CBCS SCHEME

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18AE742

Seventh Semester B.E. Degree Examination, July/August 2022
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. Describe Buckingham's method of π - theorem for dimensional analysis. **(10 Marks)**

b. The resultant aerodynamic force R expressed by an wing submerged in the free stream is depend upon the free stream velocity V_∞ size of the body C, viscosity of the fluid , μ_∞ density of the fluid ρ_∞ and compressibility of the fluid a_∞. Obtain a dimensionless expression for R. **(10 Marks)**

OR

2 a. Discuss the physical significance of the following dimensionless numbers, R_e, N_u , P_r , S_t and G_r. **(10 Marks)**

b. The Resistant R experienced by a partially submerged body depends upon the velocity V, length of the body ℓ, viscosity of the fluid μ , density of the fluid ρ and gravitational acceleration g. Obtain a dimensionless expression for R. **(10 Marks)**

Module-2

3 a. Explain with neat sketch, closed circuit subsonic wind tunnel. **(10 Marks)**

b. A closed return type wind tunnel of large contraction ratio has air at standard sea – level conditions in the setting chamber upstream of contraction to the test section. Assuming isentropic compressible flow in the tunnel, estimate the speed and the kinematic energy per unit area in the working section when the Mach number is 0.75. **(10 Marks)**

OR

4 a. Discuss on subsonic and transonic speed regime. **(10 Marks)**

b. With neat sketch, explain Blow Down Wind Tunnel. **(10 Marks)**

Module-3

5 a. Describe the speed setting of Open circuit wind tunnel. **(10 Marks)**

b. With neat sketch, explain following flow angularities :
i) Turbulence sphere ii) Yaw sphere. **(10 Marks)**

OR

6 a. Explain following : i) Rakes ii) Surging. **(10 Marks)**

b. Discuss with neat sketch, Kerosene Smoke generator. **(10 Marks)**

Module-4

7 a. With neat sketch, explain Betz Manometer. **(10 Marks)**

b. Explain with neat sketch, characteristics of Pitot – Static tube. **(10 Marks)**

OR

8 a. Briefly explain Flat – Plate Static Probe. (10 Marks)
b. Write a short note on following LDA :
i) Reference beam method ii) Fringe method. (10 Marks)

Module-5

9 a. Write a short note on Test Section Sizing. (10 Marks)
b. Explain with neat sketch Preston tube. (10 Marks)

OR

10 a. Explain with neat sketch Guide Vanes. (10 Marks)
b. Discuss the working of Rotameter. (10 Marks)

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