

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: B.Tech
BRANCH: CHEMICAL/FT**

**SEMESTER : V
SESSION : MO/2025**

SUBJECT: SR510 FUNDAMENTALS OF AEROSPACE ENGINEERING

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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Q.1(a)	For any fluid flow problem what are the different characteristics of flow with which flow types could be derived.	[2]	CO1	BL L2
Q.1(b)	What is the basis for differentiating a subcritical, critical and supercritical flows over a circular cylinder.	[1]	CO1	L2
Q.1(c)	Give an example of laminar and turbulent flows.	[1]	CO1	L3
Q.1(d)	State the output (Scalar/Vector) of following operations: i) Gradient of a scalar field ii) Divergence of a vector field iii) Curl of a vector field	[1]	CO1	L2
Q.2(a)	Define propulsion system? Give any two examples of a propulsion system.	[2]	CO3	L2
Q.2(b)	Explain with a suitable sketch that the airframe and propulsion system are interlinked.	[3]	CO3	L3
Q.3(a)	George Caley gave the concept that the wing and thrust device to be two separate devices for the successful flight in 1799. In spite of this concept, why first development in the flight took in 1903 and it took around 100 years for this development?	[2]	CO3	L2
Q.3(b)	What is the function of a propeller in a piston engine with propeller engine? Explain in brief with suitable sketch.	[3]	CO3	L3
Q.4(a)	What are the merits of using a centrifugal compressor over an axial compressor?	[2]	CO3	L2
Q.4(b)	With the neat sketch, show the temperature and pressure variations along the length of different components of a turbojet engine.	[3]	CO3	L3
Q.5(a)	What is Specific fuel consumption (SFC)? Write its unit used in the practical system.	[2]	CO3	L2
Q.5(b)	Explain how injection of water methanol in turbojet engine helps in thrust augmentation?	[3]	CO3	L3

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