

Code No: 07A72109

R07

Set No. 2

IV B.Tech I Semester Examinations, November 2010
INDUSTRIAL AERODYNAMICS
Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Discuss about vertical velocity and inversions in the study of design of chimney with neat sketches. [16]
2. What is down force? What is the importance of it in a racing car? What are the design changes that are required to increase the down force? [16]
3. What are the bases on which wind is classified? Explain with details. [16]
4. (a) Explain about interference effect of buildings.
(b) What are the building codes? Discuss. [8+8]
5. (a) Draw a sketch of a simple aero-generator and explain the components.
(b) Explain the various controls for the aero-generator. [8+8]
6. Define galloping and discuss various types of galloping. [16]
7. Can you convert all the wind energy into electric power? If not, what are the factors that affect the conversion? Over all, how much of wind energy is really utilizable? Explain with as many details as you can provide. [16]
8. You are traveling in a car on a straight road. A racing car at a very high speed overtook you and aligned right in front of you (without any reduction in speed). Is there any effect on your car? Explain technically justifying your answer with neat sketches. [16]

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R07**Set No. 4**

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INDUSTRIAL AERODYNAMICS
Aeronautical Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Define:
 - i. Reynolds number
 - ii. Mach number
 (b) What are the effects of reynolds number on wake formation of bluff bodies? [8+8]
2. Define
 - (a) Structure of wind
 - (b) Terrain and the dynamics of wind over the terrain
 - (c) Variation of wind speed with height in an open terrain
 - (d) Gust. [4+4+4+4]
3. Describe in brief about building ventilation and architectural aerodynamics. [16]
4. What is a hovercraft and write in brief about the aerodynamics of a hovercraft? [16]
5. (a) Define the coefficient of performance for a wind mill.
 (b) Define tip speed ratio (TSR).
 (c) Show graphically the variation of variation of power coefficient (K_p or C_p) with tip speed for various TSR for different types of wind mills.
 (d) What is your conclusion from this graph? [4+4+4+4]
6. What is a chimney and explain about the various design parameters that effect the flow pattern in a chimney. [16]
7. Winds are an unsteady phenomenon. Explain. [16]
8. Define:
 - (a) Boundary Layer
 - (b) Atmospheric Boundary Layer
 - (c) What is the effect of atmospheric boundary layer on the car?
 - (d) Compare and contrast the effects of atmospheric boundary layer and boundary layer on a low speed car and on a high speed car. [4+4+4+4]

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R07**Set No. 1**

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INDUSTRIAL AERODYNAMICS
Aeronautical Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Discuss about the pressure distribution on low rise building in brief. [16]
2. What are the different types of winds? Explain clearly. [16]
3. Describe the different schemes for wind electric generation. Also describe the generator and control schemes. [16]
4. How are WEC (Wind Energy Conversion) Systems classified? Discuss in brief. [16]
5. (a) Define the atmospheric boundary layer, and explain using sketches.
(b) Is it significant while computing the drag force on a fast car?
(c) How are lift and pitching moment important for a sports car? What is the design you recommend to avoid adverse effects of lift and pitching moment?
[6+4+6]
6. Discuss about the main factors that effect the millage of the car? Write about the things that can be done to improve the vehicles aerodynamics? [16]
7. What is a flume rise and discuss the different types of flume rise. [16]
8. Discuss about seperation and reattachment and what are the four variables that effects it. Discuss them in detail. [16]

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R07**Set No. 3**

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INDUSTRIAL AERODYNAMICS
Aeronautical Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Explain in brief about emission of effulents from the roof of a building. [16]
2. Derive the expression for wind power. Explain clearly, all the assumptions made in the derivation. What is the effect of altitude on your assumptions, and hence the wind power? [16]
3. (a) Derive an expression for the power from a wind mill, from the momentum theory.
(b) Using this expression derive the value of Betz coefficient. [8+8]
4. Discuss about the various design parameters that have to be considered for a tail building. Illustrate. [16]
5. Derive the equation for drag force on a car? What type of design improvements can reduce the drag on a car? [16]
6. Does a racing car require a horizontal stabilizer? Explain, starting from the definition of stability in pitching motion of the car. [16]
7. Define flutter. Explain about wake flutter and fluxural torsion flutter. [16]
8. Discuss the variation of torque coefficient of a wind mill as a function of the tip speed ratio and the number of blades in the mill. Is there any optimal number of blades for a wind mill. State your arguments clearly. [16]
