

Reg. No.:					18	Юč

Question Paper Code: 50037

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Eighth Semester

AE 6801-WIND TUNNEL TECHNIQUES

(Regulations 2013)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART - A

(10×2=20 Marks)

- 1. What is called aero-elastic similarity?
- 2. Define the Froude's number.
- Write down the equation for coefficient of pressure losses for the Meshes used in wind tunnels.
- 4. What are called Hotshot wind tunnels?
- 5. What are the different section loss coefficients?
- 6. List the parameters of interest for the transonic wind tunnel calibrations.
- 7. List the merits and demerits of pressure sensitive paints.
- 8. What are the main sources of errors in wall static pressure measurements?
- 9. What is spark photography?
- 10. What are the problems in unsteady pressure measurements in wind tunnels?

PART - B

(5×16=80 Marks)

 a) Derive Mach number and Reynolds number as relevant non-dimensional parameters in the flow over an airfoil from non-dimensional analysis.

(OR)

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- b) The power required by an impeller in a tunnel is a function of the following variables:
 - a) Diameter of the agitator
 - b) Number of rotations of the impeller per unit time
- c) Viscosity of fluid
 - d) Density of fluid
 - i) From dimensional analysis using Buckingham's method, obtain a relation between power and the four variables.
 - ii) The power consumption is found experimentally to be proportional to the square of the speed of rotation. By what factor would the power be expected to increase if the impeller diameter was doubled?
- a) Explain the operation of the intermittent type supersonic wind tunnel with neat sketches and explain the importance of the second throat.

(OR)

- b) i) Explain the special problems in testing of models transonic wind tunnel.
 ii) Explain the transonic wind tunnel with neat sketches.
- a) Explain in detail, the blockage corrections in closed circuit wind-tunnels for the wind tunnel calibrations.

(OR)

- b) Draw a sketch of three dimensional flow direction probes and explain its use in the calibration of flow direction in the wind tunnels.
- 14. a) Explain modern three component balance for force and moment measurements in wind tunnel with neat sketches.

(OR)

- b) Explain with neat sketches of the multichannel pressure measurements with scanners for pressure measurements over an airfoil with 20 No. of ports distributed equally on the surface.
- 15. a) Explain the procedure involved in the unsteady pressure measurements over an airfoil draw the $\mathrm{Cp}_{\mathrm{mean}}$, $\mathrm{Cp}_{\mathrm{rms}}$ profiles over NACA 4412 airfoil at an angle of attack of 15 degrees.

(OR

b) Explain the low speed wind tunnel design procedure with empherical equations and draw the wind tunnel model.