DESIGN AND TECHNOLOGY

Paper 6043/01

Paper 1

General comments

A much improved performance from candidates this year, with some excellent graphic answers in all three sections of the paper. Part **A** with its ten short questions proved to be a successful start for many and showed candidates had, in the main, a good all round knowledge of Design and Technology. **Question 17** however did highlight a major weakness in Centres on the use of the woodwork and centre lathe.

Details

Part A

Question 1

Most candidates were able to name **(a)** frame and **(b)** carcase construction. 'Box' was accepted as an alternative to carcase. A number of candidates offered named joints.

Question 2

Nearly every candidate was able to sketch a hand file but many could not explain the reason for the safe edge. This was to stop the hand file from filing an edge in a corner situation.

Question 3

'Evaluation' was well answered, with such answers as to make judgements, success, failure, appearance, improvements, modifications, etc.

Question 4

Good effort by candidates again who offered a range of materials from copper, aluminium and cast iron, with reasons such as good conductor of heat, lightness, hygienic, etc.

All identified the danger with the metal handle and its reason for being unsafe.

Question 5

Most candidates were able to offer one precaution, being the need to wear gloves when handling GRP. However few mentioned the fumes and the need for a face mask or good ventilation.

Question 6

A well answered question with some good simple sketches of the three processed boards.

Question 7

Once again quite well answered question with the following solutions offered as the reasons for using PVC, flexible, soft, colourful, waterproof, etc.

Question 8

Not very well answered as many kept offering the leaves or types of trees. Better candidates suggested weight, grain, colour, hardness, etc.

Question 9

Most candidates seemed able to sketch a wing nut but had problems with the panel pin.

Question 10

Only the better candidates could explain the term 'Fluidization' – making plastic powder act as a liquid by floating on a cushion of air. Many candidates offered 'its dip coating' which is the action for the metal but does not explain the process.

Part B

Section 1 – Tools and Materials.

Question 11

A very well answered question.

(a) Most candidates seemed able to identify the three tools –

A – Outside callipers, B – Micrometer, C – Vernier Gauge.

However while they had no problem explaining the purpose of B and C, they wrongly suggested that the calliper could measure an object.

It only checks the outside diameter of a round piece of material, and needs a ruler for measurement.

(b)(i) Some excellent graphics to explain how the calliper is used when checking a material and its use with a ruler.

(ii) Well attempted by most but not fully explained. Many said the micrometer made a noise when it was over tightened but failed to mention the ratchet. Better candidates identified the anvil and spindle, thimble, graduations, etc.

(iii) In the main well attempted with correct answers for external, internal and depth measurements possible with this multi-purpose tool.

(c) Nearly all candidates understood the problem of using a tool with no reading device and the need for visual comparison with a steel ruler.

Most suggested movement of the legs as the major problem.

Question 12

Quite a popular question with candidates.

(a)(i) Only partly answered by candidates who suggested correctly that the softwood would decay over time. Many however failed to mention the simple action of swelling and the increase in size of the timber.

(ii) Once again only partly answered with the heat of the bulb causing the acrylic to soften or melt. Few mentioned that it would first cause the material to discolour.

(iii) All understood the acid would corrode the mild steel but did not go on to state that over time it would destroy the material.

(b)(i) In the main only one example offered for the use of water. This tended to be cooling hot metal.

(ii) Well answered with most able to suggest a range of uses for heat; hardening, softening metal, shaping plastics, bending metal, etc.

(iii) Not well understood; some candidates seem to think it will harden metal. Be[illegible] suggested cleaning metal surfaces before joining or finishing. Decorating surfaces of circuit boards.

(c)(i) Quite well answered with many understanding air seasoning and the action of circulating reducing moisture in timber.

(ii) Most candidates seemed to understand the action of cooling metal in air but missed that this was at a very slow rate.

(iii) Well answered by nearly all who offered explanations of the extruded plastic being blown by air into its bottle shape.

Question 13

Not a well answered question with most candidates showing a distinct lack of understanding of modified materials.

(a) In the main only C had any correct solutions with the suggestion of laminating beech strips. In A candidates failed to realise that the high carbon steel chisel blade would have had to be hardened and tempered by heat to give it a cutting edge. In B no mention was made of the glass fibre matting and its lamination with the resin to give the car body added strength.

(b)(i) No correct answers, only the point that the blade would get shorter.

It should have been that regrinding may result in overheating of the blade so losing its correct temper and becoming soft.

(ii) Most suggested that the car body was sandpapered once it was made. The correct solution was that the mould should be coated with a wax emulsion and making the outside face nearest to the mould.

(iii) Some very good drawings of the set up for making the chair legs, showing the formers, beech strips, glue and cramps. Well answered.

(c)(i) Only a few candidates understood casehardening and the increase in surface hardness of the mild steel.

(ii) Once again only a few understood how the accelerator speeds up the setting time of the polyester resin.

(iii) Most seemed able to answer this question with heatproof, tough, waterproof, colourful surface to improve the blackboard.

Section 2 – Processes

Question 14

Quite a popular question with candidates.

(a) Most candidates were well able to suggest a material and pivot system for the puppet control unit. The materials suggested ranged through plywood, aluminium, acrylic, etc., all of which would have been suitable.

The pivot system tended to be either a nut and bolt or a single screw. Few however added a spacing washer for the two parts. A number of candidates wrongly suggested a glued or fixed joint.

(b) The processes tended to be described in very vague terms with such statements as ‘mark it out first’ or ‘now it’s cut to shape’.

(i) The marking out of the material tended to be for many a ruler and pencil or scriber. Few produced a centre line with a pair of odd legs or marking gauge. Only better candidates used a try square for crossed lines. Many just used an unknown template for the curves.

(ii) The drilling of the string holes was well answered with most supporting the puppe… waste material, clamping it to the drill table, setting the correct drill, etc.

(iii) Candidates do get a little confused sometimes when cutting out materials, in many cases the… the wrong tool on the wrong material.

A file is not a woodworking tool, nor will a normal coping saw blade cut metal. The best answers used the correct tools and clamped the work to the bench or held it in a vice.

(iv) Few described the joining process apart from drilling the hole. Many just repeated the method of joining as answered in part (**a**), with no mention of the parts of the pivot system or how they were tightened together.

Question 15

A fair response to this question.

(a)(i) Not well answered with only a few candidates showing any understanding of the brazing process, with its cleaning of the tubes, fluxing, supporting, hearth, torch, heat, temp, etc. Many candidates just stated that it would be welded.

(ii) Fitting the hinge was quite well attempted, with most able to mention some of the stages in fitting the hinge, such as marking out the position, then chiselling out the recess (many missed sawing the sides of the recess), fitting the hinge, drilling the holes and then screwing in position. A few less able candidates suggested nailing the hinge in position.

(iii) Few attempted this optional part of the question, those that did tried to nail or screw the foam pads in position then just glued a rectangular piece of PVC on its surface. The correct solution was to cut the foam to fit the top of the box,then use an adhesive to bond the foam to the box surface. Then cut the PVC to cover the foam and overlap the edges of the box, fit and fix with staples or upholstery pins.

(b) Most candidates were well able to describe a suitable finish for the mild steel frame, with painting the main solution. Some did suggest plastic coating.

Question 16

Another very popular question

(a) A wide range of suitable materials suggested for the clock face – such as pine, brass, ABS, etc., with reasons such as easy to work, colour, can be cast, etc.

(b) Most of the solutions offered failed to include the semi-circular arms at the back of the clock face. The main process described was injection moulding with the addition of some excellent cross sectional drawings.

A few candidates offered blow moulding which would be partly successful in forming the clock face. Some tried to build the face up from solid material and drill the disc recesses with a hole saw.

(c) Not very well answered with many trying to cut the discs from a round rod, without any support, with a junior hacksaw. Only a few used the lathe.

(d) A range of solutions to supporting the clock face at different angles, many impractical. The best included a slotted base support into which the support stand could fit and adjust.

Question 17

Very few attempted this question

(a) Only the very best candidates offered the following – A held between centres, B held in a four jaw chuck, C held on a face plate.

Many candidates seemed to lack basic knowledge of lathe work and suggested holding work in a bench vice, etc.

(b)(i) Again only a few candidates showed any understanding of how the mahogany blank would be prepared. Expected answers included marking the centre ends, drilling the centre, cutting slot, corners planed, octagonal shape, etc.

(ii) Very few correct answers to setting the nylon block at centre height on the lathe. A number of candidates mentioned adjusting the chuck jaws but had no method of checking the centre position.

(iii) It was rare to see a valid answer to the problem of holding and balancing the cast blank. A few did bolt the blank to a face plate but failed to add the balancing weights.

Question 18

A very popular question with candidates.

(a) All candidates well able to give two valid properties of a material for the scissor rack. The popular answers tended to be colourful, easy to form shape, tough, hygienic, etc.

(b) In the main well answered with good sketching of the outline shape, showing the slots, dotted fold lines and curved corners.

(c)(i) The processes was well described with details of the drilling set up, drilling action and the holding and cutting out of the slot waste material.

Some candidates did however try to chop out the slots with a chisel and hammer.

(ii) Forming the final shape was very well described by all, which in the main was the use of the strip heater and wooden former. Once again some excellent sketching by candidates.

(d) A vast range of ideas for modifying the rack to hold sheets of paper. Some used simple upturns at the edges of the rack; others cut slots across the top of the rack, while others had more complex solutions such as adding slot on bases, or the addition of a box like section to the side. All proved to have some value.

Conclusion

A larger number of candidates took the examination this year but the overall standard of performance was maintained and in some areas of the paper increased. As mentioned earlier in the report it was a pleasure to see excellent graphic work used in conjunction with well written descriptions. This is to be encouraged and can only lead to a higher standard of response from candidates. It seemed that this year candidates were particularly strong in the area of hand tools and a number of the plastic processes. However the results do show some weak areas such as the special treatment of materials, particularly metals. As mentioned earlier in the report another area for improvement is the use of the woodwork and centre lathe, and its fittings and fixtures.

DESIGN AND TECHNOLOGY

Paper 6043/02
Design Project

General comments

The theme **Gadgets, Gismos and Gimmicks** seemed to be very popular with candidates and they responded to it in a very positive way. Naturally, many of the situations and artefacts considered in the analysis of the topic were those with which young people would be particularly familiar in their normal day to day lives.

Made artefacts varied enormously and interesting products included: electronic die; multi-tools; torches; drafting machine; money box; watch polisher; mechanical arm; humane mouse trap; folding chair; portable folding table; ring holder; book stand; shoe hanger; tool holders; mobile phone case; mechanical arm and claw and many different types of kitchen and camping aids.

Comments on individual Assessment Criteria

The Folio

General Analysis of Topic

Many candidates spent a long time on this section of their design folders and they had few problems in the identification of artefacts and design situations linked to the theme. A wide range of common gadgets was evidenced and considered by most candidates and they then had a clear path to the identification of their own design problem.

Formulation of Design Brief and Specification

Design briefs were generally clearly written so that it was obvious to the reader of the folio what was to be made.

As was reported last year, design specifications have improved and most candidates are able to offer a range of meaningful points that gives them access to the higher mark bands. It is pleasing to see that most points are specific to the design problem and qualified or quantified as necessary.

Exploration of Ideas

Many candidates need to be congratulated, not only on the range of ideas considered, but also on the innovation and creativity shown for this level of examination. Designs attract interest from the reader and many are described very well through the sound use of clear annotations and explanations. It is reassuring to see that some of the more extraordinary ideas go forward for development, as should be the case.

Detailed Development of Proposed Solution

The majority of candidates were able to develop their chosen idea(s) to a fairly advanced stage and to provide information and drawings from which the product could be made by a skilled person. It is important that candidates not only make decisions and choices but give the reasons for these by offering and considering alternatives. There were fewer cases of candidates filling this section with irrelevant information on materials, constructions and fittings as has sometimes been the case in previous years.

Suitability of Chosen Materials and Construction

This section is linked to the previous one and high marks can only be awarded where candidates have given reasons for their choices of materials and constructions.

Production Planning

Many plans were very easy to follow and it was obvious that most candidates were aware of th sequences for the manufacture of their product. It is always good to see an overall order of events, pe linked to dates or time in some way, supported by more detailed information on some of the less familia more complex tasks to be carried out.

It is reassuring to report that very few plans were written in the past tense as has been seen in some cases before.

Communication

The quality of communication, particularly graphic skills was very high indeed. This made design folders straightforward to read and candidates' thought processes easy to follow. The Moderator is particularly impressed by this aspect of candidates' folios.

The Artefact

Suitability of Proposed Solution

Most of the products appeared to function as intended although it is always difficult to make a judgement from photographic evidence alone. Centres seem to be using the full range of marks to discriminate between candidates.

Workmanship

Design folios included, or were accompanied by, good photographic evidence of made products and it was pleasing to see that many candidates had taken a great deal of care in the manufacture of their design solution. A wide range of making skills was in evidence and candidates had generally used appropriate materials and construction techniques.

The Moderator is pleased to see that so many candidates have achieved a good balance between design folios and made artefacts to the extent that performance is normally at or about the same level in both.

Evaluation

As was reported last year, this section of design folios continues to improve and it is no longer the weak area for most. Centres are reminded of the strong link between Specifications and Evaluation, so that if the former is not complete then it is difficult to carry out meaningful testing and evaluation.