

UNIT-V

UNIT NAME: Boundary Layer Theory.

S.No	Questions	BT	CO	PO
Part – A (Short Answer Questions)				
1	What is boundary layer and boundary layer theory?	1	5	01
2	What is momentum thickness?	1	5	1
3	What is magnus effect?	1	5	1
4	What is Displacement thickness?	2	5	1
5	Explain the terms Drag and Lift	2	5	1

6	What is Energy thickness?	2		1
7	Explain in about laminar boundary layer	2	5	1
8	What are factors affecting boundary layer thickness along a smooth plate	2	5	1
9	Mention the methods to control or prevent the boundary layer separation	2	5	1
10	What is boundary layer separation?	2	5	1
Part – B (Long Answer Questions)				
11 a)	Explain in detail about characteristics of a boundary layer along with thin plate and factors affecting boundary layer thickness.	2	5	2
12 a)	Explain in detail about boundary layer thickness and its types in terms of mathematical expression	2	5	2
13 a)	Derive an expression for displacement thickness and momentum thickness	3	5	2
14 a)	Find the displacement thickness and momentum thickness and energy thickness for the velocity distribution in the boundary layer by $u/U = y/\delta$. when u is the velocity at a distance y from the plate and $u=U$ at $y=\delta$. Where δ is boundary layer thickness, also calculate the value of δ^*/θ	5	5	3
15 a)	Define Drag and Magnus effect	1	5	1
b)	A submarine which may be supposed to approximate a cylinder 4m in diameter and 20m long travels submerged at 1.3m/s in sea water. Find the drag exerted on it, if the drag coefficient for Reynolds number greater than 10^5 may be taken as 0.75. The density of sea water is given as 1035kg/m^3 and kinematic viscosity is as 0.15 stokes	5	5	3
16 a)	The air is flowing over a cylinder of diameter 50mm and infinite length with a velocity of 0.1m/sec. Find the total drag; shear drag and pressure drag on 1m length of the cylinder if the total drag coefficient is equal to 1.5 and shear drag coefficient is equal to 0.2. take density of air $=1.25\text{kg/cm}^3$	5	5	3