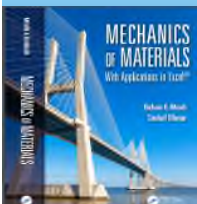


# MECHANICS OF MATERIALS: WITH APPLICATIONS IN EXCEL CHAPTER 2: TORSIONAL LOADS

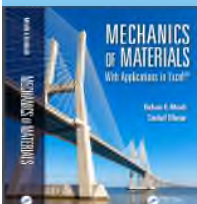
## LECTURE 10

### 2.5 DESIGN OF POWER-TRANSMISSION SHAFTS



# Lecture Outline

- Definitions
- Units of Power
- Examples



## Lecture 10

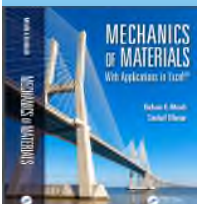
### Chapter 2. Torsional Loads

# Definitions

- Shafts are primarily used to transmit power from one location to another:

$$P = T\omega$$

- P: Transmitted power; i.e. the rate at which work is performed by the transmission shaft
- T: Internal torque in the transmission shaft
- $\omega$ : Angular speed



# Units of Power

- SI System of Units:

$\text{m}\cdot\text{N}/\text{s} = \text{joules}/\text{s} = \text{watt (W)}$

or

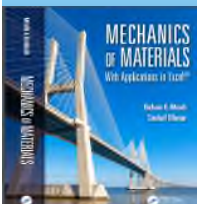
$\text{m}\cdot\text{kN}/\text{s} = \text{kilowatt (kW)}$

- US Customary System:

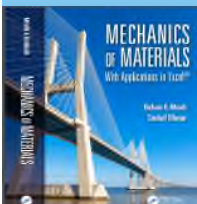
$\text{in}\cdot\text{lb}/\text{s}$  or  $\text{ft}\cdot\text{lb}/\text{s}$

or

horsepower (hp) where  $1 \text{ hp} = 550 \text{ ft}\cdot\text{lb}/\text{s} = 6600 \text{ in}\cdot\text{lb}/\text{s}$



# Examples



## Lecture 10

### Chapter 2. Torsional Loads