CBSE CLASS X

Science (086)

QUESTION PAPER

AI-generated question paper

Code: IBDQC5 **Questions: 31** **Maximum Marks: 68** **Generated: 2026-06-25 17:50**

SELECTIONS USED

Subject	Science
Lessons	11 Electricity
Level of understanding	Exam-ready
Question selection	CBSE board paper, whole lesson (~80 marks across Sections A-E)
Model	claude-sonnet-4-6

Composition — Difficulty: 9 straightforward · 17 medium · 5 deep | Types: 10 MCQ · 6 Short · 5 Assertion–reason · 4 Very short · 3 Long · 3 Case-based | Sections: A 15Q/15m · B 4Q/8m · C 6Q/18m · D 3Q/15m · E 3Q/12m

Q1. straightforward exam-ready **[1]**

The potential difference across a conductor is doubled while its resistance remains unchanged. The current through it will:
(A) be halved
(B) remain the same
(C) be doubled
(D) become four times

A be halved
B remain the same
C be doubled
D become four times

◆ **Electricity**

Q2. straightforward exam-ready **[1]**

Which of the following correctly gives the SI unit of electrical resistivity?
(A) Ω
(B) Ω m^{-1}
(C) Ω m
(D) Ω m^2

A Ω
B Ω m^{-1}
C Ω m
D Ω m^2

◆ **Electricity**

Q3. medium exam-ready **[1]**

A wire of resistance R is stretched uniformly until its length is doubled. Its new resistance will be:
(A) R/2
(B) R
(C) 2R
(D) 4R

A R/2
B R
C 2R
D 4R

◆ Electricity

Q4. straightforward exam-ready **[1]**

Which term does NOT correctly represent electric power consumed in a circuit?
(A) I^2R
(B) IR^2
(C) V^2/R
(D) VI

A I^2R
B IR^2
C V^2/R
D VI

◆ Electricity

Q5. straightforward exam-ready **[1]**

The commercial unit of electrical energy, 1 kWh, is equal to:
(A) 1000 J
(B) 3.6×10^4 J
(C) 3.6×10^6 J
(D) 3.6×10^8 J

A 1000 J
B 3.6×10^3 J
C 3.6×10^6 J
D 3.6×10^4 J

◆ Electricity

Q6. medium exam-ready **[1]**

The heat produced in a conductor when current I flows through it for time t is $H = I^2Rt$. If the current is doubled and the time is halved, the heat produced will be:
(A) remain the same
(B) doubled
(C) halved
(D) quadrupled

A remain the same
B doubled
C halved
D quadrupled

◆ Electricity

Q7. medium exam-ready **[1]**

A 100 W electric bulb and a 40 W electric bulb are both designed for 220 V. Which bulb has higher resistance?
(A) The 100 W bulb
(B) The 40 W bulb
(C) Both have the same resistance
(D) Cannot be determined from given data

A The 100 W bulb
B The 40 W bulb
C Both have the same resistance
D Cannot be determined from given data

◆ **Electricity**

Q8. straightforward exam-ready **[1]**

The resistivity of a material depends on:
(A) the length of the conductor
(B) the area of cross-section of the conductor
(C) the nature of the material and temperature
(D) both the length and area of cross-section

A the length of the conductor
B the area of cross-section of the conductor
C the nature of the material and temperature
D both the length and area of cross-section

◆ **Electricity**

Q9. straightforward exam-ready **[1]**

The V–I graph for a metallic wire at constant temperature is a straight line passing through the origin. This is a graphical representation of:
(A) Joule's law of heating
(B) Ohm's law
(C) Kirchhoff's voltage law
(D) Faraday's law

A Joule's law of heating
B Ohm's law
C Kirchhoff's voltage law
D Faraday's law

◆ **Electricity**

Q10. medium exam-ready **[1]**

An electric motor operates at 220 V and draws a current of 5 A. The energy consumed by the motor in 1 hour is:
(A) 1100 J
(B) 3.96×10^3 J
(C) 3.96×10^6 J
(D) 3.96×10^4 J

A 220 J
B 1100 J
C 3.96×10^6 J
D 1100 W

◆ **Electricity**

Q11. medium exam-ready **[1]**

Assertion (A): Alloys are preferred over pure metals for making the heating elements of electric irons and toasters.
Reason (R): Alloys have higher resistivity and do not oxidise easily at high temperatures.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Electricity**

Q12. medium exam-ready **[1]**

Assertion (A): In a parallel combination of resistors, the equivalent resistance is always less than the smallest individual resistance in the combination.
Reason (R): Adding more parallel paths provides additional routes for current, effectively reducing total opposition to current flow.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Electricity**

Q13. straightforward exam-ready **[1]**

Assertion (A): Tungsten is used for making filaments of electric bulbs.
Reason (R): Tungsten has a very high melting point (3380°C) and high resistivity, which allows it to become incandescent without melting.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Electricity**

Q14. straightforward exam-ready **[1]**

Assertion (A): The direction of conventional electric current in a metallic conductor is taken opposite to the direction of flow of electrons.
Reason (R): Electrons were not known when the phenomenon of electricity was first studied, so current was assumed to flow from positive to negative terminal.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Electricity**

Q15. medium exam-ready **[1]**

Assertion (A): The cord (connecting wire) of an electric heater does not glow, but its heating element does.
Reason (R): The heating element has much higher resistance than the cord, so it dissipates far more heat for the same current.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Electricity**

Q16. straightforward exam-ready **[2]**

Define electric potential difference between two points in a circuit. Write the formula relating it to work done and charge.

◆ **Electricity**

Q17. medium exam-ready **[2]**

A nichrome wire of length 2 m and cross-sectional area 0.5 mm² has a resistance of 4 Ω. Calculate the resistivity of nichrome.

◆ **Electricity**

Q18. medium exam-ready **[2]**

An electric heater is rated 2 kW at 220 V. A fuse rated 5 A is installed in the circuit. Will the fuse operate safely? Justify your answer with a calculation.

◆ **Electricity**

Q19. deep exam-ready **[2]**

Two resistors of 6 Ω and 3 Ω are first connected in series and then in parallel across the same 12 V battery. Find the ratio of total power dissipated in the series arrangement to that in the parallel arrangement.

◆ **Electricity**

Q20. medium exam-ready **[3]**

Derive an expression for the equivalent resistance of three resistors R_1, R_2, and R_3 connected in series. Using this result, explain why the equivalent resistance in a series combination is always greater than any individual resistance in the combination.

◆ **Electricity**

Q21. medium exam-ready **[3]**

A battery of 15 V is connected to three resistors of 3 Ω, 4 Ω, and 8 Ω connected in parallel. Calculate: (a) the equivalent resistance of the combination, (b) the total current drawn from the battery, and (c) the current through the 8 Ω resistor.

◆ **Electricity**

Q22. medium exam-ready **[3]**

State Joule's law of heating. An electric iron of resistance 25 Ω is operated at 200 V for 30 minutes. Calculate the heat produced in the iron during this time.

◆ **Electricity**

Q23. medium exam-ready **[3]**

(a) State any two advantages of connecting electrical appliances in parallel rather than in series in a domestic circuit.
(b) Three identical bulbs are connected in parallel across a 12 V source and the total current drawn is 3 A. Calculate the resistance of each bulb.

◆ **Electricity**

Q24. deep exam-ready **[3]**

Two wires X and Y are made of the same material. Wire X has twice the length and half the cross-sectional area of wire Y. Compare the resistances of X and Y. If both are connected in series to a 6 V battery, what fraction of the total voltage appears across wire Y?

◆ **Electricity**

Q25. medium exam-ready **[3]**

(a) Define electric power and write its SI unit.
(b) A household uses the following appliances: one 1000 W electric iron for 2 hours, two 60 W fans for 5 hours, and one 100 W television for 4 hours every day. Calculate the total electrical energy consumed in one day in kWh.

◆ **Electricity**

Q26. deep exam-ready **[5]**

(i) Derive an expression for the equivalent resistance when three resistors R_1, R_2, and R_3 are connected in parallel. Mention one practical advantage of this combination over a series combination.
(ii) The resistivities of copper and nichrome are 1.62×10^{-8} Ω m and 100×10^{-6} Ω m respectively. Both wires have the same length and the same cross-sectional area. Calculate the ratio of resistance of nichrome wire to copper wire. Which material would you prefer for making the element of an electric toaster, and why?

◆ **Electricity**

Q27. deep exam-ready **[5]**

(i) State Joule's law of heating and derive the expression $H = I^2Rt$.
(ii) An electric kettle of resistance 44 Ω is rated for 220 V. Calculate: (a) the current through the kettle, (b) the power consumed, and (c) the heat generated in 5 minutes of operation.
(iii) Why is tungsten used for making filaments of electric bulbs rather than copper, even though copper is a better conductor?

◆ **Electricity**

Q28. deep exam-ready **[5]**

(i) What factors affect the resistance of a metallic conductor? Write the mathematical relation showing how resistance depends on each factor, and define resistivity.
(ii) A copper wire of diameter 0.4 mm and resistivity 1.62×10^{-8} Ω m is to be used as a resistor in a circuit requiring a resistance of 10 Ω. Calculate the length of wire needed.
(iii) If this copper wire is replaced by an aluminium wire of the same length and diameter (resistivity of aluminium = 2.63×10^{-8} Ω m), how does the resistance change?

◆ **Electricity**

Q29. medium exam-ready **[4]**

Read the following information and answer the questions that follow:

Meera sets up a circuit with a 6 V battery, an ammeter, a plug key, and three resistors of 2 Ω, 3 Ω, and 6 Ω connected in parallel.

(a) Calculate the equivalent resistance of the three resistors connected in parallel. [1 mark]
(b) Calculate the total current shown by the ammeter. [1 mark]
(c) Find the current flowing through the 2 Ω resistor alone. [1 mark]
(d) If Meera disconnects the 6 Ω resistor from the parallel combination while keeping the other two connected, will the total current increase, decrease, or remain the same? Justify your answer in one sentence. [1 mark]

◆ **Electricity**

Q30. medium exam-ready **[4]**

Read the following information and answer the questions that follow:

A technician tests various conductors in a laboratory at constant temperature. She records that nichrome has a resistivity of 100×10^{-6} Ω m, while silver has a resistivity of 1.60×10^{-8} Ω m. She uses a nichrome wire of length 1 m and cross-sectional area 1×10^{-6} m^2 as a heating element.

(a) The technician observes that for the conductor at constant temperature, the current is directly proportional to the potential difference applied. Which law does this represent? State the law. [1 mark]
(b) Which material — nichrome or silver — is a better conductor of electricity? Justify your answer using the given data. [1 mark]
(c) Calculate the resistance of the nichrome heating element. [1 mark]
(d) If the cross-sectional area of the nichrome wire is doubled while its length remains the same, what will be the new resistance? [1 mark]

◆ **Electricity**

Q31. medium exam-ready **[4]**

Read the following information and answer the questions that follow:

A household has the following electrical appliances all connected in parallel to a 220 V mains supply: a 1100 W electric iron, a 100 W television, and a 60 W table fan. The household uses a single fuse in the main line to protect the circuit.

(a) Calculate the total current drawn from the mains when all three appliances are operating simultaneously. [1 mark]
(b) The family has fuses of ratings 5 A and 10 A available. Which fuse should be used in the main line, and why? [1 mark]
(c) Explain briefly how a fuse wire protects the appliances in a circuit when excessive current flows. [1 mark]
(d) If the electric iron is operated daily for 2 hours and the cost of electricity is ₹3.00 per kWh, what is the cost of running the iron for 30 days? [1 mark]

◆ **Electricity**

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