PRN:		Course Code :	PAS302

Second Year **M. Tech** End Semester Examination Winter 2023

Launch Vehicle Aerodynamics

Day and Date: Thursday, 30/11/2023 Max Marks: **100**

Time : 10.30 am to 1.30 PM Duration: **03** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Derive the expression for the Stagnation condition of an inviscid compressible flow and interpret your findings.	08	3	1
	b)	Derive the isentropic relation from Second law of thermodynamics	08	3	1
		OR			
	b)	What are shock waves and explain the different types of shock waves, also write in detail about the flow properties across normal and oblique shockwaves.	08	2	1
Q.2		**Attempt the following**			
	a)	Derive the expression for Momentum and Displacement thickness of Boundary layer.	08	3	2
	b)	Write short note on Shock Shear layer interaction.	08	2	2
		OR			
	b)	Explain on the heat transfer effect on launch vehicles.	08	2	2
Q.3		**Attempt any two from the following**			
	a)	Explain the type of rocket and missiles.	08	2	3
	b)	Write short note on the various configurations and components of missiles.	08	2	3
	c)	Explain on the nose design and drag estimation of missiles.	08	2	3
Q.4		**Attempt any two from the following**			
	a)	Write note on slender and blunt bodies.	08	2	4
	b)	Explain on Axisymmetric flow separation and vortex shedding of launch vehicles.	08	2	4
	c)	What is meant by unsteady flow characteristics of launch vehicles?	08	2	4
Q.5		**Attempt any Two of the following**			
	a)	Write note on booster separation.	09	2	5
	b)	Explain on the specific considerations in missile launching.	09	2	5
	c)	Determine the aero elastic effects of launch vehicle.	09	2	5
Q.6		**Attempt any Two of the following**			
	a)	Write note on stability characteristics of Launch vehicle configuration.	09	2	5
	b)	Write on the classification of wind tunnels.	09	2	5
	c)	Write in detail about flow visualization techniques.	09	2	5

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