GROUP MEMBERS NAME AND ROLL NO:

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EXPERIMENT

NO: EE/51/07

TITLE:

Characteristics of different types of Incandescent lamps.

OBJECTIVE:

1) To study the volt - Ampere, power - voltage resistance - voltage characteristic of Tungsten and carbon Lamps
2) The steady state operation of a typical circuit containing both Linear resistive elements

Procedure:

1) Make connection as show in fig - 1
2) cut the external resistance Rext out of the circuit and set the auto - transformer for zero output voltage
3) Increase the auto - transformer output voltage in step of 20/30V until the full voltage is obtained At each step note the reading of V, V_2, A_1 and A_2 and record them in table - 1
4) Repeat step 3 decreasing the output voltage from full to zero voltage
5) Increase the resistance Rext for maximum value and note all the meter readings for maximum auto transformer output voltage, Enter the readings in the appropriate columns of Table 2. Set Rext to another value (mid - range) and repeat the above step for this value of Rext

CIRQUIT DIA GRAM :

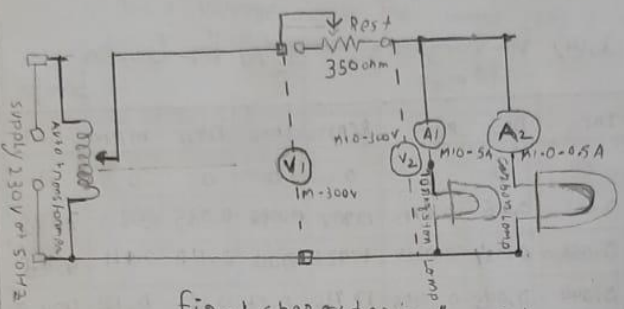
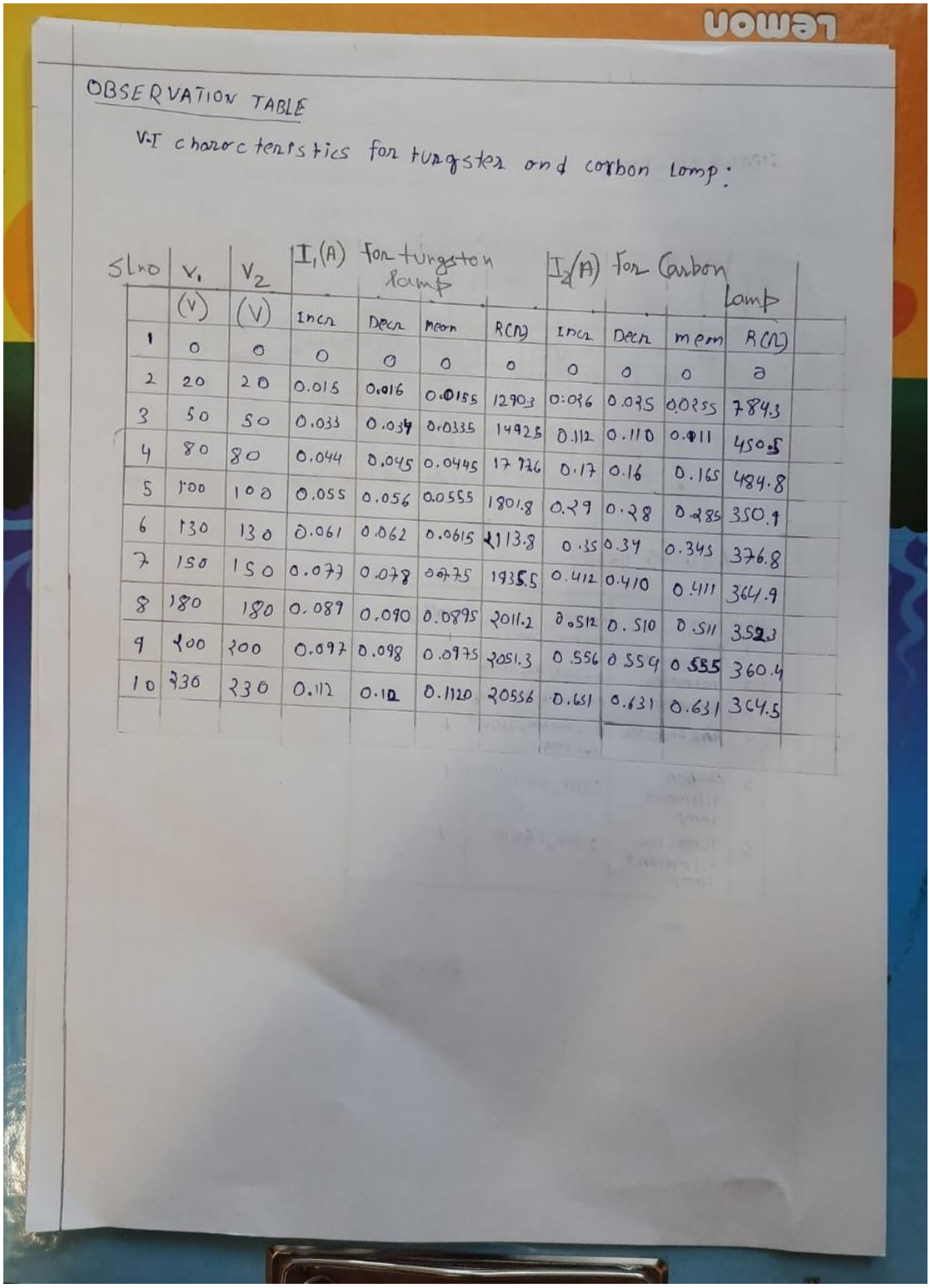


fig-1 charcterstis of carbon and Tungsten Lamps

APPARUTUS USED :

SL No	Item	Range	Quantity
1	Auto transformer	0-270V, 50Hz	1
2	volt meter	0-300V, AC, 50Hz	2
3	Ammeter	0-500mA, AC, 50Hz	2
4	~~Rhe~~ Rheostat	0-500ohm, 750W, 0-1.0A	1
5	carbon filament Lamp	230V, 50W	1
6	Tungsten filament Lamp	230V, 150W	1



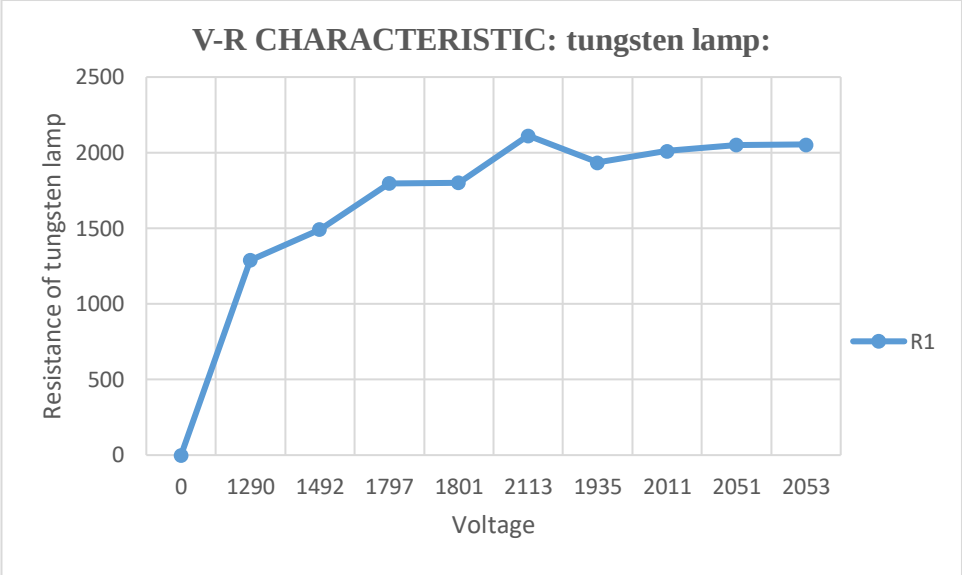
OBSERVATION TABLE

V-I characteristics for tungsten and carbon lamp:

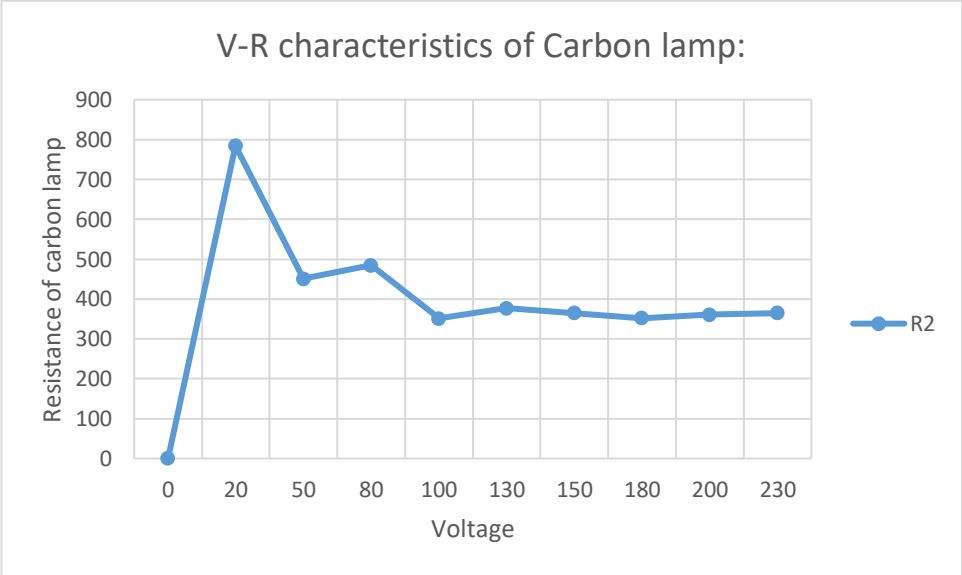
Sl no	V_1 (V)	V_2 (V)	I_1(A) for tungsten lamp				I_2(A) for Carbon lamp			
			Incr	Decr	mean	R(Ω)	Incr	Decr	mean	R(Ω)
1	0	0	0	0	0	0	0	0	0	0
2	20	20	0.015	0.016	0.0155	1290.3	0.036	0.035	0.0355	784.3
3	50	50	0.033	0.034	0.0335	1492.5	0.112	0.110	0.111	450.5
4	80	80	0.044	0.045	0.0445	1797.6	0.17	0.16	0.165	484.8
5	100	100	0.055	0.056	0.0555	1801.8	0.29	0.28	0.285	350.9
6	130	130	0.061	0.062	0.0615	2113.8	0.35	0.34	0.345	376.8
7	150	150	0.077	0.078	0.0775	1935.5	0.412	0.410	0.411	364.9
8	180	180	0.089	0.090	0.0895	2011.2	0.512	0.510	0.511	352.3
9	200	200	0.097	0.098	0.0975	2051.3	0.556	0.554	0.555	360.4
10	230	230	0.112	0.112	0.1120	2053.6	0.651	0.631	0.631	364.5

REPORT:

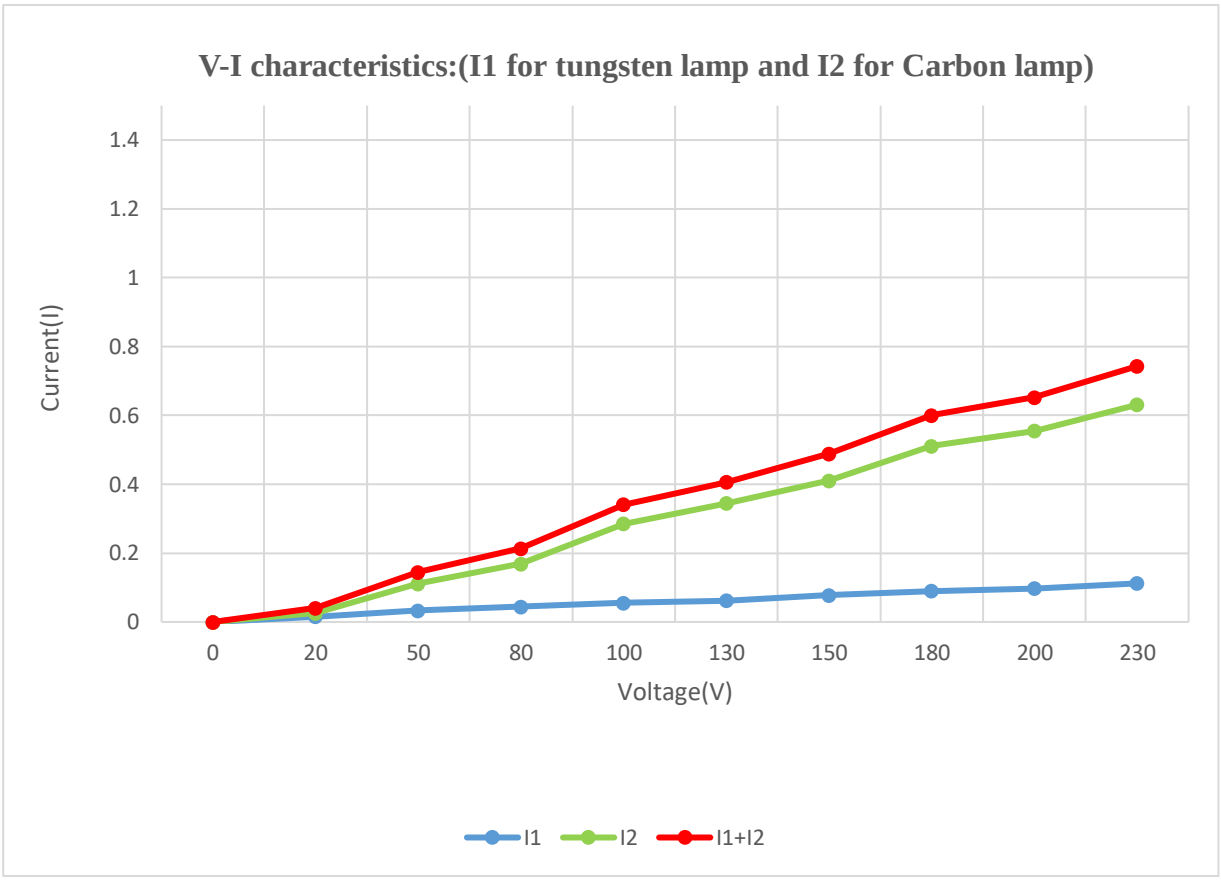
V-R CHARACTERISTIC: tungsten lamp:



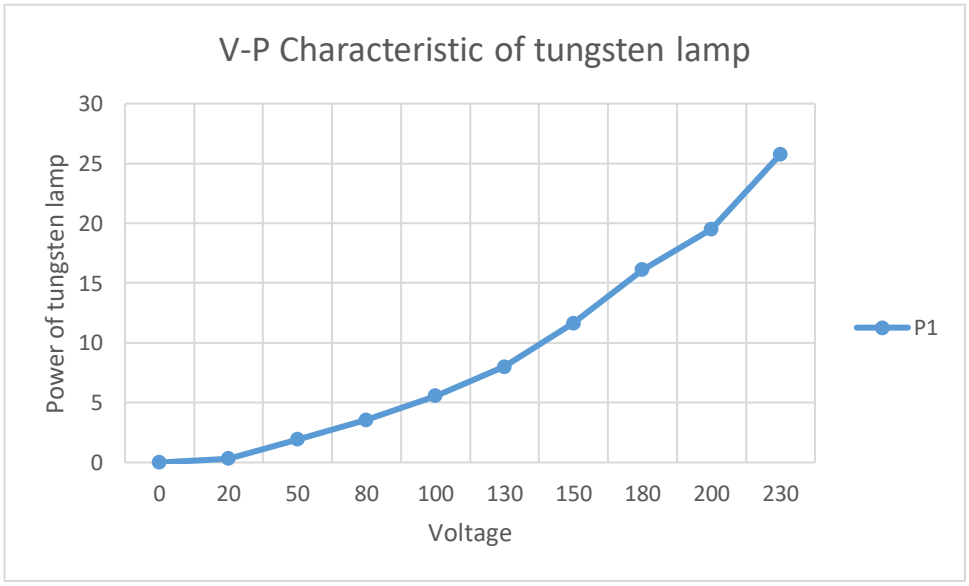
V-R CHARACTERISTIC : CARBON LAMP



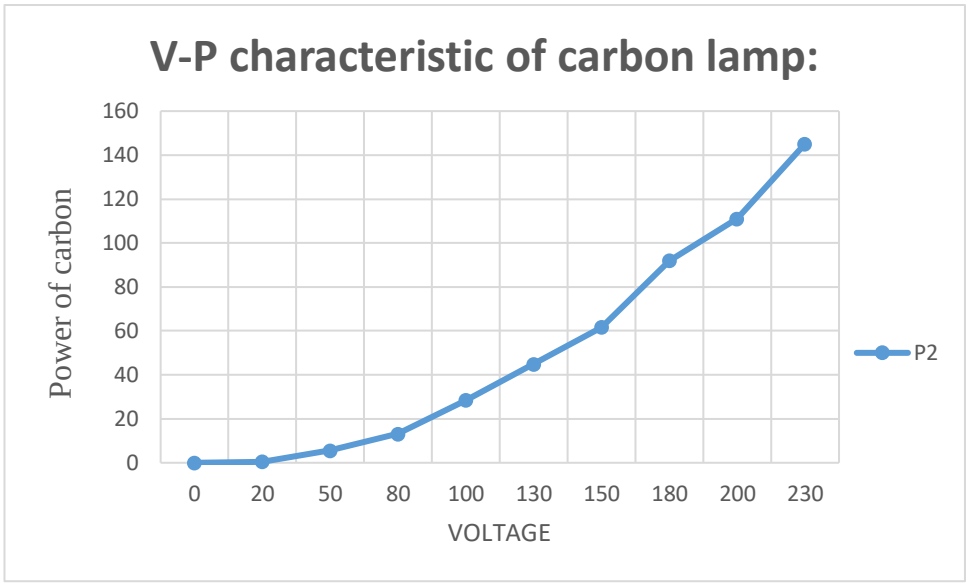
V-I characteristic: I1: for tungsten, I2: for carbon



V-P characteristic of tungsten lamp:



V-P characteristic of carbon lamp:



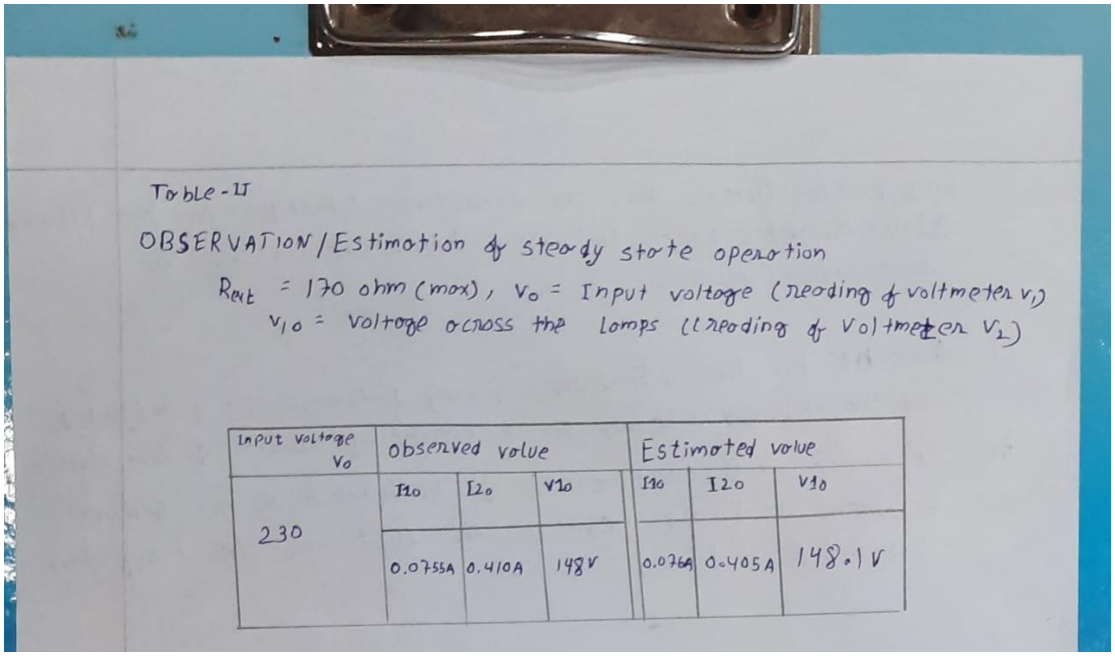


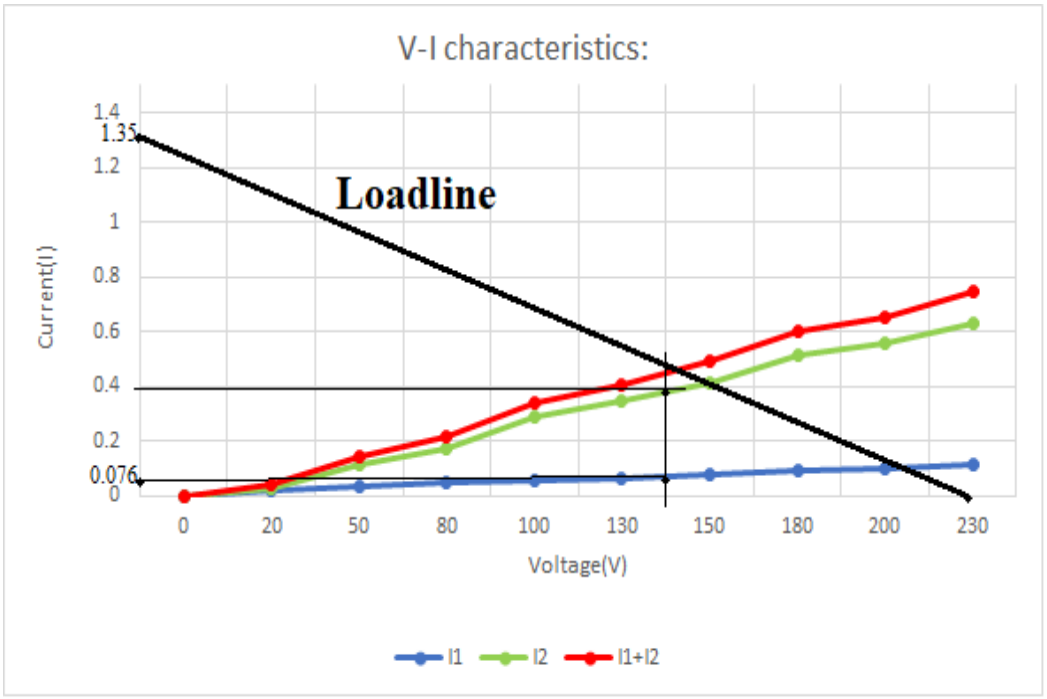
Table - II

OBSERVATION / Estimation of steady state operation

R_{ext} = 170 ohm (max), V_o = Input voltage (reading of voltmeter V_1)

V_{lo} = voltage across the lamps (reading of Voltmeter V_2)

Input voltage V_o	observed value			Estimated value		
	I_{1o}	I_{2o}	V_{1o}	I_{1o}	I_{2o}	V_{1o}
230	0.0755A	0.410A	148V	0.076A	0.405A	148.1V



DISCUSSIONS :

1) How will you interpret the V-I characteristics of two different incandescent lamps?

Ans When we plot the voltage/current graph its usual to plot the voltage (the dependent variable) along the horizontal axis and the current along the vertical axis for an incandescent lamp. the resulting graph will be curve - i.e non-linear - confirming that the metal does not obey ohm's law. This means that the resistance at any point along the graph will be the reciprocal of the tangent of the curve at that particular points. Lamp of different power rating will produce two different power curves, with the more powerful lamp having the lower resistance values at corresponding voltages

2) Why do the reading differ for increasing and decreasing value of the lamp voltages

Ans As the voltage increases, then so does the current drawn, for a particular resistance (Basic ohms Laws) However the resistance of an incandescent filament is not constant and varies with temperature, so the relationship between voltage and current

will not be linear as, the resistance changes, As the filament glows brighter with increased temperatures so the resistance alters

3) Account for the difference, if any between the predicted and the observed steady state operating points of the circuit

Ans The temperature coefficient of resistance of the carbon filament is found negative while that for the tungsten filament is found positive

Conclusions

→ characteristics of tungsten and carbon filament lamp have been exemplified

→ The nonLinearity of the filament resistance is demonstrated

→ The temperature coefficient of resistance of the carbon filament is found negative with that the tungsten filament is found positive.