Design & Technology

Composites

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. GRP is a combination of which materials?

A Glass fibre and resin

B Wood fibre and resin

C Carbon fibre and resin

Q2. Kevlar is a material that has which of these properties?

A Strong and resistant to impact

B Soft and resistant to spills and stains

C Conductive and resistant to fire

Q3. Which of these is a large sheet-based composite?

A ABS

B CRP

C MDF

Q4. What material is added to concrete to give it better tensile strength?

A Steel rods

B Glass fibres

C Aggregate/stone

Q5. Two mechanical properties of plywood are?

A Uniform strength and toughness

B Lightweight and dimensionally stable

C Strength and Hardness

Q6. What is a suitable composite material for the body of a Formula 1 car?

A GRP

B GRC

C Lightweight ceramic

Q7. What is CFRP

A Carbon fibre resin polymer

B Cement fibre reinforced plastic

C Carbon fibre reinforced polymer

Q8. What gives plywood such good strength?

A The repeating perpendicular grain

B The softwoods used in the layers

C The hardwoods used in the layers

Q9. Explain the meaning of ‘composite material’ **(2 marks)**

Q10. Name **two** suitable wood composite materials that could be used for the web of a wooden L-beam **(2 marks)**

1.

2.

Q11. Name the **three** different types of composites and give an example of each **(6 marks)**

Q12. Describe **two** techniques for strengthening **or** reinforcing products and/or materials.

Give examples in your answer **(4 marks)**

1.

2.

Q13. A Kayak is to be made from GRP.

Q13a. Name a polymer used in the GRP Kayak (**1 mark)**

Q13b. Describe the procedures involved in creating a glass reinforced plastic (GRP) moulding. **(6 marks)**

Answers

Q1. A
Q2. B
Q3. C
Q4. A
Q5. A
Q6. A
Q7. C
Q8. A

Q9.

- A mix of two of more materials (1)
- To produce a material with enhanced properties (1)

Q10.

- Plywood (1)
- Medium density fibreboard (MDF) (1)
- Blockboard (1)
- Laminboard (1)
- Chipboard
- Particle board (1)

Q11.

- Fibre-based composites (1) – GRP/CFRP (1)
- Particle-based composites (1) – Reinforced concrete/Cement (1)
- Sheet-based composites (1) – Plywood/MDF (1)

Q12.

- To make plywood stronger, it is built up in layers. (1)
- Different directions of grain are used when laying down the layers of plywood. (1)
- By doing this, the grain's weak lines of the grain are reinforced. (1)
- Reinforced concrete is used in many construction projects due to its strength.
- Reinforced concrete is a more suitable building material because it combines the compressive strength of concrete and the tensile strength of steel. (1)

- An interfacing can be used to stiffen a cotton shirt's collar. (1)
- Fabrics can be stiffened and strengthened by laminating them. (1)
- Cardboard layers with a corrugated middle layer are used to create corrugated cardboard. This makes the material stronger. (1)
- Corrugated card structural pieces, such as a wine carrier, are used to reinforce packaging. This separates the products using internal pieces. (1)

Q13a.

- Polyester resin (1)
- Epoxy resin (1)
- Polyurethane resin (1)

Q13b.

- Create the mould (1)
- Coat the mould with a wax, polish, or release agent (1)
- Gel coat and resin mixed (1)
- Gel or resin coat application (1)
- Spray or add a layer of glass fibre (1)
- Incorporate a layer of resin or work resin into the first layer of glass fibre (1)
- Allow to set or cure (1)
- Take away and trim (1)