

**B.E (FTBE) 2<sup>ND</sup> YEAR-1<sup>ST</sup> SEMESTER SUPPLEMENTARY EXAMINATION 2023****FLUID FLOW**

Time: 3 Hours

Full Marks: 100

Use Separate Answer Script for each Part

**Part-I ( Full marks 50 )****Answer any five questions (10 x 5 = 50 )**

1. For the case where a Newtonian liquid is flowing in the laminar regime through a circular tube , show that the distribution of velocity across the cross section of the pipe is parabolic in nature. Find out the relation between average velocity and the maximum possible velocity for the same case. 8 + 2
2. Draw the profile of shear stress vs. shear rate for different types of fluids mentioning examples for each type. What is the dimension of Reynold's No.? Mention it's value in different flow regime. 6 + 1+3
3. Classify different types of pumps. Name the parts of a centrifugal pump. What do you mean by 'cavitation' & 'NPSH' and how are they related? 3 + 3 + 4
4. Write the objectives of using pipe fittings in flow line. With neat sketch show the following fittings: 90 degree elbow, coupling. Write short note on 'Moody Chart'. 3 + 4 + 3
5. What do you mean by 'sphericity'? Deduce fanning friction factor ( modified) for flow through packed bed. 2 + 8
6. A horizontal pipe of non-uniform cross-section allows water to flow through it with a velocity 1 m/ sec when pressure is 50 kPa at a point. If the velocity of flow has to be 2 m/sec at some other point, what will the pressure at that point? 10
7. Draw profile of pressure drop vs. velocity as well as bed height vs. velocity of a fluid flowing through a packed bed. Mention the minimum fluidization velocity on the profile as well. Give some applications of fluidization. 5 +2 +3
8. An oil of viscosity 0.97 poise and relative density 0.90 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10m. Calculate the difference of pressure at the two ends of the pipe if 100 kg of oil is collected in a tank in 30 secs . 10

[ Turn over

**B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING  
SECOND YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2023**

**FLUID FLOW**

**Full Marks: 100**

**Time: 3hrs**

**Part-II**

**Group-A**

Answer any one question

1×10 = 10

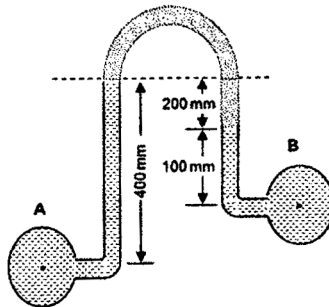
1. Why orifice meter coefficient is less than venture meter coefficient? Mention different zones of atmosphere and temperature in those zones. 4+6 = 10
2. Derive the equation for change in pressure with height in a fluid. Define pressure head and velocity head. 6+4 = 10

**Group-B**

Answer any two questions

2×20 = 40

3. (a) What are the different types of manometers?  
(b) An inverted tube differential manometer having an oil of specific gravity 0.9 is connected to two different pipes carrying water under pressure. Determine the pressure in the pipe B. The pressure in pipe A is 2 m of water. 5+15 = 20



4. (a) Write a short note on the rotameter.  
(b) A venturi meter of 15 cm inlet diameter and 10 cm throat is laid horizontally in a pipe to measure the flow of oil of 0.9 specific gravity. The reading of a mercury manometer is 20 cm. Calculate the discharge in lit/min? 5+15 = 20
5. (a) Derive the equation for volumetric flow rate in the orifice meter.  
(b) Derive the equation for change in atmospheric pressure with height. 10+10 = 20