PHYSICS

BOOKS - MTG-WBJEE PHYSICS (HINGLISH)

CURRENT ELECTRICITY

Wb Jee Previous Years Questions

1. A metal wire of circular cross-section has a resistance R. The wire is now stretched

without breaking so that its length is doubled and the density is assumed to remain the same. If the resistance of the wire now becomes R_2 then $R_2 : R_1$ is

A. $1:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: C

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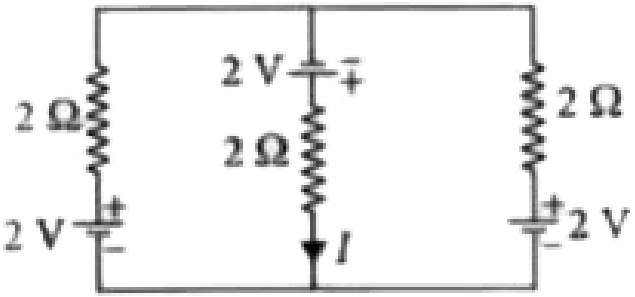
2. The current I in the circuit shown is



A. $1.33A$

B. zero

C. $2.00A$

D. $1.00A$

Answer: A

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3. Two equal resistances, 400 Ω each, are connected in series with a 8 V battery. If the resistance of first one increases by 0.5%, the change required in the resistance of the second one in order to keep the potential difference across it unaltered is to

A. increase it by 1Ω

B. increase it by 2Ω

C. increase it by 4Ω

D. decrease it by 4Ω

Answer: B

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4. Two wires of same radius having lengths l_1, and l_2 and resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity will be

A. $\frac{\rho_1 l_2 + \rho_2 l_1}{\rho_1 + \rho_2}$

B. $\frac{\rho_1 l_1 + \rho_2 l_2}{l_1 + l_2}$

C. $\frac{\rho_1 l_1 + \rho_2 l_2}{l_1 - l_2}$

D. $\frac{\rho_1 l_2 + \rho_2 l_1}{l_1 + l_2}$

Answer: B

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5. Six wires, each of resistance r, are connected so as to form a tetrahedron. The equivalent resistance of the combination when current

enters through one corner and leaves through some other corner is

A. r

B. 2r

C. $\frac{r}{3}$

D. $\frac{r}{2}$

Answer: D

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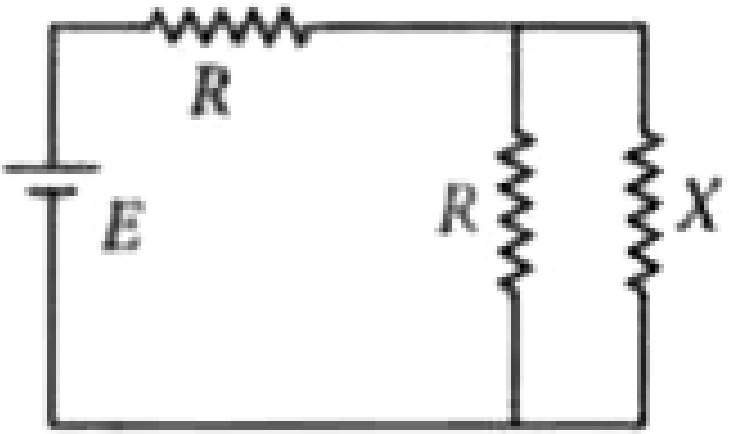
6. Consider the circuit shown in the figure. The value of the resistance X for which the thermal power generated in it is practically independent of small variation of its resistance is



A. $X = R$

B. $X = \frac{R}{3}$

C. $X = \frac{R}{2}$

D. $x = 2R$

Answer: C

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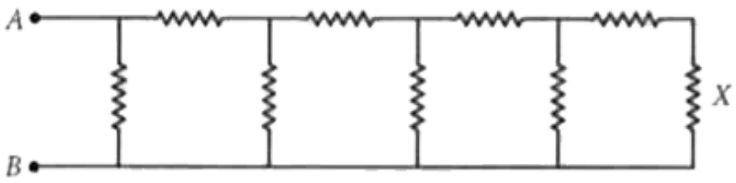
7. Consider the circuit shown in the figure where all the resistances are of magnitude 1 k. Ω. If the current in the extreme right resistance X is 1 mA, the potential difference

between A and B is



A. 34V

B. 21V

C. 68 V

D. 55V

Answer: A

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8. Four resistors, 100 Ω, 200Ω, 300Ω and 400Ω are connected to form four sides of a square. The resistors can be connected in any order. What is the maximum possible equivalent resistance across the diagonal of the square?

A. 210Ω

B. 240Ω

C. 300Ω

D. 250Ω

Answer: D

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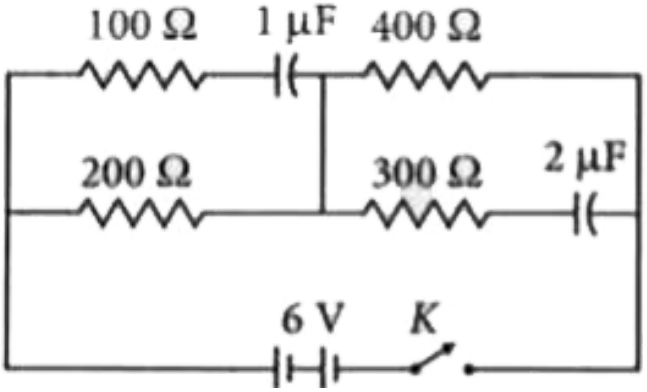
9. What will be current through the 200 Ω resistor in the given circuit a long time after the switch 'K' is made on?



A. zero

B. 100 mA

C. 10 mA

D. 1 mA

Answer: C

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10. An electric bulb, a capacitor, a battery and a switch are all in series in a circuit. How does the intensity of light vary when the switch is turned on?

A. Continues to increase gradually

B. Gradually increases for some time and then becomes steady

C. Sharply rises initially and then gradually decreases

D. Gradually increases for some time and then gradually decreases

Answer: C

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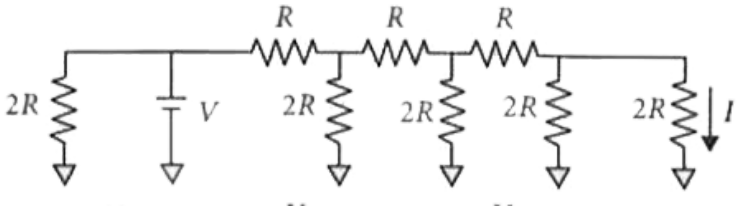
11. What is the current I shown in the given circuit?



A. $\frac{V}{2R}$

B. $\frac{V}{R}$

C. $\frac{V}{16R}$

D. $\frac{V}{8R}$

Answer: C

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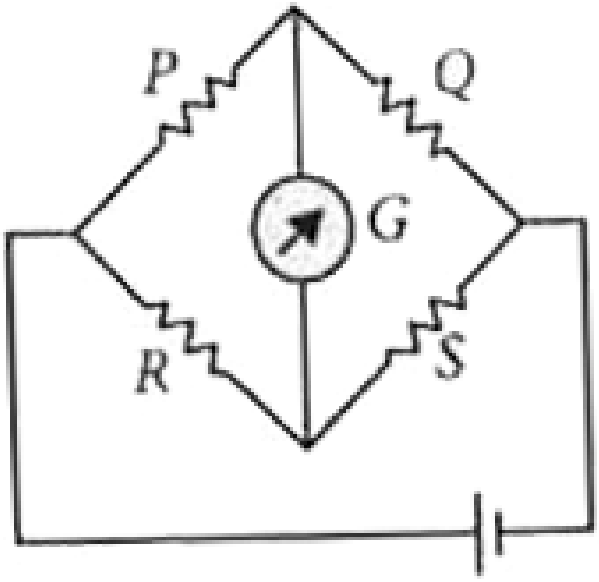
12. When the value of R in the balanced Wheatstone bridge, shown in the figure, is increased from 5 Ω to 7 Ω, the value of S has to be increased by 3 Ω in order to maintain the balance. What is the initial value of S?



A. 2.5Ω

B. 3Ω

C. 5Ω

D. 7.5Ω

Answer: D

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13. A cell of e.m.f E is connected to a resistance R_1 for time i and the amount of heat generated in it is H. If the resistance R_1 is

replaced by another resistance R_2 and is connected to the cell for the same time i, the amount of heat generated in R_2 is 4H. Then the internal resistance of the cell is

A. $\frac{2R_1 + R_2}{2}$

B. $\sqrt{R_1 R_2}\frac{2\sqrt{R_2} - \sqrt{R_1}}{\sqrt{R_2} - 2\sqrt{R_1}}$

C. $\sqrt{R_1 R_2}\frac{\sqrt{R_2} - 2\sqrt{R_1}}{2\sqrt{R_2} - \sqrt{R_1}}$

D. $\sqrt{R_1 R_2}\frac{\sqrt{R_2} - 2\sqrt{R_1}}{2\sqrt{R_2} + \sqrt{R_1}}$

Answer: B

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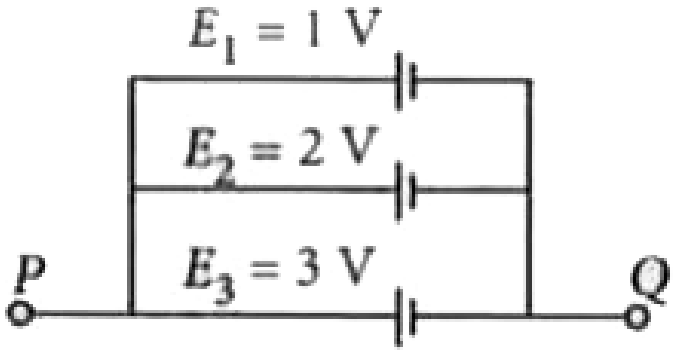
14. A circuit consists of three batteries of emf E_1 = 1 V, $E_2 = 2V$ and $E_3 = 3V$ and internal resistances $1\Omega, 2\Omega$ and 1Ω respectively which are connected in parallel as shown in the figure. The potential difference between points P and Q is



A. $1.0V$

B. $2.0V$

C. $2.2V$

D. $3.0V$

Answer: B

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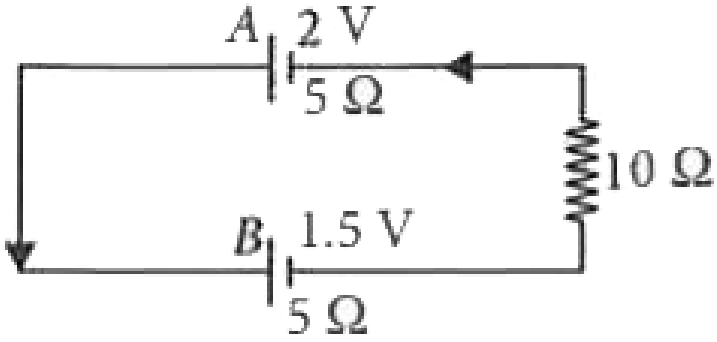
15. Two cells A and B of e.m.f.2 V and 1.5 V respectively, are connected as shown in figure through an external resistance 10 Ω The internal resistance of each cell is 5 Ω. The

potential difference E_A and E_B across the terminals of the cells A and B respectively are



A. $E_A = 2.0v, E_B = 1.5V$

B. $E_A = 2.125V, E_B = 1.375V$

C. $E_A = 1.875V, E_B = 1.625V$

D. $E_A = 1.875V, E_B = 1.375V$

Answer: C

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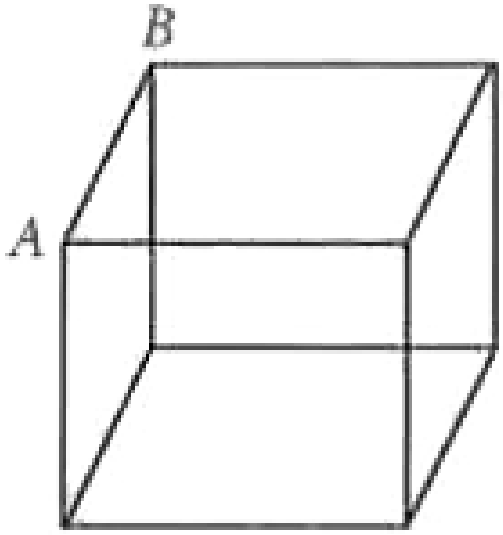
16. The effective resistance between A and B in the figure is $\frac{7}{12}\Omega$ .If each side of the cube has 1 Ω resistance The effective resistance between the same two points, when the link AB is removed is



A. $\frac{7}{12}\Omega$

B. $\frac{5}{12}\Omega$

C. $\frac{7}{5}\Omega$

D. $\frac{5}{7}\Omega$

Answer: C

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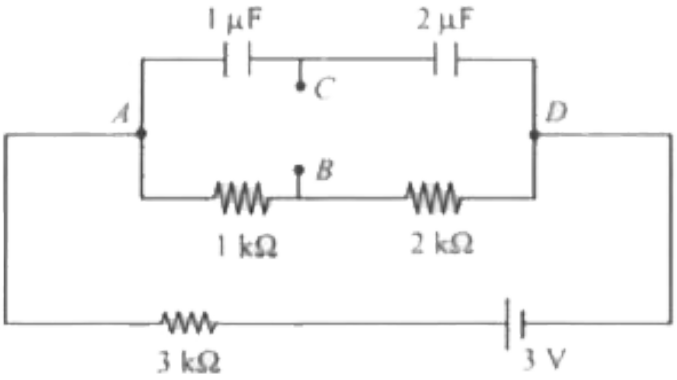
17. Consider the circuit given here. The potential difference V_{BC} between the points B

and C is



A. $1V$

B. $0.5V$

C. $0V$

D. $-1V$

Answer: B

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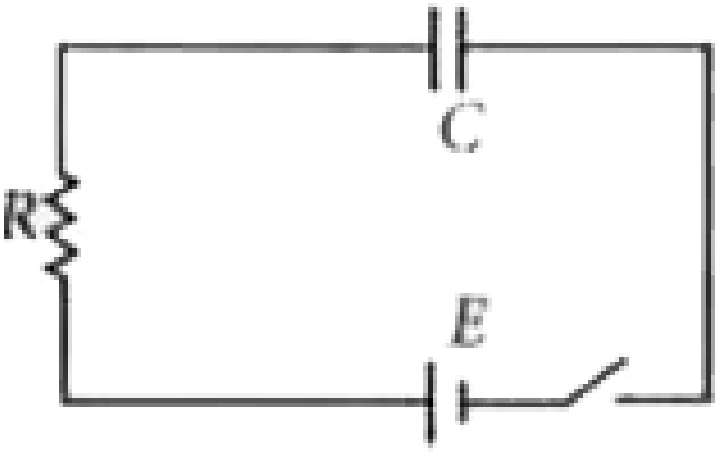
18. A capacitor of capacitance C is connected in series with a resistance R and a DC source of emf E through a key. The capacitor starts charging when the key is closed. By the time the capacitor has been fully charged, what amount of energy is dissipated in the

resistance R?



A. $\frac{1}{2}CE^2$

B. 0

C. CE^2

D. $\frac{E^2}{R}$

Answer: A

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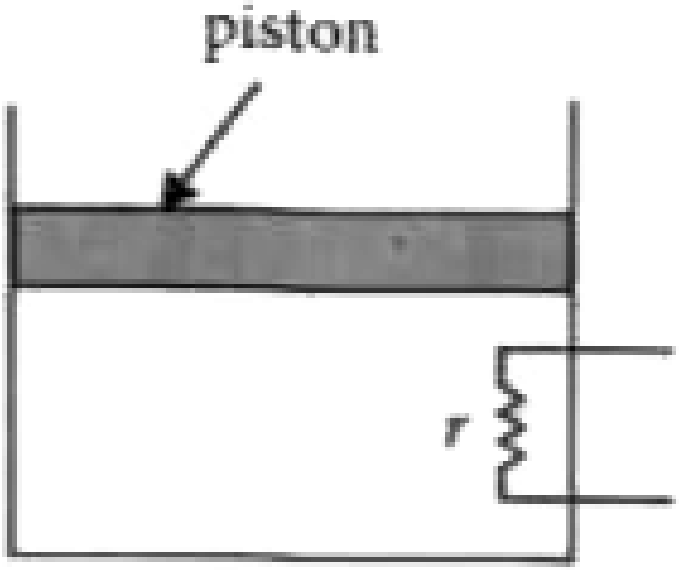
19. A heating element of piston resistance r is fitted inside an adiabatic cylinder which carries a frictionless piston of mass m and crosssection A as shown in diagram. The cylinder contains one mole of an ideal diatomic gas. The current flows through the element such that the temperature rises with time t as $\Delta T = alpaht + \frac{1}{2}\beta t^2$? ($\alpha$ and β are constants), while pressure remains constant. The atmospheric pressure above the piston is

P_0. Then



A. the rate of increase in internal energy is

$$\frac{5}{2}R(\alpha+\beta t)$$

B. the current flowing in the element is

$$\sqrt{\frac{5}{2r}R(\alpha+\beta t)}$$

C. the piston moves upwards with constant acceleration,

D. the piston moves upwards with constant speed.

Answer: A::C

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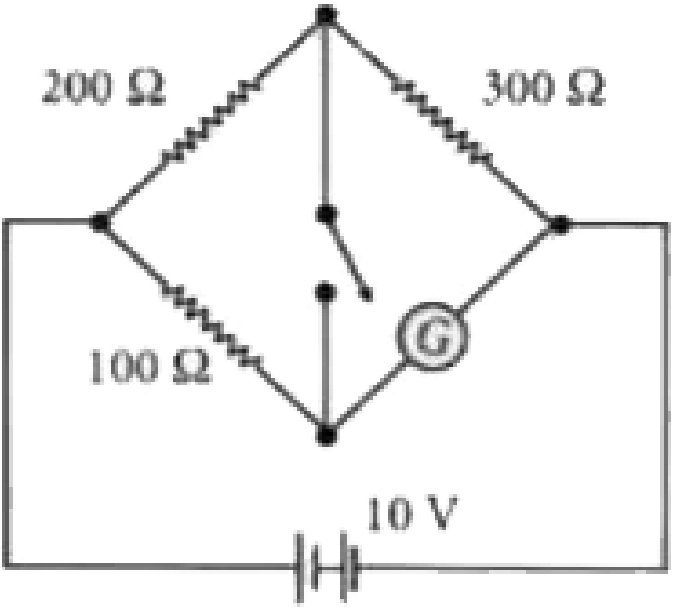
20. A non-zero current passes through the galvanometer G shown in the circuit when the key 'K' is closed and its value does not change

when the key is opened. Then which of the following statements (s) is/are true?



A. The galvanometer resistance is infinite.

B. The current through the galvanometer is 40 mA.

C. After the key is closed, the current through the 200 Ω resistor is same as the current through the 300 Ω resistor.

D. The galvanometer resistance is 150 Ω

Answer: B::C::D

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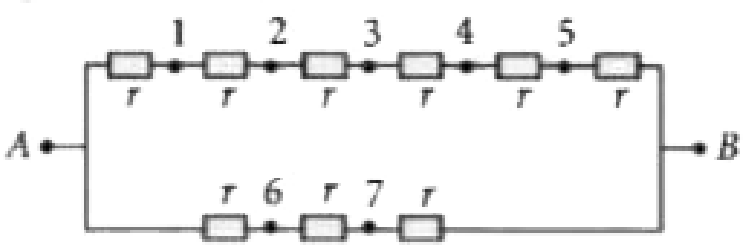
21. In the circuit shown in the figure all the resistances are identical and each has the value r Ω. The equivalent resistance of the

combination between the points A and B will remain unchanged even when the following pairs of points marked in the figure are connected through a resistance R.



A. 2 and 6

B. 3 and 6

C. 4 and 7

D. 4 and 6

Answer: A::C

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