B.Tech. (ME) 4th Semester (G-Scheme)
Examination, July–2022
FLUID MECHANICS
Paper– PCC-ME-204-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *In this question paper, there are* ***Nine*** *Number of Questions in total. Students are required to attempt* ***five*** *questions selecting* ***one*** *question from each unit.* ***Question No. 1 is compulsory.*** *All questions carry equal marks.*

1. (i) State the Newton's law of viscosity 6×2.5=15

(ii) Define stream and potential functions

(iii) State Bernoulli's theorem

(iv) Define sonic velocity

(v) Define Hagen-Poisuille Law

(vi) Define Turbulant flow

Unit - I

2. Derive the differential equation of continuity in polar co-ordinates

3. Explain the following.

(i) Newtonian and Non-Newtonian fluids.

(ii) Pascal's law

(iii) Stream, streak and path lines

Unit - II

4. An orifice meter with orifice diameter 10cm is inserted in a pipe of 20cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Cd for the meter is 0.6. Find the discharge of water through the pipe. 15

5. Explain propagation of-elastic waves due to disturbance in fluid, stagnation properties. 15

Unit - III

6. Derive Hagen-Poiseuille Law for a pipe-flow.

7. At a sudden enlargement of a water line from 240 mm to 480 mm diameter pipe, the hydraulic gradient rises by 10mm. Estimate the rate of flow.

Unit - IV

8. How would you distinguish between hydraulically smooth and rough boundaries. Calculate the average velocity distribution for smooth pipe.

9. Explain the following:

   (i) Displacement Thickness

   (ii) Von-Karman momentum Integral equation.