Shiksha Classes Bhandara
CHAPTER TEST

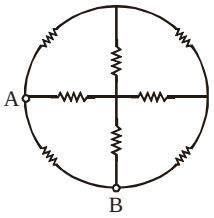
Subject : Physics **Topic : Current Electricity** **M.M. : 100**

Marking Scheme:

(i) Each question is allotted 4 (four) marks for each correct response.

(ii) ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

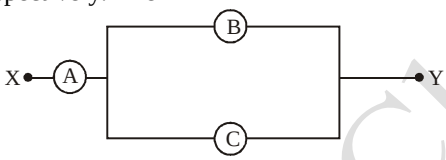
Q.1 Eight resistances each of resistance 5Ω are connected in the circuit shown in figure. The equivalent resistance between A and B is



(A) (8/3) Ω (B) (16/3) Ω
(C) (15/7) Ω (D) (19/2) Ω

Q.2 The total momentum of electrons in a straight wire of length 1000m carrying a current of 70A is closest to
(A) 40×10^{-8} N-sec (B) 30×10^{-8} N-sec
(C) 50×10^{-8} N-sec (D) 70×10^{-8} N-sec

Q.3 Three voltmeters A, B and C having resistances R, 1.5 R and 3R, respectively, are connected as shown. When some potential difference is applied between X and Y, the voltmeter readings are V_A, V_B and V_C respectively. Then –



(A) $V_A \neq V_B = V_C$ (B) $V_A = V_B \neq V_C$
(C) $V_A \neq V_B \neq V_C$ (D) $V_A = V_B = V_C$

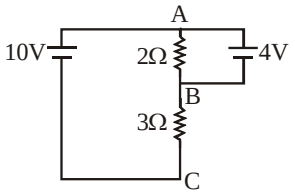
Q.4 An electric bulb rated for 500W at 100V is used in a circuit having a 200V supply. The resistance R that must be put in series with the bulb, so that the bulb draws 500W is –
(A) 100 Ω (B) 50 Ω
(C) 20Ω (D) 10Ω

Q.5 Temperature of a resistance at temperature t° C is $R = R_0(1 + at + bt^2)$. Here R_0 is the temperature at 0°C. The temperature coefficient of resistance at temperature t is –

(A) $\dfrac{a + 2bt}{1 + at + bt^2}$ (B) (a + 2bt)

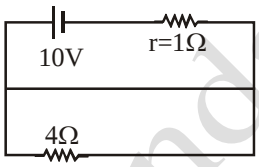
(C) $\dfrac{1 + at + bt^2}{a + 2bt}$ (D) constant

Q.6 Current passing through 3Ω resistance is



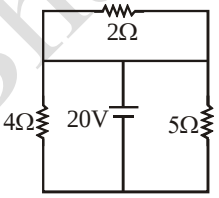
(A) (14/3) A (B) 3 A
(C) 2 A (D) (12/5) A

Q.7 Potential difference across the terminals of the battery shown in figure is (r = internal resistance of battery)



(A) 8 V (B) 10 V
(C) 6 V (D) zero

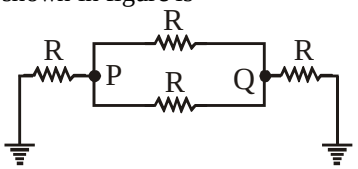
Q.8 In the circuit shown in figure



(A) current passing through 2Ω resistance is zero
(B) current passing through 4Ω resistance is 5 A
(C) current passing through 5Ω resistance is 4 A
(D) all of the above

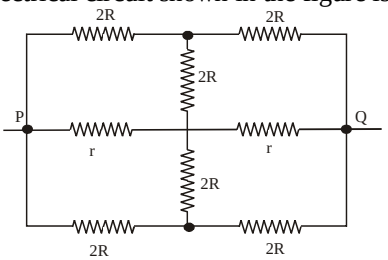
Q.9 A voltmeter with resistance 500Ω is used to measure the emf of a cell of internal resistance 4Ω. The percentage error in the reading of the voltmeter will be
(A) 0.2% (B) 0.8%
(C) 1.4% (D) 2.2%

Q.10 The net resistance between point P and Q in the circuit shown in figure is



(A) R/2 (B) 2R/5
(C) 3R/5 (D) R/3

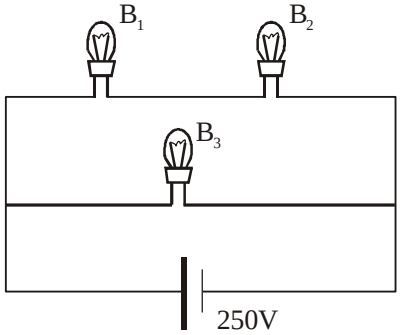
Q.11 The effective resistance between points P and Q of the electrical circuit shown in the figure is –



(A) $\dfrac{2Rr}{R + r}$ (B) $\dfrac{8R\,(R + r)}{3R + r}$

(C) 2r + 4R (D) $\frac{5R}{2+2R}$

Q.12 A 100 W bulb B_1 and two 60W bulbs B_2 and B_3, are connected to a 250V source, as shown in the figure. Now W_1, W_2 and W_3 are the output powers of the bulbs B_1, B_2 and B_3 respectively. Then –

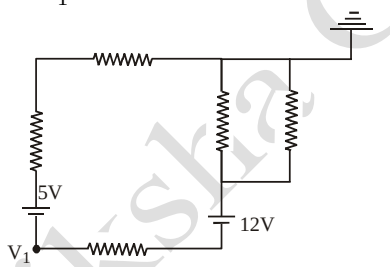


(A) $W_1 > W_2 = W_3$ (B) $W_1 > W_2 > W_3$
(C) $W_1 < W_2 = W_3$ (D) $W_1 < W_2 < W_3$

Q.13 A capacitor is charge and then made to discharge through a resistance. The time constant is τ. In what time will the potential difference across the capacitor decrease by 10%?
(A) τ ln (0.1) (B) τ ln (0.9)
(C) τ ln (10/9) (D) τ ln (11/10)

Q.14 A uniform wire has electric resistance R. The wire is cut into n equal parts. All wires are put parallel to each other and joined at the ends. The resistance of the combination is –
(A) R/n (B) R/n^2
(C) R (D) none of these.

Q.15 In the circuit shown, each resistances is 2Ω. The potential V_1 as indicated in the circuit, is equal to

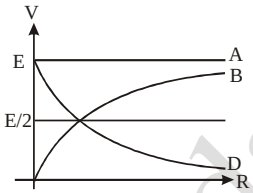


(A) 11 V (B) – 11V
(C) 9V (D) –9V

Q.16 To get maximum current through a resistance of 2.5Ω, one can use 'm' rows of cells, each row having 'n' cells. The internal resistance of each cell is 0.5Ω. What are the values of n & m, if the total number of cells is 45 –
(A) 3, 15 (B) 5, 9
(C) 9, 5 (D)15, 3

Q.17 A battery of internal resistance 2Ω is connected to a variable resistor whose value can vary from 4Ω to 10Ω. The resistance is initially set at 4Ω. If the resistance is now increased then –
(A) power consumed by it will decrease
(B) power consumed by it will increase
(C) power consumed by it may increase or may decrease
(D) power consumed will first increase then decrease.

Q.18 A cell of emf E having an internal resistance 'r' is connected to an external resistance R. The potential difference 'v' across the resistance R varies with R as shown by the curve:



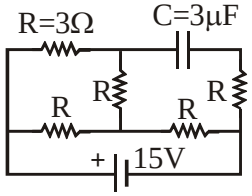
(A) A (B) B
(C) C (D) D

Q.19 'n' identical light bulbs, each designed to draw P power from a certain voltage supply are joined in series and that combination is connected across that supply. The power consumed by one bulb will be –
(A) n P (B) P
(C) P/n (D) P/n^2

Q.20 The charge on a capacitor decreases η times in time t, when it discharges through a circuit with a time constant t
(A) $t = \eta\tau$ (B) $t = \tau \ln \eta$
(C) $t = \tau (\ln \eta - 1)$ (D) $t = \tau \ln\left(1-\frac{1}{\eta}\right)$

For Q.21-Q.25 :
The answer to each question is a NUMERICAL VALUE.

Q.21 In the circuit shown, the cell is ideal, with emf = 15 V. Each resistance is of 3 Ω. The potential difference (in V) across the capacitor is



Q.22 A galvanometer of resistance 12Ω shows full scale deflection for a current of 2.5 mA. To convert it to ammeter of range 7.5A. Resistance of meter (in mΩ) is approximately

Q.23 All the edges of a block with parallel faces are unequal. Its longest edge is twice its shortest edge. The ratio of the maximum to minimum resistance between parallel faces is

Q.24 Calculate mean free path (in Å) in Cu at room temperature 300 K, if number density of free electrons is 8.5×10^{28} /m^3 and resistivity $\rho = 1.7 \times 10^{-8}$ mho-m. Given $k = 1.38 \times 10^{-23}$ J/K.

Q.25 A battery is supplying power to a tape-recorder by cable of resistance of 0.02 Ω. If the battery is generating 50 W power at 5V, then power (in W) received by tape-recorder is