Roll No. ....   Total Pages : 03

BT-4/M-20   **34020**

FLUID MECHANICS-II
CE-206-E

Time : Three Hours]   [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Assume any missing data.

Unit I

1. (a) Derive an equation for laminar flow around a sphere i.e. Stokes' law used in the fluid mechanics.   **10**

   (b) What do you understand by Couette flow and Hagen-Poiseulle flow equations ? Differentiate between them.   **10**

2. (a) Define Reynolds' number. Draw a graph of variation of C_d versus Reynolds' number for a cylinder. **10**

   (b) A compound pipe system consists of 1800 m of 0.5 m, 1400 m of 0.40 m and 700 m of 0.30 m new CI pipes connected in the series. Convert the system to an equivalent length of 0.4 m and equivalent size of pipe 3600 m long.   **10**

Unit II

3. (a) Calculate the total drag, shear drag and pressure drag exerted on 1 m length circular cylinder which has a diameter equal to 40 mm, air density 1.3 kg/m^3 flowing past the cylinder with velocity 4 m/min. The total drag coefficient is equal to 1.4 and shear drag coefficient is equal to 0.19. **10**

   (b) What is meant by Magnus effect ? How does circulation originate around an airfoil ? **10**

4. (a) Show that for a trapezoidal channel of given area of flow, the condition of maximum flow requires that hydraulic mean depth is equal to one half of depth of flow. **10**

   (b) Explain the working of standing wave flume with a neat sketch. **10**

Unit III

5. (a) What do you mean by Mach number ? Explain its significance in compressible fluid studies. **10**

   (b) A volume of air at atmospheric pressure of 101.04 kN/m^2 absolute and 24ºC is compressed adiabatically to a gage pressure of 3.09×10^7 N/m^2. Calculate the final volume. **10**

6. (a) How to measure discharge of a compressible fluid ? Explain its procedure. **10**

(b) A rocket travels in air of pressure 1.033 kg/cm^2 at 15ºC at a velocity of 1750 km/hour. Find the Mach number and the Mach angle. Take k = 1.4 and R = 29.27 m/ºK. **10**

Unit IV

7. (a) A water turbine develops 134 kW at 235 rpm under a head of 17 m. Determine scale ratio and speed of a similar machine which will generate 600 kW when working under a head of 26 m. **10**

(b) Explain with sketches functions of scroll casing, stay vanes and guide vanes for a reaction turbine.

10

8. (a) Explain the working principle of reciprocating pump with sketches. **10**

(b) What are different efficiencies of centrifugal pump ? Explain them briefly. **10**