Lecture No. 57
Tutorial

Lecture delivered by:

Objectives

At the end of this lecture, student will be able to:

- Solve problems on speed control of DC motors

Problem No 1

- A series motor runs at 900 r/min when taking 30A at 230V. The total resistance of the armature and field circuits is 0.8Ω. Calculate the values of additional resistance required in series with the machine to reduce the speed to 500 r/min if the gross torque is:

  a) constant

  b)proportional to the speed

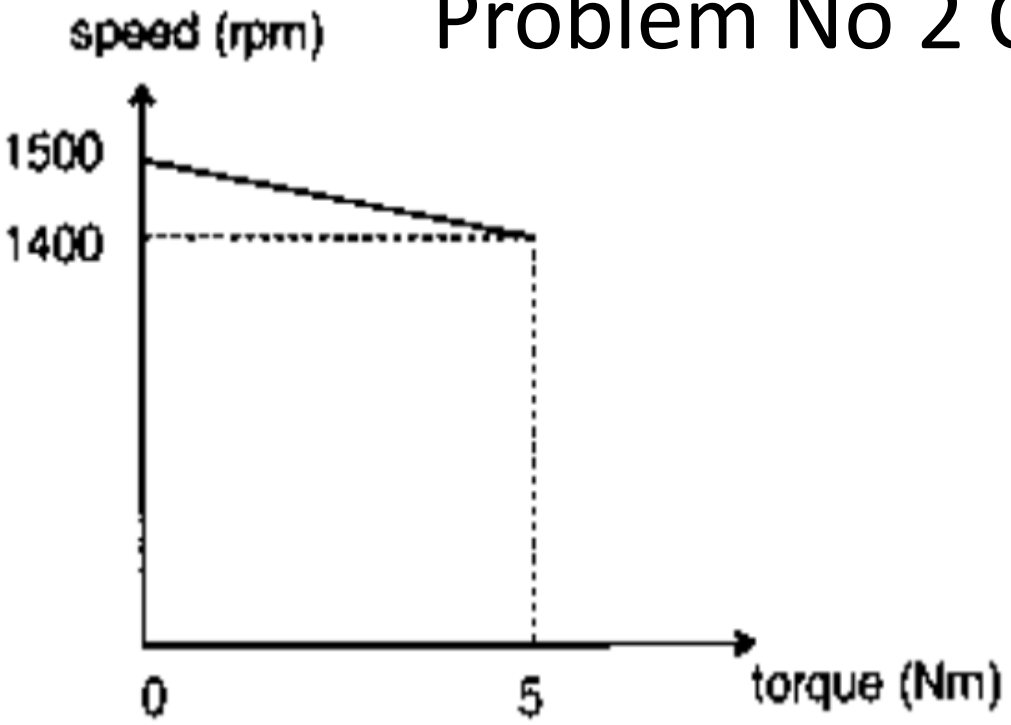
  c) proportional to the square of the speed.

  Assume the magnetic circuit to be unsaturated.

Problem No 2

- A separately excited DC motor runs at 1500 rpm under no load with 200V applied to the armature. The field voltage is maintained at its rated value. The speed of the motor, when it delivers a torque of 5Nm, is 1400 rpmas shown in the figure. The rotational losses and armature reaction is neglected.

Problem No 2 Cont…



a) What is the armature resistance of the motor?

b) What is the armature to be applied, for motor to deliver a torque of 2.5 Nm at 1400rpm?

Problem No 3

- A d.c motor takes an armature current of 50A at 220V. The resistance of the armature is 0.2Ω. The motor has 6 poles and the armature is lap wound with 430 conductors. The flux per pole is 0.03Wb. Calculate the speed at which the motor is running and the electromagnetic torque developed.

Problem No 4

- A 220 V, d.c shunt motor has Ra= 0.8 Ω and draws an armature current of 20 A while supplying a constant load torque. If flux is suddenly reduced by 10%, then immediately the armature current will become:

(a)45.5A and the new steady state armature current will be 22.2A

(b)20 A and the new steady state armature current will be 22.2 A

(c) 22.2 A and the new steady state armature current will be 45.5 A

(d)20 A and the new steady state armature current will be 25 A

Problem No 5

- A 220 V, d.c shunt motor has Ra= 0.8 Ω and draws an armature current of 20 A while supplying a constant load torque. If a 4.2 Ω resistance is inserted in the armature circuit suddenly, then immediately the armature current will become:

(a)20 A and the new steady state armature current will be 3.2 A

(b)3.2 A and the new steady state armature current will be 20 A

(c)47.2 A and the new steady state armature current will be 3.2 A

(d)3.2 A and the new steady state armature current will be 47.2 A

Summary

- Understand and be able to use separately excited DC motor
- Understand and be able to use DC Shunt motor
- Understand and be able to electromagnetic torque