

Maximum Marks: 100

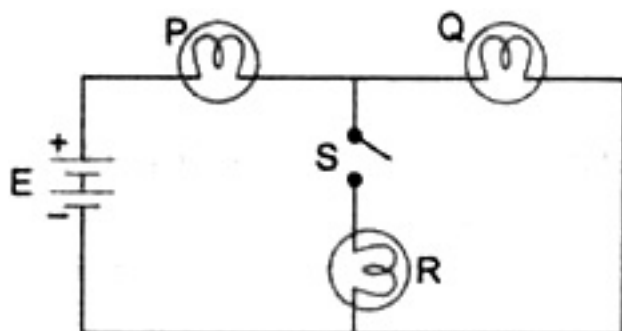
Time Allowed: 2 hours

General Instructions:

answer all questions

Section A

1. (i) Which among iron and mercury is a better conductor? 3
(ii) Which material is the best conductor and why?
2. A battery E is connected to three identical lamps P, Q and R as shown in figure: 3



Initially the switch S is kept open and the lamp P and Q are observed to glow with same brightness. Then switch S is closed. How will the brightness of the glow of bulbs P and Q will change? Justify your answer.

3. You have two circuits: 3
(i) a 6V battery is series with 1Ω and 2Ω resistors
(ii) a 4V battery in parallel with 12Ω and 2Ω . resistors
Compare the power used in 2Ω resistor in each case.
4. The length of different metallic wires, but of the same area of cross-section and made of the same material are given below: 3

Wire - Length

A - 1 m

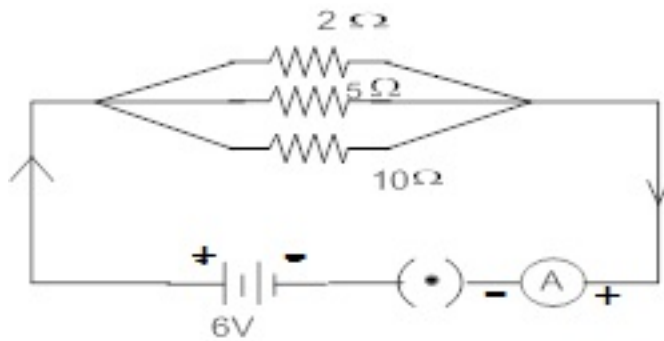
B - 1.5 m

C - 2.0 m

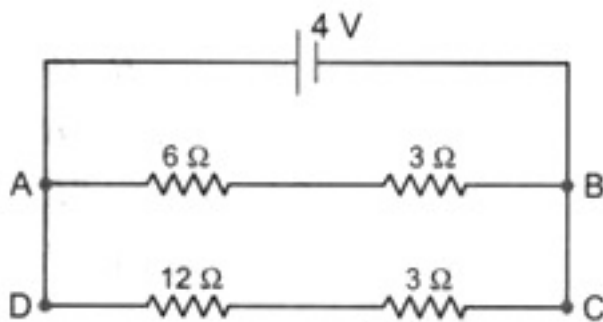
- (i) Out of these three wires, which wire has higher resistance?
(ii) Which wire has higher electrical resistivity? Justify your answer.

5. In the circuit diagram given here, calculate-

3



- (a) The total effective resistance
(b) The total current
(c) The current through each resistor
6. Why does an electric bulb become dim when an electric heater in parallel circuit is switched on? Why does dimness decrease after some time? 3
7. For the circuit shown in the given diagram: 3

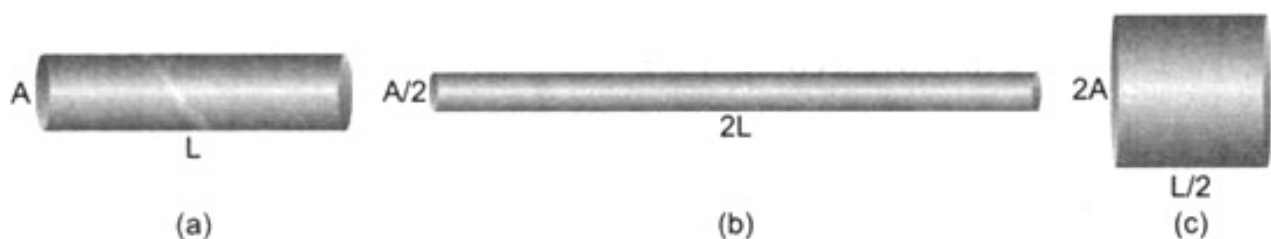


What is the value of

- (i) current through 6 resistor?
(ii) potential difference across 12Ω resistor?
8. Calculate the cost of seeing 2 movies on colour T.V. daily for the month of September. 3
- Given wattage of colour T.V. = 60 W, duration each movie is 2 hours 30 min and 1kWh costs Rs. 4
9. On what factors does the resistance of a conductor depend? 3
10. An electric lamp of 100 ohms, a toaster of resistance 50 ohms and a water filter of resistance 500 ohms are connected in parallel to a 220V source. what is the resistance of the electric iron connected to the same source that takes as much 3

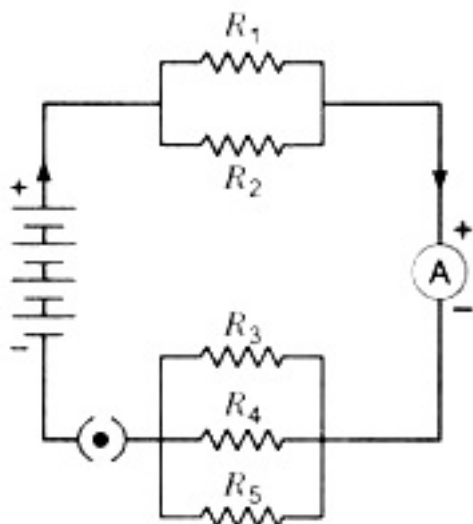
current as all the three appliances and what is the current through it ?

11. Compare the power used in $2\ \Omega$ resistor in each of the following circuits 3
 - (i) a 6V battery in series with $1\ \Omega$ and $2\ \Omega$ resistors and
 - (ii) a 4V battery in parallel with $12\ \Omega$ and $2\ \Omega$ resistors.
12. A current of 30 mA is flowing through a wire of resistance of $50\ \Omega$. what is the potential difference between two ends of the wire ? 3
13. A $4\ \Omega$ resistance wire is doubled on it. Calculate the new resistance of the wire. 3
14. A hot plate of an electric oven connected to a 220 V line has two resistance coils A and B, each of $24\ \Omega$ resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases? 3
15. An electric lamp of $100\ \Omega$, a toaster of resistance $50\ \Omega$, and a water filter of resistance $500\ \Omega$ are connected in parallel to a 220 V source. What is the resistance of an electric iron connected to the same source that takes as much current as all three appliances, and what is the current through it? 3
16. Redraw the circuit putting an ammeter to measure the current through the resistors and voltmeter to measure the potential difference across $12\ \Omega$ resistor. what would be the reading in the ammeter and the voltmeter ? 3
17. A bird sitting on an 11,000 V wire is quite safe but a man touching 220 V wire may die. Why do ? 3
18. A potential difference of 220 V is applied across a resistance of $440\ \Omega$ in an electric ion. 3
 - (i) Find the current.
 - (ii) Heat energy produced is 30s.
19. Figure (a), (b) and (c) show three cylindrical copper conductors along with their face areas and length. Which of the conductors will have highest resistance and why? 3



20. If in the figure $R_1 = 10\ \Omega$, $R_2 = 40\ \Omega$, $R_3 = 30\ \Omega$, $R_4 = 20\ \Omega$, $R_5 = 60\ \Omega$, and a 12 V battery is 3

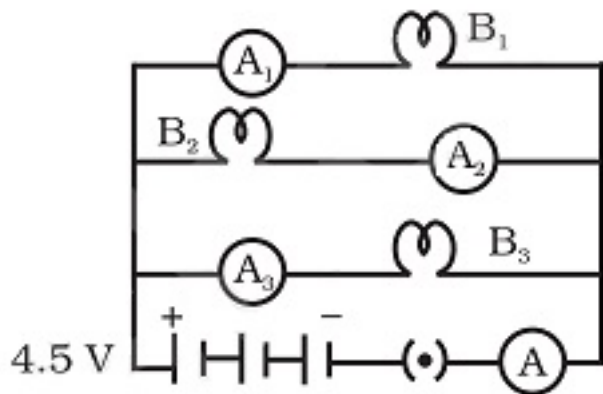
connected to the arrangement. Calculate (i) the total resistance in the circuit, and (ii) the total current flowing in the circuit.



21. (a) Define electrical energy with the S.I. unit? 5
 (b) A household uses the following electric appliance:
 (i) Refrigerator of rating 400W for ten hours each day.
 (ii) Two electric fans of rating 80W each for twelve hours each day.
 (iii) Six electric tubes of rating 18W each for six hours each day.
 Calculate the electricity bill of the household for the month of June if the cost per unit of electric energy is ₹3.00
22. Explain the following: 5
 (a) Why is tungsten used almost exclusively for filament of electric lamps?
 (b) Why are the conductors of electric heating devices, such as bread-toasters and electric irons, made of an alloy rather than a pure metal?
 (c) Why is the series arrangement not used for domestic circuits?
 (d) How does the resistance of wire vary with its area of cross-section?
 (e) Why are copper and aluminium wires usually employed for electric transmission?
23. What is the resultant resistance when number of resistors are connected in parallel? 5
24. A copper wire has diameter 0.5 mm and resistivity of $1.6 \times 10^{-8} \Omega m$. What will be the length of this wire to make its resistance 10 Ω ? How much does the resistance change if the diameter is doubled? 5
25. An electric heater of resistance 8 Ω draws 15A from service mains for 2 hours. 2

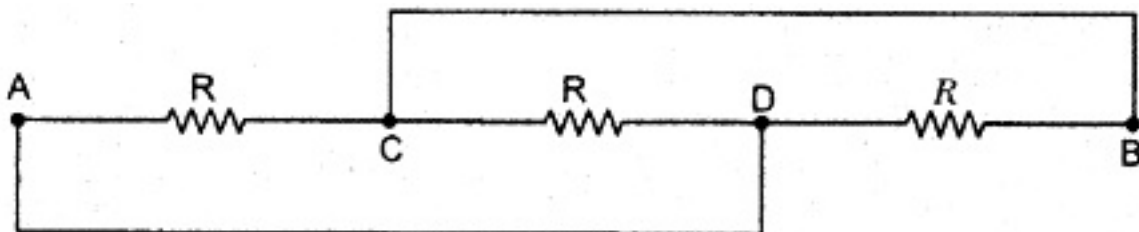
Calculate the rate at which heat is developed in the heater.

26. Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal? 2
27. Will current flow more easily through a thick wire or a thin wire of the same material, when connected to the same source? Why? 2
28. Should the heating element of an electric iron be made of iron, silver or nichrome wire? Justify giving three reasons? 2
29. B_1 , B_2 and B_3 are three identical bulbs connected as shown in figure. When all the three bulbs glow, a current of 3A is recorded by the ammeter A. 2



(i) What happens to the glow of the other two bulbs when the bulb B_1 gets fused?

30. What is the resistance between A and B in the network shown in the figure? 2



31. Though the same current flows through line wires and the filament of a bulb, yet only the latter glows. Why? 2
32. Heat is generated continuously in an electric heater, but the temperature of its element becomes constant after some time. Why? 2
33. Alloys are used in electrical heating devices rather than pure metals. Give reason. 2
34. An electric motor takes 5A from a 220V line. Determine the power of the motor and the energy consumed in 2 h. 2