



College of Engineering & Technology

Department: Mechanical Engineering

Lecturer: Dr. Rola Afify

Course Code: ME416

Marks: 20

Time: 12:30 – 2:00

Date: 11/11/2015

Name:

R.N.:

Answer the following questions:

Question one (10 marks)

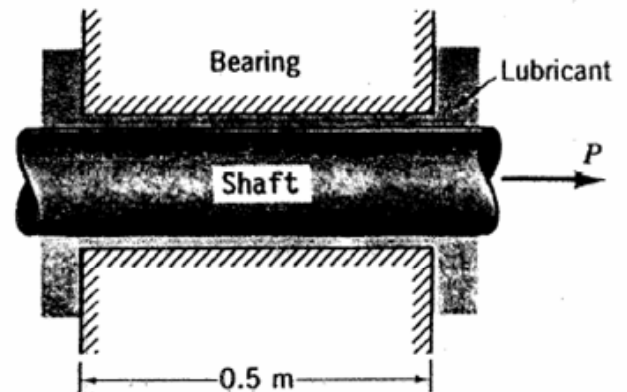
A) Define:

i- Density:

ii- specific weight:

iii- Kinematic viscosity:

- B) A 25 mm diameter shaft is pulled through a cylindrical bearing as shown in Figure. The lubricant that fills the 0.3 mm gap between the shaft and bearing is oil having a kinematic viscosity of $8 \times 10^{-4} \text{ m}^2/\text{s}$ and a specific gravity of 0.91. Determine the force P required to pull the shaft at a velocity of 3 m/s. Assume the velocity distribution in the gap is linear.



Question two (10 marks)

A) Define Streamline:

B) Write the general form equation for:

i- Streamline in 3D:

ii- Velocity in vector form in 3D:

iii- Acceleration in 2D:

C) If $\vec{V} = 3x \vec{i} + 2y \vec{j} - 2z \vec{k}$, determine:

i- Velocity at origin:

ii- Velocity at x-axis:

iii- Acceleration in vector form: