GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

AERONAUTICAL ENGINEERING

Subject Name: **HIGH SPEED AERODYNAMICS AND EXPERIMENTAL TECHNIQUES**

Sr. No.	Course Contents	Total Hrs
1.	**Supersonic flow over wings** General remarks about supersonic wings, governing equations & Boundary conditions, consequence of linearity, solution methods conical flow method, Rectangular wings, swept wings, delta & arrow wings, design consideration for supersonic aircraft aerodynamic extraction.	06
2.	**Fundamentals of Hypersonic flows** Preliminary thoughts: Thin shock layers, entropy layer, Viscous retraction, High temp flows, low density flows, recapitulation Mach No. independence. Newtonian flow model, stagnation region flow field properties, modified Newtonian flow & wave riders, aerodynamic heating.	10
3.	**Hypersonic shock & Expansion wave relation** Introduction, basic hypersonic shock relations, hypersonic shock relation in terms of hypersonic similarity parameters, hypersonic expansion wave relation.	08
4.	**Local Surface Inundation Methods.** Newtonian flow, modified Newtonian flow, centrifugal force correction to Newtonian theory tangent-wedge/ Tangent – cone methods, shock expansion method.	10
5.	**Experimental Method in Aerodynamics** Introduction to wind tunnel & its components, measurements of various quantities in wind tunnel, solid blockage, wake blockage, wind tunnel balances, corrections, flow visualization techniques, supersonic wind tunnels, high speed subsonic tunnels, transonic wind tunnel, shock tube, hypersonic wind tunnel , experimental methodology.	18

Text Books:

1. Aerodynamics for engineers – John J Bertin
2. Hypersonic and high temperature gas dynamics – J D Anderson
3. Aerodynamics – L J Clancy

Reference Books:

1. Hypersonic aerothermodynamics – John J Bertin
2. Supersonic aerodynamics – E R C Miles