BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : V**
BRANCH: ALL **SESSION : MO/2025**

SUBJECT: SR510: FUNDAMENTALS OF AEROSPACE ENGINEERING

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**

			CO	BL
Q.1(a)	Explain the Reynolds experiment to obtain the conclusion of flow regimes in a pipe flow.	[5]	CO1	L3
Q.1(b)	Differentiate between laminar and turbulent flows. With the help of a sketch show the flow patterns listing them feature wise for a transition from laminar to turbulent flow over a flat plate.	[5]	CO1	L2
Q.2(a)	Show the graphical representation of an infinitesimal sounding particle travelling at a speed less than its propagation of sound. Also quantitatively find the values of the distance between subsequent travel and the radius of the wave propagation.	[5]	CO2	L3
Q.2(b)	List down the salient features of a stationary normal shock wave. What factors causes the entropy to increase across a shock. Also show that across normal shock the flow would always be subsonic.	[5]	CO2	L3
Q.3(a)	What does “Engine is limited by altitude and Mach number” means, explain in brief?	[2]	CO3	L2
Q.3(b)	What is the function of a turbine in a turbojet engine? What is the principle on which it works?	[3]	CO3	L3
Q.3(c)	What is the difference between a turbojet and a turboprop engine, explain with suitable sketches? Also write the disadvantages over each other.	[5]	CO3	L4
Q.4(a)	Define the terms Insulator, Inhibitor and Liner.	[2]	CO4	L2
Q.4(b)	What are the ingredients used in a double base solid propellant? Also give the reasons why it is also called homogenous propellant.	[3]	CO4	L3
Q.4(c)	Explain with suitable figure the pump feed arrangement used in a Gas Generator cycle of a liquid rocket engine.	[5]	CO4	L4
Q.5(a)	Write the Law of Ellipses that is followed in the planetary motion in the space.	[2]	CO5	L2
Q.5(b)	Derive the equation for the acceleration due to gravity.	[3]	CO5	L3
Q.5(c)	Derive the equation for the orbital velocity and also show how it changes with the altitude?	[5]	CO5	L4

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