CBCS SCHEME

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15AE752

# Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020
## Wind Tunnel Techniques

Time: 3 hrs. Max. Marks: 80

**Note:** ***Answer any FIVE full questions, choosing ONE full question from each module.***



### Module-1

1 The pressure difference dp in a pipe of diameter D and length ℓ due to viscous flow depends on the velocity v , μ viscosity and ρ density. Using Buckingham's theorem, obtain an expression for dp. **(16 Marks)**

**OR**

2 a. List and explain similitude. **(09 Marks)**
b. Obtain the expression for Reynold's number for pipe flow. **(07 Marks)**

### Module-2

3 a. With neat diagram, explain a closed circuit wind tunnel. **(10 Marks)**
b. Define Spatial non uniformity, Swirl , Low frequency pulsation. **(06 Marks)**

**OR**

4 a. Explain two problems in the operation of supersonic wind tunnels. **(10 Marks)**
b. Describe sizing the wind tunnels model. **(06 Marks)**

### Module-3

5 a. Show that $P_L - P_S = (1 - K_1 - K_2) K_3 q_1$. **(10 Marks)**
b. With neat diagram, explain schematic indication of the settling chamber, contraction and test section of typical wind tunnel. **(06 Marks)**

**OR**

6 a. Explain Turbulence sphere. **(08 Marks)**
b. Describe higher the turbulence , the better the tunnel as the effective Reynolds No. of the test would be higher. **(08 Marks)**

### Module-4

7 a. With neat diagram, explain basic layout of platform balance. **(10 Marks)**
b. Describe the advantages of flexures. **(06 Marks)**

**OR**

8 a. Explain the following : i) Direct visualization ii) Numerical flow visualization. **(08 Marks)**
b. Explain the following : i) Tufts ii) Oil. **(08 Marks)**

### Module-5

9 a. Explain U – tube manometer. **(08 Marks)**
b. Explain $O_2$ – quenched photoluminescence process. **(08 Marks)**

**OR**

10 Explain the challenges faced during the design of wind tunnel model. **(16 Marks)**

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