W371

B. Tech. (Weekend) EXAMINATION, 2020

(Third Semester)

(Re-appear Only)

(CE)

CEW201

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. Assume any data if missing.

1. (a) Define the terms—Compressibility, Specific Volume, Vacuum pressure, Specific Gravity.   **10**

    (b) What is surface tension ? Derive the expression for surface tension of hollow bubble.   **10**

2. (a) Discuss the phenomenon of laminar flow passing a sphere. Discuss Navier-Stokes equation of motion.   **10**

    (b) In a soap bubble of 80 mm diameter when the inside pressure is 3.45 N/m^2 above atmosphere. Find the surface tension of the bubble.   **10**

3. (a) A body has the cylindrical upper portion of 3 m diameter and 1.8 m deep. The lower portion is a curved one, which displace a volume of 0.6 m^3 of water. The center of buoyancy of the curved portion is at a distance of 1.95 m below the top of the cylinder. The Centre of gravity of the whole body is 1.20 m below the top of the cylinder. The total displacement of water is 3.9 tons. Find the meta-centric height of the body.   **15**

    (b) Differentiate between laminar and turbulent flow.   **5**

4. (a) The right limb of a simple U tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of Sp. Gr. 0.9 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the mercury level in the two limb is 20 cm. **10**

(b) Find out an expression for total pressure and centre of pressure for vertical plane surface submerged in liquid. **10**

5. Write short notes on the following : **20**

(a) Separation of boundary layer.

(b) Hydraulic gradient line.

(c) Loss at sudden expansion

(d) Meta centric height.

6. (a) A velocity potential for a two dimensional flow is given by $\phi = x^2 - y^2 + 6xy$. Calculate : **10**

(i) the stream function, and

(ii) the flow rate between the streamlines passing through points (2, 1) and (3, 2)

(b) Explain all kinds of flow in a liquid. What are stream lines, streaks lines and path lines ? **10**

7. (a) Explain the following : **10**

(i) Karman Vortex Trial

(ii) Separation of Boundary Layer.

(b) State and drive Bernoulli's equation of motion. **10**

8. (a) Explain the concept of combination of pipes. Explain the combination of pipes in series. **10**

(b) What are the various types of major losses and minor losses in pipes ? Explain major losses in detail. **10**