Code No: R21212/R10

**Set No. 1**

II B.Tech I Semester Supplementary Examinations, Oct/Nov 2017
MECHANICS OF FLUIDS
(Aeronautical Engineering)

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) A plate 0.05 mm distant from a fixed plate moves at 1.2 m/s and requires a force of 2.2 N/ $m^2$ to maintain this speed. Find the viscosity of the fluid between the plates.
   (b) Expalin how vacuum pressure can be measure with the help of a U-tube manometer. [8+7]

2. (a) The diameter of a pipe at the sections 1-1 and 2-2 are 200 mm and 300 mm respectively. If the velocity of water flowing through the pipe at section 1-1 is 4 m/s, find;
      i. Discharge through the pipe, and
      ii. Velocity of water at section 2-2
   (b) Define steady, non-steady, uniform and non-uniform flows. [8+7]

3. (a) Drive Bernoulli s equation from the principle of conservation of energy?
   (b) The water is flowing through a pipe having diameters 20cm and 15cm at section 1and 2 respectively. The rate of flow through pipe is 40 Lit/s. The section 1is 6m above datum line and section 2 is 3m above the datum. If the pressure at section 1is 29.43 N/c $m^2$, find the intensity of pressure at section 2. [8+7]

4. (a) Define and explain Reynolds number, Froude Number and Mach number.
   (b) For measuring the flow of oil of specific gravity 0.81 in a pipeline inclined to $45^0$ to the horizontal, a venturimeter is used. The throat area ratio is 4. If the difference in a mercury levels in the gauge is 45mm, Calculate the flow if the pipe diameter is 30m. Take Cd =0.97 and Specific gravity of mercury as 13.6. [6+9]

5. (a) What are different types of drag? What is streamlining? What is its effect on the Different types of drag?
   (b) A cylinder 15 cm in diameter and 10 m long, is made to turn 1500 revolutions per minute with its axis perpendicular in a stream of air having uniform velocity of 25 m/sec. Assuming ideal fluid flow, find [8+7]
      i. Circulation
      ii. Lift force experienced by the cylinder and
      iii. The position of stagnation points Take density of air as 1.2 kg/$m^3$.

6. (a) What do you mean by 'pipes in parallel'? When pipes are connected in parallel? What is the loss of head in the system.

   (b) A pumping plant forces water through a 50 cm diameter main, the frictional head being 30 m. It is proposed to lay another main of appropriate diameter alongside the existing one so that the two pipes may work parallel for the entire length and reduce the friction head to 10 m only. Find the diameter of the new main if, with the exception of the diameter, it is similar to the existing one in every other aspect. [7+8]

7. (a) Sketch the velocity distribution of laminar flow in ideal and real fluid flow and explain it in details?

   (b) A viscous liquid was flowing in laminar regime in a 8cm diameter circular pipe. A Pitot tube at a radial distance 3 cm from the axis indicated a velocity of 0.6 m/s. Calculate the maximum velocity, mean velocity and the discharge in the pipe? [7+8]

8. (a) Write short notes on Reynolds number, Mach number, Mach angle and Zone of action.

   (b) A supersonic airflow flies at an altitude of 2KM where the temperature is $4^0$ C. Determine the speed of aircraft if its sound is heard 4 seconds after its passage over the head of abserver. Take K=1.4 and R=281.43 J/Kg K. [7+8]

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