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

CLASS: M. Tech.   SEMESTER : II
BRANCH: SER   SESSION : SP/2023

SUBJECT: SR508 AERODYNAMIC STABILITY AND CONTROL
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)	Describe the effect of planform in designing a wing in supersonic flow.	[5]	1	2
Q.1(b)	Classify the missile on the basis of points of launching and impact.	[5]	1	2
Q.2(a)	Explain the effect of wing in longitudinal static stability of an aircraft.	[5]	2	2
Q.2(b)	Discuss in brief about the effect of aircraft fuselage and vertical tail fin on directional static stability.	[5]	2	2
Q.3(a)	Discuss on the short-period-oscillation in longitudinal mode of aircraft motion in dynamic stability.	[5]	3	2
Q.3(b)	Demonstrate the spin of an aircraft and its recovery.	[5]	3	3
Q.4(a)	Briefly discuss on the open-loop and closed-loop control systems with some practical applications.	[5]	4	2
Q.4(b)	Explain the transient response characteristics such as delay time, peak time, maximum overshoot and settling time.	[5]	4	2
Q.5(a)	Discuss on the safety of parent aircraft during air launch of missile.	[5]	5	2
Q.5(b)	Ten thousand components were put into service at time zero. The number of components (n) in their normal state at t = 5000, 10000, …, 25000 cycles are given below. Compute the reliability and unreliability at t = 0, 5000, 10000, …, 25000 and Mean Time to Failure (MTTF).	[5]	5	3

t (cycles)	n (t)
0	10000
5000	9500
10000	7500
15000	4500
20000	500
25000	0

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