Total No. of Question : [4]

Registration No. : ⎕⎕⎕⎕⎕⎕⎕⎕⎕⎕

Programme Name : Bachelor of Chemical Engineering
Regular S.Y.B.Tech. ESE (A.Y. 2023-24) Sem. III Nov.2023
III SEMESTER (2022 BATCH)
201CHL204 -Fluid Flow Operations (TH)

Duration : [11:00 AM - 01:00 PM]
Date : 30 Nov, 2023
Day : Thursday

Marks : 50

Instructions :
1.Read questions carefully.

(Q1) **All Questions are compulsory**   [20.0]

CO :- 1, 2, 3
Blooms Taxonomy :- Remember, Understand

(1.1) Derive an expression for determination of pressure difference by U tube Manometer   [6.0]

(1.2) 10 LPM of toluene is flowing through a pipe of 1.2 cm I.D. pipe. If the density of   [7.0]
toluene is 0.87 gm/cm^3. Calculate

i) Volumetric flow rate in cm^3/sec.
ii) Mass flow rate gm/sec.
iii) Average velocity cm/sec.

(1.3) Derive an expression for Hagen-Poiseullies equation for laminar flow.   [7.0]

(Q2) **All Questions are compulsory**   [10.0]

CO :- 4
Blooms Taxonomy :- Remember, Understand

(2.1) Define Mach Number and classify the compressible flow.   [4.0]

(2.2) A pipe with 7.75cm I.D. is carrying HCL in which a venturimeter is fitted having a throat   [6.0]
dia.2.7 cm. The differential manometer filled with mercury connected across meter
reads 40cm. Calculate the mass flow rate of the acid flowing through the pipe. (
Cv=0.98 & density of acid=1300Kg/m^3)

OR [2.2 / 2.3]

(2.3) Discuss various types of flow in details with neat diagrams.   [6.0]

(Q3) **All Questions are compulsory**   [10.0]

CO :- 5
Blooms Taxonomy :- Remember, Understand

(3.1) Define drag and drag coefficient   [3.0]

(3.2) Derive Ergun?s equation for packed bed   [7.0]

OR [3.2 / 3.3]

    (3.3) Write a short notes on   [7.0]
         a) Drag coefficient and Shape factor
         b) Discuss Total energy balance equation and equation for velocity of sound for compressible fluids.

(Q4) Attempt any two out of three questions   [10.0]

      CO :- 6
      Blooms Taxonomy :- Remember, Understand

    (4.1) Discuss the flow patterns in agitated vessel   [5.0]
    (4.2) Write the equations for flow number and power co-relations   [5.0]
    (4.3) Write a note on types of impeller   [5.0]

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