DTBase©

Design & Technology
Eduqas GCSE

Timber: specialist techniques and processes

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don’t spend too much time on one question

Good luck!

Q1. Which adhesive is spread on both surfaces, left until touch dry, then pressed together for an instant bond?

A PVA

B Contact adhesive

C Epoxy resin

Q2. Which of these is a box (carcass) joint?

A Bridle

B Dovetail

C Mortise and tenon

Q3. For steam bending, solid wood is steamed for about:

A 10 minutes per 25 mm of thickness

B 1 day per 25 mm of thickness

C 1 hour per 25 mm of thickness

Q4. Which joint has its ends cut at 45° so that no end grain shows?

A Mitre

B Halving

C Housing

Q5. Up to about what thickness can a laser cutter cut plywood and MDF?

A 6 mm

B 25 mm

C 50 mm

Q6. Which CAM machine turns identical round parts such as table legs and handles?

A CNC router

B Laser cutter

C CNC lathe

Q7. The number wheels of a teaching aid have a 10 mm hole through the centre. Each wheel is made from a square piece of beech measuring 100 mm × 100 mm × 15 mm. Use notes and sketches to show how a 10 mm hole would be drilled through the centre of one of the wheels using a pillar drilling machine. **(4 marks)**

Q8. The frame of a desk is constructed using a mortise and tenon joint. Sketch a mortise and tenon joint and label its features. **(4 marks)**

Q9. A desk tidy has a side panel made from 15 mm MDF, measuring 250 mm × 220 mm. Use notes and sketches to show how the 15 mm MDF side panel would be veneered on one side. **(4 marks)**

Q10. The top and bottom of a flat pack bookcase are joined to the sides using cam lock knock-down fittings. Using notes and sketches, explain how a cam lock knock-down fitting would be used in the bookcase construction. **(5 marks)**

Q11. The outline of a fish, about 100 mm × 40 mm, has been marked out on a piece of 6 mm plywood. Use notes and sketches to show how the fish would be cut out using hand tools. **(4 marks)**

Q12. A cylindrical fishing rod handle is made from jelutong. Give two different methods that could be used to manufacture the cylindrical handle from a length of square section material. Explain one reason for using each manufacturing method. **(6 marks)**

Q13. A plywood dinner tray has slots 9 mm deep for plates, glasses and cutlery. Explain two reasons for using a router to manufacture the dinner trays. **(4 marks)**

Q14. The MDF parts of a sweet dispenser are joined using a contact adhesive.

Q14a. State one benefit and one drawback of using a contact adhesive to join the parts of the sweet dispenser. **(2 marks)**

Q14b. Describe how the contact adhesive would be used to join the parts of the sweet dispenser. **(2 marks)**

Q15. In commercial manufacture, timbers can be laser cut. Analyse the advantages and disadvantages of laser cutting timbers, for example to make the squares or veneers for a chessboard. **(5 marks)**

Answers

Q1. B
Q2. B
Q3. C
Q4. A
Q5. A
Q6. C

Q7.

One mark for each point shown in notes and/or sketches, up to 4 marks:

- Mark the centre on the piece of wood (1)
- Clamp it to the machine bed or hold it in a vice, using a sacrificial piece of wood underneath to prevent break out on the back (1)
- Put the 10 mm drill bit into the chuck (1)
- Wear PPE to protect your eyes (1)
- Turn the machine on and lower the drill bit into the wood (1)

Q8.

- Up to 2 marks for a reasonable sketch that looks like the joint
- 1 mark each for correctly labelling the mortise and the tenon
- 1 mark for a key feature: stopped joint; haunches; greater surface area increases the strength of the joint; sawn surfaces give better bonding

Q9.

Cap at 3 marks if there are no sketches, or sketches with no notes. One mark for each:

- The surface and edges of the MDF are sanded and the dust cleaned off (1)
- Glue is applied to the surface, or the self-adhesive backing is removed (1)
- The side panel and veneer are put together and lined up (1)
- Pressure is applied with clamps or a bag press, or heat with an iron (1)
- They are left for the glue to dry (1)

Q10.

Up to 5 marks for words and sketches showing a clear understanding of the stages. A maximum of 3 marks if only words or only sketches are given. For example:

- Drill the hole and fit the cam lock nut (1)
- Drill the hole and fit the cam screw (dowel) (1)
- Line up the two parts of the fitting and slot them together (1)
- Place the cam lock nut in the cam hole (1)
- Place the cam screw into the cam lock nut and twist the cam to lock it (1)

Credit quality control checks, e.g. measure and mark out where the holes are drilled, check the holes line up, check the correct fittings are used.

Q11.

Cap at 3 marks if there are no sketches, or sketches with no notes. One mark for each:

- The work is held in a vice or clamped down (1)
- The work is held as low as possible in the vice to reduce vibration (1)
- Start with small strokes of the saw (1)
- A coping saw is used to cut into the waste and around the shape (1)
- The work is turned in the vice, or the coping saw turned or the blade rotated in the frame, to follow the curve (1)

Q12.

Two methods (1 mark each), each with two linked justifications (1) + (1). For example:

- Turning on a lathe (1): the handle can be turned round (1), so other processes such as holes, chamfers and sanding can be done on the same machine at the same time (1)
- Planing or using a rasp or Surform (1): the handle is held in a vice and turned (1), so the corners can be removed to make a cylindrical shape (1)
- Sanding on a belt sander (1): the timber is rotated against the moving belt (1), giving a smooth, rounded surface (1)
- CNC 4 axis mill or router (1): the timber is held in a chuck (1), so it can be rotated as the cutter moves along to machine the profile (1)

Q13.

Two reasons (1 mark each), each with a linked justification (1 mark each). For example:

- A router can be used with a collar or profile cutter (1), so it can follow a template and make identical trays (1)
- It can plunge to a set depth (1), so it can cut out the slots and recesses (1)
- Different sized and shaped cutters can be used (1), so edges can be shaped, corners rounded and sharp edges removed (1)
- Routers can be used in CNC machines (1), so the trays can be cut unaided and faster than by hand (1)

Q14a.

- Benefit (1): quick to apply and join the parts; no clamping needed
- Drawback (1): can be messy; the joint cannot be adjusted; not as strong as PVA type adhesives; excess adhesive is hard to remove; toxic fumes

Q14b.

Two clear stages: a thin layer of contact adhesive is spread evenly on both surfaces to be joined (1); it is left until touch dry before the two surfaces are pressed together (1).

Q15. (5 marks)

Answers must include both advantages and disadvantages to access the full 5 marks.

Advantages

- Improved accuracy, so all the squares or veneers are identical; precision of about ±0.1 mm means pieces fit together
- No allowance is needed for a saw cut, although a small allowance is needed for the width of the laser cut
- Veneers could be laser cut instead of solid wood, or laser plywood or MDF used, to reduce cost
- The layout can be marked out or engraved by the laser to make construction easier

- More than one thickness of wood can be cut, speeding up production
- Needs little manpower; no mechanical friction, so little wear; safe, as it stops if the lid is opened

Disadvantages

- The size of the pieces is limited by the size of the laser bed
- Edges are burnt and dark, and there may be burn marks on the surface that need sanding off; staining from the bed can mark the wood
- Natural materials smell when laser cut (the smell fades over time)
- Some manufactured boards cannot be laser cut because the glues may be flammable, melt or give off fumes
- A ventilation system is needed, and its filters need replacing
- Expensive to buy, install, service and repair; more expensive than CNC routers; training is needed
- Settings differ for each material and thickness; wrong settings can damage the material or set it on fire

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of the advantages and disadvantages of laser cutting timber. Relevant examples and a well-developed, logical chain of reasoning, sustained throughout.
2	2 to 3	Some coherence, with partial knowledge and understanding. Mostly relevant examples and a logical chain of reasoning that may not be sustained throughout.
1	1	Basic knowledge and understanding. Limited relevant examples or logical chain of reasoning.
0	0	Incorrect or irrelevant answers.