			Register Number:	……..	
ENTER **B.E** or **B.TECH DEGREE EXAMINATIONS: NOV/DEC 2012**					
Seventh Semester- Fast track course					
AERONAUTICAL ENGINEERING					
AER145 – Boundary Layer Theory					
Time: Three Hours				**Maximum Marks: 100**	
Answer all the Questions:-					
PART A (10 x 1 = 10 Marks)					
1.	Following are the "low friction fluids"				
	a)	Water & oil	b)	water & glycerin	
	c)	Water & air	d)	Air & oil	
2.	_____ is the suitable boundary condition for viscous flow over a solid boundary.				
	a)	Free slip	b)	No slip	
	c)	Turn slip	d)	Separation slip	
3.	Energy thickness is _____ times δ_{99}				
	a)	0.25	b)	0.20	
	c)	0.22	d)	0.40	
4.	The following is the typical value of $Re_{x,tr}$ ~_____ for gusty free streams				
	a)	5×10^5	b)	5×10^4	
	c)	5×10^6	d)	5×10^3	
5.	Blasius shown his dimensionless velocity profile in his 1908 dissertation from_____				
	a)	Georgia	b)	Sottingen	
	c)	Petersburg,Virginia	d)	Gottingen	
6.	The steady N-S equations have been solved numerically for flow over cylinder's when_____				
	a)	Re>60	b)	Re>120	
	c)	Re>80	d)	Re>90	
7.	The value of '*m* and β' for 180° wedge flows is equal to _____				
	a)	Zero	b)	One	
	c)	Four	d)	Nine	
8.	Prandtl Number is the ratio of _____				
	a)	Inertia /viscous	b)	Inertia /Gravity	
	c)	Dissipation/Conduction	d)	Conduction/Dissipation	
9.	In BL Theory the quantity $\boldsymbol{\pi}$ is termed as _____				

	a)	Blasius wake parameter	b)	Maxwell's wake parameter	
	c)	Cole's wake parameter	d)	Prandlt's wake parameter	
10.	The Turbulent BL increases with 'x' as power of				
	a)	2/7	b)	6/7	
	c)	7/6	d)	6/8	
PART B (10 x 2 = 20 Marks)					
11.	Define Perturbation theory.				
12.	Draw the Couette flow diagram and give its velocity profile equation.				
13.	Discuss about 99% BL thickness.				
14.	Write down equation of wall slip velocity suggested by Navier.				
15.	Write down the formulae of C_D for two different Re_{Trans}?				
16.	What is "Adverse Pressure Gradient"				
17.	Write down the Pohlhausen result for thermal boundary layer calculation.				
18.	Explain the term 'Transition to Turbulence' of BL				
19.	Write down the significance of "Law of the wall" in Turbulent BL calculations.				
20.	What is Moody's chart? Give its application in pipe flows.				
PART C (5 x 14 = 70 Marks)					
21.	a)		Derive the Navier Stokes Equation.		9
			Write short notes on "Development of Viscous Fluid Flow theories"		5
(OR)					
	b)		Explain any two boundary conditions of viscous flow problems in detail.		7
			Explain the principle of Hot wire anemometry with neat sketch		7
22.	a)		Derive the expression of the displacement, energy and momentum thickness for flow over a flat plate		14
(OR)					
	b)	1	Consider flow at U= 20 ft/s past a flat plate of 1 ft long. Compute the boundary layer thickness (δ) at the trailing edge for (i) Air (ν of air =$1.61X10^{-4}$ ft^2/s) (ii) Water @ 68°F (ν of water =$1.08X10^{-5}$ ft^2/s)		9
		2	Write short notes on " Development of Boundary Layer" using neat sketch		5

23.	a)		Discuss in detail about "Karman's momentum integral theory" with comparison to classical integral theory.	14
			(OR)	
	b)		Discuss the Blasius solution for flow over a flat plate using his velocity profiles.	14
24.	a)		Explain the solution strategy given by Falkner-Skan to find out thermal properties of Boundary Layer.	14
			(OR)	
	b)		Explain the methodology of Thermal Boundary Layer calculations using one and two parameter integral methods.	14
25.	a)		Write Short notes on Eddy Viscosity Theories	4
			Explain the influence of various Pressure Gradients in the Boundary Layer development with neat sketch.	10
			(OR)	
	b)		Discuss the Turbulent flow behavior on the following: (i) Through rough pipes (ii) Channel flow between parallel plates.	 7 7

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