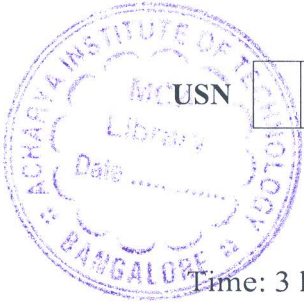


CBCS SCHEME



17AE752

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023

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. The resisting torque 'T' against the motion of a shaft in a lubricated bearing depends on the viscosity, μ , the rotational speed N, the diameter D and the bearing pressure intensity P. Show that $T = \mu ND^3 \phi \left[\frac{P}{\mu N} \right]$. (10 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. (10 Marks)

OR

- 2 a. Define similarities. Explain its type. (10 Marks)
- b. The rate of flow through a horizontal capillary tube is taken to depend upon the pressure drop per unit length, the diameter of the tube and the viscosity of the fluid obtain a formula for the rate of flow. (10 Marks)

Module-2

- 3 a. Explain the working of Blow-down type wind tunnel with its advantages and disadvantages. (10 Marks)
- b. Determine the losses in contraction cone of a wind tunnel. (10 Marks)

OR

- 4 a. Explain the procedure involved in calculating energy loss in cylindrical parts of a wind tunnel. (10 Marks)
- b. Explain the structure of low – speed closed circuit wind tunnel along with its working. (10 Marks)

Module-3

- 5 a. Explain horizontal buoyancy and flow angularity in wind tunnel test section. (10 Marks)
- b. Explain the steps involved in calibration of subsonic wind tunnel. (10 Marks)

OR

- 6 a. Illustrate how speed of the wind tunnel will be calibrated with the help of pressure measurement techniques. (10 Marks)
- b. Explain the working principle of claw yaw meter using neat sketch. (10 Marks)

Module-4

- 7 a. Explain various flow visualization techniques in subsonic flow region. (10 Marks)
- b. List out the different types of force measuring balances. Explain any one in details. (10 Marks)

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OR

- 8 a. Define any two pressure measuring apparatus used in wind tunnel. (10 Marks)
b. Explain shadow graph with neat sketch. (10 Marks)

Module-5

- 9 a. Define the steps involved in model design for wind tunnel testing. (10 Marks)
b. Define intake test in detail. (10 Marks)

OR

- 10 a. Explain in detail unsteady force and pressure measurement methods in wind tunnel. (10 Marks)
b. Explain store carriage and separation test. (10 Marks)

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