Code No.: **73103** | **MR17**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

M.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2019

Subject: **Advanced Fluid Mechanics**

Branch/Specialization: **ME/Thermal Engineering**

Time: 3 hours **Max. Marks: 60**

PART – A

Answer ALL questions of the following **5x4Mark=20 Marks**

1. Define Vorticity and Rotationality with suitable example.
2. Differentiate Coutte Flow with other flows.
3. Name the parameters which influence the growth of Laminar Boundary Layer on a Horizontal Plate.
4. Discuss about the characteristics of turbulent flow. Describe Homogeneous turbulence and isotropic turbulence.
5. Give the examples where Liquid is treated as a Compressible Fluid.

PART-B

Answer ALL questions of the following **5x8Marks= 40 Marks**

1. Describe the phenomenon of linear translation using control mass approach

(OR)

2. **(a)** Differentiate between Lagrangian and Eulerian description of flow. Which description is useful to study path lines?

   (b) What is an irrotational flow? Explain the significance of a potential function.

3. Derive the equation for a plane Poiseuille flow between parallel plates.

(OR)

4. Water at 20^0C is flowing between a two-dimensional channel in which the top and bottom walls are 1.5 mm apart. If the average velocity is 2 m/s, find out (i) the maximum velocity, (ii) the pressure drop, and (iii) the wall shearing stress [$\mu = 0.00101$kg/m.s]
5. Derive Von-Karman momentum integral Equation for Laminar Boundary Layer.

(OR)

6. **(a)** Explain boundary layer.

   (b) Atmospheric air at 25^0C flows over a Flat Plate with a Velocity of 2.5 m/s. Find the Boundary Layer thickness at a distance of 15 cm and 30 cm from the leading edge of the plate. Also find the mass flow that enters the boundary layer between the above two points. Assume air has Viscosity 1.7 x 10^{-5} Kg/m-s and density of 1.18 kg/m^3.

7. Sketch Moody's diagram and show the variation of f with Reynolds's number (i) in laminar range, (ii) for turbulent flow in smooth pipes and (iii) for a fully established rough pipe flow.

(OR)

8. **(a)** What is the common logarithmic equation for turbulent flow in smooth and rough pipes?
   (b) Two parallel pipes 200 m long, one of 20 cm diameter (f= 0.020) and another of 30 cm diameter (f= 0.018) form part of a long pipe line. If the discharge is 0.15 m^3/sec. find the discharge in each pipe. Find also the head loss.

9. Show how the stagnation temperature T_S is related to the temperature at a point in the ambient flow assuming adiabatic conditions.

(OR)

10. Describe Oblique Shocks.