

1) A ^{DC} generator is connected to a 60Ω load and supplied with a current of $10A$. If the armature resistance is 7Ω . Calculate the terminal voltage and generated emf.

Soln. $R_L = 60\Omega$.

$$I_a = 10A$$

$$R_a = 7\Omega$$

$$V_T = ?$$

$$E_g = ?$$

$$V_T = E_g - \underline{I_a R_a}$$

$$E_g = V_T + \underline{I_a R_a}$$

$$V_T = R_L \times I_a$$

$$V_T = 60 \times 10$$

$$V_T = 600V$$

$$E_g = 600 + 10 \times 7$$

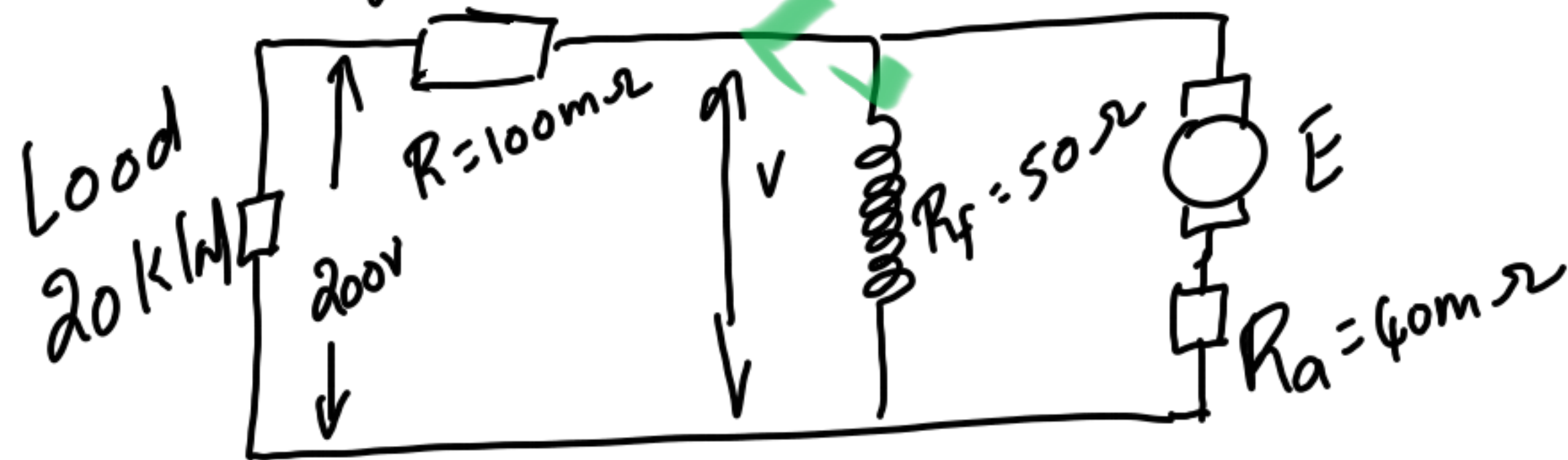
$$E_g = 600 + 70$$

$$E_g = 670 \text{ V}$$

2) A Shunt generator Supplies a 20kW load at 200V through Cable of Resistance $R = 100 \text{ m}\Omega$. If the field winding Resistance $R_f = 50 \Omega$ and the armature Resistance is $40 \text{ m}\Omega$. Determine.

- the terminal voltage
- the emf generated in the armature

V_T
 E_g



$$P_L = V \cdot I_L$$

$$I_L = \frac{P_L}{V}$$

$$I_L = \frac{100}{\cancel{20000} \cancel{200}}$$

$$I_L = 100 \text{ A}$$

Voltage drop across cable.

$$V_D = I_L \times R$$

$$= 100 \times 100 \times 10^{-3}$$

$$V_D = 10 \text{ V}$$

Terminal voltage.

$$V_T = V_L + V_D$$

$$V_T = 200 + 10$$

$$V_T = 210 \text{ V}$$

$$\text{ii) } E_g = V_T + I_a R_a$$

Current across the armature.

$$I_a = I_L + I_f$$

Field Current:

$$I_f = \frac{V}{R} = \frac{210}{50}$$

$$I_f = 4.2 \text{ A}$$

$$I_a = 100 + 4.2$$

$$I_a = 104.2 \text{ A}$$

$$E_g = V_T + I_a R_a$$

$$E_g = 210 + 104.2 \times 40 \times 10^{-3}$$

$$E_g = 214.17 \text{ V}$$

Duration - 2 hrs.

Marks $\rightarrow$ 100

$\rightarrow$ Question paper + Formula sheet.

$\rightarrow$ Answer script

$\rightarrow$ + Calculator.

$\rightarrow$ Answer all the questions.

$\rightarrow$ 4 $\rightarrow$ Questions, $\rightarrow$ 25 marks.

$$25 \times 4 = 100$$

Question (1)

a $\rightarrow$ (5)

b $\rightarrow$ (10)

c $\rightarrow$ (7)

d $\rightarrow$ (8)

$\rightarrow$ Theorem Statement.

$\rightarrow$ Maximum power transfer $\downarrow$
Calculation.

$\rightarrow$ RC $\rightarrow$ transient

$\rightarrow$ Average value, form factor,
Rms, average value, ϕ , etc.

$\rightarrow$ RLC, RL, RC $\rightarrow$ Complex Calculations

$\rightarrow$ PF, Reactive power, Active power
Apparent power.

→ Transformer → 1

→ DC machines → Principles

(or) → Components of machine.

→ Machines.

→ 3 phase → power