Roll No. ....

Printed Pages : 3

34020

BT-4 / M-18
FLUID MECHANICS-II
Paper–CE–206-E

Time allowed : 3 hours] [*Maximum marks : 100*

Note :- *Attempt any five questions selecting at least one question from each unit. All questions carry equal marks. Assume any missing data.*

Unit–I

1. (a) Discuss Stoke's law with reference to laminar flow. 10

   (b) If a pipe 3m in diameter is to carry a flow of 7.5m³/s of water with a minimum expenditure of energy, determine the permissible height of the roughness projection of the pipe wall, when υ for water is 0.015×10^{-4} m²/s. 10

2. (a) What do you mean by energy losses in a pipe line? How they are determined? 10

   (b) Water flows through a horizontal pipe 2 m long, which tapers from a diameter of 0.2 m to 0.15 m in the length 2 m. A constant discharge of 40 liters per second flows through the pipe, starting from first principles, determine the loss of head due to friction. Take f = 0.04. 10

Unit–II

3. (a) Explain development of drag on a flat plate held perpendicular to the direction of flow with neat sketch. 10

34020 [Turn over

(2)

   (b) A semi-tubular cylinder of 85 mm radius with concave side upstream (drag coefficient = 2.3 is submerged in flowing water of velocity 0.65 m/s. If the cylinder is 7.5 m long, calculate the drag. Assume density of water as 1000 kg/m³. 10

4. (a) What do you understand by (i) steady and unsteady flow; (ii) uniform and non-uniform flow, (iii) laminar and turbulent flow in the case of open channels? 10

   (b) A rectangular channel is reduced gradually from 2m to 1.5 m and the floor is raised by 0.25 m at a given section. When the approaching depth of flow is 1.5 m, what rate of flow will be indicated if the flow at the contracted section is at critical depth. 10

Unit–III

5. Derive and prove energy equation applied in flow of compressible flow. 20

6. (a) Differentiate between isothermal and adiabatic processes. Give examples. 10

   (b) A test plane is described as having attained a flight speed of Ma = 2 at an altitude of 16 km where the temperature is approximately –56.5°C (or 216.65 K). Assuming k = 1.4 and R = 287 J/ kg. K, determine the speed of the air plane. 10

Unit–III

34020

7. (a) Discuss various classifications of turbines with suitable examples. Draw sketch of single jet Pelton wheel turbine. 10

(b) A hydraulic turbine under a head of 25 m develops 7260 kW running at 110 rpm. What is the specific speed of the turbine? What type of turbine is this? Find also the normal speed and output if the head on the turbine is reduced to 20 m. 10

8. (a) Explain work done by a single acting and double acting reciprocating pump. 10

(b) Differentiate between two types of centrifugal pumps namely Volute and turbine pump with neat diagrams. 10