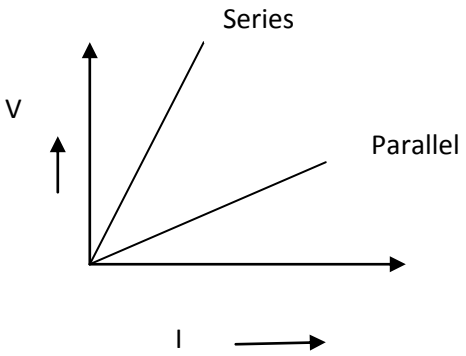
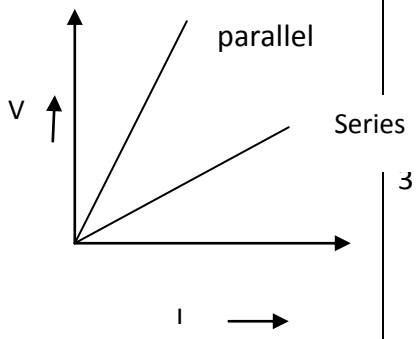
ELECTRICITY

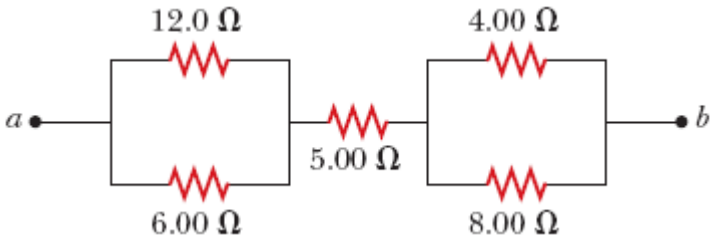
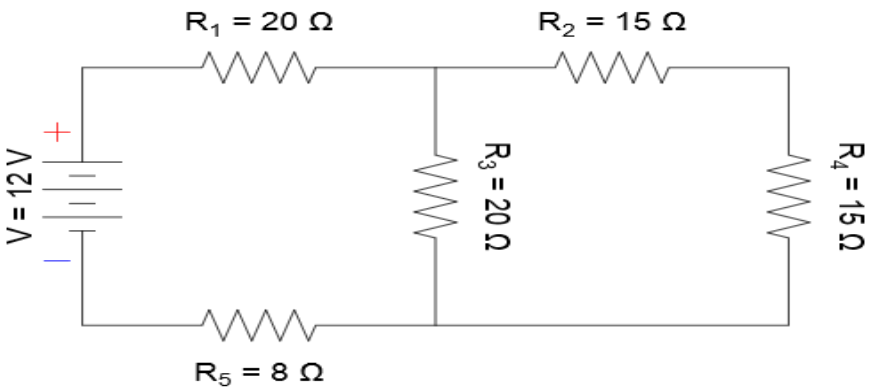
Assignment No - 1

Section A

CONCEPTUAL QUESTIONS

S.No	QUESTIONS	MARKS
1	Calculate the number of electrons constituting one Coulomb of charge	**2**
2	How do we connect voltmeter and ammeter in an electric circuit? What is likely to happen if the positions of these instruments are interchanged?	**(2015 SA1)**2
3	A bulb cannot be used in place of a resistor to verify Ohm's law. Justify this statement with reason.	2
4	State the type of combination used for connecting different electric appliances in domestic circuit. Give reasons	3
5	  Two students perform the experiments on series and parallel combination of two given resistors R_1 and R_2 and plot the following V-I graphs. Which of the two diagrams correctly represents the labels 'series and parallel' on the plotted curves? Justify your answer.	3
6	Explain the following: (i) Copper and Aluminum wires are employed for electricity transmission. (ii) Heating devices are made of an alloy rather than a pure metal. (iii) Tungsten is used for filament of electric lamp.	3
7	Two metallic wires of the same material are connected in parallel. Wire A has length "**l**" and radius **r,** wire B has a length **2l** and radius **2r**. Calculate the ratio of their equivalent resistance in parallel combination and the resistance of wire A.	3

8	Why are electric bulbs filled with chemically inactive nitrogen or argon?	1
9	Derive an expression for the equivalent resistance of three resistors R_1, R_2 and R_3 connected in series.	3
10	Match the correct range of resistivity with the materials given: a) Conductor ---- i) 10^{-6} Ωm b) Alloys ---- ii) 10^{12} to 10^{17}Ωm c) Insulators ---- iii) 10^{-6} to 10^{-8}Ωm	**2012 SA1** 3
11	Derive an expression for Joule's law of heating. Give two examples for applications of heating effect of electric current.	3
12	A wire of resistivity ρ is stretched to double of its length. Find its new resistance and resistivity.	3
	Section B **NUMERICAL PROBLEMS**	
13	100J of work is done in transferring 20C of charge between two points in a conductor. Find the resistance offered by the conductor, if a current of 2A flows through it.	2
14	Calculate the resistance of a metal wire of length 2m and area of cross section $1.55\times10^{-6}m^2$, if the resistivity of the metal be 2.8×10^{-8}Ωm? **()**	2
15	A battery of 12V is connected to a series combination of resistors 3Ω, 4Ω, 5Ω and 12Ω. How much current would flow through the 12Ω resistor?	3
16	Nichrome wire of length l and radius 'r' has resistance of 10Ω. How would the resitance of the wire change when (i) only the diameter is doubled? (ii) only length of the wire is doubled?	**(2012 SA1)**3
17	Two devices of rating 44W, 220V and 11W.220V are connected in series. The combination is connected across a 440V main. The fuse of which of the two devices is likely to burn when the switch is ON? Justify your answer.	3
19	A wire of resistance 10Ω is bent in the form of a closed circle. What is the effective resistance between the two points at the ends of any diameter of the circle?	2
20	Two resistors with resistances 5Ω and 10Ω are to be connected to a battery of 6V so as to obtain: (i) Minimum current (ii) Maximum current. How will you connect the resistances in each case?	3

21	Two identical resistors are first connected in series and then in parallel to a source of supply. Find the ratio of heat produced in two cases.	3
22	A torch bulb is rated 5V and 500mA. Calculate its (i) power, (ii) resistance, (iii) energy consumed when it is lighted for 4 hours. (	**(2013SA1)**3
23	An electric heater rated 880W operates 6h/day. Find the cost of energy to operate it for 30 days at Rs 3.00 per unit.	
24	Calculate the net resistance between the points a and b in the circuit diagram shown. 	3
25	 From the above diagram, determine i) The equivalent resistance of the entire circuit ii) The current through each resistor iii) The total current from the power supply iv) The voltage drop across each resistor	5