

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

CLASS: M.TECH
BRANCH: SER

SEMESTER : II
SESSION : SP/19

SUBJECT: SR580 ELEMENTS OF HYPERSONIC FLIGHT

TIME: 3.00 Hrs.

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.
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- Q.1(a) Why does the hypersonic flow differs from the other flow regimes? [5]
Q.1(b) Briefly explain the thin shock layer theory. [5]
- Q.2(a) Obtain the hypersonic shock relations for pressure, temperature and density. [5]
Q.2(b) What do you understand by Low density flows? Explain its applicability towards hypersonic flows. [5]
- Q.3(a) Prove that for a very high Mach number $\beta = 1.2\theta$. [5]
Q.3(b) Show that in the case of high mach number flows, the coefficient of pressure is a function of hypersonic similarity parameter and C_p/C_v . [5]
- Q.4(a) Using suitable assumptions, obtain the Newtonian Sine squared law. [5]
Q.4(b) Obtain the hypersonic small disturbance equation. [5]
- Q.5(a) Explain the hypersonic equivalence principle. [5]
Q.5(b) How does the prandtl's boundary layer equation applicable to the Hypersonic flows. [5]

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