

**Electrical Engineering Department**

EE 306-01

Term 031

Sequence #

Quiz #6

Student Id #

Student name

A shunt-connected generator has 4 poles and its armature is lap-connected with 576 conductors. The armature and field resistances are 0.1 Ohms and 100 Ohms respectively. The flux per pole is 30 mWb. The generator supplies 3.5 kW to a load connected to its terminals at 120-V. Determine the generator speed.

Solution

$$I_t = P/V_t = 3500/120 = 29.17 \text{ A}$$

$$I_f = V_t/R_f = \frac{120}{100} = 1.2 \text{ A}$$

$$\therefore I_a = I_f + I_t = 30.37 \text{ A}$$

$$E = V_t + I_a R_a = 120 + 30.37 \times 0.1$$

$$= 123 \text{ V}$$

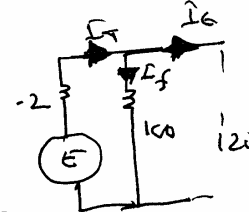
$$= k \phi \omega$$

$$k = \frac{PZ}{2\pi a}$$

$$= \frac{4 \times 576}{2\pi (4)} = 91.67$$

$$\omega = \frac{E}{k\phi} = \frac{123}{91.67 \times 30 \times 10^{-3}}$$

$$N = \frac{60 \omega}{2\pi}$$



$$P = 4 \quad \phi = 30 \text{ mWb}$$

$$a = 4 \quad Z = 576$$

$$= 44.72 \text{ rad/sec}$$

$$= \underline{\underline{427 \text{ RPM}}}$$

## Electrical Engineering Department

EE 360-01

Term 071

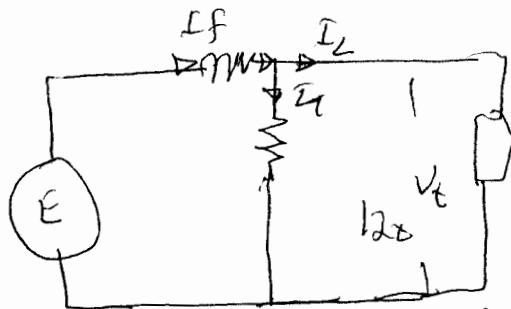
Sequence #

Quiz #3

Student Id #

Student name

A shunt-connected generator has 4 poles and its armature is lap-connected with 576 conductors. The armature and field resistances are 0.1 Ohms and 100 Ohms respectively. The flux per pole is 30 mWb. The generator supplies 3.5 kW to a load connected to its terminals at 120-V. Determine the generator speed.



$$I_L = \frac{3500}{120} = \frac{P_{out}}{V_t} = 29.17$$

$$I_f = \frac{V_t}{R_f} = \frac{120}{100} = 1.2 \text{ A}$$

$$I_a = I_L + I_f = 29.17 + 1.2 = 30.37$$

$$E = V_t + I_a R_a = 120 + 30.37(0.1) = \underline{\underline{123 \text{ V}}}$$

$$E = k \phi \omega$$

$$k = \frac{pZ}{2\pi A} = \frac{4(576)}{2\pi(4)} = 91.67$$

$$\omega = \frac{E}{k\phi} = \frac{123}{91.67(30) \times 10^{-3}} = 44.71 \text{ rad/sec}$$

$$N = \underline{\underline{427 \text{ rpm}}}$$