

CBCS SCHEME

17AE/AS752

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Seventh Semester B.E. Degree Examination, Jan./Feb. 2021

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. Explain Buckingham theorem. (08 Marks)
b. Show that the velocity through a circular orifice is given by $V = \sqrt{2gH} \phi \left(\frac{D}{H}, \frac{\mu}{\rho V H} \right)$. (12 Marks)

OR

- 2 a. Explain following similarities:
(i) Geometric (ii) Kinematic (iii) Dynamic (08 Marks)
b. Geometrically similar model of an air duct is built to $\frac{1}{25}$ scale and tested with water which is 50 times more viscous and 800 times denser when tested under dynamically similar conditions. The pressure drop is 2 bar in the model, find the corresponding pressure drop in full scale prototype. (12 Marks)

Module-2

- 3 a. Explain with neat sketch closed circuit low speed wind tunnel. (10 Marks)
b. Discuss with neat sketch working principles of blow down tunnel. (10 Marks)

OR

- 4 a. Write a short note on flow irregularities in subsonic wind tunnel. (10 Marks)
b. Discuss on subsonic and transonic speed regime. (10 Marks)

Module-3

- 5 a. Explain calibration of wind tunnel. (10 Marks)
b. Write a short note on hot wire anemometer. (10 Marks)

OR

- 6 a. Discuss how to calculate the test section air speed. (10 Marks)
b. Describe turbulence measuring methods. (10 Marks)

Module-4

- 7 a. Briefly explain the measurement of pressure, velocity and force in a wind tunnel. (10 Marks)
b. Discuss working of U-tube and multi-tube monometers. (10 Marks)

OR

- 8 a. Describe with neat sketch the fundamental principle of an interferometer. (10 Marks)
b. Write a short note on tuft grid and oil flow visualization technique. (10 Marks)

Module-5

- 9 a. Explain with neat sketch flat plate boundary layer measurement. (10 Marks)
b. Discuss with neat sketch two-dimensional water flow channel. (10 Marks)

OR

- 10 a. Describe the concept of transition and reverse transition. (10 Marks)
b. Briefly explain rotating tank experiment. (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.