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For Class 9 Mathematics	Click here
For Class 10 Science	Click here
For Class 10 Mathematics	Click here
For Class 11 Physics	Click here
For Class 11 Chemistry	Click here
For Class 11 Biology	Click here
For Class 11 mathematics	Click here
For Class 12 Physics	Click here
For Class 12 Chemistry	Click here
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C. U. Q

ELECTRIC CURRENT AND DRIFT VELOCITY

1. If n, e, τ, m, are representing electron density, charge, relaxation time and mass of an electron respectively then the resistance of wire of length l and cross sectional area A is given by

1) $\frac{ml}{ne^2\tau A}$ 2) $\frac{2mA}{ne^2\tau}$ 3) $ne^2\tau A$ 4) $\frac{ne^2\tau A}{2m}$

2. Among the following dependences of drift velocity v_d on electric field E, Ohm's Law obeyed is

1) $v_d \alpha E$ 2) $v_d \alpha E^2$

3) $v_d \alpha \sqrt{E}$ 4) v_d = constant

3. A steady current is passing through a linear conductor of nonuniform cross-section. The net quantity of charge crossing any cross section per second is

1) independent of area of cross-section

2) directly proportional to the length of the conductor

3) directly proportional to the area of cross section.

4) inversely proportional to the area of the conductor

4. Given a current carrying wire of non-uniform cross section. Which of the following quantity or quantities are constant throughout the length of the wire?

1) current, electric field and drift speed

2) drift speed only

3) current and drift speed

4) current only

5. When electric field ($\vec{E}$) is applied on the ends of a conductor, the free electrons starts moving in direction

1) similar to $\vec{E}$ 2) Opposite to $\vec{E}$

3) Perpendicular to $\vec{E}$ 4) Cannot be predicted

6. The drift speed of an electron in a metal is of the order of

1) 10^{-13} m/s 2) 10^{-3} mm/s

3) 10^{-4} m/s 4) 10^{-30} m/s

7. In metals and vacuum tubes charge carriers are

1) electrons 2) protons

3) both 4) positrons

8. The electric intensity E, current density j and conductivity σ are related as :

1) $j = \sigma E$ 2) $j = E/\sigma$ 3) $jE = \sigma$ 4) $j = \sigma^2 E$

9. Electric field (E) and current density (J) have relation

1) $E \propto J^{-1}$ 2) $E \propto J$ 3) $E \propto \frac{1}{J^2}$ 4) $E^2 \propto \frac{1}{J}$

10. Assertion : A current flows in a conductor only when there is an electric field within the conductor.
Reason : The drift velocity of electron in presence of electric field decreases.

1) Both (A) and (R) are true and (R) is the correct explanation of A.
2) Both (A) and (R) are true but (R) is not the correct explanation of A.
3) (A) is true but (R) is false
4) (A) is false but (R) is true

OHM'S LAW & FACTORS EFFECTING RESISTANCE

11. In an electric circuit containg a battery, the charge (assumed positive) inside the battery

1) always goes form the positive terminal to the negative terminal
2) may move from the positive terminal to the negative terminal
3) always goes from the negative terminal to the positive terminal
4) does not move .

12. From the following the quantity which is analogous to temperature in electricity is

1) potential 2) resistance
3) current 4) charge

13. The flow of the electric current through a metallic conductor is

1) only due to electrons
2) only due to +ve charges
3) due to both nuclei and electrons.
4) can not be predicted.

14. For making standard resistance, wire of following material is used

1) Nichrome 2) Copper
3) Silver 4) manganin

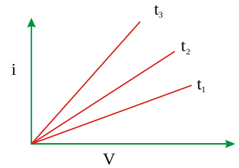
15. Material used for heating coils is

1) Nichrome 2) Copper
3) Silver 4) Manganin

16. A piece of silver and another of silicon are heated from room temperature. The resistance of

1) each of them increases
2) each of them decreases
3) Silver increases and Silicon decreases
4) Silver decreases and Silicon increases

17. i-v graph for a metal at temperatures t_1, t_2, t_3 are as shown. The highest temperature is



1) t_1 2) t_2 3) t_3 4) $t_1 = t_2 = t_3$

18. A certain piece of copper is to be shaped into a conductor of minimum resistance. Its length and cross sectional area should be

1) L and A 2) 2L and A/2
3) L/2 and 2A 4) 3L and A/3

19. When light falls on semiconductors, their resistance

1) decreases 2) increases
3) does not change 4) can't be predicted

20. With the increase of temperature, the ratio of conductivity to resistivity of a metal conductor

1) Decreases 2) Remains same
3) Increases 4) May increase or decrease

21. The conductivity of a super conductor, in the super conducting state is

1) Zero 2) Infinity
3) Depends on temp
4) Depends on free election

22. When a piece of aluminium wire of finite length is drawn through a series of dies to reduce its diameter to half its original value, **its resistance will become**

1) Two times 2) Four times
3) Eight times 4) Sixteen times

23. Metals have

1) Zero resistivity 2) High resistivity
3) Low resistivity 4) Infinite resistivity

24. Consider a rectangular slab of length L, and area of cross-section A. A current I is passed through it, if the length is doubled the potential drop across the end faces

1) Becomes half of the initial value
2) Becomes one-forth of the initial value
3) Becomes double the initial value
4) Remains Same

25. A metallic block has no potential difference applied across it, then the mean velocity of free electrons is (T = absolute temperature of the block)

1) Proportional to T 2) Proportional to $\sqrt{T}$
3) Zero
4) Finite but independent of temperature.

26. The resistance of a metal increases with increasing temperature because

1) The collisions of the conducting electrons with the electrons increases.

2) The collisions of the conducting electrons with the lattice consisting of the ions of the metal increases

3) The number of the conduction electrons decreases.

4) The number of conduction electrons increase.

27. In the absence of applied potential, the electric current flowing through a metallic wire is zero because

1) The average velocity of electron is zero

2) The electrons are drifted in random direction with a speed of the order of 10^{-2}cm/s.

3) The electrons move in random direction with a speed of the order close to that of velocity of light.

4) Electrons and ions move in opposite direction.

28. A long constan wire is connected across the terminals of an ideal battery. if the wire is cut in to two equal pieces and one of them is now connected to the same battery, what will be the mobility of free electrons now in the wire compared to that in the first case?

1) same as that of previous value

2) double that of previous value

3) half that of previous value

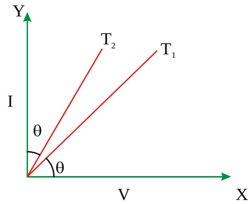
4) four times that of previous value

29. Ohm's law is not applicable for

1) insulators 2) semi conductors

3) vaccum tube 4) all the above

30. V - I graphs for two materials is shown in the figure. The graphs are drawn at two different temperatures.



1) $T_1 - T_2 \propto \cot 2\theta$ 2) $T_1 - T_2 \propto \sin 2\theta$

3) $T_1 - T_2 \propto \tan 2\theta$ 4) $T_1 - T_2 \propto \cos 2\theta$

31. Wires of Nichrome and Copper of equal dimensions are connected in series in electrical circuit. Then

1) More current will flow in copper wire

2) More current will flow in Nichrome wire

3) Copper wire will get heated more

4) Nichrome wire will get heated more

32. At absolute zero silver wire behaves as

1) Super conductor 2) Semi conductor

3) Perfect insulator 4) Semi insulator

33. Fuse wire is a wire of

1) low melting point and low value of α

2) high melting pointand high value of α

3) high melting point and low value of α

4) low melting point and high value of α

34. Assertion : Material used in the construction of a standard resistance is constantan or manganin.

Reason : Temperature coefficient of constantan is very small.

1) Both (A) and (R) are true and (R) is the correct explanation of A.

2) Both (A) and (R) are true but (R) is not the correct explanation of A.

3) (A) is true but (R) is false

4) (A) is false but (R) is true

35. Assertion (A) : Bending of a conducting wire effects electrical resistance.

Reason (R) : Resistance of a wire depends on resistivity of that material.

1) Both (A) and (R) are true and (R) is the correct explanation of A.

2) Both (A) and (R) are true but (R) is not the correct explanation of A.

3) (A) is true but (R) is false

4) (A) is false but (R) is true

36. Assertion (A) : When the radius of a copper wire is doubled, its specific resistance gets increased.

Reason (R):Specific resistance is independent of cross-section of material used

1) Both (A) and (R) are true and (R) is the correct explanation of A.

2) Both (A) and (R) are true but (R) is not the correct explanation of A.

3) (A) is true but (R) is false

4) (A) is false but (R) is true

THERMISTOR

37. The thermistors are usually made of

1) metals with low temperature coefficient of resistivity

2) metals with high temperature coefficient of resistivity.

3) metal oxides with high temperature coefficient of resistivity

4) semiconducting materials having low temperature coefficient of resistivity

38. For a chosen non-zero value of voltage, there can be more than one value of current in

1) copper wire 2) thermistor

3) zener diode 4) manganin wire

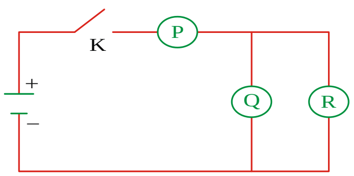
ELECTRIC POWER

39. **A heater coil is cut into two equal parts and only one part is used in the heater. Then the heat generated becomes**
1) become one fourth 2) halved
3) doubled4) become four times

40. **Two lamps have resistance r and R, R being greater than r. If they are connected in parallel in an electric circuit, then**
1) the lamp with resistance R will shine more brightly
2) the lamp with resistance r will shine more brightly
3) the two lamps will shine equal brightly
4) the lamp with resistance R will not shine at all

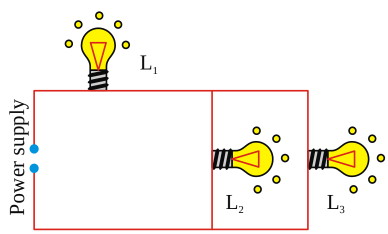
41. **Two bulbs are fitted in a room in the domestic electric installation. If one of them glows brighter than the other, then**
1) the brighter bulb has smaller resistance
2) the brighter bulb has larger resistance
3) both the bulbs have the same resistance
4) nothing can be said about the resistance unless other factors are known

42. **Three identical bulbs P, Q and R are connected to a battery as shown in the figure. When the circuit is closed**



1) Q and R will be brighter than P
2) Q and R will be dimmer than P
3) All the bulbs will be equally bright
4) Q and R will not shine at all

43. **Figure shows three similar lamps L_1, L_2, L_3 connected across a power supply. If the lamp L_3 fuses. The light emitted by L_1 and L_2 will change as**



1) no change
2) brilliance of L_1 decreases and that of L_2 increases
3) brilliance of both L_1 and L_2 increases
4) brilliance of both L_1 and L_2 decreases

44. **The potential difference across a conductor is doubled, the rate of generation of heat will**
1) become one fourth 2) be halved
3) be doubledtimes 4) become four times

45. **Two metallic wires of same material and same length have different diameters. When the wires are connected in parallel across an ideal battery the rate of heat produced in thinner wire is Q_1 and that in thicker wire is Q_2. The correct statement is**
1) $Q_1 = Q_2$ 2) $Q_1 < Q_2$ 3) $Q_1 > Q_2$
4) It will depend on the emf of the battery

46. **There are two metalic wires of same material, same length but of different radii. When these are connected to an ideal battery in series, heat produced is H_1 but when connected in parallel, heat produced is H_2 for the same time. Then the correct statement is**
1) $H_1 = H_2$ 2) $H_1 < H_2$
3) $H_1 > H_2$ 4) No relation

47. **Two electric bulbs rated P_1 watt and V volt , are connected in series, across V-volt supply. The total power consumed is**
1) $\frac{P_1+P_2}{2}$ 2) $\sqrt{P_1 \cdot P_2}$ 3) $\frac{P_1 \cdot P_2}{P_1+P_2}$ 4) (P_1+P_2)

48. **In above question, if the bulbs are connected in parallel, total power consumed is**
1) $\frac{P_1+P_2}{2}$ 2) $\sqrt{P_1 \cdot P_2}$ 3) $\frac{P_1 \cdot P_2}{P_1+P_2}$ 4) (P_1+P_2)

49. **Which of the following causes production of heat, when current is set up in a wire**
1) Fall of electron from higher orbits to lower orbits
2)Inter atomic collisions
3)Inter electron collisions
4)Collisions of conduction electrons with atoms

50. **A constant voltage is applied between the two ends of a metallic wire. If both the length and the radius of the wire are doubled, the rate of heat developed in the wire**
1) will be doubled 2) will be halved
3) will remain the same 4) will be quadrupled

51. **A resistor R_1 dissipates the power P when connected to a certain generator. If the resistor R_2 is put in series with R_1, the power dissipated by R_1**
1) Decreases 2) Increases
3) Remains the same
4) Any of the above depending upon the relative values of R_1 and R_2

CELL-INTERNAL RESISTANCE EMF

52. Back emf of a cell is due to
1) Electrolytic polarization
2) Peltier effect
3) Magnetic effect of current
4) Internal resistance

53. The direction of current in a cell is
1) $(-)$ ve pole to $(+)$ ve pole during discharging
2) $(+)$ ve pole to $(-)$ ve pole during discharging
3) Always $(-)$ ve pole to $(+)$ ve pole
4) always flows from (+)ve ploe to (-) ve pole

54. When an electric cell drives current through load resistance, its Back emf,
1) Supports the original emf
2) Opposes the original emf
3) Supports if internal resistance is low
4) Opposes if load resistance is large

55. The terminal voltage of a cell is greater than its emf. when it is
1) being charged 2) an open circuit
3) being discharged 4) it never happens

56. What is constant in a battery (also called a source of emf) ?
1) current supplied by it
2) terminal potential difference
3) internal resistance
4) emf

57. From the following the standard cell is
1) Daniel cell 2) Cadmium cell
3) Leclanche cell 4) Lead accumulator

58. A cell is to convert
1) chemical energy into electrical energy
2) electrical energy into chemical energy
3) heat energy into potential energy
4) potential energy into heat energy

59. 'n' identical cells, each of internal resistance (r) are first connected in parallel and then connected in series across a resistance (R). If the current through R is the same in both cases, then
1) R = r/2 2) r = R/2 3) R = r 4) r = 0

60. The value of internal resistance of ideal cell is
1) Zero 2) infinite 3) 1 Ω 4) 2 Ω

61. In a circuit two or more cells of the same emf are connected in parallel in order
1) Increases the pd across a resistance in the circuit
2) Decreases pd across a resistance in the circuit
3) Facilitate drawing more current from the battery system
4) Change the emf across the system of batteries

62. The resistance of an open circuit is
1) Infinity 2) Zero
3) Negative 4) cann't be predicted

63. According to joule's law if potential difference across a conductor having a material of specific resistance ρ, remains constant, then heat produced in the conductor is directly proportional to
1) ρ 2) ρ^2 3) $\frac{1}{\sqrt{\rho}}$ 4) $\frac{1}{\rho}$

64. Internal resistance of a cell depends on
1) concentration of electrolyte
2) distance between the electrodes
3) area of electrode
4) all the above

65. When cells are arranged in series
1) the current capacity decreases
2) The current capacity increases
3) the emf increases 4) the emf decreases

66. To supply maximum current, cells should be arrange in
1) series 2) parallel 3) Mixed grouping
4) depends on the internal and external resistance

67. The terminal Pd of a cell is equal to its emf if
1) external resistance is infinity
2) internal resistance is zero
3) both 1 and 2
4) internal resistance is 5Ω

68. The electric power transfered by a cell to an external resistance is maximum when the external resistance is equal to ...(r internal resistance)
1) $\frac{r}{2}$ 2) 2r 3) r 4) r^2

69. Which depolarizers are used to neutralizes hydrogen layer in cells
1) Potassium dichromite 2) Manganese dioxide
3) 1 or 2 4) hydrogen peroxide

70. Assertion : Series combination of cells is used when their internal resitance is much smaller than the external resistance.

Reason : $I = \frac{n\varepsilon}{R + nr}$ **where the symbols have their standard meaning,in series connection**
1) Both (A) and (R) are true and (R) is the correct explanation of A.
2) Both (A) and (R) are true but (R) is not the correct explanation of A.
3) (A) is true but (R) is false
4) (A) is false but (R) is true

71. Assertion (A) : To draw more current at low P.d; parallel connection of cells is preferred.
Reason (R) : In parallel connection, current $i=\frac{nE}{r}$, if r >> R.
1) Both (A) and (R) are true and (R) is the correct explanation of A.
2) Both (A) and (R) are true but (R) is not the correct explanation of A.
3) (A) is true but (R) is false
4) (A) is false but (R) is true

KIRCHHOFF'S LAWS
WHEATSTONE BRIDGE

72. Kirchoff's law of meshes is in accordance with law of conservation of
1) charge 2) current
3) energy 4) angular momentum

73. Kirchoff's law of junctions is also called the law of conservation of
1) energy 2) charge
3) momentum 4) angular momentum

74. Wheatstones's bridge cannot be used for measurement of very ——— resistances.
1) high 2) low 3) low(or) high 4) zero

75. In a balanced Wheatstone's network, the resistances in the arms Q and S are interchanged. As a result of this :
1)galvanometer and the cell must be interchanged to balance
2) galvanometer shows zero deflection
3) network is not balanced
4) network is still balanced

76. If galvanometer and battery are interchanged in balanced wheatstone bridge, then
1) the battery discharges
2) the bridge still balances
3) the balance point is changed
4) the galvanometer is damaged due to flow of high current

77. Wheatstone bridge can be used
1) To compare two unknown resistances.
2) to measure small strains produced in hardmetals
3) as the working principle of meterbridge
4) All the above

78. In a wheatstone's bridge three resistances P,Q,R connected in three arms and the fourth arm is formed by two resitances S_1,S_2 connected in parallel.The condition for bridge to be balanced will be
1) $\frac{P}{Q}=\frac{R}{S_1+S_2}$ 2) $\frac{P}{Q}=\frac{2R}{S_1+S_2}$
3) $\frac{P}{Q}=\frac{R(S_1+S_2)}{S_1S_2}$ 4) $\frac{P}{Q}=\frac{R(S_1+S_2)}{2S_1S_2}$

79. Assertion : At any junction of a network, algebraic sum of various currents is zero
Reason : At steady state there is no accumulation of charge at the junction.
1) Both (A) and (R) are true and (R) is the correct explanation of A.
2) Both (A) and (R) are true but (R) is not the correct explanation of A.
3) (A) is true but (R) is false
4) (A) is false but (R) is true

METERBRIDGE

80. Metal wire is connected in the left gap, semi conductor is connected in the right gap of meter bridge and balancing point is found. Both are heated so that change of resistances in them are same. Then the balancing point
1) will not shift
2) shifts towards left
3) shifts towards right
4) depends on rise of temperature

81. A metre bridge is balanced with known resistance in the right gap and a metal wire in the left gap. If the metal wire is heated the balance point.
1) shifts towards left
2) shifts towards right
3) does not change
4) may shift towards left or right depending on the nature of the metal.

82. In metre bridge experiment of resistances, the known and unknown resistances are interchanged . The error so removed is
1) end correction
2) index error
3) due to temperature effect
4) random error

83. In a metre-bridge experiment, when the resistances in the gaps are interchanged, the balance-point did not shift at all. The ratio of resistances must be

1) Very large 2) Very small
3) Equal to unity 4) zero

84. Assertion (A) : Meterbridge wire is made up of manganin

Reason (R) : The temperature coeffecient of resistance is very small for manganin

1) Both (A) and (R) are true and (R) is the correct explanation of A.
2) Both (A) and (R) are true but (R) is not the correct explanation of A.
3) (A) is true but (R) is false
4) (A) is false but (R) is true

POTENTIOMETER

85. A potentiometer is superior to voltmeter for measuring a potential because

1) voltmeter has high resistance
2) resistance of potentiometer wire is quite low
3) potentiometer does not draw any current from the unknown source of emf. to be measured.
4) sensitivity of potentiometer is higher than that of a voltmeter.

86. In comparing emf's of 2 cells with the help of potentiometer, at the balance point, the current flowing through the wire is taken from

1) Any one of these cells.
2) both of these cells
3) Battery in the primary circuit
4) From an unknown source

87. A potentiometer wire is connected across the ideal battery now, the radius of potentiometer wire is doubled without changing its length. The value of potential gradient

1) increases 4 times 2) increases two times
3) Does not change 4) becomes half

88. In a potentiometer of ten wires, the balance point is obtained on the sixth wire. To shift the balance point to eighth wire, we should

1) increase resistance in the primary circuit.
2) decrease resistance in the primary circuit.
3) decrease resistance in series with the cell whose emf. has to be measured.
4) increase resistance in series with the cell whose emf. has to be measured.

89. If the emf of the cell in the primary circuit is doubled, with out changing the cell in the secondary circuit, the balancing length is

1) Doubled 2) Halved
3) Uncharged 4) Zero

90. The potential gradients on the potentiometer wire are V_1 and V_2 with an ideal cell and a real cell of same emf in the primary circuit then

1) $V_1 = V_2$ 2) $V_1 > V_2$ 3) $V_1 < V_2$ 4) $V_1 \leq V_2$

91. If the current in the primary circuit is decreased, then balancing length is obtained at

1) Lower length 2) Higher length
3) Same length 4) 1/3rd length

92. Temperature coefficient of resistance 'α' and resistivity 'ρ' of a potentiometer wire must be

1) high and low 2) low and high
3) low and low 4) high and high

93. A series high resistance is preferable than shunt resistance in the galvanometer circuit of potentiometer. Because

1) shunt resistances are costly
2) shunt resistance damages the galvanometer
3) series resistance reduces the current through galvanometer in an unbalanced circuit
4) high resistances are easily available

94. The sensitivity of potentiometer wire can be increased by

1) decreasing the length of potentiometer wire
2) increasing potential gradient on its wire
3) increasing emf of battery in the primary circuit
4) decreasing the potential gradient on its wire

95. A cell of emf 'E' and internal resistance 'r' connected in the secondary gets balanced against length 'ℓ' of potentiometer wire. If a resistance 'R' is connected in parallel with the cell, then the new balancing length for the cell will be

1) $\left(\frac{R}{R-r}\right)l$ 2) $\left(\frac{R-r}{R}\right)l$ 3) $\left(\frac{R}{r}\right)$ 4) $\left(\frac{R}{R+r}\right)l$

96. Potentiometer is an ideal instrument, because

1) no current is drawn from the source of unknown emf

2) current is drawn from the source of unknown emf

3) it gives deflection even at null point

4) it has variable potential gradient

97. On increasing the resistance of the primary circuit of potentiometer, its potential gradient will

1) become more 2) become less

3) not change 4) become infinite

98. If the value of potential gradient on potentiometer wire is decreased, then the new null point will be obtained at

1) lower length 2) higher length

3) same length 4) nothing can be said

99. A cell of negligible internal resistance is connected to a potentiometer wire and potential gradient is found. Keeping the length as constant, if the radius of potentiometer wire is increased four times, the potential gradient will become (no series resistance in primary)

1) 4 times 2) 2 times 3) half 4) constant

100. For the working of potentiometer, the emf of cell in the primary circuit (E) compared to the emf of the cell in the secondary circuit (E^1) is

1) $E > E^1$ 2) $E < E^1$

3) Both the above 4) $E = E^1$

101. The balancing lengths of potentiometer wire are l_1 and l_2 when two cells of emf E_1 and E_2 are connected in the secondary circuit in series first to help each other and next to oppose each other $\frac{E_1}{E_2}$ is equal to ($E_1 > E_2$).

1) $\frac{l_1}{l_2}$ 2) $\frac{l_1 - l_2}{l_1 + l_2}$ 3) $\frac{l_1 + l_2}{l_1 - l_2}$ 4) $\frac{l_2}{l_1}$

102. At the moment when the potentiometer is balanced,

1) Current flows only in the primary circuit

2) Current flows only in the secondary circuit

3) Current flows both in primary and secondary circuits

4) current does not flow in any circuit

103. The quantity that cannot be measured by a potentiometer is ....

1) Resistance 2) emf

3) current in the wire 4) Inductance

104. Assertion : Potentiometer is much better than a voltmeter for measuring emf of cell

Reason : A potentiometer draws no current while measuring emf of a cell

1) Both (A) and (R) are true and (R) is the correct explanation of A.

2) Both (A) and (R) are true but (R) is not the correct explanation of A.

3) (A) is true but (R) is false

4) (A) is false but (R) is true

105. A : The emf of the cell in secondary circuit must be less than emf of cell in primary circuit in potentiometer.

R : Balancing length cannot be more than length of potentiometer wire.

1) Both (A) and (R) are true and (R) is the correct explanation of A.

2) Both (A) and (R) are true but (R) is not the correct explanation of A.

3) (A) is true but (R) is false

4) (A) is false but (R) is true

C. U. Q KEY

1) 1	2) 1	3) 1	4) 4	5) 2	6) 3
7) 1	8) 1	9) 2	10) 3	11) 2	12) 1
13) 1	14) 4	15) 1	16) 3	17) 1	18) 3
19) 1	20) 1	21) 2	22) 4	23) 1	24) 3
25) 3	26) 2	27) 1	28) 1	29) 4	30) 1
31) 4	32) 1	33) 4	34) 1	35) 2	36) 4
37) 3	38) 2	39) 3	40) 2	41) 1	42) 2
43) 2	44) 4	45) 2	46) 2	47) 3	48) 4
49) 4	50) 1	51) 1	52) 1	53) 1	54) 2
55) 1	56) 4	57) 2	58) 1	59) 3	60) 1
61) 3	62) 1	63) 4	64) 4	65) 3	66) 4
67) 3	68) 3	69) 3	70) 1	71) 1	72) 3
73) 2	74) 2	75) 3	76) 2	77) 4	78) 3
79) 1	80) 3	81) 2	82) 1	83) 3	84) 1
85) 3	86)3	87) 3	88) 1	89) 2	90) 2
91) 2	92) 2	93) 3	94) 4	95) 4	96) 1
97) 2	98) 2	99) 4	100)1	101)3	102) 1
103) 4	104) 1	105) 1			

LEVEL - I (C. W)

ELECTRIC CURRENT & DRIFT VELOCITY

1. **If the electron in a Hydrogen atom makes 6.25×10^{15} revolutions in one second, the current is**
1) 1.12 mA 2) 1 mA 3) 1.25 mA 4) 1.5 mA

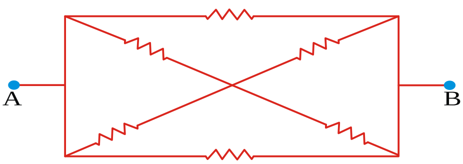
2. **The current through a wire connected to a condenser varies with time as $i=(2t+1)A$ The charge transport to the condenser from $t=0$ to $t=5s$ is**
1) 5C 2) 55C 3) 30C 4) 60C

3. **A copper wire of cross-sectional area 2.0 mm^2, resistivity = 1.7×10^{-8} Ωm, carries a current of 1 A. The electric field in the copper wire is**
1) 8.5×10^{-5} V/m 2) 8.5×10^{-4} V/m
3) 8.5×10^{-3} V/m 4) 8.5×10^{-2} V/m

OHM'S LAW AND COMBINATION OF RESISTANCES

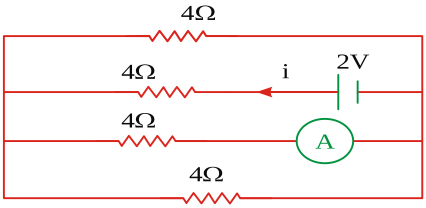
4. **Using three wires of resistances 1 ohm, 2ohm and 3 ohm, then no.of different values of resistances that possible are**
1) 6 2) 4 3) 10 4) 8

5. **Six resistances of each 12 ohm are connected as shown in the fig. The effective resistance between the terminals A and B is**



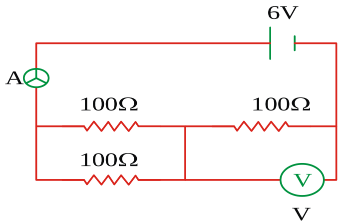
1) 8 Ω 2) 6 Ω 3) 4 Ω 4) 12 Ω

6. **Current 'i' coming from the battery and ammeter reading are**



1) $\frac{3}{8}A,\frac{1}{8}A$ 2) $\frac{1}{8}A,\frac{1}{8}A$
3) $2A,\frac{2}{3}A$ 4) $2A,\frac{1}{8}A$

7. **In the circuit shown, the reading of the voltmeter and the ammeter are**



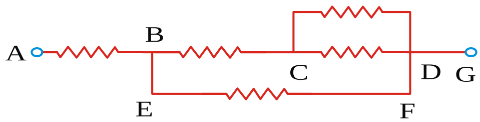
1)4V, 0.2A 2) 2V, 0.4A 3)3V, 0.6A 4)4V, 0.04A

8. **The resistance of a wire of 100 cm length is 10 Ω. Now, it is cut into 10 equal parts and all of them are twisted to form a single bundle. Its resistance is**
1) 1 Ω 2) 0.5 Ω 3) 5 Ω 4) 0.1 Ω

9. **A metallic wire of resistance 20 ohm stretched until its length is doubled. Its resistance is**
1) 20 Ω 2) 40 Ω 3) 80 Ω 4) 60 Ω

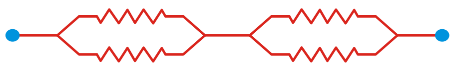
10. **A wire of resistance 20 Ω is bent in the form of a square. The resistance between the ends of diagonal is**
1) 10 Ω 2) 5 Ω 3) 20 Ω 4) 15 Ω

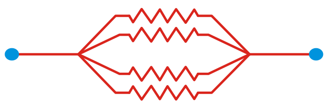
11. **Resistance of each 10 Ω are connected as shown in the fig. The effective resistance betweeen A and G is**

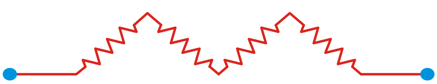


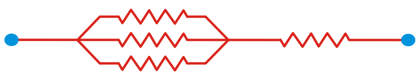
1) 16 Ω 2) 20 Ω 3) 12 Ω 4) 8 Ω

12. **Which arrangement of four identical resistances should be used to draw maximum energy from a cell of voltage V**

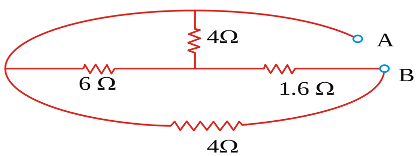
1) 

2) 

3) 

4) 

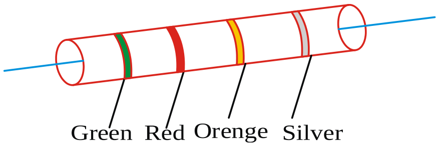
13. **If four resistances are connected as shown in the fig. between A and B the effective resistance is**



1) 4 Ω 2) 8 Ω 3) 2.4 Ω 4) 2 Ω

14. **A letter 'A' is constructed as a uniform wire of resistance 1 ohm/cm. The sides of the letter are 20 cm long and the cross piece in the middle is 10cm long while the vertex angle is 60^0. The resistance of the letter between the two ends of the legs is**
1) 40/3 Ω 2) 80/3 Ω 3) 40 Ω 4) 10 Ω

15. **Find the value of colour coded resistance shown is fig**



1) $520 \pm 10\%$ 2) $5200 \pm 1\%$
3) $52000 \pm 10\%$ 4) $52000 \pm 1\%$

16. **The resistance of a wire is 2 Ω. If it is drawn** in such a way that it experiences a **longitudinal strain 200%. Its new resistance is**
1) 4 Ω 2) 8 Ω 3) 16 Ω 4) 18 Ω

17. **'n' conducting wires of same dimensions but having resistivities 1, 2, 3,...n are connected in series. The equivalent resistivity of the combination is**
1) $\frac{n(n+1)}{2}$ 2) $\frac{n+1}{2}$ 3) $\frac{n+1}{2n}$ 4) $\frac{2n}{n+1}$

18. **An Aluminium (α = $4 \times 10^{-3} K^{-1}$) resistance R_1 and a carbon (α = $-0.5 \times 10^{-3} K^{-1}$) resistance R_2 are connected in series to have a resultant resistance of 36 Ω at all temperatures. The values of R_1 and R_2 in Ω respectively are :**
1) 32, 4 2) 16, 20 3) 4, 32 4) 20, 16

19. **The temperature coefficient of a wire is $0.00125°C^{-1}$. At 300 K its resistance is one ohm. The resistance of the wire will be 2 Ω at**
1) 1154 K 2) 1100 K 3) 1400 K 4) 1127 K

20. **The electrical resistance of a mercury column in a cylindrical container is 'R'. The mercury is poured into another cylindrical container with half the radius of cross-section. The resistance of the mercury column is**
1) R 2) 2R 3) 16R 4) 5R

21. **Four conductors of same resistance connected to form a square. If the resistance between diagonally opposite corners is 8 ohm, the resistance between any two adjacent corners is**
1) 32 ohm 2) 8 ohm 3) 1/6 ohm 4) 6 ohm

22. **The resistivity of a material is S ohm meter. The resistance between opposite faces of a solid cube of edge 10 cm is (in ohm)**
1) S/2 2) S/10 3) 100S 4) 10S

23. **Four wires made of same material have different lengths and radii, the wire having more resistance in the following case is**
1) $\ell = 100cm, r = 1mm$ 2) $\ell = 50cm, r = 2mm$
3) $\ell = 100cm, r = \frac{1}{2}mm$ 4) $\ell = 50cm, r = \frac{1}{2}mm$

24. **Two different wires have specific resistivities, lengths, area of cross-sections are in the raio 3:4, 2:9 and 8:27. Then the ratio of resistance of two wires is**
1) $\frac{16}{9}$ 2) $\frac{9}{16}$ 3) $\frac{8}{27}$ 4) $\frac{27}{8}$

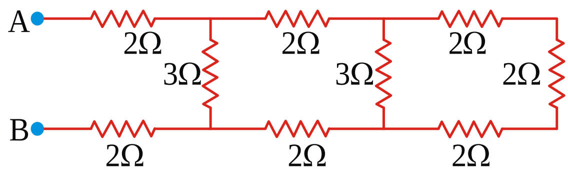
25. **Two wires made of same material have their length are in the ratio 1:2 and their masses in the ratio 3 : 16. The ratio of resistance of two wires is**
1) 3/4 2) 1:2 3) 2:1 4) 4:3

26. **A wire of resistance 18 ohm is drawn until its radius reduce $\frac{1}{2}$ th of its original radius then resistance of the wire is**
1) 188 Ω 2) 72 Ω 3) 288 Ω 4) 388 Ω

27. **A piece of wire of resistance 4 Ω is bent through 180^0 at its midpoint and the two halves are twisted together. Then the resistance is**
1) 8 Ω 2) 1 Ω 3) 2 Ω 4) 5 Ω

28. **If three wires of equal resistance are given then number of combinations they cany be made to give different resistance is**
1) 4 2) 3 3) 5 4) 2

29. **The effective resistance between A and B in the given circuit is**



1) 20 Ω 2) 7 Ω 3) 3 Ω 4) 6 Ω

30. **How many cells each marked $(6V - 12A)$ should be connected in mixed grouping so that it may be marked $(24V - 24A)$**
1) 4 2) 8 3) 12 4) 6

31. **The effective resistance in series combination of two equal resistance is 's'. When they are joined in parallel the total resistance is p. If s = np then the minimum possible value of 'n' is**
1) 4 2) 1 3) 2 4) 3

ELECTRIC POWER & JOULES LEW

32. A 25 watt, 220 volt bulb and a 100 watt, 220 volt bulb are connected in series across 440 volt line
1) only 100 watt bulb will fuse
2) only 25 watt bulb will fuse
3) none of the bulb will fuse
4) both bulbs will fuse

33. There are 5 tube-lights each of 40W in a house. These are used on an average for 5 hours per day. In addition, there is an immersion heater of 1500W used on an average for 1 hour per day. The number of units of electricity are consumed ina month is
1) 25 units 2) 50 units 3) 75 units 4) 100 units

34. Three equal resistors connected in series across a source emf together dissipate 10 watt. If the same resistors are connected in parallel across the same emf the power dissipate will be
1) 10 watt 2) 30 watt 3) 10/3 watt 4) 90 watt

35. Time taken by a 836 W heater to heat one litre of water from $10^0 C$ to $40^0 C$ is
1) 50 s 2) 100 s 3) 150 s 4) 200 s

36. A lamp of 600W-240V is connected to 220V mains. Its resistance is
1) 96 Ω 2) 84 Ω 3) 90 Ω 4) 64 Ω

37. A 200W - 200V lamp is connected to 250V mains. It power consumption is
1) 300 W 2) 312.5W 3) 292 W 4) 250 W

38. If the current in a heater increases by 10% , the percentage change in the power consumption
1) 19% 2) 21% 3) 25% 4) 17%

39. The power of a heating coil is P. It is cut into two equal parts. The power of one of them across same mains is
1) 2P 2) 3P 3) P/2 4) 4P

40. In a house there are four bulbs each of 50W and 5 fans each of 60W. If they are used at the rate of 6 hours a day, the electrical energy consumed in a month of 30 days is
1) 64 KWH 2)90.8KWH 3)72 KWH 4) 42 KWH

41. An electric kettle has two coils. When one coil is switched on it takes 15 minutes and the other takes 30 minutes to boil certain mass of water. The ratio of times taken by them, when connected in series and in parallel to boil the same mass of water is
1) 9 :2 2) 2:9 3) 4:5 4) 5:4

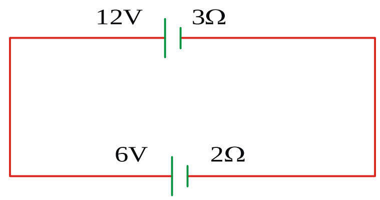
42. A resistance coil of 60Ω is immersed in 42kg of water. A current of 7A is passed through it. The rise in temperature of water per minute is
1) $4^0 C$ 2) $8^0 C$ 3) $13^0 C$ 4) $12^0 C$

43. What is the required resistance of the heater coil of an immersion heater that will increase the temperature of 1.50 kg of water from $10^0 C$ to $50^0 C$ in 10 minutes while operating at $240V$?
1) 25Ω 2) 12.5Ω 3) 250Ω 4) 137.2Ω

44. A $5^0 C$ rise in the temperature is observed in a conductor by passing some current. When the current is doubled, then rise in tem perature will be equal to
1) $5^0 C$ 2) $10^0 C$ 3) $20^0 C$ 4) $40^0 C$

CELLS AND COMBINATION OF CELLS

45. In the following diagram, the pd across 6V cell is



1) 6V 2) 5.6V 3) 8.2V 4) 8.4V

46. While connecting 6 cells in a battery in series, in a tape recorder, by mistake one cell is connected with reverse polarity. If the effective resistance of load is 24 ohm and internal resistance of each cell is one ohm and emf 1.5V, the current devlivered by the battery is
1) 0.1A 2) 0.2A 3) 0.3A 4) 0.4A

47. A 10m long wire of resistance 15 ohm is connected in series with a battery of emf 2V (no internal resistance) and a resistance of 5 ohm. The potential gradient along the wire is
1) 0.15 Vm^{-1} 2) 0.45V m^{-1}
3) 1.5Vm^{-1} 4)4.5Vm^{-1}

48. When a resistance of 2 ohm is placed across a battery the current is 1A and when the resistance across the terminals is 17 ohm, the current is 0.25A. the emf of the battery is
1) 4.5 V 2) 5 V 3) 3 V 4) 6 V

49. A battery has six cells in series. Each has an emf 1.5V and internal resistance 1 ohm. If an external load of 24Ω is connected to it. The potential drop across the load is
1) 7.2V 2) 0.3V 3) 6.8V 4) 0.4V

50. **12 cells of each emf 2V are connected in series among them, if 3 cells are connected wrongly. Then the effective emf. of the combination is**

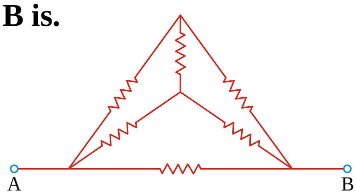
1) 18 V 2) 12 V 3) 24 V 4) 6 V

51. **When a battery connected across a resistor of 16Ω, the voltage across the resistor is 12V.When the same battery is connected across a resistor of 10Ω, voltage across it is 11V. The internal resistance of the battery in ohms is**

1) 10/7 2) 20/7 3) 25/7 4) 30/7

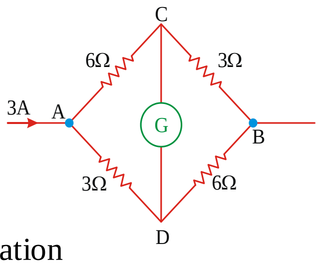
KIRCHOFF'S LAWS, WHEATSTONE BRIDGE

52. **Six resistors of each 2 ohm are connected as shown in the figure. The resultant resistance between A and B is.**



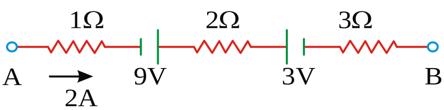
1) 4Ω 2) 2Ω 3) 1Ω 4) 10Ω

53. **In the given circuit current through the galvanometer is**



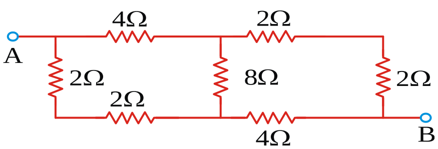
1) Zero
2) Flows from C to D
3) Flows from D to C
4) In sufficient information

54. **The potential difference between A & B in the given branch of a circuit is**



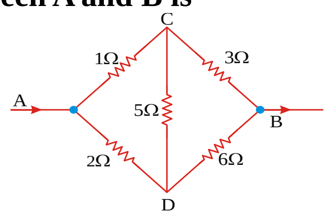
1) 6V 2) 12V 3) 9V 4) 0V

55. **The resistance between A and B is**



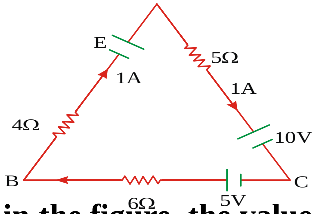
1) 8 Ω 2) 4Ω 3) 3.75Ω 4) 2Ω

56. **The resistance between A and B is**



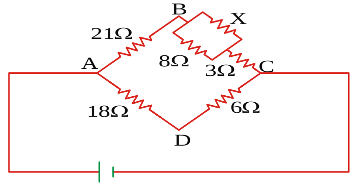
1) $\frac{288}{56}\Omega$ 2) 12Ω 3) $\frac{8}{3}\Omega$ 4) $\frac{9}{4}\Omega$

57. **The value of E of the given circuit is**



1) 10 V 2) 12 V 3) 14 V 4) 18 V

58. **In the circuit shown in the figure, the value of Resistance X, when potential difference between the poins B and D is zero will be**



1) 9 Ω 2) 8 Ω 3) 6 Ω 4) 4 Ω

METRE BRIDGE

59. **When an unknown resistance and a resistance of 4Ω are connected in the left and right gaps of a Meterbridge, the balance point is obtained at 50cm. The shift in the balance point if a 4Ω resistance is now connected in parallel to the resistance in the right gap is**

1) 66.7cm 2)16.7 cm 3) 34.6 cm 4) 14.6 cm

60. **In a meter bridge, the gaps are closed by resistances 2 and 3 ohms. The value of shunt to be added to 3 ohm resistor to shift the balancing point by 22.5 cm is**

1) 1Ω 2) 2Ω 3) 2.5Ω 4) 5Ω

61. **Two equal resistance are connected in the gaps of a metre bridge. If the resistance in the left gap is increased by 10%, the balancing point shift**

1) 10 % to right 2) 10% to left
3) 9.6% to right 4) 4.8% to right

POTENTIO METER

62. **A potentiometer having a wire of 4m length is connected to the terminals of a battery with a steady voltage. A leclanche cell has a null point at 1m. If the length of the potentiometer wire is increased by 1m, The position of the null point is**

1) 1.5m 2) 1.25m 3) 10.05m 4) 1.31m

63. **The emf of a battery A is balanced by a length of 80cm on a potentio meter wire. The emf of a standard cell 1v is balanced by 50cm. The emf of A is**

1) 2 V 2) 1.4 V 3) 1.5 V 4) 1.6 V

64. **When 6 identical cells of no internal resistance are connected in series in the secondary circuit of a potentio meter, the balancing length is 'l', balancing length becomes $l/3$ when some cells are connected wrongly, the number of cells conected wrongly are**

1) 1 2) 3 3) 2 4) 4

65. In a potentiometer experiment, the balancing length with a cell is 560cm. When an external resistance of 10ohms is connected in parallel to the cell the balancing length changs by 60cm. The internal resistance of the cell in ohm is

1) 3.6 2) 2.4 3) 1.2 4) 0.6

66. The resistivity of a potentio meter wire is, if the area of cross section of the wire is 4cm². The current flowing in the circuit is 1A, the poetntial gradient is 7.5 v/m

1) 3×10^{-3} Ω - m 2) 2×10^{-6} Ω - m
3) 4×10^{-6} Ω - m 4) 5×10^{-4} Ω - m

67. A potentiometer wire of 10m legngth and 20 Ohm resistance is connected in series with a resistance R ohms and a battery of emf 2V, negligible internal resistance, Potential gradient on the wire is 0.16 millivolt / centimetre then R is ...ohms

1) 50 Ω 2) 60 Ω 3) 230 Ω 4) 46 Ω

LEVEL -I (C. W) KEY

1) 2	2) 3	3) 3	4) 4	5) 3	6) 1
7) 4	8) 4	9)3	10) 2	11) 1	12) 2
13) 4	14) 2	15) 3	16) 4	17) 2	18) 3
19) 4	20) 3	21) 4	22) 4	23) 3	24) 2
25) 4	26) 3	27) 2	28) 1	29) 4	30) 1
31) 1	32) 2	33) 3	34) 4	35) 3	36) 1
37) 2	38) 2	39) 1	40) 2	41) 1	42) 3
43) 4	44) 3	45) 4	46) 2	47) 1	48) 2
49) 1	50) 2	51) 2	52) 3	53) 3	54) 1
55) 2	56) 3	57) 4	58) 2	59) 2	60) 2
61) 4	62) 2	63) 4	64) 3	65) 3	66) 1
67) 3					

LEVEL - I (C. W) - HINTS

1. i = qf
2. $q = \int_0^5 i\,dt$
3. $E = \dfrac{i\rho}{A}$
4. no of combinations $x = 2^n$
5. combination of resistors
6. combination of resistors
7. combination of resistors
8. $R_{eff} = \dfrac{R}{n^2}$
9. $R = \dfrac{\rho l}{A}$, $V = A.l$
10. $R^1 = \dfrac{20}{4} = 5$
   $R_1 = 10\Omega, R_2 = 10$; $R_P = \dfrac{10}{2} = 5$
11. Solving for effective resistence by series and parallel combination
12. combination of resistors
13. combination of resistors
14. combination of resistors
15. $R = 52 \times 10^3 \pm 10\%$
16. $R \propto l^2$
17. $R = R_1 + R_2 + ...R_n$
   $\dfrac{\rho(nl)}{A} = 1\dfrac{l}{A} + 2\dfrac{l}{A} + ... + n\dfrac{l}{A}$
   $\rho n = 1 + 2 + 3 + ... + n$
   $\rho n = \dfrac{n(n+1)}{2} = \dfrac{n+1}{2}$ S
18. $R_1\alpha_1 = R_2\alpha_2$ and $R_1 + R_2 = 36$ ohm.
19. $\alpha = \dfrac{R_2 - R_1}{R_1 t_2 - R_2 t_1}$
20. $R = \dfrac{\rho l}{A}$, $V = A.l$
21. Combination of resistors
22. $R = \dfrac{\rho l}{A}$
23. $R\alpha \dfrac{l}{r^2}$. Check the options
24. $R = \dfrac{\rho l}{A}$
25. $R \propto \dfrac{l^2}{m}$
26. $R \propto \dfrac{1}{r^4}$
27. $R^1 = \dfrac{R_1 R_2}{R_1 + R_2}$
28. 2^{n-1}
29. Combination of resistors
30. Number of rows $= \dfrac{\text{required current}}{\text{Given current}}$
   $= \dfrac{24A}{12A} = 2 = m$
   Number of cells in each row
   $= \dfrac{\text{requried potential}}{\text{Given potential}}$

$$=\frac{24}{6}=4=n$$

$\therefore$ Total no of cells $= n\times m$

$$=2\times 4=8$$

31. $R_S = n.R_P$

32. $R=\frac{V^2}{P};\ V=iR$

33. $P=\frac{E}{t}$, 1 K.W.H = 1 unit

34. $P=\frac{V^2}{R}\Rightarrow\frac{P_S}{P_P}=\frac{R_P}{R_S}$

35. $W=JQ\Rightarrow P\times t=Jms\Delta T$

36. $R=\frac{(V')^2}{P'}$

37. $P=\frac{V^2}{R}$

38. $P\propto i^2$

39. $P=\frac{V^2}{R}$; $R=\frac{\rho l}{A}$

40. 1 unit = $\frac{no.watts\times no.of\ hours}{1000}$

41. $t_s=t_1+t_2$; $t_p=\frac{t_1t_2}{t_1+t_2}$

42. $JQ=i^2Rt$, $mS\Delta t=i^2Rt$

43. use Joule's law

$Q=ms\Delta T\Rightarrow but\ Q=i^2RT\Rightarrow\Delta T\alpha i^2$

44. $\frac{\Delta t_1}{\Delta t_2}=\frac{i_1^2}{i_2^2}\Rightarrow\Delta t_2=20^\circ C$

45. $V=E+ir$

46. $i=\frac{(n-2m)E}{(R+nr)}$

47. Potential gradient = $\frac{E}{r+R+R_S}\times\frac{R}{L_P}$

$=\frac{2}{0+15+5}\times\frac{15}{10}=0.15$

48. $i=\frac{E}{R+r}$

49. $V=\left(\frac{nE}{R+nr}\right)R$

50. $E_{eq}=(N-2m)E$

51. $r=\left(\frac{E-V_1}{V_1}\right)R_1=\left(\frac{E-V_2}{V_2}\right)R_2$. Solve for E and substitute for r

52. to 56. Use K.V.L.

57. from K V L

58. $\frac{P}{Q}=\frac{R}{S}$

59. $\frac{x}{y}=\frac{50}{50}$ ---- (1) ; $\frac{4}{2}=\frac{l}{(100-l)}$ ----- (2)

$l-50=16.7$

60. $\frac{2}{3}=\frac{l}{100-l}\Rightarrow l=40\ cm$; $\frac{\frac{2}{3r}}{3+r}=\frac{62.5}{100-62.5}$

61. $\frac{X}{R}=\frac{l}{100-l}$

62. $l\alpha L\Rightarrow\frac{l_1}{l_2}=\frac{L_1}{L_2}$

63. v = $i\rho l$

64. $E'=(n-2m)E$

65. $r=R\left[\frac{\ell_1-l_2}{\ell_2}\right]$

66. $P.G=\frac{iR}{l}$; Resistivity $\rho=\frac{RA}{L}$

67. $v=i\rho l$

LEVEL - I (H. W)

ELECTRIC CURRENT & DRIFT VELOCITY

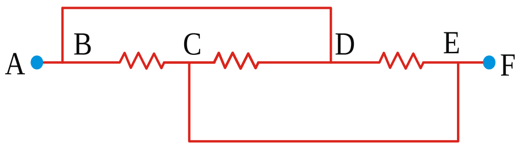
1. **The current passing through a conductor is 5 ampere. The charge that passes through that conductor in 5 minute is**
   1) 1200C 2) 300 C 3) 1000C 4)1500C
2. **In a hydrogen atom, an electron is revolving with an angular frequency 6.28 rad/s around the nucleus. Then the equivalent electric current is ..... $\times 10^{-19}$ A**
   1) 0.16 2) 1.6 3) 0.016 4) 16
3. **A current of 1.6 A is flowing in a conductor. The number of electrons flowing per second through the conductor is**
   1) 10^9 2) 10^{19} 3) 10^{16} 4) 10^{31}
4. **If an electron revolves in the circular path of radius 0.5A^0 at a frequency of 5 x 10^{15} cycles/sec. The equivalent electric current is**
   1) 0.4 mA 2) 0.8 mA 3) 1.2 mA 4) 1.6 mA

5. A current flows in a wire of circular cross section with the free electrons travelling with drift velocity $\vec{V}$. If an equal current flows in a wire of twice the radius, new drift velocity is

1) $\vec{V}$ 2) $\frac{\vec{V}}{2}$ 3) $\frac{\vec{V}}{4}$ 4) $2\vec{V}$

OHM'S LAW AND COMBINATION OF RESISTANCES

6. Three resistances each of 3 Ω are connected as shown in fig. The resultant resistance between A and F is



1) 9 Ω 2) 2 Ω 3) 4 Ω 4) 1 Ω

7. Two wires made of same material have lengths in the ratio 1 : 2 and their volumes in the same ratio. The ratio of their resistances is
1) 4 : 1 2) 2 : 1 3) 1 : 2 4) 1 : 4

8. Two wires made of same material have their electrical resistances in the ratio 1 : 4. If their lengths are in the ratio 1 : 2, the ratio of their masses is
1) 1: 1 2) 1 : 8 3) 8 : 1 4) 2 : 1

9. There are five equal resistors. The minimum resistance possible by their combination is 2 ohm. The maximum possible resistance we can make with them is
1) 25 ohm 2) 50 ohm 3) 100 ohm 4) 150 ohm

10. 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 4/3 and 2/3, then the ratio of the currents passing through the wires will be
1) 3 2) 1/3 3) 8/9 4) 2

11. A current of 1 A is passed through two resistances 1 Ω and 2 Ω connected in parallel. The current flowing through 2 Ω resistor will be
1) 1/3 A 2) 1 A 3) 2/3 A 4) 3 A

12. The colour coded resistance of corbon resistance is (Initial three bands are red and fourth band is silver)
1) $222.\Omega \pm 10\%$ 2) $2200\Omega \pm 10\%$
3) $333\Omega \pm 5\%$ 4) $33000\Omega \pm 10\%$

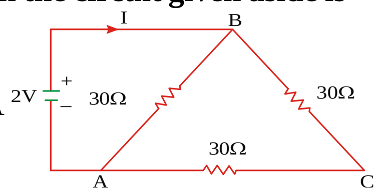
13. The resistance of a wire is 10 ohm. The resistance of a wire whose length is twice and the radius is half, if it is made of same material is
1) 20 Ω 2) 5 Ω 3) 80 Ω 4) 40 Ω

14. The resultant resistance of two resistors when connected in series is 48 ohm. The ratio of their resistances is 3 : 1. The value of each resistance is
1) 20 Ω, 28 Ω 2) 32 Ω, 16 Ω
3) 36 Ω, 12 Ω 4) 24 Ω, 24 Ω

15. The resistance of a bulb filament is 100Ω at a temperature of 100^0C. If its temperature coefficient of resistance be 0.005 per ^0C, its resistance will become 200Ω at temperature of
1) 300^0C 2) 400^0C 3) 500^0C 4) 200^0C

16. The current 'i' in the circuit given aside is

1) 0.1 A 2) 0.2A



3) 1.0A 4) 2.0 A

17. The combined resistance of two conductors in series is 1 Ω. If the conductance of one conductor is 1.1 siemen, the conductance of the other conductor in siemen is
1) 10 2) 11 3) 1 4) 1.1

18. Four conductors of resistnace 16Ω each are connected to form a square. The equivalent resistance across two adjacent corners is (in ohm)
1) 6 2) 18 3) 12 4) 16

19. When two resistances are connected in parallel then the equivalent resistance is $6/5\Omega$. When one of the resistance is removed then the effective resistance is 2Ω. The resistance of the wire removed will be

1) 3 ohm 2) 2 ohm 3) $\frac{3}{5}ohm$ 4) $\frac{6}{5}ohm$

20. A material 'B' has twice the specific resistance of 'A'. A circular wire made of 'B' has twice the diameter of a wire made of 'A'. Then for the two wires to have the same resistace, the ratio l_B/l_A of their respective lengths must
1) 1 2) 1/2 3) 1/4 4) 2/1

21. If a wire of resistance 'R' is melted and recasted in to half of its length, then the new resistance of the wire will be
1) R/4 2) R/2 3) R 4) 2R

22. **When a wire is drawn until its radius decreases by 3%. Then percentage of increase in resistance is**
1) 10% 2) 9% 3) 6% 4) 12%

23. **When three wires of unequal resistances are given the number of combinations they can be made to give different resistances is**
1) 6 2) 4 3) 2 4) 8

24. **The resistance of a coi is 4.2Ω at 100^{0}C and the temperature coefficient of resistance of its material is 0.004/^{0}C. Its resistance at 0^{0}C is**
1) 6.5 Ω 2) 5 Ω 3) 3 Ω 4) 2.5 Ω

25. **You are given several identical resistors each of value 10Ω and each capable of carrying a maximum current of 1A. It is required to make a suitable combination of these to resistances to produce a resistance of 5Ω which can carry a current of 4A. The minimum number of resistors required for this job is**
1) 4 2) 8 3) 10 4) 20

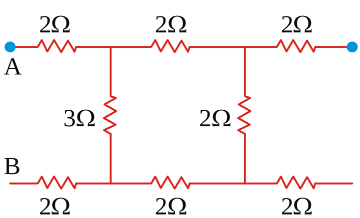
26. **A wire of resistance 50Ω is cut into six equal parts and they ae bundled together side by side to form a thicker wire. The resistance of the bundle is**
1) $\frac{18}{25}\Omega$ 2) $\frac{9}{12.5}\Omega$ 3) $\frac{25}{9}\Omega$ 4) $\frac{25}{18}\Omega$

27. **Three conductors of resistance 12Ω each are connected to form an equilateral triangle. The resistance between any two vertices is**
1) 4 Ω 2) 2 Ω 3) 6 Ω 4) 8 Ω

28. **When three equal resistance are connected in parallel, the effective resistance is $1/3\Omega$. If all are connected in series, the effective resistance is**
1) 9 Ω 2) 3 Ω 3) 6 Ω 4) 12 Ω

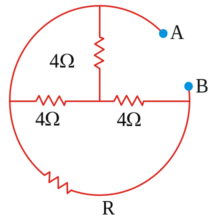
29. **A technician has only two resistance coils. By using them in series or in paralle he is able to obtain the resistance 3,4,12 and 16 ohms. The resistance of two coils are**
1) 6, 10 2) 4, 12 3) 7, 9 4) 4, 16

30. **The effective resistance between A&B in the given circuit is**



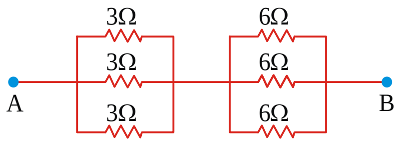
1) 7 Ω 2) 2 Ω 3) 6 Ω 4) 5 Ω

31. **The effective resistance between A and B is 3Ω then the value of R is**



1) 2 Ω 2) 4 Ω
3) 6 Ω 4) 8 Ω

32. **The effective resistance between A and B in the given circuit is**



1) 2 Ω 2) 4 Ω
3) 3 Ω 4) 6 Ω

ELECTRIC POWER & JOULES LAW

33. **An electric bulb is rated 220 volt and 100 watt. Power consumed by it when operated on 110 volt is**
1) 50 watt 2) 75 watt 3) 90 watt 4) 25 watt

34. **A heater coil is cut in to two parts of equal length and only one of them is used in the heater. The ratio of the heat produced by this half-coil to that by the original coil is**
1) 2 : 1 2) 1 : 2 3) 1 : 4 4) 4 : 1

35. **If the electric current in a lamp decreases by 5% then the power output decreases by**
1) 20% 2) 10% 3) 5% 4) 2.5%

36. **Two electric bulbs whose resistances are in the ratio of 1 : 2 are connected in parallel to a constant voltage source. The powers dissipated in them have the ratio**
1) 1 : 2 2) 1 : 1 3) 2 : 1 4) 1 : 4

37. **A bulb rated 60 W -120V is connected to 80V mains. What is the current through the bulb**
1) $\frac{1}{3}A$ 2) $\frac{2}{3}A$ 3) $\frac{5}{3}A$ 4) $\frac{3}{5}A$

38. **An electric bulb has the following specifications 100 watt, 220 volt. The resistance of bulb**
1) 384 Ω 2) 484 Ω 3) 344 Ω 4) 584 Ω

39. **A 200W and 100W bulbs, both meant for operation at 220V, are connected in series to 220V. The power consumption by the combination is**
1) 46 W 2) 66 W 3) 56 W 4) 75 W

40. **Five bulbs, each rated at 40 W-220 V are used for 5 hours daily on 20V line. How may units of electric energy is consumed in a month of 30 days?**
1) 20 units 2) 25 units 3) 15 units 4) 30 units

41. **An electric Kettle has two heating coils. When one of them is switched on water in it boils in 6 minutes and when other is switched on water boils in 4 minutes. In what time will the water boil if both coil are switched on simultaneously**
1) 1.6 min 2) 2.8 min 3) 2.4 min 4) 3 min

42. **A 10 V storage battery of negligible internal resistance is connected across a $50\,\Omega$ resistor. How much heat energy is produced in the resistor in 1 hour**
1) 7200J 2) 6200J 3) 5200J 4) 4200J

CELLS AND COMBINATION OF CELLS

43. **A cell of emf 6V is being charged by 1A current. If the internal resistance of the cell is 1 ohm, the potential difference across the terminals of the cell is**
1) 5V 2) 7V 3) 6V 4) 8V

44. **When two identical cells are connected either in series or in parallel across 2 ohm resistor they send the same current through it. The internal resistance of each cell is**
1) 2 ohm 2) 1.2 ohm 3) 12 ohm 4) 21 ohm

45. **The emf of a Daniel cell is 1.08V. When the terminals of the cells are connected to a resistance of $3\,\Omega$, the potential difference across the terminlas is found to be 0.6V. Then the internal resistance of the cell is**
1) 1.8 Ω 2) 2.4 Ω 3) 3.24 Ω 4) 0.2 Ω

46. **Four cells each of emf 2V and internal resistance 1 ohm are connected in parallel with an external resistance of 6 ohm. The current in the external resistance is**
1) 0.32 A 2) 0.16 A 3) 0.2 A 4) 0.6 A

47. **A student is asked to connected four cells of emf of 1 V and internal resistance 0.5 ohm in series with an external resistance of 1 ohm. But one cell is wrongly connected by him with its terminal reversed, the current in the circuit is**
1) $\frac{1}{3}A$ 2) $\frac{2}{3}A$ 3) $\frac{3}{4}A$ 4) $\frac{4}{3}A$

48. **Two cells of emf 1.25V, 0.75V and each of internal resistance 1Ω are connected in parallel. The effective emf will be**
1) 1 V 2) 1.25 V 3) 2 V 4) 0.5 V

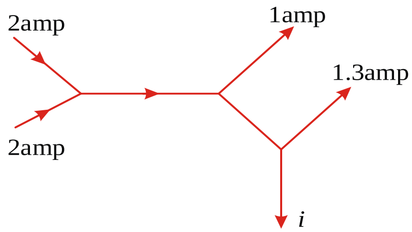
49. **The emf of a cell is 2V. When the terminals of the cell is connected to a resistance 4Ω. The potential difference across the terminals, if internal resistance of cell is 1Ω is**
1) $\frac{3}{5}V$ 2) $\frac{8}{5}V$ 3) $\frac{6}{5}V$ 4) $\frac{5}{8}V$

50. **If the external resistance is equal to internal resistance of a cell of emf E. The current across the circuit is**
1) $\frac{E}{r}$ 2) $\frac{r}{E}$ 3) $\frac{r}{2E}$ 4) $\frac{E}{2r}$

51. **Two cells each of emf 10V and each 1Ω internal resistance are used to send a current through a wire of 2Ω resistance. The cells are arranged in parallel. Then the current through the circuit**
1) 2A 2) 4A 3) 3A 4) 5A

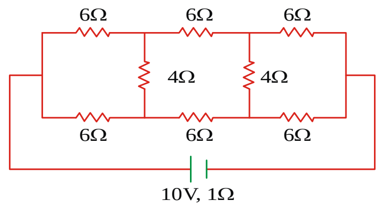
KIRCHOFF'S LAWS, WHEATSTONE BRIDGE

52. **The figure below shows current in a part of electric circuit. The current i is**



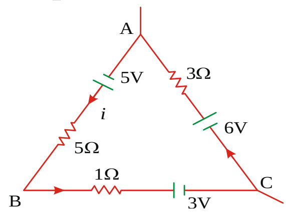
1) 1.7*amp* 2) 3.7 *amp* 3) 1.3 *amp* 4) 1 *amp*

53. **Current in the main circuit shown is**



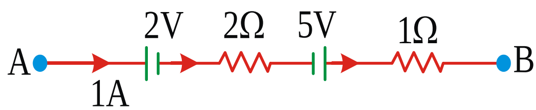
1) 1.5 A 2) 2 A 3) 0.6 A 4) 1 A

54.. **Find 'i' for the given loop.**



1) $\frac{6}{5}A$ 2) $\frac{8}{9}A$ 3) $\frac{1}{2}A$ 4) 1A

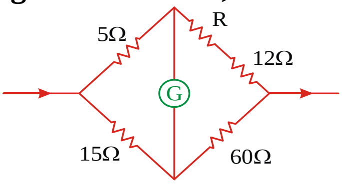
55. **The potential difference between points A and B is**



1) 0 V 2) 10 V 3) 4 V 4) 5 V

56. **In wheat stone bridge, P and Q are approximately equal. When R is 500Ω, the bridge is balanced. On interchanging P and Q, the values of R is 505Ω for balanching . The value of 'S' is**
1) 500.5 Ω 2) 501.5 Ω 3) 502.5 Ω 4) 503.5 Ω

57. To balance the bridge in the circuit, the values of R is



1) 8 Ω 2) 4 Ω 3) 20 Ω 4) 12 Ω

METRE BRIDGE

58. The point in a Metre bridge is at 35.6 cm. If the resistances in the gaps are interchanged,the new balance point is
1) 64.4 cm 2) 56 cm 3) 41.2 cm 4) 56.7 cm

59. In a metre bridge expt, when the resistances in the gaps are interchanged the balance point is increases by 10cm. The ratio of the resistances is
1) $\frac{15}{5}$ 2) $\frac{12}{8}$ 3) $\frac{11}{9}$ 4) $\frac{10}{9}$

60. When an unknown resistance and a resistance 6Ω are connected in the left and right gaps of a meter bridge, the balance point is obtained at 50cm. If 3Ω resistance is connected in parallel to resistance in right gap, the balance point is
1) decrease by 25 cm 2) increase by 25 cm
3) decrease by 16.7 cm 4) increase by 16.7 cm

61. When un known resistance and a resistance of 5Ω are used in left and right gaps of meter bridge the balance point is 50cm. The balanceing point if 5Ω resistance is now connected in seriece to the resistor in right gap
1) 20 cm 2) 33.3 cm 3) 60 cm 4) 60 cm

62. In a meter bridge experiement two unkonwn resistances X and y are connected to left and right gaps of a meter bridge and the balancing point is obtained at 20cm from right (X>Y) the new position of the null point from left if one decides balance a resistance of 4X against Y.
1) 114 cm 2) 80 cm 3) 53.3 cm 4) 70 cm

POTENTIO METER

63. In a potentiometer the balance length with standard cadmium cell is 509 cm. The emf of a cell which when connected in the place of the standard cell gave a balance length of 750 cm is (emf of standard cell is 1.018V)
1) 1.5V 2) 0.5V 3) 1.08V 4) 1.2V

64. Two cells of emf's E_1 and E_2 when placed in series produce null deflection at a distance of 204 cm in a potentio meter. When one cell is reversed they produce null deflection at 36 cm if E_1 1.4v then E_2=
1) 0.98 V 2) 2.47 V 3) 0.098 V 4) 98.8 V

65. When 6 identical cells of no internal resistance are connected in series in the second arycircuit of a poetntio meter, the balancing length is l. If two of them are wrongly connected the balancing length becomes
1) $\frac{l}{4}$ 2) $\frac{l}{3}$ 3) l 4) $\frac{2l}{3}$

66. In an experiment to determine the internal resistance of a cell with potentiometer, the balancing length is 165cm. When a reistance of 5 ohm is joined in parallel with the cell the balancing length is 150cm. The internal resistance of cell is
1) 2.2 Ω 2) 1.1 Ω 3) 3.3 Ω 4) 0.5 Ω

67. The resistivity of a potentio meter wire is 40 x 10^{-8} $\Omega - m$ and its area of cross section is 8 x 10^{-6} m^2. If 0.2A current is flowing through the wire, the potential gradient will be
1) 10^{-2} V/m 2) 10^{-1} V/m
3) 3.2×10^{-2} V/m 4) 1 V/m

68. The emf of a cell is Ev, and its its internal resistance is 1Ω. A resistance of 4Ω is joined to battery in parallel. This is connected in secondary circuit of poetntio meter. The balancing length is 160cm. If 1V cell balances for 100cm of potentio meter wire, the emf of cell E is
1) 1 V 2) 3 V 3) 2 V 4) 4 V

LEVEL -I (H. W) KEY

1) 4	2) 2	3) 2	4) 2	5) 3	6) 4
7) 4	8) 1	9) 2	10) 2	11) 1	12) 2
13) 3	14) 3	15) 2	16) 1	17) 2	18) 3
19) 1	20) 4	21) 1	22) 4	23) 4	24) 3
25) 2	26) 4	27) 4	28) 2	29) 2	30) 3
31) 3	32) 3	33) 4	34) 1	35) 2	36) 3
37) 1	38) 2	39) 2	40) 4	41) 3	42) 1
43) 2	44) 1	45)2	46) 1	47) 2	48) 1
49) 2	50) 4	51) 2	52) 1	53) 4	54) 2
55) 1	56) 3	57) 1	58) 1	59) 3	60) 2
61) 2	62) 3	63) 1	64) 1	65) 2	66) 4
67) 1	68) 3				

LEVEL - I (H. W) - HINTS

1. $i = \frac{q}{t}$
2. $i = qf$
3. $i = \frac{ne}{t} \Rightarrow n = \frac{it}{e}$
4. $i = q\ f$
5. $V_d \propto \frac{1}{r^2}$
6. The 3 resistances are parallel
7. $R \propto l^2 \quad \because$ V constant
8. $R \propto \frac{l^2}{m}$
9. $\frac{R}{5} = 2 \quad R_{\max} = 5R \quad R_{\min} = \frac{R}{5}$.
10. $\frac{i_1}{i_2} = \frac{r_1^2}{r_2^2} \times \frac{l_2}{l_1}$
11. $i_2 = \frac{iR_1}{R_1 + R_2}$
12. $R = 22 \times 10^2 \pm 10\%$
13. $\frac{R_1}{R_2} = \frac{l_1}{l_2} \times \frac{r_2^2}{r_1^2}$
14. $R_S = R_1 + R_2, R_P = \frac{R_1 R_2}{R_1 + R_2}$

    Solving for R_1 & R_2
15. $\alpha = \frac{R_2 - R_1}{R_1 t_2 - R_2 t_1}$
16. use ohm's law
17. $R_1 + R_2 = 1$ ohm.

    $\frac{1}{R_1} = 1.1$ => $R_1 = \frac{10}{11}$

    $R_2 = 1 - R_1 \quad \therefore \frac{1}{R_2} = \frac{1}{1 - R_1}$
19. $\frac{R_1 R_2}{R_1 + R_2} = \frac{6}{5}$. If R_2 is removed $R_1 = 2\Omega$

    $\frac{2R_2}{2 + R_2} = \frac{6}{5} \Rightarrow 5R_2 = 6 + 3R_2 \Rightarrow R_2 = 3\Omega$
20. $R = \frac{\rho \ell}{A} \Rightarrow \ell = \frac{RA}{\rho} \Rightarrow l \propto \frac{r^2}{\rho}$
21. $R \propto \ell^2$
22. $R \propto \frac{1}{r^4}$
23. 2^n
24. $R_t = R_0 (1 + \alpha t)$
25. $R_P = \frac{R}{n}$; $i_p = mi$

    $\Rightarrow$ m × n = ...
26. $R' = \frac{R}{n^2}$
27. $R' = \frac{2R}{3}$
28. $R_P = \frac{R}{n}$ and $R_S = nR$
29. $R_1 = \frac{R_S + \sqrt{R_s^2 - 4R_s R_p}}{2}$

    $R_2 = \frac{R_s - \sqrt{R_s^2 - 4R_s R_p}}{2}$
30. Using combination of resistors
31. Using combination of resistors
32. Using combination of resistors
33. $P = \frac{V^2}{R}$
34. $W = JQ \Rightarrow Q = \frac{V^2}{RJ} \Rightarrow \frac{Q_1}{Q_2} = \frac{R_2}{R_1}$
35. $P = i^2 R \Rightarrow P \alpha i^2 \Rightarrow \frac{\Delta P}{P} \times 100 = 2 \times \frac{\Delta I}{I} \times 100$

36. $P=\frac{V^2}{R}$

37. $R=\frac{V'^2}{P'}$ and $i=\frac{V}{R}$

38. $R=\frac{V^2}{P}$

39. $P=\frac{P_1P_2}{P_1+P_2}$

40. $\frac{no.of\ watts \times no.of\ hours}{1000}$

41. $t_s=t_1+t_2$; $t_p=\frac{t_1t_2}{t_1+t_2}$

42. $Q=\frac{V^2}{R}t \Rightarrow Q=7200J$

43. $V=E+ir$

44. $i_S=i_P$; $\frac{nE}{(R+nr)}=\frac{E}{\left(R+\frac{r}{n}\right)}$

45. $r=\left(\frac{E-V}{V}\right)R$

46. $i=\frac{E}{R+\frac{r}{n}}=\frac{2}{6+\frac{1}{4}}=\frac{2\times4}{25}=\frac{8}{25}$

47. $i=\frac{(N-2n)E}{R+Nr}=\frac{(4-2)\times1}{1+4\times0.5}=\frac{2\times1}{3}$

48. $E_{eff}=\frac{E_1r_2+E_2r_1}{r_1+r_2}$

49. $V=E-i\,r$

50. $i=\frac{E}{R+r}$

51. $i=\frac{E}{\frac{r}{n}+R}$

52. K.C.L

53. K.C.L

54. K.C.L

55. K.C.L

56. $\frac{P}{Q}=\frac{R}{S}$

57. $\frac{P}{Q}=\frac{R}{S}$

58. $\frac{P}{Q}=\frac{35.6}{64.4},\frac{Q}{R}=\frac{64.4}{35.6}$

59. $\frac{X}{R}=\frac{l}{100-l}$

60. $\frac{X}{R}=\frac{l}{100-l}$

61. $\frac{X}{R}=\frac{l}{100-l}$

62. $\frac{x}{y}=\frac{l}{100-l}$

63. $\frac{E_1}{E_2}=\frac{l_1}{l_2}\,3$

64. $\frac{E_1}{E_2}=\frac{\ell_1+\ell_2}{\ell_1-\ell_2}$

65. $NE\alpha l_1,\ (N-2m)E\alpha l_2$

66. $r=R\left[\frac{\ell_1-l_2}{\ell_2}\right]$

67. $P.G=\frac{i\rho}{A}$

68. $r=R\left[\frac{\ell_1-l_2}{\ell_2}\right]$