SNS COLLEGE OF TECHNOLOGY

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COIMBATORE-35

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEB201 DC Machines & Transformers

II YEAR / III SEMESTER

Unit 3 – Testing of DC Motor

Topic 2: Brake Test

What We'll Discuss

TOPIC OUTLINE

Testing of DC Machines

Brake test

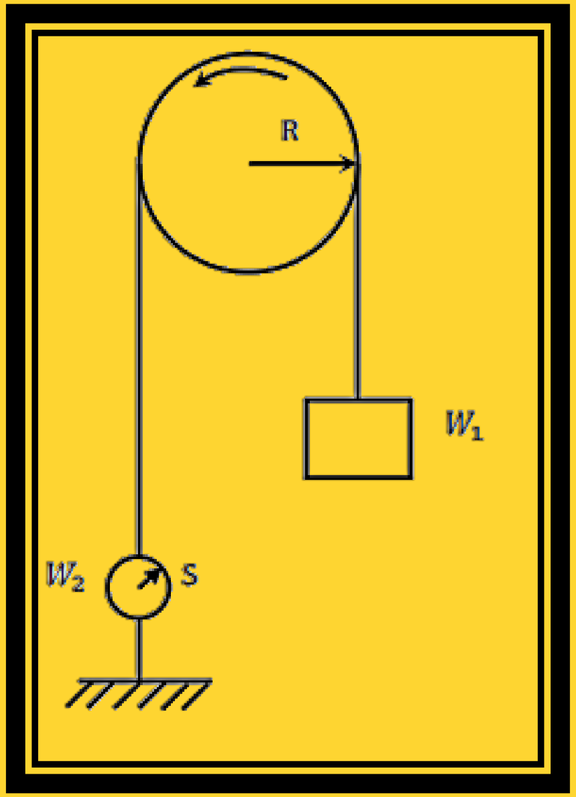
Assessment

Testing of DC Motor

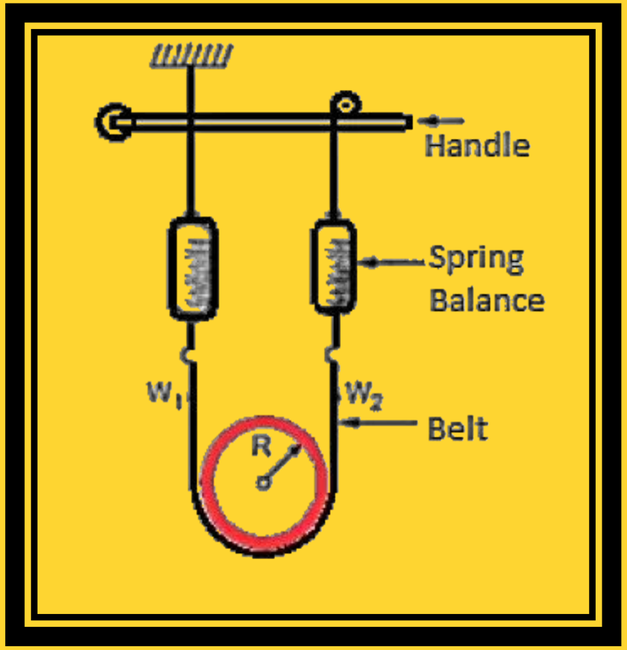
Testing of DC machines can be broadly classified as

i) Direct method of Testing
ii) Indirect method of testing

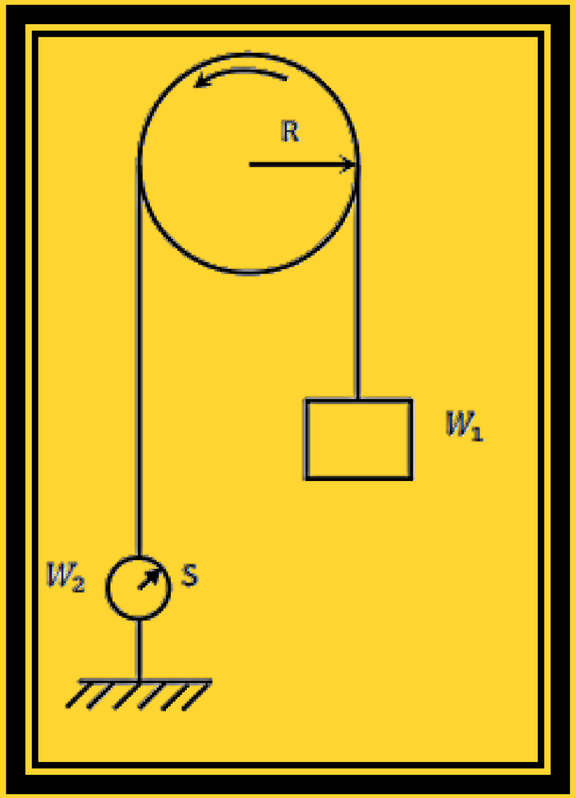
Brake Test

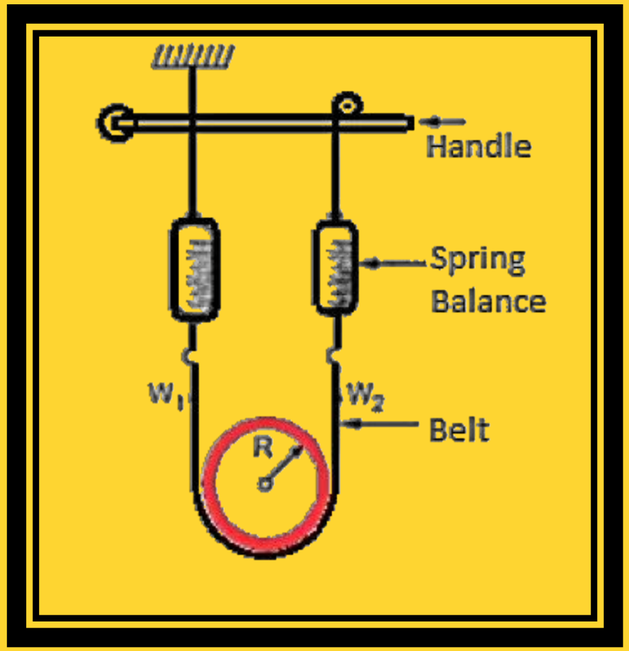


$\eta m = (w\ (S1 - S2)\ 9.81) / VtIl * 100$



Brake Test





Let W_1 = suspended weight in kg

W_2 = reading on spring balance in kg-wt

The net pull on the band due to friction at the pulley is $(W_1 - W_2)$ kg. wt. or 9.81 $(W_1 - W_2)$ newton.

If R = radius of the pulley in metre

and N = motor or pulley speed in r.p.s.

Then, shaft torque T_{sh} developed by the motor

$= (W_1 - W_2)\,R$ kg-m $= 9.81\,(W_1 - W_2)\,R$ N-m

Motor output power $= T_{sh} \times 2\pi N$ watt

$= 2\pi \times 9.81\,N(W_1 - W_2)\,R$ watt

$= 61.68\,N(W_1 - W_2)\,R$ watt

Let V = supply voltage ; I = full-load current taken by the motor.

Then, input power = VI watt

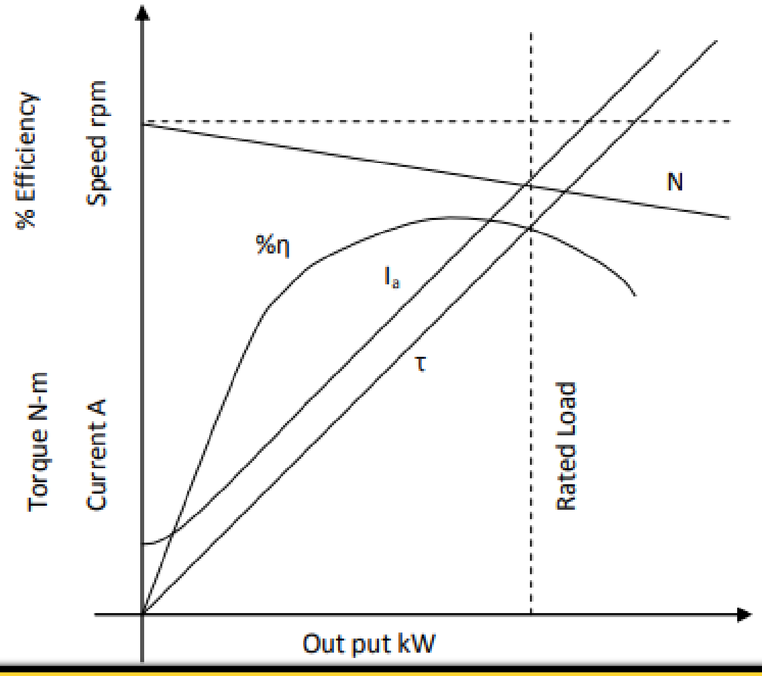
$$\therefore \quad \eta = \frac{\text{Output}}{\text{Input}} = \frac{61.68\,N(W_1 - W_2)R}{VI}$$

Brake Test

Graphs:

(a) Speed ~ Output (b) Torque ~ Output (c) Induced emf ~ Output (d) Flux per pole ~ Output (f) Efficiency ~ outpute(f) Speed ~ Torque

Model Graphs:

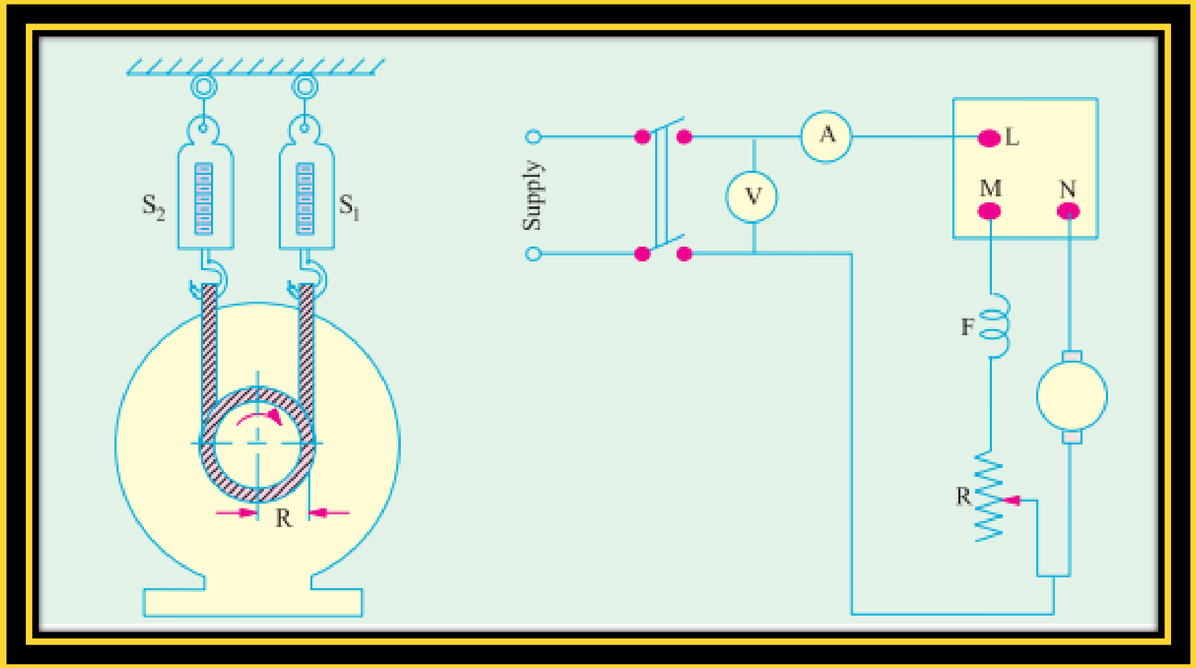


Brake Test Disadvantages:

- Spring balance readings are not stable ,they always fluctuate
- Some of the output power is wasted
- Frictional torque at a particular setting doesn't be similar.

RECALL

1. Conduct a Brake test in the laboratory with the circuit



RECALL

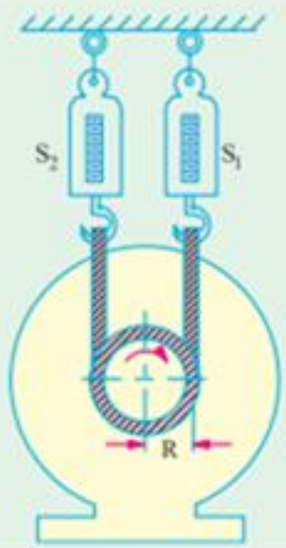


Fig. 31.2 (a)

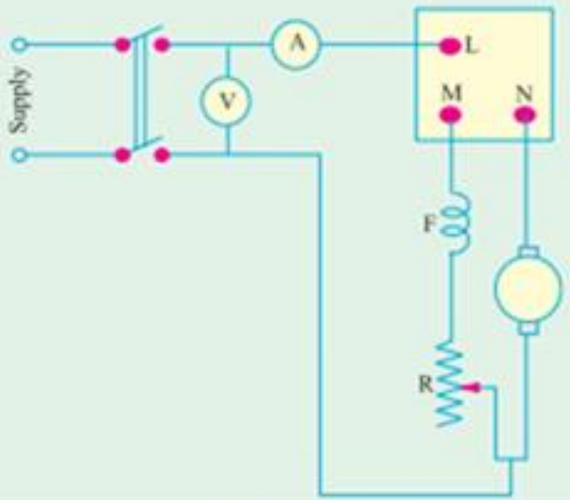


Fig. 31.2 (b)

Example 31.2(a). *The following readings are obtained when doing a load test on a d.c. shunt motor using a brake drum :*

Spring balance reading	*10 kg and 35 kg*	*Diameter of the drum*	*40 cm*
Speed of the motor	*950 r.p.m.*	*Applied voltage*	*200 V*
Line current	*30 A*		

Calculate the output power and the efficiency. **(Electrical Engineering, Madras Univ. 1986)**

Solution. Force on the drum surface $F = (35 - 10) = 25$ kg wt $= 25 \times 9.8$ N

Drum radius $R = 20$ cm $= 0.2$ m ; Torque $T_{sh} = F \times R = 25 \times 9.8 \times 0.2 = 49$ N

$N = 950/60 = 95/6$ r.p.s. ; $\omega = 2\pi\,(95/6) = 99.5$ rad/s

Motor output $= T_{sh} \times \omega$ watt $= 49 \times 99.5 = 4,876$ W

Motor input $= 200 \times 30 = 6000$ W ; $\eta = 4876/6000 = 0.813$ or **81.3%**

THANK YOU