INDIAN SCHOOL DARSAIT
DEPARTMENT OF SCIENCE

Subject : PHYSICS **Topic** : ELECTRICITY REVISION WORKSHEET (NUMERICALS)

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Name of the Student :_____ **Class & Division** : _____ **Roll Number** : __

1.	Two bulbs have ratings 100 W, 220 V and 60 W, 220 V respectively. Which one has a greater resistance? **$P= V^2/R$** **For the same V, R is inversely proportional to P.** **Therefore, the bulb 60 W, 220 V has a greater resistance.**	1
2.	A Rectangular block of iron has dimensions L X L X b. What is the resistance of the block measured between the two square ends? Given ρ= resistivity. **$R=\rho\, b/L^2$**	1
3.	How much energy is given to each coulomb of charge passing through a 9 V battery? **W=VQ= 9×1 = 9 Joule**	1
4.	100 J of work is done in moving a charge of 5 C from one terminal of battery to another. What is the potential difference of battery? **V = W/Q = 100/5 = 20 V**	1
5.	If 4×10^{-3} J of work is done in moving a particles carrying a charge of 16×10^{-6} C from infinity to point P .What will be the potential at a point? **V = W/q** **$= (4 \times 10^{-3}) / (16 \times 10^{-6}) = 250$ V**	1
6.	Calculate the current and resistance of a 100 W, 200V electric bulb. **P = 100W, V = 200V** **P = VI** **I = P/V = 100/200 = 0.5A** **R = V/I = 200/0.5 = 400W**	1
7.	Calculate the power rating of the heater coil when used on 220V supply taking 5 Amps. **V = 220V ,** **P = VI = 220 × 5 = 1100W = 1.1 KW**	1
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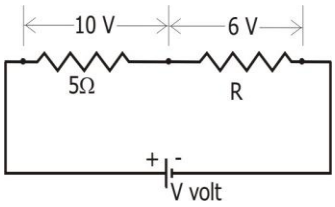
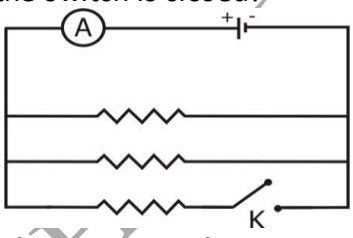
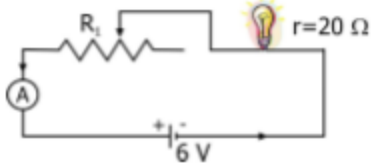
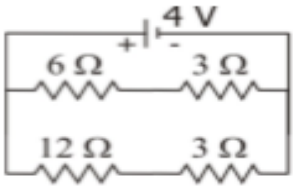
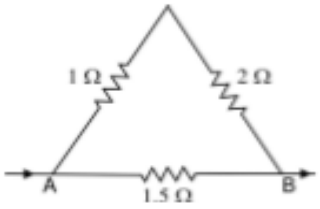
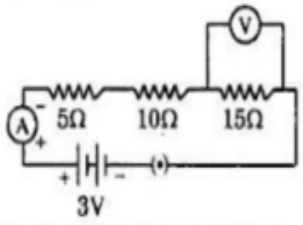
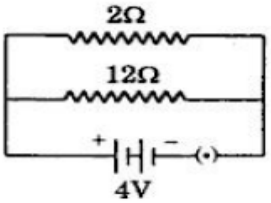
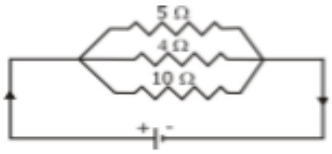
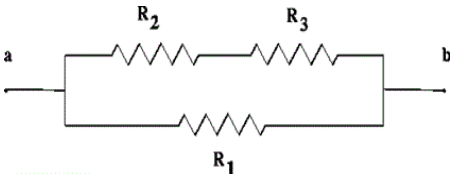
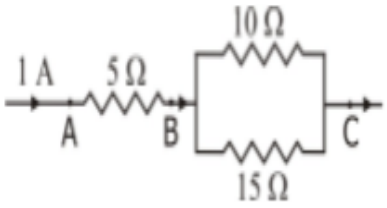
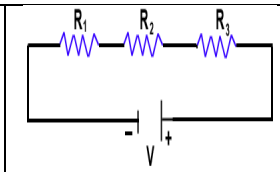
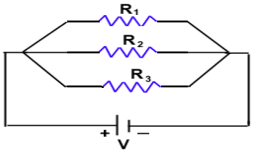
	R = V/I = 200/0.5 = 400W	
9.	Calculate the power rating of the heater coil when used on 220V supply taking 5 Amps. **V = 220V ,** **P = VI = 220 × 5 = 1100W = 1.1 KW**	1
10.	Calculate the work done in moving a charge of 5 coulombs from a point at a potential of 210 volts to another point at 240 volts. **Potential difference = 240 - 210 = 30 V** **W= V x Q = 30 x 5 = 150 J**	1
11.	Calculate the current supplied by a cell if the amount of charge passing through the cell in 4 seconds is 12 C? **I =Q/t => I = Q/t = 12/4 = 3A**	1
12.	A lamp has a resistance of 96 ohms. How much current flows through the lamp when it is connected to 120 volts? **I = V/R = 120/96 = 1.25 A** **The current through the lamp equals 1.25 A**	1
13.	Two resistors X and Y are connected turn by turn: (i) in parallel, and (ii) in series. In which case the resultant resistance will be less than either of the individual resistances? **In Parallel combination the resultant resistance will be less than either of the individual resistances.**	1
14.	A torch bulb has a resistance of 1 Ω when cold. It draws a current of 0.2 A from a source of 2 V and glows. Calculate (i) the resistance of the bulb when glowing and (ii) explain the reason for the difference in resistance. **(i) When the bulb glows: V = I R ---- Ohm's law R = V/I = 2/.2 =10 Ω** **(ii) Resistance of the filament of the bulb increases with increase in temperature. Hence when it glows its resistances is greater than when it is cold.**	2
15.	A lamp can work on a 50 volt main taking 2 amps. What value of the resistance must be connected in series with it so that it can be operated from 200 volt mains giving the same power? **V = 50V,I = 2A** **R= V/I = 50 / 2 = 25 Ω** **Let resistance connected in series with lamp = r** **V = 200V, I = 2A** **Total resistance R′= V/I = 200/2 = 100Ω** **R′ = R + r => 100 = 25 + r => r = 75Ω**	2
16.	How many electrons pass through a lamp in one minute if the current be 200 mA? **I = 220 mA = 0.22 A** **I = Q/t 0.22 = Q/60** **Q= 0.22 x 60 = 13.2 C** **No of electron carry 1 C charge = 6 x 10^{18}**	2

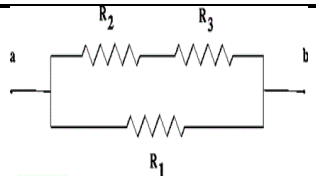
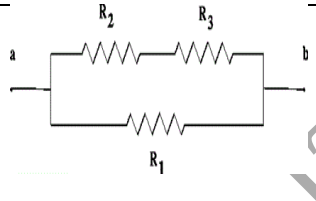
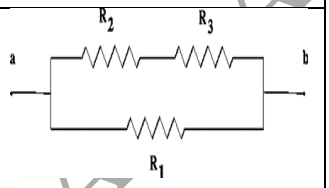
	No of electron carry 13.2 C charge = 6 x 10 ^{18}x 13.2 = 79.2 x 10 ^{18}	
17.	A 2 Volt cell is connected to a 1 Ω resistor. How many electrons come out of the negative terminal of the cell in 2 minutes? **V = IR** **I = V/R = 2/1 = 2 A** **I = Q/t => Q = It = 2 x 2 x 20 = 80 C** **No of electron carry 1 C charge = 6 x 10 ^{18}** **No of electron carry 80 C charge = 6 x 10 ^{18} x 80 C = 108 x 10 ^{18} = 1. 08 x 10 ^{20}**	2
18.	The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 120 V? **V = 60 V, I = 4 A** **R = V/I = 60/4 =15Ω** **V'= 120 V** **I = V'/R = 120/15 = 8A** **The current through the heater becomes 8 A**	2
19.	A 4 Ω resistance wire is doubled on it. Calculate the new resistance of the wire. **R = 4 Ω, l'=l/2, A'= 2A** **R = ρ(l/A)** **R1 = R/4 = 4/4 = 1Ω**	2
20.	A 220V line supplies a total current of 5A to N resistors (each of 176Ω) connected in parallel. What is the value of N? **The net resistance of N resistors= 220/5= 44Ω** **R_P=R/N** **N=R/R_P=176/44=4**	2
21.	How many bulbs of 8Ω should be joined in parallel to draw a current of 2A from a battery of 4 V? **N=4**	2
22.	(a) The manufacturer specifies that a certain lamp will allow 0.8 ampere of current when 120 volts is applied to it. What is the resistance of the lamp? **V = IR So, R = V/I = 120/0.8 = 150 W** (b) How much voltage is required to cause 1.6 amperes in a device that has 30 ohms of resistance? **V = IR = 1.6 x 30 = 48 V** **(OR)** (c) How much power is dissipated when 0.2 ampere of current flows through a 100-ohm resistor? **P = I^2 R = 0.2 x 0.2 x 100 = 4 W** (d) How much energy is converted by a device that draws 1.5 amperes from a 12-volt battery for 2 hours? **E= VIt = 12 x 1.5 x 2 = 36 Wh**	2

23.	Two resistances are connected in series as shown in the fig.  (i) What is the current through 5Ω resistor? **I=V/R=10/5=2A** (ii) What is the current through R? **I=2A. In series circuit, current remains the same**. (iii) What is the value of R? **R=V/I=6/2=3Ω** (iv) What is the value of V? **V=10+6=16V**	2
24.	In the diagram, the cell and the ammeter both have negligible resistance. The resistors are identical. With the switch K open, the ammeter reads 0.6 A. What will be the ammeter reading when the switch is closed?  **Let I be the current through each resistor. With K open,** **2I=0.6A** **I=0.6/2=0.3A** **With K closed, Current =3I=0.9A**	2
25.	Suppose a 6V battery is connected across a lamp, whose resistance is 20 Ω, through a variable resistor as shown in fig. If the current in the circuit is 0.25 A, calculate the value of the resistance from the resistor which must be used.  **Total Resistance = V/I= 6/0.25= 24Ω** **R_1+r=24** **R_1+20=24** **R_1=24-20=4Ω**	2
26.	Five dry cells each of 1.5 volt have internal resistance of 0.2, 0.3, 0.4, 0.5 and 12 ohms. When connected in series, what current will these five cells furnish through 10Ω resistance?	2

	Total V=5x1.5=7.5V **Total R=0.2+0.3+0.4+0.5+12=13.4Ω** **Current I=V/R=7.5/13.4=75/134 A**	
27.	For the circuit shown in the following diagram, find the value of: (i) Current through 6 Ω resistor. (ii) Potential difference across 12 Ω resistor.  **(i) Current across 6Ω, I=4/9A** **(ii) P.d. across 12Ω, V=4x12/15=16/5V**	2
28.	Calculate the effective resistance between the points A and B in the network shown here.  **1Ω and 2Ω are in series R_s=3Ω** **R_P=3x1.5/4.5=1Ω**	2
29.	What are the likely readings of the ammeter and the voltmeter in the circuit shown here?  **R=5+10+15=30Ω** **The ammeter reading = I=V/R=3/30=0.1A** **The voltmeter reading=V=IR_3=0.1x15=1.5V**	2
30.	Calculate the power used in 2Ω resistor in the circuit shown here.  **Current through 2Ω I=4/2=2A** **Power $P=V^2/R$= 16/2=8W**	2

31.	When a potential difference of 2 V is applied across the ends of a wire of 5 m length, a current of 1 A is found to flow through it. Calculate: (i) The resistance per unit length of the wire (ii) the resistance of 2 m length of this wire (iii) The resistance across the ends of the wire if it is doubled on itself. **(i) R=V/I=2/1= 2Ω.** **Resistance per unit length: 2/5= 0.4 Ω/m.** **(ii) Resistance of 2 m length of the wire = 0.4 x 2=0.8 ohm** **(iii) A_2= 2 A and L_2= L/2** **Resistance R' = p (l/2)/(2A)** **= 1/4(p(L/A)** **=R/4** **R' = 2/4 =0.5 Ohm**	3
32.	In the circuit diagram given here, the current flowing in 5Ω resistor is 1A. Find the current flowing through the other two resistors.  **V =IR=1x5=5V** **Current across 4Ω=V/R_2= 5/4=1.25A** **Current across 10Ω=V/R_3=5/10=0.5A**	3
33.	How will you connect three resistors of 2Ω, 3Ω and 5Ω respectively so as to obtain a resultant resistance of 2.5 Ω? Draw the diagram to show the arrangement. **2Ω, 3Ω are in series and parallel to 5Ω**  Two resistances when connected in parallel give resultant value of 2Ω. When they are connected in series, the value becomes 9 Ω. Calculate the value of each resistance. **For Series,** **R_1+R_2=9----------(1)** **For Parallel,** $$\frac{R_1R_2}{R_1+R_2}=2$$ $$\frac{R_1R_2}{9}=2$$ **R_1R_2=18** $(R_1-R_2)^2=(R_1+R_2)^2-4R_1R_2$ $(R_1-R_2)^2=81-72$ $(R_1-R_2)^2=9$	3

	$R_1 - R_2 = 3$----------(2) **Solving (1) & (2)** $2R_1 = 6$ **R_1= 3Ω, R_2=3Ω**	
34.	Three resistors are connected as shown in the diagram. Through the resistor 5 ohm, a current of 1 ampere is flowing. (i) What is the current through other two resistors? (ii) What is the p.d. across AB and across AC? (iii) What is the total resistance?  **(i) Resistance across parallel combination R_P=6Ω** **V_{BC}=IR_P=1x6=6V** **As p.d. across parallel combination remains same,** **10I_1=6** **I_1= 0.6A** **15I_2=6** **I_2=0.4A** **(ii) V_{AB}= 1x5=5V ; V_{AC}=11V** **(iii) 10Ω and 15Ω are parallel** $$R_P = \frac{R_1 R_2}{R_1 + R_2} = \frac{10 \times 15}{10 + 15} = \frac{150}{25} = 6\Omega$$ **Total resistance =5+6=11Ω**	3
35.	You are given three resistances of 1, 2 and 3 ohms. Show by diagrams, how with the help of these resistances you can get: (i) 6 Ω, (ii) 6/11 Ω, (iii) 1.5 Ω, (iv) 4/3 Ω, (v) 5/6 Ω, (vi) 11/5 Ω **all in series**  **all in parallel**  	3

		1Ω & 2Ω in series and the combination is parallel to 3Ω			
		1Ω & 3Ω in series and the combination is parallel to 2Ω			
		2Ω &3Ω in series and the combination parallel to 1Ω			
		parallel combination of 2 Ω and 3 Ω in series with 1 Ω