14. A gas at 40°C under a pressure of 1,800 kPa, abs has a unit weight of 400 N/cu.m. Find the molecular weight of the gas.

15. Helium at 170 kPa, abs and 15∘C isentropically compressed to one-fifth of its original volume. What is its final pressure if k = 1.667?

16. A 12-inch diameter circular plate is placed over a fixed bottom plate with a 0.1-inch gap between the two plates filled with glycerin. If the absolute viscosity of glycerin is 0.95 Pa.s, determine the torque required to rotate the circular plate slowly at 2 rpm. Assume that the velocity distribution in the gap is linear and that the shear stress on the edge of the rotating plate is negligible.
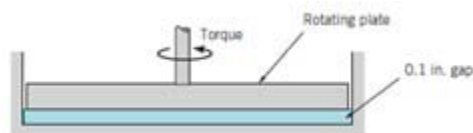
17. The Burj Khalifa skyscraper being built in the United Arab Emirates became the world's tallest building in 2008 with a height of at least 828 m, although its final height remains a secret. Estimate the ratio of pressure at the projected height of the building to the pressure at its base, assuming the air to be at a common temperature of 60°C.

18. A 0.15 m diameter jet with a velocity of 40 m/s impinges on a single vane moving in the same direction at a velocity of 15 m/s. If the deflection angle denoted as β is 135∘ and friction losses over the vane are such that the relative velocity at outlet is 95% of relative velocity at inlet (i.e., $u_2 = 0.95\ u_1$). What is the absolute velocity at outlet?

19. Using item no.18, what is the direction of absolute velocity at outlet?

20. Using item no.18, determine the magnitude and direction of resultant force exerted by the water on the vane.

21. Water flows through a pipe reducer. The static pressures at (1) and (2) are measured by the inverted U-tube manometer containing oil of specific gravity of SG less than unity. Determine the manometer reading "h".

22. Find the pull on the bolts in the figure. Assume ideal flow. Let d_1 = 5 cm, d_2 = 10 cm, d_3 = 2.5cm, γoil= 7.85 kN/cu.m, γw= 9.81 kN/cu.m and y = 2 m.