Lecture 4

Topics covered

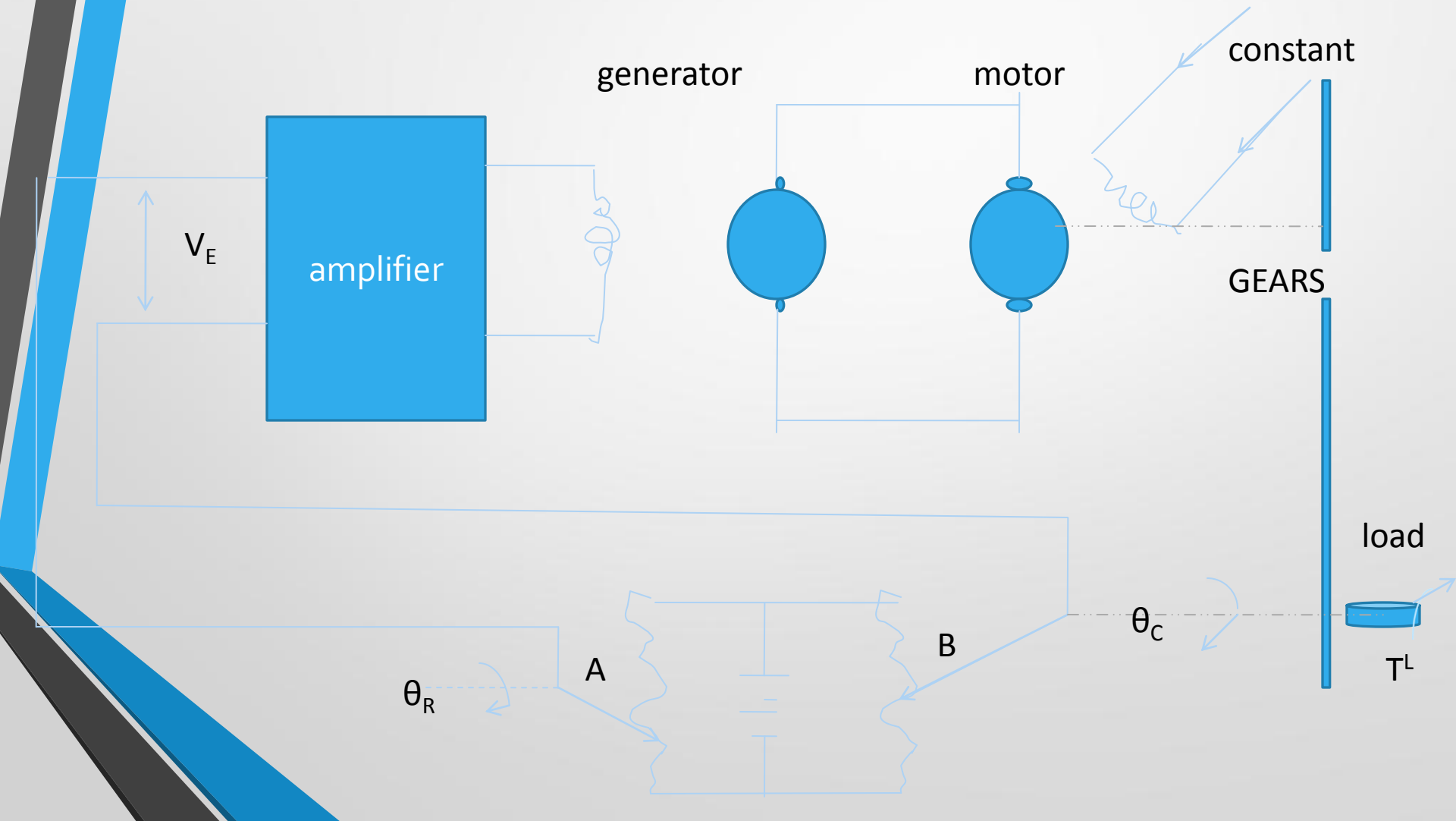
Servomechanism

Servo mechanism

- It is restricted to feed back control system in which controlled variable is a mechanical position or time derivative of position (e.g velocity or acceleration)

$\theta_E = \theta_R - \theta_C$

$Vc = Kp\ \theta_E$



Transfer function

- Laplace transfer of output to the Laplace transform of the input
- ADVANTAGE AND FEATURES
- It gives the mathematical model of all components
- Laplace approach simple algebra
- Value is dependent on the parameters of the

System and independent of the values of input and out put

Helps in determining about poles,zeros, character equation

Stability analysis of the system

- Disadvantages
- Linear time variant system
- Provide any information concerning the physical structure of the system
- Effects arising due to initial conditions are neglected. Initial condition lose their importance

Classification of the system

- Natural system
- Manmade system
- Combined

Some of the classifications

i) Time varying and Time invariant System
ii) Linear and non linear systems
iii) Continuous and discrete time control system
iv) Deterministic& stochastic control sytem

v)Lumped and distributed system

VI) Single input single output and multiple input and multiple out put system

VII) servo system

VIII)Open and closed system

IX) Causal and non-Causal system

Causal and non causal sytem

- Causal system: A system whose out put depends on present and past
- $y(t)= x(t)+ x(t-1)$
- Non causal system: output depends upon past present and future
- $y(t)= x(t)+ x(t+1)$

Transfer function with impulse response

TRANSFER FUNCTION

$$\frac{C(s)}{R(s)} = G(S)$$

$$C(s) = R(s)G(S)$$

TIME RESPONSE IS TAKEN BY TAKING LAPLACE INVERSE

If input is specified as unit impulse AT t=0 then R(s)= 1

$$C(s) = 1 * G(S)$$

$$\ell^{-1}C(s) = \ell^{-1}G(S)$$

$$C(t) = g(t)$$