EEE 269

Full marks: 20

Class Test 3

Time: 30 min + 5 min

Q. 1. (10)

A 50-hp, 250-V 1200 r/min dc shunt motor with compensating windings has an armature resistance (including the brushes and interpoles) of 0.06 Ω. Its field circuit has a resistance **R_F of 25 Ω** with adjustable resistance **R_{adj}**, variable in 0~100 Ω. Which produces a no-load speed of 1200 r/min. There are 1200 turns per pole on the shunt field winding. The magnetization curve of this machine is shown in Fig. 1.

(a) For some load, when R_{adj} = 25 Ω, the speed of the motor is 1250. Calculate the armature current I_A, converted power P_{conv} and induced torque.
(b) For the armature current calculated in (a), Find the range of speed achieved by this motor by field resistance control method.
(c) Calculate the total starting resistance and number of stages necessary if we want to limit the armature current between the value calculated in (a) and twice that.

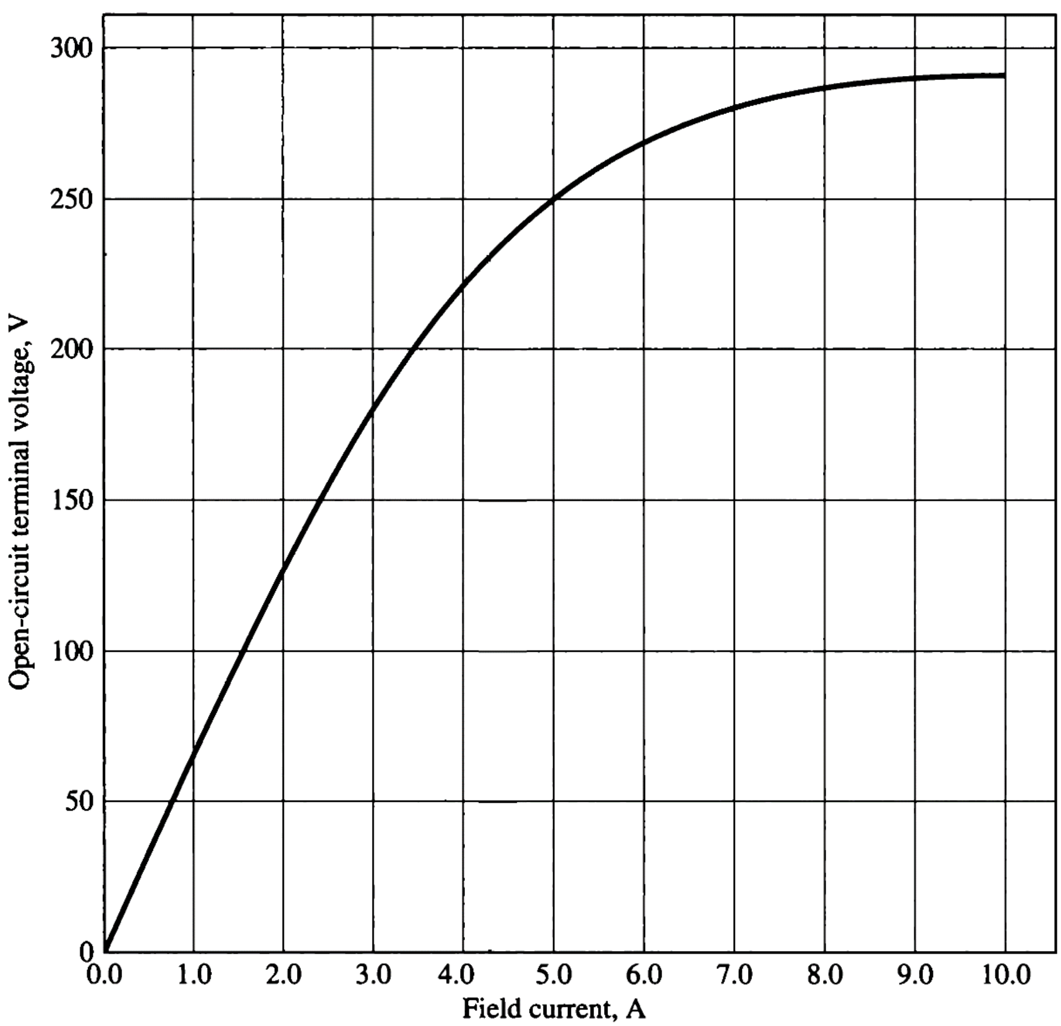

FIGURE 8–9
The magnetization curve of a typical 250-V dc motor, taken at a speed of 1200 r/min.

Q. 2 (05)

The motor described in Q. 1 is being used as a generator. If shaft speed is 1200 r/min, $R_{adj} = 25\ \Omega$, then,

(a) What is the no load voltage?
(b) After some electrical load is connected, the terminal voltage drops to 200 V. What is the armature current?

Q. 3 (05)

How does the R_A control method affect the no-load speed of a separately excited dc motor? Explain with relevant curve/equation.