

CBCS SCHEME

17AE/AS752

USN

Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024

Wind Tunnel Techniques

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Why similarity is needed in Wind Tunnel testing? (06 Marks)
- b. Define different Similarities. (06 Marks)
- c. Define Mach number, Reynold's number and Froude number and show that these are non – dimensional. (08 Marks)

OR

- 2 a. Explain Buckingham T1 - Theorem. (08 Marks)
- b. The variables controlling the motion of a floating vessel through water are the drag force F , the speed V , the length l , the density ρ and viscosity μ of water and acceleration due to gravity g . Derive an expression for F by dimensional analysis. (12 Marks)

Module-2

- 3 a. With neat sketch, explain the working principles of open and closed subsonic wind tunnels. (12 Marks)
- b. Draw a schematic diagram and explain blow down supersonic tunnels. (08 Marks)

OR

- 4 a. Explain about the special problems of testing in supersonic wind tunnels. (10 Marks)
- b. Sketch the typical layouts of Hypersonic Wind Tunnel and explain. (10 Marks)

Module-3

- 5 a. Write a short note on Hot Wire Anemometer. (10 Marks)
- b. With neat sketch, explain following Flow Angularities : (10 Marks)
 - i) Claw yaw meter
 - ii) Turbulence sphere.

OR

- 6 a. Derive the column height to which the liquid column will rise in the tube at standard conditions. (10 Marks)
- b. Write a note on following: i) Rakes ii) Surging. (10 Marks)

Module-4

- 7 With neat sketch, explain the construction and working of six components Wind Tunnel Balance. (20 Marks)

OR

- 8 a. Draw neat sketch and explain velocity measurements in Wind Tunnel. (12 Marks)
- b. Explain about the Oil Flow visualization techniques. (08 Marks)

Module-5

- 9 a. Write a short note on Small Tunnels. (10 Marks)
- b. Discuss Working of Piston tube. (10 Marks)

OR

- 10 a. Explain with neat sketch, Measurement of Wall shear using Fence technique. (10 Marks)
- b. Describe with neat sketch, the working principle of Drag Body flow meter. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

