Lorik educational academy-vidyanagar

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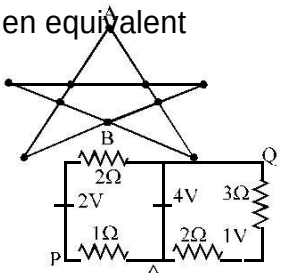
Section: Senior **TOPIC: CURRENT ELECTRICITY**

SINGLE ANSWER TYPE

Q.1 The resistance of all the wires between any two adjacent dots is R. Then equivalent resistance between A and B as shown in figure is :

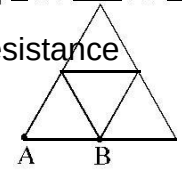


(A) 7/3 R (B) 7/6 R
(C) 14/8 R (D) None of these

Q.2 In the circuit shown, what is the potential difference V_{PQ}?

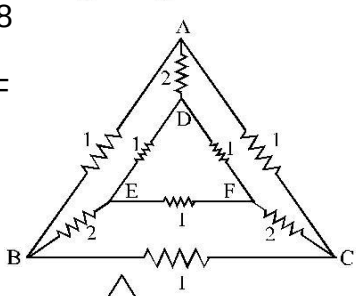
(A) + 3V (B) + 2V (C) –2V (D) none

Q.3 In the diagram resistance between any two junctions is R. Equivalent resistance across terminals A and B is

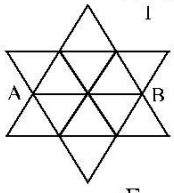


(A) $\frac{11R}{7}$ (B) $\frac{18R}{11}$ (C) $\frac{7R}{11}$ (D) $\frac{11R}{18}$

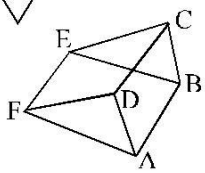
Q.4. A network of nine conductors connects six points A, B, C, D, E and F as shown in figure. The figure denotes resistances in ohms. Find the equivalent resistance between A and D.



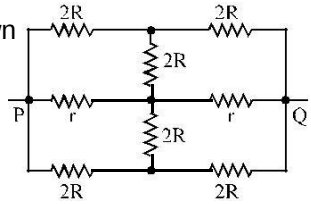
Q.5 Find the equivalent resistance of the circuit between points A and B shown in figure is: (each branch is of resistance = 1)



Q.6 In the circuit shown in figure, all wires have equal resistance r. Find the equivalent resistance between A and B.

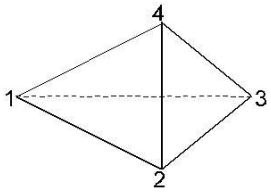


Q.7 The effective resistance between the points P and Q of the electrical circuit shown in the figure is



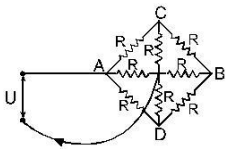
(A) 2 Rr / (R + r) (B) 8R(R + r)/(3R + r)
(C) 2r + 4R (D) 5 R/2 + 2r

Q.8 As shown in the figure a wire is in the form of a tetrahedron. The resistance of each edge is r. Calculate the resistance of the frame between the corners;

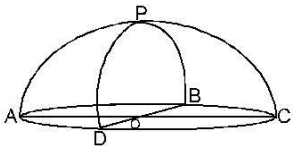


(i) 1 - 2 (ii) 1 - 3

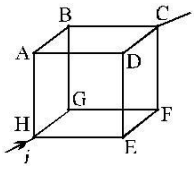
Q.9 The resistance of each resistor in the circuit diagram shown in figure is the same and equal to R. The voltage across the terminals is U. Determine the current I in the leads if their resistance can be neglected.



Q.10 A hemispherical network of radius a is made by using a conducting wire of resistance per unit length 'r'. Find the equivalent resistance across OP.

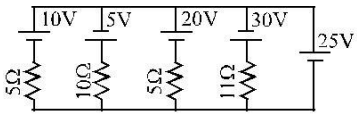


Q.11 In the box shown current i enters at H and leaves at C. If $i_{AB} = \frac{i}{6}$, $i_{DC} = \frac{2i}{3}$, $i_{HA} = \frac{i}{2}$, $i_{GF} = \frac{i}{6}$, $i_{HE} = \frac{i}{6}$, choose the branch in which current is zero

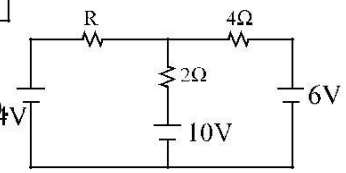


(A) BG (B) FC (C) ED (D) none

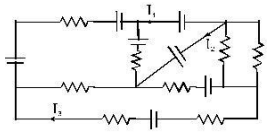
Q.12 Find the current through 25V cell & power supplied by 20V cell in the figure shown.



Q.13 For what value of R in circuit, current through 4 resistance is zero



Q.14 Find the currents $_1$, $_2$ and $_3$ in the following circuit. All resistors are of 2 and all batteries are ideal with EMF 2V.

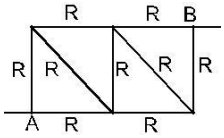


Q.15 A square pyramid is formed by joining 8 equal resistance R across the edges. The square base of the pyramid has the corners at A, B, C, D. The vertex is at M. Calculate the:

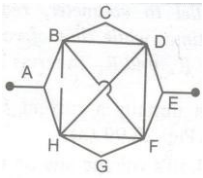
(a) Current in the edge MC if an ideal cell of emf E is connected across the adjacent corners A and B.

(b) Current in the edge MA if an ideal cell of emf E is connected across the opposite corners A and C.

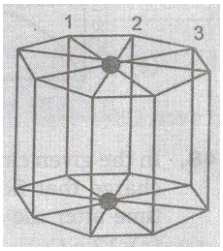
Q.16 Determine the resistance R_{AB} between points A and B of the frame formed by nine identical wires of resistance R each.



Q.17 Fourteen identical resistors, each of resistance r are connected as shown in Fig. 2E.100(a). Calculate equivalent resistance between A and E.



Q.18 In the diagram shown, all the wires have resistance R. The equivalent resistance between the upper and lower dots shown in the diagram is:



a) R/8 b) R c) 2R/5 d) 3R/8

19. When electric bulbs of same power, but different marked voltage are connected in series across the power line, their brightness will be :
(A) proportional to their marked voltage (B) inversely proportional to their marked voltage
(C) proportional to the square of their marked voltage
(D) inversely proportional to the square of their marked voltage (E) the same for all of them

20. Two bulbs rated (25 W – 220V) and (100W – 220V) are connected in series to a 440 V line. Which one is likely to fuse?
(A) 25 W bulb (B) 100 W bulb (C) both bulbs (D) none

21. Rate of dissipation of Joule's heat in resistance per unit volume is (symbols have usual meaning)
(A) E (B) J (C) J E (D) None

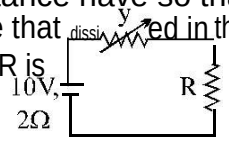
22. If the length of the filament of a heater is reduced by 10%, the power of the heater will
(A) increase by about 9% (B) increase by about 11%
(C) increase by about 19% (D) decrease by about 10%

23. A heater A gives out 300 W of heat when connected to a 200 V d.c. supply. A second heater B gives out 600 W when connected to a 200 v d.c. supply. If a series combination of the two heaters is connected to a 200 V d.c. supply the heat output will be
(A) 100 W (B) 450 W (C) 300 W (D) 200 W

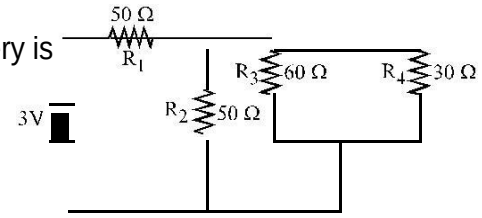
24. Three 60 W light bulbs are mistakenly wired in series and connected to a 120 V power supply. Assume the light bulbs are rated for single connection to 120 V. With the mistaken connection, the power dissipated by each bulb is:
(A) 6.7 W (B) 13.3 W (C) 20 W (D) 40 W

25. The current I through a rod of a certain metallic oxide is given by $I = 0.2\ V^{5/2}$, where V is the potential difference across it. The rod is connected in series with a resistance to a 6V battery of negligible internal resistance. What value should the series resistance have so that :
(i) the current in the circuit is 0.44 (ii) the power dissipated in the rod is twice that dissipated in the resistance.

26. In the figure shown the power generated in y is maximum when y = 5 . Then R is
(A) 2 (B) 6
(C) 5 (D) 3



27. In the circuit shown, the resistances are given in ohms and the battery is assumed ideal with emf equal to 3.0 volts. The resistor that dissipates the most power is
(A) R_1 (B) R_2
(C) R_3 (D) R_4



28. What amount of heat will be generated in a coil of resistance R due to a charge q passing through it if the current in the coil decreases to zero uniformly during a time interval t
(A) $\frac{4}{3}\frac{q^2R}{t}$ (B) $\frac{q^2R}{\ln 2\ t}$ (C) $\frac{2q^2R}{3\ t}$ (D) $\ln\frac{2\ t}{q^2R}$

29. The variation of current (I) and voltage (V) is as shown in figure A. The variation of power P with current *I* is best shown by which of the following graph

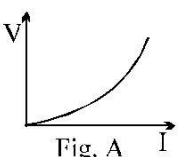
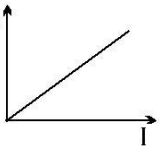
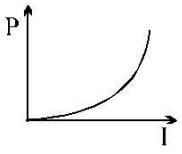
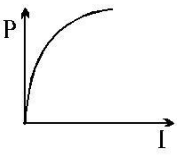
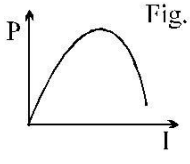


Fig. A

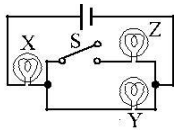
(A) 

(B) 

(C) 

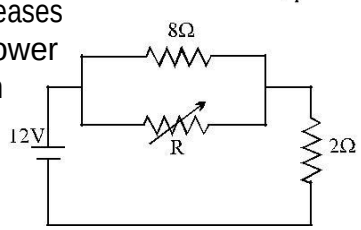
(D) 

30. If X, Y and Z in figure are identical lamps, which of the following changes to the brightnesses of the lamps occur when switch S is closed?



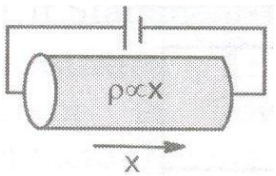
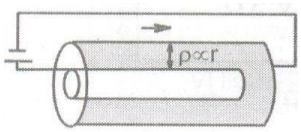
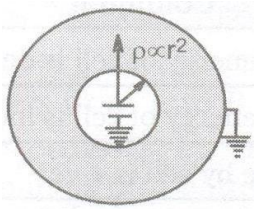
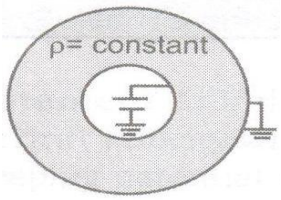
(A) X stays the same, Y decreases (B) X increases, Y decreases
(C) X increases, Y stays the same (D) X decreases, Y increases

31. The value of the resistance R in figure is adjusted such that power dissipated in the 2 resistor is maximum. Under this condition

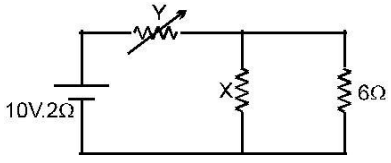


(A) R = 0
(B) R = 8
(C) power dissipated in the 2 resistor is 72 W.
(D) power dissipated in the 2 resistor is 8 W.

32. Column - I has some conductor across which battery is connected as shown. Variation of resistivity is also indicated. Which of the quantities in Column - II remain constant throughout the volume of conductor.

Column - I	**Column - II**
a) 	p) Magnitude of electric field
b) 	q) Magnitude of current density
c) 	r) Power dissipated per unit volume
d) 	s) Drift speed of free electron
	t) Electric current

33. In the figure shown the thermal power generated in ' y ' is maximum when y = 4 . Then X is:



(A) 2 (B) 3 (C) 1 (D) 6

KEY

1) **B** **2)** **B** **3)** **D** **4)** 1 **5)** $\frac{22}{35}$ **6)** $\frac{3r}{5}$ **7)** **A**

8) (i) r/2 (ii) r/2 **9)** $= \frac{15U}{7R}$ **10)** $\frac{(2\ )ar}{8}$ **11)** **B** **12)** 12A, –20W

13) 1 **14)** $_1 = -1A;\ _2 = 1A;\ _3 = 0A$ **15)** (a) $\frac{E}{8R}$ (b) $\frac{E}{2R}$ **16)** $R_{AB} = \frac{15}{11} R$

17) **1.2 r** **18)** **D** **19.** **C** **20.** **A** **21.** **C** **22.** **B** **23.** **D**

24. **A** **25.** (i) 10.52 (ii) 0.3125 **26.** **D** **27.** **A**

28. **A** **29.** **B** **30.** **B** **31.** **A,C** **32.** **A-Q,S,T ; B-Q,S,T ; C-P,T ; D-T**

33. **B**