

DESIGN AND TECHNOLOGY

Paper 6043/01

Paper 1

General Comments

The general performance of candidates was slightly better than last year, with a marked improvement in the approach to the processes section of the question paper. Candidates seemed more prepared to break down their responses into logical workshop stages, resulting in more valid answers. Terms such as 'I cut it', 'I used glue', 'it bent', still appear in some answers, and gain few marks for the candidate unless supported by real detail of the tools or equipment being used. Most candidates did well in **Section A**, showing a good understanding of the subject area and aided by well drawn graphics.

Greater detail is beginning to appear in answers backed up by clear and relevant drawings. Areas that still need attention are materials and their uses, for example mild steel does not rust, nylon is not heavy, PVC is not an adhesive. The lathe is another area of the syllabus that seems not to have been familiar. Injection moulding and casting processes continue to be well understood and described; candidates also need to increase their familiarity with how to build up artefacts from pieces.

Comments on specific questions

Part A

Question 1

This was a well answered question, with some excellent sketches of the two parts of the mortice and tenon joint.

Question 2

A range of solutions were given to the problem of joining the two parts of the template, such as rivets, machine screws, soldering, silver soldering, epoxy resin, etc. All these were acceptable.

Question 3

Extrusion moulding proved to be less well known than other plastic processes.

Question 4

The term 'anthropometric data' was well explained as 'the measurement of man' by a large number of candidates.

Question 5

This was another well attempted question with a wide range of valid solutions. Safety features identified included non-toxic paint, sharp edges, no loose parts, strong construction, good balance, etc.

Question 6

There was a mixed response to this question with most able to identify the hexagonal nut and plain washer; others called them bolts and springs.

Question 7

The problem of how to heat acrylic did not prove to be a problem for candidates who suggested heater, oven, hot air gun.

Question 8

In the main, this was well answered with most candidates identifying the problem of cutting against the wood grain as apposed to with the grain.

Question 9

Answers generally mentioned the folded edge or an added piece such as plastic or rubber edging. The wired edge did not appear.

Question 10

A large number of different reasons were given for using plastic to produce the clip. Candidates suggested lightness, colourful, hygienic, flexible, water resistant, etc. All were valid answers.

Part B

Section 1 – Tools and Materials.

Question 11

- (a) Most candidates were well able to identify the three tools and in each case give an example of its use. A-Tenon Saw used to cut wood joints, B – Hacksaw used to cut metal in general, C – Coping Saw used to curve or irregular shapes in wood or plastic.
- (b)(i) In general this was partly answered, with most able to explain that the thicker back kept the blade straight; the best responses included the fact that it also added weight to the saw.
- (ii) Most candidates were able to explain the workings of the wing nut on the hacksaw and tensioning of the blade.
- (iii) The purpose of the small pins was explained in good detail, with holding and adjusting the blade as the main reason.
- (c) There were some very good detailed drawings of saws. Candidates suggested a vast range, such as hand, dovetail, panel, junior hacksaw, bow, piercing, etc. In general, they were sketched well, named and their purpose explained.

Question 12

The chart was copied as required and the missing elements of danger and special clothes and equipment were usually added correctly. Candidates need to avoid giving general terms with insufficient specific detail. For example, the answer 'gloves' appeared in all the dangerous situations, often with no mention of rubber or leather as appropriate to each danger.

- (a) The danger of turning wood on the lathe was identified as dust or splinters being thrown into the face or eyes. A face mask or face shield was generally given as the main form of protection.

The danger of laying up a G.R.P. mould was identified as fumes or handling glass fibre; some confused the danger as a burning problem. A face mask and rubber gloves were the best answers.

The danger of cleaning copper in an acid bath was identified as a burning problem for the skin or eyes. Some suggested tongs which was correct but missed out by just saying gloves. Others suggested apron, face shield, etc.

The main danger with cutting sheet polystyrene is the toxic fumes not the hot wire cut which is often missed.

The danger casting molten aluminium was identified as a burning problem for hands, face and body. Leather should have been the main safe material for all the protection clothes such as leggings, apron, gloves.

- (b) This was well answered by all who attempted the question, giving dust as the cause of breathing and lung complications and painful eye and sight problems.

Question 13

- (a) (i) The use of MDF in furniture making was identified; merits such as large sheet sizes, takes paint well, smooth surface, were not always known.
- (ii) Most candidates gave the use of mild steel tube in chairs and tables; others suggested bicycles, with its excellent strength as the reason for choice. Many missed its other main advantage which is its light weight.
- (iii) All candidates seemed to have a good understanding of the value of expanded polystyrene and its role in packaging and thermal insulation. Some even offered the solution of a surf board, owing to the buoyancy of polystyrene in water.
- (b) (i) Most gave low cost as the reason for using chipboard in furniture, but missed the fact that it could be covered with more expensive materials such as decorative plastic or real wood.
- (ii) Answers generally focussed simply on the fact that it could be obtained in a range of colours.
- (iii) This was very well answered with the two main reasons given as it resists corrosion and is a good conductor of electricity.
- (c) In the main, this was well answered with the two reasons for using materials in liquid form given as making complex shapes and ease of production.

Section 2 – Processes

Question 14

- (a) (i) This part on aluminium was well answered by candidates, with reasons for selection being given as easily cast to complex shape, strong, and reasons for rejection as sharp edge, quite heavy, could hurt someone if dropped.
- (ii) This part on birch plywood also posed few problems, with reasons for selection being given as lightweight, easy to carry, takes a good finish, etc. and those for rejection as not waterproof, time to cut out, etc.
- (iii) Nylon proved more difficult, with only a range of colours offered as an answer. Many suggested it would be heavy and rust.
- (b) A wide range of possible production methods were suggested for the base, the best being injection moulding or sand casting. Candidates did well in explaining the processes by using sectional drawings with plenty of added detail. Those that opted to make the base from solid material needed to take care to explain all the tools and equipment used.
- (c) Most candidates tried to join the peg to the base with a non-specific glue and without a means of correct location. Better answers were drilled holes, threaded the peg, turned it into a riveting situation, etc.

Question 15

- (a) The popular material chosen was acrylic with hygienic, easy to clean, colourful, easy to bend reasons. Others chose aluminium, pine, stainless steel, etc. All these were valid answers.
- (b)(i) Some excellent sketching was used in answer to the problem of cutting the slots in the salad server. Most drilled the two different size holes then cut the shapes with a coping saw, finishing with a file, etc.
- (ii) Once again the drawings aided the explanation of cutting out the outline shape. Detail of holding the work both on the bench and in the vice was very well done.
- (c) Most candidates showed a good working knowledge of the use of formers and heat bending of acrylic. Some even suggested steam bending for timber.

Question 16

- (a)(i) The most common reason put forward for selection of nylon was that it was strong. Once again answers suggested a limited knowledge of nylon and that it was weather resistant, colourful, tough, resistant to temperature extremes.
- (ii) Responses to this part were generally good, and referred to properties of copper such as having good sound qualities, colour, weather resistant, etc.
- (b)(i) Injection moulding proved to be the most popular method of production for the house part with some excellent sectional drawings of the process. Details such as the plastic granules, hopper, heater, screw, ram, mould, all appeared in the sketches.
- (ii) The built up section proved more difficult for candidates, who did not always give full detail in the marking out, cutting to shape and assembly.
- (iii) Casting the house was well done with the process presented in logical stages, again aided by good graphics and simple text.

Question 17

- (a)(i) In general only one reason was given for using mild steel on the coat rail and that was its strength. Few mentioned its light weight and how easily it could be joined.
- (ii) Candidates showed a better understanding of the qualities of mahogany with reasons such as its attractive colour, it is easily worked, durable, etc.
- (iii) The use of polyurethane lacquer was also well known, with answers such as waterproof, hardwearing, clear, lets the wood colour show, etc.
- (b) Some candidates answered all three parts to this question, when only two were needed.
- (i) Candidates did not always give full details for boring the hole in the rail. Methods of holding the work, protection, working the supports as a pair, drill size, etc. were often missed.
- (ii) This was well answered with annotated sketches of the drilling and screwing of the slats. Only the spacing of the slats was missed.
- (iii) In general, candidates identified a single brushed or sprayed coating. Better answers are those that include details of preparation, number of coats, time factor, etc.

Question 18

- (a) Quite a wide range of features were suggested for the wind direction indicator, such as it must be waterproof, must not corrode, must be lightweight, must be tough to withstand the wind, clear lettering, etc.

- (b)(i)** Answers for marine plywood tended to be just painted pieces with little real detail. Candidates could have included stained, burnt, added material, etc.
- Answers for brass tended to be scratching with a scribe. Other methods might have been cutting out, added material, colouring, etching, etc.
- Answers for acrylic tended to be by adding another piece of acrylic. Others might have been cutting out, transfers, stickers, etc.
- (ii)** The joining method for the compass letter and main support plate was better understood, with a good range of suggestions. Some candidates suggested cutting a section out of the main support and fitting the letter in place, others suggested screwing the letter from underneath the main support. Some suggested bonding the two parts with an adhesive but did not specify which.
- (c)** This part was missed out by most candidates.

DESIGN AND TECHNOLOGY

Paper 6043/02
Design Project

General Comments

The theme **Caring** was well responded to by most of the candidates entered for the examination. The folios and artefacts produced demonstrated that the theme was well understood and that candidates were able to find a design problem they wanted to pursue. Candidates should be guided at the start of the Design Project to ensure that they eventually identify a project which is within their capability and which can be produced using the facilities available.

The artefacts produced were very varied. Most candidates picked up on an aspect of Caring and produced a design problem which focused on a specific caring need, for example: a walking aid for the elderly or disabled; various aspects of caring for a pet; caring aids in the home. Wider interpretations included: Insect specimen display tray, gardening tools holder, first aid box, various boxes made in response to a caring need. Most candidates therefore managed to produce an artefact which had a direct or related connection to the theme.

Comments on Individual Assessment Criteria

The Folio

General Analysis of Topic

The best folders identified a series of possible problems as the exploration of the theme proceeded. This approach ensured that the candidate had a number of problem areas from which they could identify a specific problem to be developed. For some Candidates, the theme exploration was too long and did not lead to a design situation which could be developed. Candidates should be advised not to spend many hours reproducing information about the theme that does not serve the purpose of eventual problem identification.

Formulation of Design Brief and Specification

Design briefs were in general clear. The specification was almost always present and it was clear that most candidates were keeping the points specific to the design brief. Weaker candidates continued to rely on generalised specification points which did not tie down the problem to be developed; this approach led to a weaker Evaluation process later in the Folio.

Exploration of Ideas

This area of the folio offers candidates the space to develop more than one idea. Many candidates showed real innovation and often demonstrated some quite original thinking. Candidates should be encouraged to explore ideas that may not be within their 'comfort zone'. Candidates who checked back to the specification kept a better focus on resolving the design brief. The standard of sketches and annotations was generally good and provided evidence that in general candidates felt comfortable with developing the design.

Detailed Development of Proposed Solution

Many candidates went on to produce a comprehensive development of the chosen problem. Most candidates systematically covered all of the aspects required by the original specification but most did not provide clear annotations and explanations as they developed their solution. Some candidates provided extensive information about materials, constructions and fittings, without this information being relevant to the problem being developed; in general credit can not be given for such generic and unfocused information.

Suitability of Chosen Materials and Construction

In this section the candidate needs to draw the development stage to a precise conclusion, showing final details, cutting lists, details of joints and general construction approaches. Many candidates fully understood the purpose of this stage and made high-quality drawings and notes to demonstrate their skill.

Production Planning

Overall this section was completed to a high standard. The better folios had a staged and annotated approach which clearly demonstrated that the candidate understood the sequence of production, and in some cases they revealed a detailed knowledge of the processes involved. Some of the plans were date related and had then been subsequently augmented with the addition of photographs taken during manufacture in the School workshop.

Communication

The overall quality of graphics and the overall quality of communication was very high. Throughout the folio many candidates displayed an approach which brought together visually informative, colourful and, where appropriate, annotated sketches, charts and diagrams. Their work often revealed a pride and a desire to communicate their thinking and design skills to the highest level.

The Artefact

Suitability of Proposed Solution

The importance of the specification is further emphasised here because the candidate's original specification should be used to judge the actual performance of the Artefact.

Workmanship

In the main, folders incorporated good-quality photographs of the finished Artefact. It is important to include photographs of the artefact to allow the moderation process to judge the marks awarded for the quality of the work produced. Many of the artefacts were complete and finished to a high standard.

Evaluation

Many candidates produced a good-quality evaluation, the best included some or all of the following sections: overall evaluation of the performance of the Artefact, referring to the details of the original specification, testing the Artefact in realistic conditions, recording production problems encountered during the manufacturing process, recording the views of people either using the Artefact or viewing it in its finished form, an assessment of what improvements could be made.