BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO-2022)

CLASS: **B.TECH/BARCH** **SEMESTER : V**
BRANCH: **BT/CHEMICAL/CS/IT/ECE/EEE/ME/ARCH** **SESSION : MO/2022**

SUBJECT: SR510 FUNDAMENTALS OF AEROSPACE ENGINEERING

TIME: **03 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.

Q.1(a)	Why an aerodynamic study about a body is so important?	[2]
Q.1(b)	Explain with an example of an internal aerodynamics and its implication.	[3]
Q.1(c)	What are the basic sources of an aerodynamic force? How these forces are acting over an airfoil and leading to the different types of loads?	[5]
Q.2(a)	Why a non-dimensional force such as lift coefficient and drag coefficient has been utilized instead of lift or drag?	[2]
Q.2(b)	What do you mean by a dynamic pressure and how it is different from the static pressure?	[3]
Q.2(c)	Derive an equation to get the moments about the leading edge of the airfoil.	[5]
Q.3(a)	Why after certain angle of attack of a wing, the lift coefficient starts decreasing?	[2]
Q.3(b)	How the flow velocity having M<1 could be accelerated by changing the cross-sectional area of the duct? Explain using an sketch,	[3]
Q.3(c)	Derive the equation of speed of sound (a) to get equation in terms of temperature of the medium through which sound propagates.	[5]
Q.4(a)	What is the function of a propeller in a piston engine with propeller engine?	[2]
Q.4(b)	What do you mean by bypass ratio in a turbofan engine? Why it is lower for the military aircraft engine?	[3]
Q.4(c)	Show with a schematic sketches, working principles of a turbojet engine? Also show its T-S diagram.	[5]
Q.5(a)	Why rocket has convergent-divergent nozzle?	[2]
Q.5(b)	Show with a schematic diagram, all the components of a solid rocket motor.	[3]
Q.5(c)	Explain with certain schematic diagram the working principle of a liquid rocket engine.	[5]

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