(b) Write notes on power absorbed in bearings. **8**

6. (a) A lubricating oil of viscosity 1 poise and specific gravity 0.9 is pumped through a 30 mm diameter pipe. If the pressure drop per metre length of pipe is 20 kN/m^2, find (i) mass flow rate in kg/min (ii) shear stress at the pipe wall (iii) Reynolds number of flow, and (iv) power required per 50 m length of pipe to maintain the flow. **13**

(b) Derive a relation between coefficient of friction and Reynolds number. **7**

7. (a) A smooth plate 2 m wide and 2.5 m long is towed in oil (Specific gravity = 0.8) at a velocity of 1.5 m/s along its length. Find the thickness of boundary layer and shear stress at the trailing edge of the plate. Take kinematic viscosity of oil = 10^{-4} m^2/s. **10**

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W333

B. Tech. (Weekend)

EXAMINATION, May 2019

(Third Semester)

(Re-appear Only)

(ME)

MEW205

FLUID MECHANICS

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks.

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1. (a) Distinguish between :

(i) Ideal and Real fluids

(ii) Newtonian and Non-Newtonian fluids

(iii) Specific gravity and Specific weight. **10**

(b) Discuss stability the floating and submerged bodies. **6**

(c) State Pascal's law and hydrostatic law. **4**

2. (a) Define steady flow, rotational flow, incompressible flow and laminar flow. **8**

(b) Derive differential equation of stream line. **4**

(c) Show that stream lines and equipotential lines are cross each other at right angle. **8**

3. (a) Derive Bernoulli's equation. What are the limitations of Bernoulli's equation ? **8**

(b) A large tank has a sharp edged circular orifice of 930 mm^2 area at a depth of 3 m below constant water level. The jet issues horizontally and in a horizontal distance of 2.4 m, it falls by 0.53 m, the measured discharge is 4.3 litres/s. Find hydraulic coefficients for the orifice. **8**

(c) Classify mouthpieces. **4**

4. (a) A point P (0.5, 1) is situated in the flow field of a doublet of strength 5 m^2/s. Calculate the velocity at this point and also the value of the stream function. **12**

(b) Develop expression for the streamlines and equipotential lines for the Source flow. **8**

5. (a) Two parallel plates kept 100 mm apart have laminar flow of oil between them with a maximum velocity of 1.5 m/s. Calculate : (i) That discharge per metre width, (ii) Shear stress at the plate (iii) the difference in pressure between two points 20 m apart, (iv) velocity gradient at the plate and (v) velocity at 20 mm from the plate. Assume viscosity of oil to be 2.45 Ns/m^2. **12**

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(b) Write notes on boundary layer separation and control. **10**

8. (a) The velocity of flow in a badly corroded 7.5 cm diameter pipe is found to increase 20% as pitot tube is moved from a point 1 cm from the wall to a point 2 cm from the wall. Estimate the height of roughness elements. **15**

(b) What is Turbulence ? How is turbulent motion classified ? **5**

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