

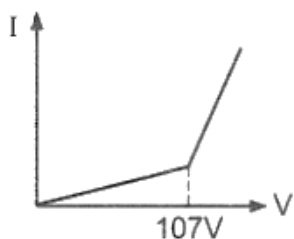
CET25P3

Class 12 - Physics

Time Allowed: 1 hour and 30 minutes

Maximum Marks: 75

- If the electric current in a lamp decreases by 5%, then the power output decreases by:
a) 20% b) 25%
c) 10% d) 5%
- In a copper voltameter experiment current is decreased to one-fourth of the initial value but it is passed for four times the earlier duration, then the amount of copper deposited will be:
a) 4 times the previous value b) $\frac{1}{4}$ th of the previous value
c) same d) $\frac{1}{16}$ th of the previous value
- The electrical resistance of a conductor
a) decreases with increase in its temperature b) decreases with increase in its conductivity
c) is independent of its shape but depends only on its volume d) varies directly proportional to its area of cross-section
- Ohm's law is obeyed by
a) metals at low temperature b) intrinsic semiconductors
c) extrinsic semiconductors d) metals at high temperature
- Two cells, having the same emf are connected in series through an external resistance R. Cells have internal resistances r_1 and $r_2(r_1 > r_2)$ respectively. When the circuit is closed, the potential difference across the first cell is zero. The value of R is:
a) $r_1 + r_2$ b) $\frac{(r_1 - r_2)}{2}$
c) $\frac{(r_1 + r_2)}{2}$ d) $r_1 - r_2$
- Kirchhoff's first law, i.e., $\sum I = 0$ at a junction, deals with the conservation of
a) Energy b) Momentum
c) Angular momentum d) Charge
- Time taken by an 836 W water heater to heat one liter of water from 10°C to 40°C is:
a) 100 s b) 50 s
c) 150 s d) 200 s
- Ampere second is a unit measuring:
a) Power b) Electric charge
c) Current strength d) Energy



- a) a water voltmeter
b) both copper and water voltmeter
c) a copper voltmeter
d) any voltmeter
18. Three copper wires have lengths and cross-sectional areas as (l, A) ; $(2l, \frac{A}{2})$ and $(\frac{l}{2}, 2A)$. Resistance is minimum in: [1]
a) same in all the three cases
b) wire of cross-sectional area A
c) wire of cross-sectional area $\frac{A}{2}$
d) wire of cross-sectional area $2A$
19. When a current flows in a wire, there exists an electric field in the direction of: [1]
a) flow of current
b) perpendicular to the flow of current
c) opposite to the flow of current
d) at an angle of 45° to the flow of current
20. The current flowing through a lamp marked as 50 W, 250 V is: [1]
a) 5 A
b) 2 A
c) 2.5 A
d) 0.2 A
21. The instrument among the following which measures the emf of a cell most accurately is: [1]
a) potentiometer
b) a voltmeter
c) post office box
d) an ammeter
22. Thermo emf ε (in volts) of a certain thermocouple is found to vary with θ (in $^\circ\text{C}$) according to equation $E = 20\theta - \frac{\theta^2}{20}$, where θ is the temperature of the hot junction, the cold junction being kept at 0°C . Then, the neutral temperature of the thermocouple is: [1]
a) 100°C
b) 340°C
c) 200°C
d) 300°C
23. A 10 m long wire of resistance $20\ \Omega$ is connected in series with a battery of emf 3 V and a resistance of $10\ \Omega$. The potential gradient along the wire in V/m is: [1]
a) 0.2
b) 0.02
c) 1.2
d) 0.1
24. A Wheatstone bridge is balanced for four resistors R_1, R_2, R_3 and R_4 with a Leclanche cell between A and C and a galvanometer between B and D. The positions of the cell and the galvanometer are interchanged. The balance will [1]
a) Change and can be obtained by changing R_1
b) decrease by about 9%
c) Change and can be obtained by changing R_4
d) Not change
25. Amount of charge in coulomb required to deposit one gram equivalent of substance by electrolysis is [1]
a) $4.8 \times 10^{-4}\text{ C}$
b) 96500 C

- c) 6500 C
d) 9.6×10^4 C

26. Ammeter is always used [1]
 a) in series with the element through which current is to be determined
 b) in parallel with the element through which current is to be determined
 c) to simulate the element across which voltage is to be determined
 d) to simulate the element through which resistance is to be determined

27. Resistivity of a given conductor depends upon [1]
 a) area of cross-section
 b) length of conductor
 c) temperature
 d) shape of the conductor

28. A hot electric iron has a resistance of $80\ \Omega$ and is used on a 200 V source. The electrical energy spent, if it is used for 2 h, will be: [1]
 a) 800 Wh
 b) 1000 Wh
 c) 2000 Wh
 d) 8000 Wh

29. If the electric current in a lamp decreases by 5%, then the power output decreases by [1]
 a) 20%
 b) 25%
 c) 5%
 d) 10%

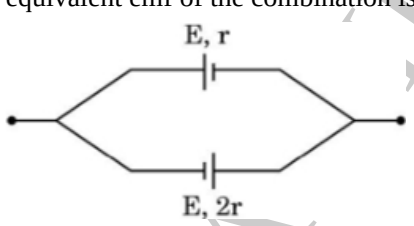
30. The rate of increase of thermo emf with the temperature at the neutral temperature of a thermocouple: [1]
 a) is negative
 b) is zero
 c) depends upon the choice of the two materials of the thermocouple
 d) is positive

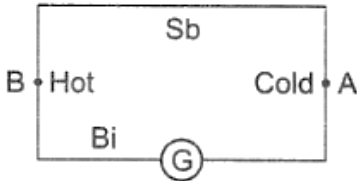
31. A current of 2 A flows through a $2\ \Omega$ resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a $9\ \Omega$ resistor. The internal resistance of the battery is: [1]
 a) $0.5\ \Omega$
 b) $1\ \Omega$
 c) $\frac{1}{3}\ \Omega$
 d) $\frac{1}{4}\ \Omega$

32. A battery is charged at a potential of 15 V for 8 hours when the current flowing is 10 A. The battery on discharge supplies a current of 5 A for 15 hours. The mean terminal voltage during discharge is 14V. The watt-hour efficiency of the battery is: [1]
 a) 80 %
 b) 87.5 %
 c) 90 %
 d) 82.5 %

33. The SI unit of mobility of charge carriers is: [1]
 a) $\text{m s}^{-1} \text{V}^{-1}$
 b) Ωs^{-1}
 c) Ωm
 d) $\text{m}^2 \text{V}^{-1} \text{s}^{-1}$

34. Two resistance filaments of same length are connected first in series and then in parallel. Find the ratio of power dissipated in both cases assuming that equal current flows in the main circuit. [1]
 a) 4 : 1
 b) 1 : 2
 c) 2 : 1
 d) 1 : 4

35. According to Kirchhoff's Junction Rule, [1]
- At any junction of circuit elements, the sum of currents entering the junction must not equal the sum of currents leaving it.
 - At any junction of circuit elements, the sum of currents entering and leaving the junction must be positive.
 - At any junction of circuit elements, the sum of currents entering the junction must equal the sum of currents leaving it.
 - At any junction of circuit elements, the sum of currents entering and leaving the junction must be negative.
36. Fuse wire should have: [1]
- high resistance, low melting point
 - high resistance, high melting point
 - low resistance, high melting point
 - low resistance, low melting point
37. If two identical heaters each rated as (1000 W, 220 V) are connected in parallel to 220 V, then the total power consumed is: [1]
- 250 W
 - 2000 W
 - 2500 W
 - 200 W
38. For a Wheatstone bridge arrangement of four resistances – R_1, R_2, R_3, R_4 (Junction of R_1 and R_2 is connected to anode and Junction of R_3 and R_4 to the cathode of the cell). The null-point condition is given by [1]
- $(R_1 - R_3) = (R_2 - R_4)$
 - $(R_1 \times R_3) = (R_2 \times R_4)$
 - $\frac{R_1}{R_3} = \frac{R_2}{R_4}$
 - $(R_1 + R_3) = (R_2 + R_4)$
39. In a Wheatstone's bridge, all the four arms have equal resistance R . If the resistance of the galvanometer arm is also R , the equivalent resistance of the combination as seen by the battery is: [1]
- $2R$
 - R
 - $\frac{R}{4}$
 - $\frac{R}{2}$
40. Two cells of emf E each and internal resistances r and $2r$ are connected in parallel as shown in the figure. The equivalent emf of the combination is: [1]
- 
- E
 - $\frac{E}{2}$
 - zero
 - $\frac{E}{3}$
41. The resistance of each arm of a Wheatstone bridge is $10\ \Omega$. A resistance of $10\ \Omega$ is connected in series with the galvanometer. Then, the equivalent resistance of the bridge across the battery will be: [1]
- $20\ \Omega$
 - $10\ \Omega$
 - $15\ \Omega$
 - $40\ \Omega$
42. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fall of potential per km is 8 volt and the average resistance per km is $0.5\ \Omega$. The power loss in the wires is: [1]
- 19.2 kW
 - 12.2 J

- c) 12.2 kW
d) 19.2 J
43. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of $10\ \Omega$ is: [1]
a) $1.0\ \Omega$
b) $0.5\ \Omega$
c) $0.8\ \Omega$
d) $0.2\ \Omega$
44. One kilowatt-hour is equal to: [1]
a) $36 \times 10^5\ \text{J}$
b) $36 \times 10^{-5}\ \text{J}$
c) $36 \times 10^3\ \text{J}$
d) $36 \times 10^{-3}\ \text{J}$
45. An antimony-bismuth thermocouple is shown in the figure, where A is the cold junction and B is the hot junction: [1]
- 
- a) current can flow in any direction
b) current will not flow at all
c) current will flow from B to A via G
d) current flows from A to B via G
46. Which of the following is not the cause of low conductivity of electrolysis? [1]
a) Low number of density of charge carriers
b) Ionization of salt
c) High number of density of charge carriers
d) High resistance offered by the solution to the motion of ions
47. If P and Q are two batteries connected in series with anode of one connected to anode of the other, producing voltages E_1 and $E_2 > E_1$ respectively. The e.m.f of the pair is [1]
a) E_1
b) E_2
c) $E_2 - E_1$
d) $E_2 + E_1$
48. Si and Cu are cooled from 300 K to a temperature of 60 K. Then resistivity: [1]
a) decreases for both Si and Cu
b) increases for both Si and Cu
c) for Cu increases and for Si decreases
d) for Si increases and for Cu decreases
49. Nichrome or manganin is widely used in wire-bound standard resistors because of their: [1]
a) very weakly temperature-dependent resistivity
b) temperature independent resistivity
c) mechanical strength
d) strong dependence of resistivity with temperature
50. A student measures the terminal potential difference (V) of a cell (of emf ε and internal resistance r) as a function of the current (I) flowing through it. The slope, and intercept, of the graph between V and I, then, respectively, equal: [1]
a) $-r$ and ε
b) $-\varepsilon$ and r
c) r and $-\varepsilon$
d) ε and $-r$

51. If a copper wire is stretched to make it 0.1% longer, the percentage increase in resistance will be [1]
 a) 0.1 b) 0.2
 c) 1 d) 2
52. A 1250 W heater operates at 115 V. What is the resistance of the heating coil? [1]
 a) 1.6Ω b) 13.5Ω
 c) 10.6Ω d) 1250Ω
53. Identify the set in which all the three materials are good conductors of electricity: [1]
 a) Cu, Hg and NaCl b) Cu, Ag and Au
 c) Cu, Si and diamond d) Cu, Ge and Hg
54. Cu and Al wire each of length $l = 20 \text{ cm}$ and area of cross-section $A = 50 \text{ cm}^2$. Their resistivity $\rho_{Cu} = 1.69 \times 10^{-8} \Omega\text{m}$ and $\rho_{Al} = 2.75 \times 10^{-8} \Omega\text{m}$. If they are joined end to end, then the total resistance of the combination is: [1]
 a) 1×10^{-2} b) 4.44
 c) 0.888 d) 0.01×10^{-2}
55. A wire has resistance 12Ω . It is bent in the form of a circle. The effective resistance between the two points on any diameter of the circle is: [1]
 a) 24Ω b) 6Ω
 c) 3Ω d) 12Ω
56. Power dissipated in a resistance R through which current I is flowing is [1]
 a) $I^2 R$ b) $I^2 R^2$
 c) IR d) IR^2
57. The element of a heater is rated (P, V). If it is connected across a source of voltage $\frac{V}{2}$, then the power consumed by it will be [1]
 a) P b) $\frac{P}{4}$
 c) 2P d) $\frac{P}{2}$
58. An electric motor runs on DC source of emf 200 V and draws a current of 10 A. If the Efficiency be 40%, then the resistance of armature is: [1]
 a) 16Ω b) 8Ω
 c) 12Ω d) 2Ω
59. Wheatstone Bridge is not suitable for measurement of [1]
 a) medium value resistances b) both very high value resistances and very low value resistances
 c) very high value resistances. d) very low value resistances.
60. If a wire of resistivity ρ is stretched to double its length, then its new resistivity will: [1]
 a) not change b) be double
 c) be 4 times d) be half

61. When a current of 0.2 A is drawn from a battery, then potential difference between its terminals is 20 V and when a current of 2 A is drawn, then the potential difference drops to 16 V. The emf of the battery is:

a) 18.9 V b) 20.4 V
c) 23.2 V d) 15.1 V

62. Electromotive force is

a) The number of charges pumped by the source from lower to higher potential energy
b) The work done by the source in taking the charge from lower to higher potential energy
c) The work done per unit charge by the source in taking the charge from lower to higher potential energy
d) The work done per unit charge by the source in taking the charge from higher to lower potential energy

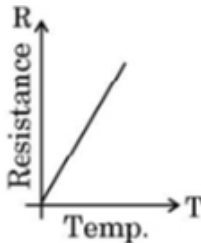
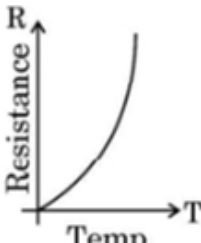
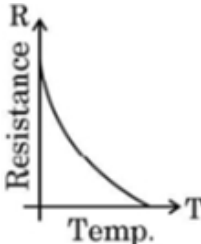
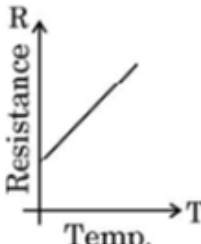
63. In a Wheatstone's bridge, P = 9 ohms, Q = 11 ohms, R = 4 ohms and S = 6 ohms. How much resistance must be put in parallel to the resistance S to balance the wheatstone bridge?

a) 24 ohms b) 18.7 ohms
c) 26.4 ohms d) 4.89 ohms

64. When no current is passed through a conductor:

a) the average speed of a free-electron over a large period of time is not zero
b) the average of the velocities of all the free electrons at an instant is non-zero
c) the free electrons do not move
d) the average velocity of a free electron over a large period of time is zero

65. For a metallic conductor, the correct representation of variation of resistance R with temperature T is:

a)  b) 
c)  d) 

66. Two similar head lamps are connected in parallel to each other. Together, they consume 48 W from a 6 V battery, the resistance of each filament is:

a) 4Ω b) 6Ω
c) 3Ω d) 1.5Ω

67. A steady current of 8 mA flows through a wire. The number of electrons passing through a cross-section of the wire in 10 s is

a) 1.6×10^{18} b) 1.6×10^{17}
c) 1.6×10^{16} d) 1.6×10^{15}

$$5.0 \times 10^{17}$$

$$1.6 \times 10^{16}$$

c) 4.0×10^{16}

d) 1.0×10^{17}

68. Kirchhoff's first rule at a junction in an electrical network, deals with conservation of [1]

a) energy

b) momentum

c) both energy and charge

d) charge

69. The emf and internal resistance of a cell are E and r respectively. It is connected across an external resistance $R = 2r$. The potential drop across the terminals of the cell will be: [1]

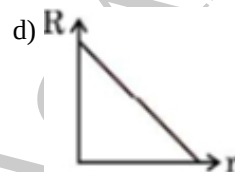
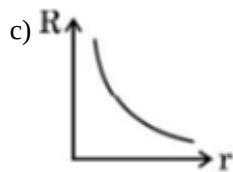
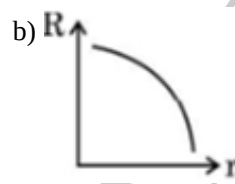
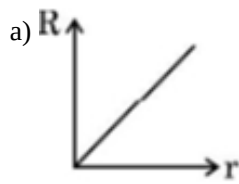
a) $\frac{E}{3}$

b) $\frac{E}{4}$

c) $\frac{2}{3}E$

d) $\frac{E}{2}$

70. The correct graph showing the variation of the resistance (R) of a cylindrical metal wire as a function of its radius (r), keeping its length and temperature constant, is: [1]



71. The electric power consumed by a 220 V - 100 W bulb when operated at 110 V is [1]

a) 30 W

b) 25 W

c) 45 W

d) 35 W

72. Pieces of copper and of silicon are initially at room temperature. Both are heated to temperature T . The conductivity of [1]

a) both increases.

b) copper increases and silicon decreases.

c) copper decreases and silicon increases.

d) both decreases.

73. If two identical cells, when connected in series or in parallel, supply the same amount of current through an external resistance of 2Ω . The internal resistance of each cell is: [1]

a) 1Ω

b) 4Ω

c) 8Ω

d) 2Ω

74. The masses of two cylindrical wires of copper are in the ratio of $1 : 3$ and their lengths are in the ratio of $5 : 3$. The ratio of their resistances will be: [1]

a) $2 : 5$

b) $1 : 5$

c) $2 : 3$

d) $3 : 5$

75. A battery of emf E and internal resistance r is connected to an external circuit. The potential drop within the battery is proportional to: [1]

a) power dissipated in the circuit

b) current in the circuit

c) emf of the battery

d) total resistance of the circuit

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