



***THE HASHMITE UNIVERSITY
ELECTRICAL ENGINEERING DEPARTMENT
ELECTRICAL MACHINES LAP***

Lab Sheet

DC-Series Motor

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DC-Series Motor

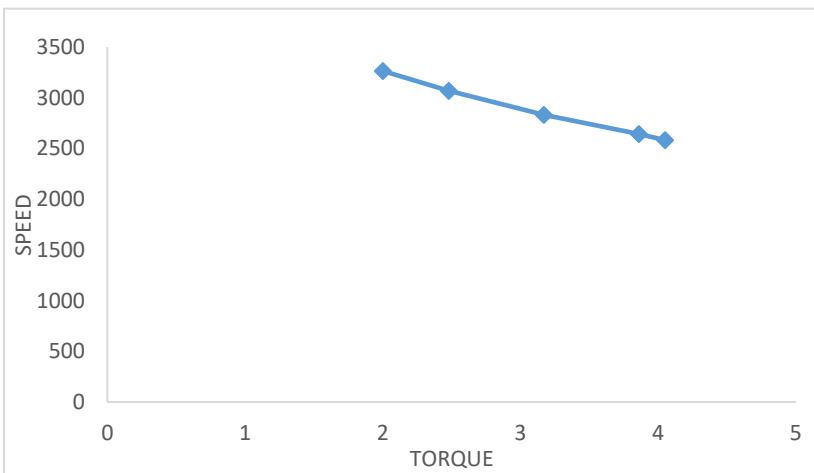
A) Measuring some characteristics of DC series motor.

Table 5-1

I_a (A)	V_t (V) constant	P_{in} (W)	n (rpm)	τ (Nm)	P_{out} (W)	$\eta\%$
4.3	220	946	3265	2	683.82	72.28%
5	220	1100	3070	2.48	797.29	72.02%
6	220	1320	2833	3.17	940.44	71.24%
7	220	1540	2644	3.86	1068.75	69.39%
7.3	220	1606	2583	4.05	1095.48	68.21%

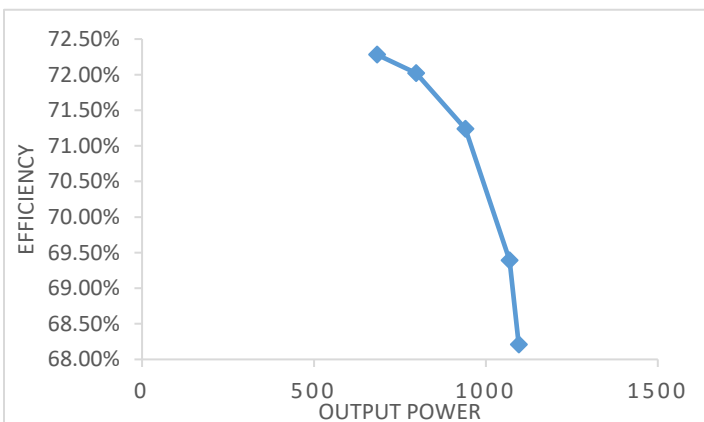
Questions:

1. Plot speed versus torque curve, Explain the nature of curve.



We can note from the figure that the torque is inversely proportional to speed, as the greater torque, the lower the speed

2. Plot efficiency versus output power curve, Explain the nature of curve.



We can note from the figure that the output power is inversely proportional to efficiency because the increase in power comes from the increase in the current, and then the losses will increase.

3. Why series motor cannot be started on **(no-load)**?

The armature current is very low at no load, and the field current is also very low. The motor will attain the enormously high speed if started at no load.

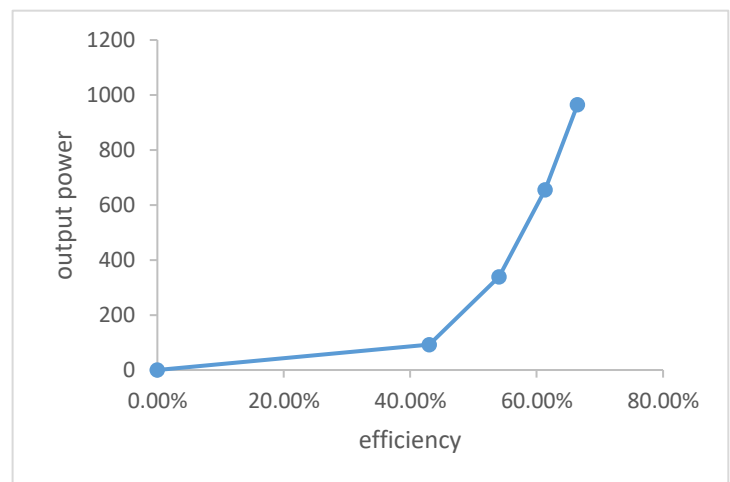
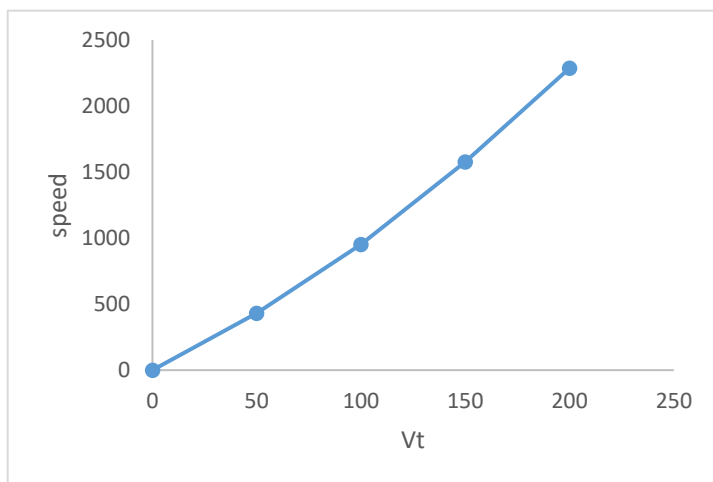
B) Speed Control of a DC series motor.

Table 5-2

I_a (A)	V_t (V)	P_{in} (W)	n (rpm)	τ (Nm)	P_{out} (W)	$\eta\%$
7.26	200	1452	2287	4.03	965.16	66.47%
7.13	150	1069.5	1578	3.97	656.033	61.34%
6.28	100	628	951	3.41	339.59	54.07%
4.28	50	214	430	2.06	92.76	43%
0	0	0	0	0	0	0%

Questions:

1. Plot the speed versus V_t curve and output power versus efficiency.



C) Reversing the Direction of Rotation of DC Series Motor.

Questions:

1. If the direction of the current through the field is changed, what will happen?

the direction of rotation reversed.

2. If the direction of the current through the armature is changed, what will happen?

the direction of rotation reversed.

3. If the direction of the current through both the armature and field is changed, what will happen? Explain why?

Nothing happens and the direction of rotation remains the same because the change in the direction of one of the two currents leads to a reversal of the direction of rotation, and if we change them together, the direction of rotation remains the same.

Conclusions:

- 1) Dc series motor have good accelerating torque and relatively huge starting torques.
- 2) Dc series motor delivers high torque during an overload.
- 3) DC series motor have low speed when overloaded.
- 4) Speed regulation in the dc series motor is quite poor.
- 5) This motor is not highly efficient in applications requiring high torque.