Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐ **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(Petroleum Refinary Engineering) (2013 Onwards) (Sem.–3)

FLUID FLOW

Subject Code : BTPC-302

M.Code : 72191

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

a) Explain the concept of Newtonian fluid.

b) Explain the concept of Buoyancy force.

c) What is dimensional analysis?

d) Which device is used for low pressure difference measurement and why?

e) What is drag? How is it important to consider into calculations/

f) Basic difference between fan and blower.

g) What is surface tension and discuss its importance in fluid flow?

h) What are the important characteristics of streamline flow?

i) What is Reynolds number? Why is it so important?

j) What is NPSH? Explain available and required NPSH with the help of Figure?

SECTION-B

2. Explain Manometer and working principle of differential manometers.

3. Derive the Bernoulli's equation, limitations and applications of Bernoulli's theorem.

4. A geometrically similar model of an air duct is built 1:30 scale and tested with water which is 50 times more viscous and 800 times denser than air. When tested under dynamically similar conditions, the pressure drop is 2.25 atm in the model. Find the corresponding pressure drop in the full-scale prototype. Viscosity of water is 1 centipoise. Friction Coefficient is given by 0.079 $Re^{-0.25}$.

5. A siphon consisting of a 3 cm diameter tube is used to drain water from a tank. The outlet end of the tube (atmospheric) is 2 m below the water surface in the tank. Neglecting friction, calculate the discharge. If the peak point of the siphon is 1.4 m above the water surface in the tank, estimate the pressure of fluid at the point of siphon. Viscosity of water is 1 centipoise.

6. Write the Dimensionless Number (Nos.5) with their physical significance. Explain the Buckingham's method for dimensional analysis.

SECTION-C

7. An oil pipeline and a 1.3 m^3 rigid air tank are connected to each other by a manometer, as shown in Figure. If the tank contains 15 kg of air at 80°C, determine:

   a) The absolute pressure in the pipeline and

   b) the change in delta h when the temperature in the tank drops to 20°C. Assume the pressure in the oil pipeline to remain constant, and the air volume in the manometer to be negligible relative to the volume of the tank.

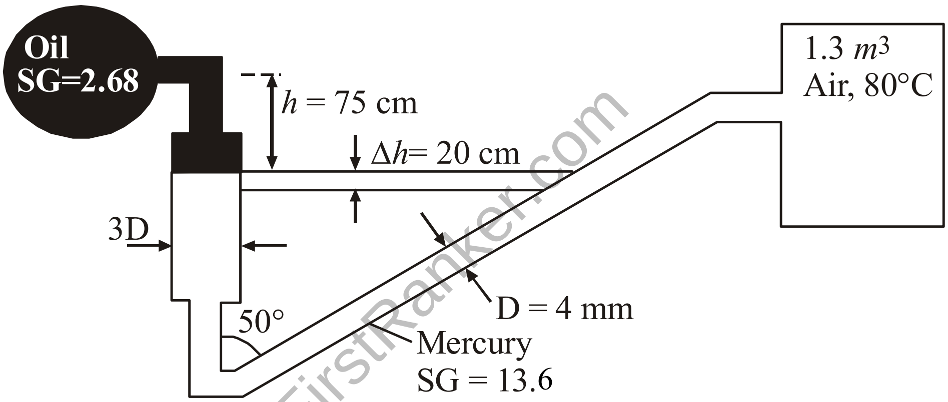

FIG.1

8. Details the Multistage centrifugal pumps for high head and flow rate. Also, Specify speed of pump and Minimum speed of the pump to start the fluid flow.

9. A Pump draws oil (specific gravity 0.85) from a storage tank and discharges it to an overhead tank. The mechanical energy delivered by the pump to the fluid is 60 J/kg. The velocities at the suction and discharge points of the pumps are 2m/s and 7 m/s, respectively. Neglecting friction losses and assuming kinetic energy correction factor to be unity, determine the pressure developed by the pump (in kN/m^2).

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.