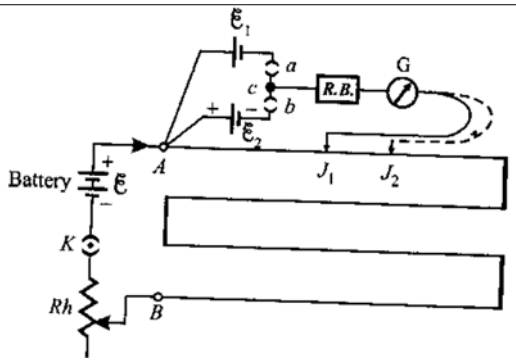
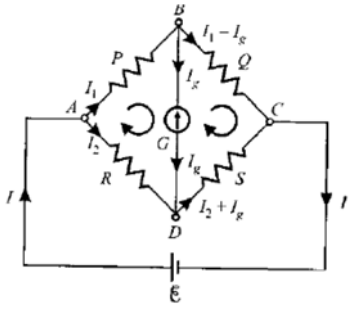
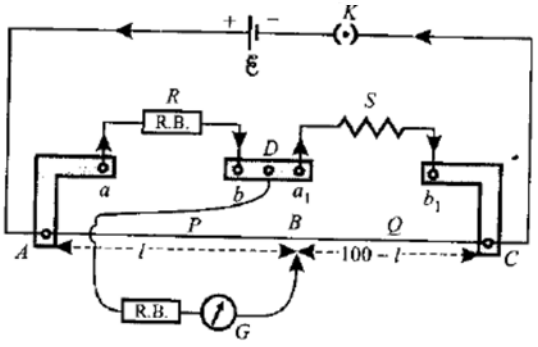
CLASS XII MLL Questions

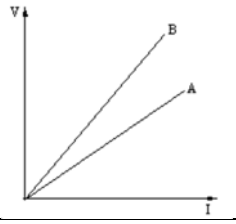
Current Electricity

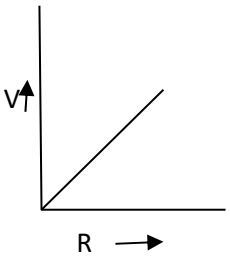
Q.1	. The sequence of bands marked on a carbon resistor is red, red. Red silver. What is the value of resistance? Ans:- $22\times10^2 \pm 10\%$	1
Q.2	Does the drift velocity vary with the magnitude of the current through the conductor? Explain. Ans. Yes. Drift velocity, $V_d = \frac{I}{ned}$. i.e. $V_d \alpha I$	2
Q.3	. A wire is cut into half. What is the effect on its specific resistance? Ans :- No effect.	1
Q.4	:- Why do we prefer a potentiometer with a longer bridge wire? Ans:- When the bridge wire is longer the potential gradient is smaller. Smaller the potential gradient more is the sensitivity of potentiometer wire.	1
Q.5	What are the factors affecting internal resistance of a cell Ans-Nature of electrolyte Separation between the electrode	2
Q.6	Establish a relation between the current and drift velocity Ans-Page 97 NCERT	2
Q.7	Describe with the help of circuit diagram how a potentiometer can be used to compare the e.m.f. of two cells. Ans-Potential gradient – The potential drop per unit of length of the potentiometer. Method to compare emf of two cells – $\xi_1 = kl$ when a is closed	3

	 $\xi_2 = kl_2$ when b is closed $\therefore \xi_1 = kl_1$ $\xi_2 = kl_1$ $\xi_3 = \xi_1 \frac{l_2}{l}$ Causes for one sided deflection of potentionetari (i) +ve terminals of all cells are not connected at one point. (ii) emf of driving cell is less than emf of cell.	
Q.8	Define resistivity and state its SI unit. State and explain how the resistivity of a conductor varies with temperature Ans-Resistivity is the resistance of a conductor of that material having unit length and unit area of cross-section. S.I. unit = ohm metre (ΩM) Resistivity = $\frac{M}{ne^2 \uparrow} \uparrow$ With increase in temperature, the electrons suffer collisions more frequently and the relaxation time τ decreases. Hence, the resistivity of a conductor increases.	3
Q.9	*(a) Three resistors 1 Ω, 2 Ω, and 3 Ω are combined in series. What is the total resistance of the combination? (b) If the combination is connected to a battery of emf 12 V and negligible internal resistance, obtain the potential drop across each resistor* Ans- (a) Three resistors of resistances 1 Ω, 2 Ω, and 3 Ω are combined in series. Total resistance of	3

	the combination is given by the algebraic sum of individual resistances. Total resistance = 1 + 2 + 3 = 6 Ω (b) Current flowing through the circuit = I Emf of the battery, E = 12 V Total resistance of the circuit, R = 6 Ω The relation for current using Ohm's law is, $I = \frac{E}{R}$ $= \frac{12}{6} = 2$ A Potential drop across 1 Ω resistor = V_1 From Ohm's law, the value of V_1 can be obtained as $V_1 = 2 \times 1 = 2$ V … (i) Potential drop across 2 Ω resistor = V_2 Again, from Ohm's law, the value of V_2 can be obtained as $V_2 = 2 \times 2 = 4$ V … (ii) Potential drop across 3 Ω resistor = V_3 Again, from Ohm's law, the value of V_3 can be obtained as $V_3 = 2 \times 3 = 6$ V … (iii) Therefore, the potential drop across 1 Ω, 2 Ω, and 3 Ω resistors are 2 V, 4 V, and 6 V respectively.	
Q.10	Derive the balance condition of Wheat Stone bridge .also draw the circuit diagram to find the specific rsistance by meter bridge. Ans-  	3

	Kirchoff's first law – In an electrical circuit, the sum of input current is equal to output current. Second Law - $\Sigma\xi = \Sigma IR$ Applying kirchoff's law in 100P ABDA, $I_1P + IgG - I_2R = 0$ In 100p BCDB, $(I_1 - I_g) - (I_2 + I_g)S - GI_g = 0$ In balanced condition, Ig=0 $I_1P - I_2R = 0$ $I_1\theta - I_2S = 0$ $\frac{P}{Q} = \frac{R}{S}$ circuit diag. to determine the unknown resistance.  	
Q.11	What do you mean by relaxation time of free electrons in metals? Ans-It is average time between two successive collisions between electrons in conductor or semiconductor	1
Q.12	Will the drift speed of free electrons in a metallic conductor increases or decreases with increase or decrease in temperature?	2

	Ans-With increase in temperature, resistance increase and hence drift velocity decreases.	
Q.13	V – I graphs for parallel and series combination of two metallic resistors are shown in figure. Which graph represents parallel combination? Justify your answer-. 	2
Q.14	Describe the formula for the equivalent EMF and internal resistance for the parallel combination of two cells with EMF E1 and E2 and internal resistances r1 and r2 respectively. What is the corresponding formula for the series combination? Ans-Derivation for parallel combination $E = \frac{E_1 r_2 + E_2 r_1}{(r_1 + r_2)}$ $r = \frac{r_1 r_2}{r_1 + r_2}$ (ii) Series combination formula $(E = E_1 + E_2), (r = r_1 + r_2)$ (iii) Numerical $\left[\frac{2+1}{1+2+R} = \frac{(1x1+2x2)/(1+2)}{\frac{1x2}{1+2}} \Rightarrow R = \frac{9}{4}\Omega ; \text{Morein series} \right]$	3
Q.15	Why the resistance of the conductor increases with rise in temperature? Ans:- resistance R = ml/nAe^{2}Ć. When the temperature of conductor is increased the electron begin to collide more frequently with atoms and ions, so the relaxation time is decreased consequently the resistance increases.	2
Q.16	A carbon resistor of $47\times10^3 \pm 5\%$ is to be marked with rings of different colours for its identification write the sequence of colours? Ans:- Yellow, Violet, Orange , Gold.	1
Q.17	State the Kirchoff's laws Ans – First law- Junction Rule or Current Law In an electric circuit,the algebraic sum of currents at any junction is zero Second Law- Loop Rule or Potential Law The algebraic sum of the emfs of any loop of a circuit is equal to the sum of the product of the	2

	currents and resistances in it.	
Q.18	Two wires of equal length, one of copper and other of manganin have seen same resistance .Which is thicker? Ans-R_{copper}=R $_{maganin}$ We know that R=$\frac{\rho l}{A}$ For same length, $\frac{\rho_c}{A_c} = \frac{\rho_m}{A_m}$ $\rho_c < \rho_m$ So, $A_c < A_m$ Therefore manganin is thicker than copper.	3
Q.19	If the current supplied to a variable resister, is constant. Draw a graph between Voltage and Resistance.  	1
Q.20	Name the material used formatting standard résistance. Give reason of choice. Ans –Manganin ,constantan or Nichrome. High resistivity and low temperature coefficient of resistance	2