



Register Number:.....

**B.E DEGREE EXAMINATIONS: NOV/DEC 2014**

(Regulation 2009)

Seventh Semester

**AERONAUTICAL ENGINEERING**

AER135: Industrial and Experimental Aerodynamics

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. In high winds the blades can be allowed to bend which reduces their \_\_\_\_\_ and thus their wind resistance.
  - a) Blade angle
  - b) Swept area
  - c) Tip ratio
  - d) Taper ratio
2. Due to data transmission problems, health monitoring of wind turbines is usually performed using several \_\_\_\_\_ and strain gages attached to the nacelle to monitor the gearbox and equipments.
  - a) anemometers
  - b) gyroscopes
  - c) accelerometers
  - d) boosters
3. The effect of wind on building models is reproduced in a boundary layer wind tunnel. This allows for the measurement of \_\_\_\_\_ on buildings, air flow around tall buildings and around groups of tall buildings, environmental pedestrian level wind studies.
  - a) mean and fluctuating wind loads
  - b) wind speed
  - c) wind direction
  - d) Side slip wind stream
4. \_\_\_\_\_ of the buildings significantly affects the wind forces on it and the resulting motion.
  - a) shape
  - b) height
  - c) location
  - d) Design with low height
5. The drag of an airfoil can be evaluated from the loss of \_\_\_\_\_ in the wake.
  - a) Static pressure
  - b) Dynamic pressure
  - c) Pressure at stagnant point
  - d) Total pressure

6. The synthesis of aeroelasticity with thermodynamics is known as
  - a) aerothermodynamics
  - b) aerothermoelasticity
  - c) Stabilized aeroelasticity
  - d) Un stabilized aeroelasticity
7. The center of buoyancy of an object is the \_\_\_\_\_ of the displaced volume of fluid.
  - a) centroid
  - b)  $1/3^{\text{rd}}$  of centroid
  - c)  $2/3^{\text{rd}}$  of centroid
  - d) Aerodynamic centre
8. Rotor degradation doesn't change the \_\_\_\_\_ of the core, but it does change the total lines of flux.
  - a) area
  - b) Flux density
  - c) Magneto motive force
  - d) total lines of flux
9. The way of achieving the huge power output is with the use of a vacuum storage tank. These tunnels are called \_\_\_\_\_ supersonic wind tunnels
  - a) continuous
  - b) intermittent
  - c) blowdown
  - d) indraft
10. \_\_\_\_\_ nozzles are generally preferred in the hypersonic tunnels
  - a) convergent
  - b) Convergent divergent axi-symmetric
  - c) divergent
  - d) Convergent divergent

**PART B (10 x 2 = 20 Marks)**

11. List out the major wind energy collectors.
12. What are the factors to be considered in automobile aerodynamics?
13. What are the effects of winds on the building?
14. How to design a building to avoid the damages from the environmental winds?
15. Define energy density.
16. What is meant by aero elasticity?
17. What is called wake blocking?
18. Define the term vortex shedding?
19. List down the various types of supersonic wind tunnels.
20. What do you infer from near transonic testing?

**PART C (5 x 14 = 70 Marks)**

21. a) Explain in detail horizontal and vertical axis machines with neat sketches.

**(OR)**

b) Define power coefficient and briefly explain the Betz coefficient by momentum theory.

22. a) (i) Discuss the pressure distribution on low rise buildings. (7)  
(ii) Explain the effects of aerodynamics on the buildings. (7)

**(OR)**

b) Write short notes on the following:

- (i) Galloping (7)  
(ii) Stall flutter (7)

23. a) Describe the lift and drag measurements through various techniques.

**(OR)**

b) Write short notes on:

- (i) Testing of wind mill generator (7)  
(ii) Testing of rotor (7)

24. a) Analyze the effects of solid blocking and wake blocking.

**(OR)**

b) Analyze the scale effects of aerodynamic characteristics on the wind tunnel.

25. a) Explain the types and special design features of supersonic tunnel.

**(OR)**

b) Discuss the design of near transonic tunnel and testing.

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