

# GBCS SCHEME

15AE752



## Seventh Semester B.E. Degree Examination, July/August 2021 Wind Tunnel Techniques

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions.**

- 1 a. Define Buckingham theorem. (04 Marks)  
b. Show that the lift  $F_L$  on airfoil can be expressed as  $F_L = \rho v^2 d^2 \phi \left( \frac{\rho v d}{\mu}, \alpha \right)$ . (12 Marks)
- 2 a. Define following dimensionless number : i) Reynolds number ii) Froude's number iii) Mach's number. (06 Marks)  
b. In an aeroplane model of size  $\frac{1}{10}$  of its prototype the pressure drop is  $7.5 \text{ kN/m}^2$ . The model is tested in water. Find the corresponding pressure drop in the prototype. (10 Marks)
- 3 a. Explain with neat sketch, open circuit low speed wind tunnel. (08 Marks)  
b. Describe irregularities of flow in low speed tunnel. (08 Marks)
- 4 a. Describe with neat sketch, Indraft type Supersonic wind tunnel. (08 Marks)  
b. Explain with neat sketch, Pressure driven hypersonic wind tunnel. (08 Marks)
- 5 a. Explain with neat sketch, the working of a hot wire anemometer. (08 Marks)  
b. Describe the techniques used for turbulence measurement in a wind tunnel. (08 Marks)
- 6 a. With neat sketch, explain the construction of six component wind tunnel. (08 Marks)  
b. Write a short note on pressure and temperature measurement in wind tunnel. (08 Marks)
- 7 a. Explain with neat sketch, Wire type balance. (08 Marks)  
b. Discuss with neat sketch, optical flow visualization technique for supersonic flow wind tunnel. (08 Marks)
- 8 a. Explain briefly Flow visualization by Shadow Graph method. (08 Marks)  
b. Explain with a neat sketch the basic principle of barometer. (08 Marks)
- 9 a. With neat sketch, explain Water flow channel. (08 Marks)  
b. Discuss with neat sketch, Flat plate boundary layer measurement. (08 Marks)
- 10 a. Explain with example, Taylor – Proudman theorem. (08 Marks)  
b. Write a short note on Unsteady pressure measure technique in wind tunnel. (08 Marks)

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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.