UCE 305 FLUID MECHANICS
TUTORIAL NO. 2 (MEASUREMENT OF FLUID PRRSSURE)
(Assume data suitably, wherever required)

Q1: An open tank contains mercury up to a depth 3 m and above of water up to a depth 2 m and above water an oil of specific gravity 0.92 for a depth of 1.2 m. Find the intensity of pressure (i) at the interface of oil and water (ii) at the interface of water and mercury (iii) at the bottom of tank.

Q2: Find the pressure represented by a column of (i) 10 cm of water (ii) 5 cm of oil of relative density 0.75 and (iii) 2 cm of mercury.

Q3: For **Figures 1 to 6**, determine the pressure in the pipe or the difference of pressures in the pipes (as the case may be).

Q4: A differential manometer connected to pipes **A** and **B** carrying liquids of specific gravity 0.90 and 0.80, respectively. The point **B** is 0.80 m below **A**. If mercury level in the left limb is 0.20 m below **A** and the difference in levels of mercury in two limbs is 0.95 m, find the pressure difference between **A** and **B**.

Q5: For a pressure of -10.9 kPa at **A**, find specific gravity of liquid **B** in the manometer (**Figure 7**).

Q6: Pipes **A** and **B** contain water under pressure of 276 kPa and 138 kPa, respectively (**Figure 8**). Determine deflection of mercury in the manometer.

Q7: The tank in **Figure 9** is closed at top and contains air pressure**.** Calculate the gauge reading at **A** for the manometer reading shown in the figure.

Q8: The levels of mercury in a **U**-tube manometer of diameter 10 mm is 150 mm. If 15 cm^3 of water is poured into one of the two limbs of the manometer, find the difference of levels of mercury in the two limbs of the manometer.

Q9: A **U**-tube differential manometer containing mercury is connected to two points 15 m apart, on pipeline carrying water. The manometer reading is 150 mm. Determine the pressure difference between the two points if the pipe (**i**) is horizontal (**ii**) makes an angle of 15^o with the horizontal and the flow is (**a**) upward and (**b**) downward.

Q10: Figure 10 shows a conical vessel having its outlet at **A** to which a U-tube manometer is connected. The reading of manometer given in the figure shows when vessel is empty. Find the reading of manometer when vessel is completely filled with water.

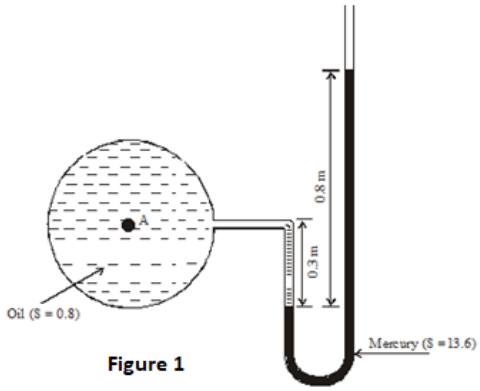

Figure 1

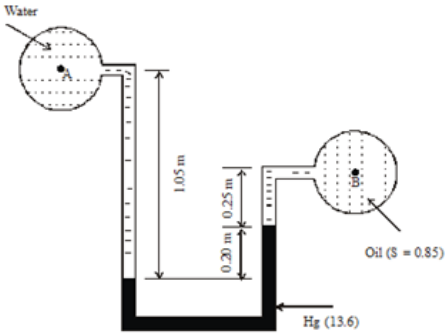

Figure 2

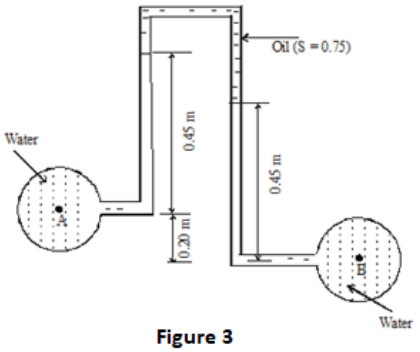

Figure 3

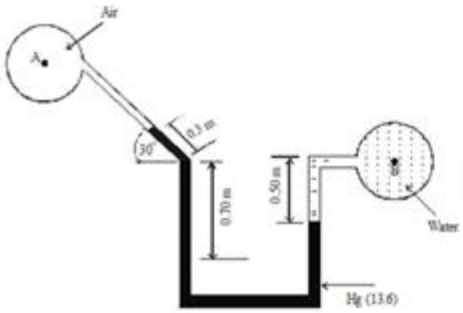

Figure 4

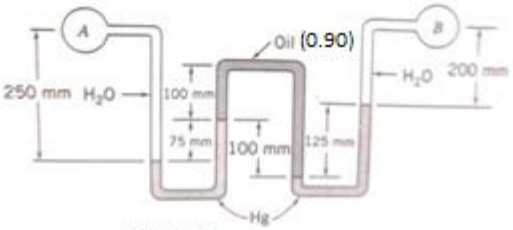

Figure 5

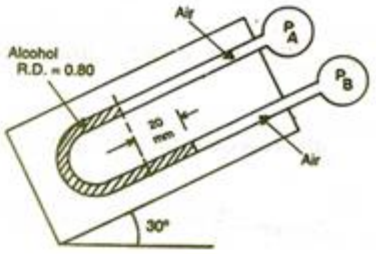

Figure 6

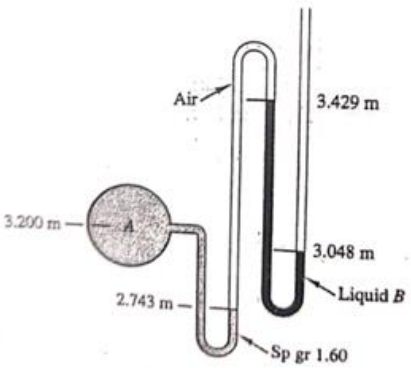

Figure 7

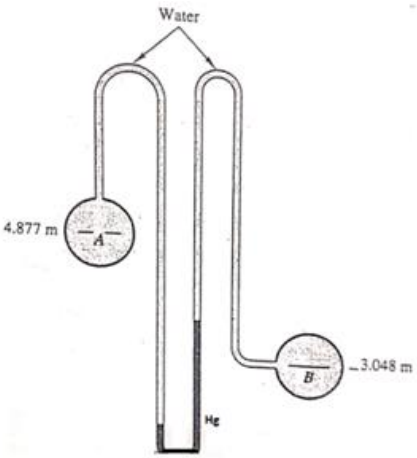

Figure 8

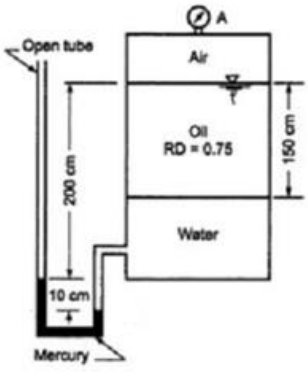

Figure 9

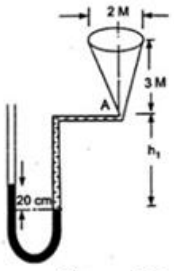

Figure 10

Answers:

Q1: (10.83, 30.45, 430.7 **kPa**); **Q2**: (981, 367.87, 2668.32 **Pa); Q3: (**104.38, 18.47, - 1.47, 81.8, 25.3, 0.0785 **kPa); Q4:** 125.76 **kPa; Q5:** 1; **Q6**: 1.26 m; **Q7**: - 3.58 **kPa**; **Q8**: 0.014 **m**; **Q9**: (18.54, 56.63, - 19.52 **kPa**); **Q10**: 0.43 **m**