JEE MAIN : CHAPTER WISE TEST PAPER-3

SUBJECT :- PHYSICS　　　　　　　　　　　　　　DATE..

CLASS :- 12th　　　　　　　　　　　　　　　　　　NAME...

**CHAPTER :- CURRENT ELECTRICITY**　　　　　SECTION...

(SECTION-A)

1. In the presence of an applied electric field ($\vec{E}$) in a metallic conductor.

(A) The electrons move in the direction of $\vec{E}$

(B) The electrons move in a direction opposite to $\vec{E}$

(C) The electrons may move in any direction randomly, but slowly drift in the direction of $\vec{E}$.

(D) The electrons move randomly but slowly drift in a direction opposite to $\vec{E}$.

2. A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be :

(A) doubled　　　　　　　(B) four times

(C) one-fourth　　　　　　(D) half

3. There are two wires of the same length and of the same material and radii r and 2r. The ratio of their specific resistance is

(A) 1 : 2　　(B) 1 : 1　　(C) 1 : 4　　(D) 4 : 1

4. If the length and cross-section of a wire is doubled, then the resistance will

(A) become half

(B) increase two times

(C) remain unchanged

(D) increase four times

5. When the resistance of copper wire is 0.1 Ω and the radius is 1 mm, then the length of the wire is (specific resistance of copper is 3.14×10^{-8} ohm x m)

(A) 10 cm　　　　　　　(B) 10 m

(C) 100 m　　　　　　　(D) 100 cm
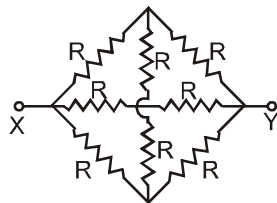
**6.** Find the equivalent resistance between the X and Y

(A) 2R/3　　(B) R/3　　(C) 2 R　　(D) 3 R

7. Find the equivalent emf of the three batteries as shown in the figure.

(A) 0　　(B) 4 v　　(C) 8 v　　(D) 12 v
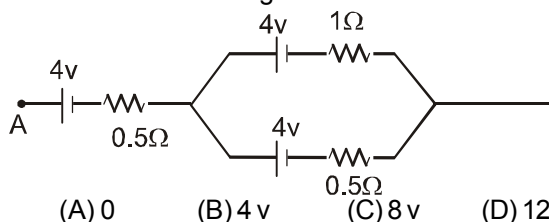
8. The unit of potential gradient is

(A) volt　　　　　　　　(B) volt/ampere

(C) volt/meter　　　　　(D) volt x meter

9. The potentiometer wire 10 m long and 20 ohm resistance is connected to a 3 volt emf battery and a 10 ohm resistance. The value of potential gradient in volt/m of the wire will be

(A) 1.0　　(B) 0.2　　(C) 0.1　　(D) 0.02

10. Two coils connected in series have resistances 600 Ω and 300 Ω at 20°C and temperature coefficient of resistivity 0.001 k^{-1} and 0.004 k^{-1} respectively.

The resistance of the combination at temperature 50°C is

(A) 426 Ω　　　　　　(B) 954 Ω

(C) 1806 Ω　　　　　(D) 214 Ω

11. Read the following statements carefully :

Y : The resistivity of semiconductor decreases with increase of temperature.

Z : In a conducting solid, the rate of collisions between free electrons and ions increases with increase of temperature.

Select the correct statement (s) from the following :

(A) Y is true but Z is false

(B) Y is false but Z is true

(C) Both Y and Z are true

(D) Y is true and Z is the correct reason for Y

**12.** A conductor with rectangular cross section has dimension (a × 2a × 4a) as shown in fig. Resistance across AB is x, across CD is y and across EF is z. Then
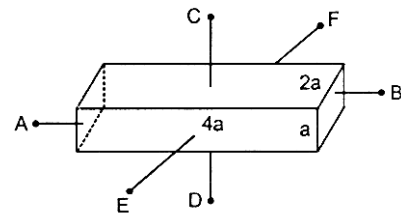

(A) x = y = z　　　　　　(B) x > y > z

(C) y > z > x　　　　　　(D) x > z > y

13. Two wires of same dimension but resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is

(A) $\rho_1 + \rho_2$　　　　　　(B) $\frac{1}{2}(\rho_1 + \rho_2)$

(C) $\sqrt{\rho_1 \rho_2}$　　　　　　(D) $2(\rho_1 + \rho_2)$

14. If internal resistance of a cell is proportional to current drawn from the cell. Then the best representation of terminal potential difference of a cell with current drawn from cell will be:
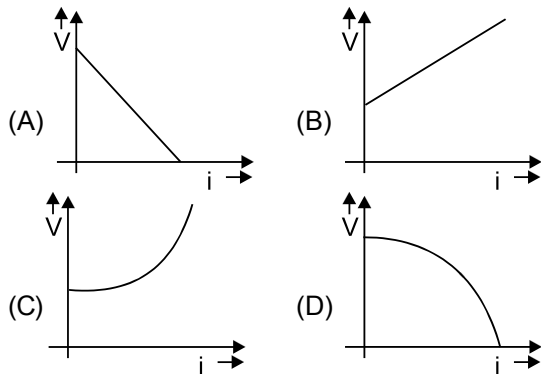
15. In the circuit shown the readings of ammeter and voltmeter are 4A and 20V respectively. The meters are non-ideal, then R is

(A) 5 Ω

(B) less than 5Ω

(C) greater than 5Ω

(D) between 4Ω and 5Ω.
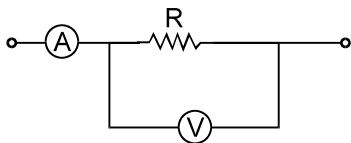
16. The ammeter shown in figure consists of a 480 Ω coil connected in parallel to a 20 Ω shunt. Find the reading of the ammeter.
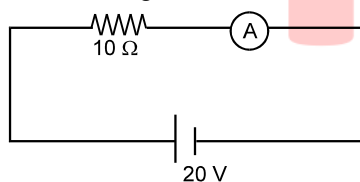
(A) $\frac{50}{73}$ A   (B) $\frac{40}{53}$ A   (C) $\frac{50}{93}$ A   (D) $\frac{73}{50}$ A

17. **STATEMENT-1 :** The current density $\vec{j}$ at any point in ohmic resistor is in direction of electric field $\vec{E}$ at that point.

STATEMENT-2 : A point charge when released from rest in a region having only electrostatic field always moves along electric lines of force.

(A) Statement-1 is True, Statement-2 is True; Statement-2 **is** a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 **is NOT** a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True.

18. Time taken by a 836 W heater to heat one litre of water from 10ºC to 40ºC is :

(A) 50 s   (B) 100 s   (C) 150 s   (D) 200 s

19. Seven resistors are connected as shown in the diagram.
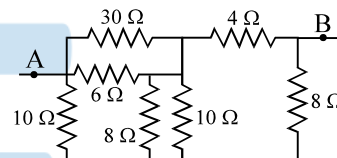

The equivalent resistance in ohms of this network between A and B is

(A) 6   (B) 8   (C) 12   (D) 20

20. Resistance P, Q, S and R are arranged in a cyclic order to form a balanced Wheatstone's network. The ratio of power consumed in the branches (P + Q) and (R + S) is

(A) 1 : 1   (B) R : P

(C) $P^2 : Q^2$ (D) $P^2 : R^2$

(SECTION-B)

21. A wire when connected to 220 V mains supply has power dissipation P_1. Now the wire is cut into two equal pieces which are connected in parallel to the same supply. Power dissipation in this case is P_2. Then $P_2 : P_1$ is x : y. so find the value of x+y = ?

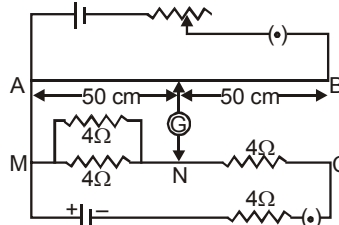**22.** If in the circuit, power dissipation is 150 W then R is .....Ω.
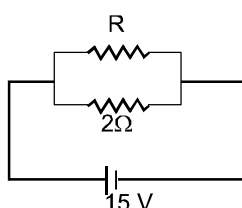
23. A wire has a resistance of 12 ohms. If it is bent in the form of a circle. The effective resistance between (in Ω) the two points on any diameter is equal to

24. The total current (Amp.) supplied to the circuit by the battery is :
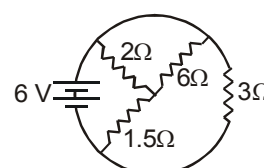
25. An electric current is passed through a circuit containing two wires of the same material, connected in parallel. If the lengths and radii of the wires are in the ratio of 4/3 and 2/3, then the ratio of the currents passing through the wire will be P : Q. find the value of Q

26. In a potentiometer experiment the balancing with a cell is at length 240 cm. On shunting the cell with a resistance of 2Ω, the balancing length becomes 120 cm. The internal resistance Ω of the cell is :

27. The resistance of bulb filament is 100 Ω at a temperature of 100°C. If its temperature coefficient of resistance be 0.005 per °C, its resistance will become 200 Ω at a temperature of ...... °C.

28. An electric bulb is rated 220 volt - 100 watt. The power (in watt) consumed by it when operated on 110 volt will be

29. The current in the primary circuit of a potentiometer is 0.2 A. The specific resistance and cross-section of the potentiometer wire are 4×10^{-7} ohm metre and 8×10^{-7} m^2 respectively. The potential gradient (in V/m) will be equal to :

30. In the following figure, the p.d. between the points M and N is balanced at 50 cm length. The balancing length in cm, for the p.d. between points N and C will be