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

CLASS: MTECH   SEMESTER : I
BRANCH: SPACE ENGINEERING AND ROCKETRY   SESSION : MO/2023

SUBJECT: SR503 SPACE ENGINEERING AND SPACE DYNAMICS
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.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Explain the adverse effects of wind shear, headwind, density shear, radiation, and ice clouds on launch vehicles.	[5]	4	2
Q.1(b)	Draw a sketch qualitatively showing "standard atmosphere."	[5]	4	1
Q.2(a)	Prove that $\Lambda=\lambda+\varepsilon(1-\lambda)^{-1}$, where Λ: mass ratio, λ: payload ratio, and ε: structural efficiency.	[5]	2	3
Q.2(b)	Prove that the classical one-body problem could be used to explain the principle of energy conservation.	[5]	2,3	4
Q.3(a)	Explain the perturbation problem applied to orbits and describe special and general perturbation methods in brief.	[5]	2,3	4
Q.3(b)	With the help of Tsiolkovsky equation, prove that Δv is given without displacement in impulsive shot.	[5]	3,4	4
Q.4(a)	Explain the difference between jitter and attitude error.	[5]	3	3
Q.4(b)	Which disturbance torques determine the attitude error?	[5]	3	3
Q.5(a)	Draw a sketch showing the usable region for power sources used in space.	[5]	4	3
Q.5(b)	Is it possible to use solar arrays and batteries in a definite sequence?	[5]	4	3