Sanjay Ghodawat University, Kolhapur

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2020-21

EXM/P/09/00

Year and Program: TY B.Tech	School of Technology	Department: Aero
Course Code: AET301	Course Title: Aerodynamics-II	Semester : V
Day and Date:	End Semester Examination	Time:2 Hrs. Max Marks:50

Instructions: 1) All Questions are compulsory.

Q.1		Answer/Solve the following (any Two)	Marks	Bloom's Level	CO
	a)	Derive the relation for temperature, pressure and density in terms of isentropic process (Isentropic relation).	8	2	CO1
	b)	Consider a point in an airflow where the local Mach number, static pressure and static temperature are 3.5, 0.3atm and 180K respectively. Calculate local values of P_0, T_0, T^*, a^* and M^* at this point.	8	3	CO2
	c)	State the significance of second law of thermodynamics in terms of entropy and derive the relation for s_2-s_1.	8	2	CO2
Q.2		**Answer/Solve the following (any two)**			
	a)	Explain in detail about Shock expansion theory.	8	2	CO3
	b)	A uniform supersonic flow at $M_1 = 2, p_1 = 0.8X10^5$ N/m^2 and temperature 270K expands through two convex corners of 10° each. Determine the downstream Mach number M_3 ,p_3 and T_3 for the Expansion shock wave.	8	3	CO4
	c)	Write about the working of supersonic wind tunnel with a neat sketch.	8	2	CO4
Q.3		**Answer/Solve the following (any two)**			
	a)	What is critical Mach number? Explain M_{crit} in terms of freestream mach number and comment on the location of minimum pressure.	9	2	CO5
	b)	Using linearized theory, calculate the lift and drag coefficients for an infinitely thin flat plate in a Mach 2.6 freestream at angles of attack of a) $\alpha = 5^0$ b) $\alpha = 15°$	9	3	CO5
	c)	Derive the lift and wave drag coefficients for the supersonic flow over a flat plate.	9	2	CO5