramp.

(ii) work held in bench/engineering vice, work set level. With vice jaws, protection on both sides, etc. (1 x 6) [6]

(e) Simple design – does it fit the surface, is it based on a flower. (1 x 2) [2]

14 (a) Material suggested and reason given. Such as teak, brass, nylon, with reason as lightweight, resistant to chemicals, easy to clean, tough, etc. (1 x 2) [2]

(b) Processes described.

(a) marking out ends – ruler, scriber, square, compass, dividers-lines, centres, circles, angles, etc. [tools must relate to material].

(b) drilling process, support, holding, protection, drill size, speed, action, movement for other holes, etc.

(c) the joining process such as rebate, butt, tenon, dowel, cutting out, drilling, gluing, etc. Could be nailed or screwed but not the best solution. (1 x 5 x 3) [15]

15 (a) **Two** properties for the ring game body – such as tough, lightweight, colourful, easy to shape, etc. (1 x 2) [2]

(b) Suitable material for.

(i) the body – such as polypropylene, aluminium, pine, etc. Plus reason – as in section **(a)**.

(ii) the rod – beech, aluminium, acrylic, etc. Plus reason – as in section **(a)**. (1 x 4) [4]

(c) Processes described –

(i) making the body – this may be cast, injection moulded or built up from pieces. [Must include stages, tools and materials.] (1 x 7) [7]

(ii) joining the rod to the body – such as drilled hole, reduced diameter rod, shoulder, thread, glue, etc. (1 x 4) [4]

16 (a) **Two** safety features for toy – such as nothing that can trap fingers, lightweight, no sharp corners, no loose parts, nearly unbreakable, etc. (1 x 2) [2]

(b) Processes of making the toy described –

(i) forming the body shape – this may be steam bending timber, strip heating plastic, annealing and bending metal. (1 x 6) [6]

(ii) forming the head – this may be turning on the lathe or injection moulding. (1 x 6) [6]
[All tools, equipment and materials should be included.]

(c) Turning system design – should include, handle, crank, fixing system, etc. (1 x 3) [3]

17 (a) Suitable material and reason. – such as acrylic, brass, silver, timber veneers e.g. ash. Plus reason such as decorative, colourful, easy to form shape, etc. (1 x 2) [2]

(b) Processes explained –

(i) cutting the opening in the holder – may be done before forming shape, drilling, cutting with saw, removing waste, smoothing, etc.

(ii) forming the shape, may be built up with veneers, softening and bending metal or plastic.

(iii) constructing the base – may be built up from pieces, cast, moulded, etc.

[All stages, tools and materials to be included.] (1 x 15) [15]

18 (a) **Two** methods of construction for the support – which may be sand casting metal, injection moulding plastic, turning wood – reasons such as complex shape, less waste, speed of production, etc. (2 x 2) [4]

(b) **Major** stages of making the support – this would relate to chosen material – e.g. metal casting, boxes, sand, sieve, ramming, parting sand, sprue pins, runners, risers, etc. (1 x 10) [10]

(c) Marking the three centres on base – using odd legs, compass, dividers, centre square, circle, divided into six with radius. (1 x 3) [3]