Design & Technology

Metals

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. What makes a metal a ferrous metal?

A It must contain carbon

B It must contain iron

C It must contain rust

Q2. The carbon content in ferrous metals usually ranges between what?

A 0.15 and 1.4%

B 98.3 and 100%

C 23.3 and 42%

Q3. What is a disadvantage of Cast iron?

A It is ductile

B It is soft

C It is brittle

Q4. Aluminium is ideal for aircraft due to what property?

A Its malleable

B Its lightweight

C Its corrosion resistant

Q5. What is a disadvantage of Cast iron?

A It is ductile

B It is soft

C It is brittle

Q6. Copper is used for wiring because of what property?

A It is ductile

B It is soft

C It is brittle

Q7. Why is brass used in gears?

A Casts well

B Easy to machine

C Low coefficient of friction

Q8. What might stainless steel be used to make?

A Kitchen utensils

B Ship propellers

C Magnets

Q9. A kitchen sink that has been manufactured from stainless steel.

Provide **two physical** and **two mechanical** characteristics of the metal chosen for the kitchen sink, along with an explanation for why each property is appropriate for this product. (8 marks)

Q10. Die-casting is a common process used for making metal products.

Explain **one** specific characteristic of zinc that justifies its usage as a material for die-casting. **(2 marks)**

Q11. Casting is a common process used for making metal products such as brass paperweights.

Explain **one** specific characteristic of zinc that justifies its usage as a material for casting. **(2 marks)**

Q12. Explain **three** distinct mechanical properties of copper that render it appropriate for usage as electrical wire. **(6 marks)**

Answers

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

Q9.

Mechanical Properties

- Due to its hardness (1) since its surface resists scratches from cutlery, dishes, washing, etc (1).
- Toughness (1) prevents it from breaking if a pan is dropped on it (1).
- Malleability (1) means it is press-formable into the sink's shape (1).

Physical properties

- Corrosion resistance (1) won't rust or deteriorate when in contact with water (1).
- Chemical resistance (1) prevents detergent degradation (1).

Q10.

- When molten, zinc has good fluidity (1), so it will flow easily into the die (1).
- Zinc uses less energy to melt (1) because of its low melting point (1).

Q11.

- When molten, brass has good fluidity (1), so it will flow easily into the die (1).
- Brass uses less energy to melt (1) because of its low melting point (1).

Q12.

- Enough durability (1) to withstand breaking (1).
- Flexibility (1) allows the wire to flex without snapping (1).
- Ductility (1) to enable wire drawing (1).
- Fatigue strength (1), which enables repeated bends without fracture (1).
- Being soft (1) makes it simple to cut (1).
- Creep resistant (1), preventing deformation from repeated pressures (1).