Quiz 4

A 4-pole, long-shunt lap-wound compound generator delivers a load current of (50 A) at (500 V). The armature resistance is (0.03 Ω), series field resistance is (0.04 Ω) and shunt field resistance is (200 Ω). The brush drop may be taken as (1V). Determine the e.m.f. generated. Calculate also the no. of conductors if the speed is (1200 r.p.m) and flux per poles (0.02 Wb). Neglect armature reaction.

Solution:

$$I_{sh} = \frac{500}{200} = 2.5 \text{ A}$$

$$I_a = I_{sh} + I = 50 + 2.5 = 52.5 \text{ A}$$

$$\text{Series field drop} = 52.5 \times 0.04 = 2.1 \text{ V}$$

$$\text{Armature drop} = 52.5 \times 0.03 = 1.575 \text{ V}$$

$$\text{Brush drop} = 2 \times 1 = 2 \text{ V}$$

$$\text{e.m.f } E_g = 500 + 2.1 + 1.575 + 2 = 505.67 \text{ V}$$

now,

$$E_g = \frac{Z \cdot \phi \cdot n}{60}\left(\frac{p}{a}\right)$$

$$505.67 = \frac{Z \times 0.02 \times 1200}{60}\left(\frac{4}{4}\right)$$

$$Z = 1264$$