

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE) (Sem.-4)
FLUID MECHANICS-II
Subject Code : BTCE-404
M.Code : 56086
Date of Examination : 09-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Show the velocity distribution for ideal and real fluids.
- b) Under what circumstances minor losses will be negligible.
- c) What is meant by turbulence?
- d) Define specific energy.
- e) What is a hydraulic jump?
- f) What is the relation between wetted perimeter and hydraulic mean depth?
- g) What do you understand by a smooth pipe and rough pipe flow?
- h) Define critical velocity and critical Reynold's number.
- i) What is the momentum principle.
- j) Cite some examples of boundary layer formation.

SECTION-B

- Oil of specific gravity 0.82 is pumped through a horizontal pipe line 15 cm in diameter and 3 km long at the rate of 900 litres per minute. The pump has an efficiency of 68% and requires 7.35 kW to pump the oil. Determine the dynamic viscosity of oil and verify whether the oil is laminar.
- A horizontal pipe 10 cm in diameter is joined by sudden enlargement to a 15 cm diameter pipe. Water is flowing through it at the rate of $2 \text{ m}^3/\text{min}$. Find the loss of head due to abrupt expansion and the pressure difference in the two pipes. If the change of the pressure is gradual without any loss, what would be the change in pressure?
- For a given specific energy show that the maximum discharge in a rectangular channel occurs at a critical depth.
- What are the causes which result in separation of boundary layer?
- Discuss various types of water surface curves which may be formed on adverse slopes.

SECTION-C

- A 3m wide rectangular channel conveys $7.5 \text{ m}^3/\text{s}$ of water with a velocity of 5m/s. Is there a condition for hydraulic jump to occur? If so, calculate the height, length and strength of the jump. Also, determine the loss of energy per kg of water.
- Show that most economical trapezoidal section for an open channel is one which has the three sides tangential to the semi-circle described on the water line.
- A pipe 10 cm in diameter and 1000m long is used to pump oil of viscosity 8.5 poises and sp. gr. 0.92 at the rate of 1200 lit/min. The first 300m of the pipe is laid along the ground sloping upwards at 10° to the horizontal and the remaining pipe is laid on the ground sloping upwards at 15° to the horizontal. State whether the flow is laminar or turbulent. Determine the pressure required to be developed by the pump and the power of the driving motor if the pump efficiency is 60%. Assume suitable data for friction factor f , if required.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.