



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

B.Tech VI Semester End Examinations (Regular), November – 2020

Regulation: IARE–R16

EXPERIMENTAL AERODYNAMICS

(AE)

Time: 2 Hours

Max Marks: 70

Answer any Four Questions from Part A

Answer any Five Questions from Part B

PART – A

1. Mention the importance of sizing and design parameters? [5M]
2. Identify the methods used to measure flow angularities and the instruments used to measure them? [5M]
3. Highlight the important is wind tunnel balance? Mention its types? [5M]
4. What is the basic principle behind, laser doppler anemometry? [5M]
5. Distinguish between the working of schlieren and shadow graphs with their merits and demerits. [5M]
6. Discuss about various types of specials tunnels and their usage advantages. [5M]
7. Find the relationship between fluid density and refractive index. [5M]
8. List out the types of load measurement techniques in wind tunnel. [5M]

PART – B

9. The model of a boat is made to a scale 1:60. The model boat has a wave resistance of 0.025 N while operating in water at a velocity of 1 m/s. Determine the corresponding wave resistance of the prototype. Find also the power required for the prototype. What velocity does this test represent in the prototype? [10M]
10. Explain low and high-speed wind tunnels layout, principles and explain the following important components: the effuser, the working or test-section, the diffuser, and the driving unit. [10M]
11. Determine the minimum possible diffuser contraction ratio and the power required for a two-stage compressor to run a closed-circuit supersonic tunnel at $M = 2.2$. The efficiency of the compressor is 85 percent, $p_{01} = 4$ atm, $T_0 = 330K$ and $ATS = 0.04m^2$. [10M]
12. Summarize the flow characteristics in the wind tunnel by using calibration of wind tunnel. [10M]
13. Discuss the method of yoke balance wind tunnel with neat sketch along with equations. [10M]
14. Describe the working of strain gauge balance types and which is more preferable type. Justify with reasons. [10M]
15. Find the pressure that would be read by a mercury manometer connected to a static pressure tap located at the wall of a convergent nozzle where the flow Mach number is 0.8 and the nozzle is connected to a tank at a pressure of 3 atmospheres absolute (assume $\gamma = 1.4$, for the gas). [10M]
16. Explain the total pressure measurements by incidents, Reynolds number and velocity gradient effects. [10M]
17. Highlight the working of hele shaw apparatus on aerofoil and cylinder with necessary diagrams. [10M]
18. Explain flow visualization by dye in water- direct injection method. [10M]