



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020
Regulation: IARE–R18

FLUID MECHANICS AND MACHINES (ME)

Time: 2 Hours

Max Marks: 70

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Distinguish between specific weight, specific volume and specific gravity. [5M]
2. Obtain the Euler's equation of motion. [5M]
3. Discuss the various minor losses in a pipe flow. [5M]
4. Classify the hydraulic turbines and explain in detail. [5M]
5. List out the various types of impeller used in centrifugal pumps and explain with neat sketch. [5M]
6. Find the continuity equation in three dimension. [5M]
7. Distinguish between stream line, stream tube, path line and streak line. [5M]
8. What will happen when the pipes are connected in series and in parallel? [5M]

PART – B

9. A flat plate having an area of 0.64 m^2 slides down the inclined plane at an angle of 30° to the horizontal with a speed of 0.35 m/s . A lubricant layer of 1.6 mm thickness is placed between the plane and the plate. Determine the viscosity of the lubricant used if the weight of the plate is 250 N [10M]
10. Explain in detail viscosity and write about the effect of temperature and pressure on viscosity. [10M]
11. The water is flowing through a tapering pipe having diameters 0.25 m and 0.125 m at sections 1-1 and 2-2, respectively. The discharge through the pipe is $40 \text{ litres per second}$. The section 1-1 is 5 m above the datum and section 2-2 is 3 m above the datum. If the pressure at section 1-1 is 0.4 MPa , then determine the intensity of pressure at section 2-2. [10M]
12. Classify the types of flows and explain in detail with neat sketch each of them. [10M]
13. With neat sketch explain the boundary layer for flow over a flat plate and plot the different flow regime. [10M]
14. The difference in the water surface levels of two reservoirs which are connected by a siphon is 8 m . The length of the siphon is 600 m and its diameter 0.3 m . Assuming $f = 0.02$, determine the discharge when the siphon is running full. If the summit of the pipeline is 5 m above the surface level of the upper reservoir, determine the maximum length of the inlet leg for the pipe to run full. Allow for all the losses and assume the permissible minimum pressure at the summit of the siphon to be absolute zero. [10M]
15. A Francis turbine has a speed of 300 rpm . The inlet diameter of the turbine is 1.20 m and its width is 280 mm at the inlet. The vane thickness coefficient can be taken as 0.95 . If at the inlet, the guide vane angle is 30° and the blade angle is 90° , estimate the power produced by assuming an overall efficiency of 0.90 . Assume radial discharge at the outlet. [10M]
16. How to govern the impulse turbines? Explain with a neat sketch. [10M]
17. Write the expression for specific speed of a centrifugal pump. Draw and explain characteristic curves for centrifugal pumps. [10M]
18. A centrifugal pump has an impeller of 30 cm outer diameter. The vane tips are radial at the outlet. For a rotative speed of 1450 rpm , calculate the manometric head developed. Assume a manometric efficiency of 82% . [10M]