

R09
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Code: 9A21502

B.Tech III Year I Semester (R09) Supplementary Examinations, May 2013

**FLIGHT MECHANICS - I**

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) Explain lift coefficient and drag coefficient of an airfoil.  
(b) Describe the variation of these with mach number for a typical airfoil.
- 2 (a) Explain the different parts of a propeller.  
(b) Define propeller efficiency and advance ratio.  
(c) Explain, with the help of sketches, how a propeller generates thrust.
- 3 Starting from fundamentals, derive an expression for the range of a jet aircraft in terms of the aerodynamic lift and drag coefficients and other relevant parameters.
- 4 Derive an expression for the take-off distance of an aircraft. State all the assumptions clearly.
- 5 (a) Explain the principal features of missiles.  
(b) What is the difference between 'boost-glide' and 'boost-sustain' of a rocket?
- 6 (a) Define the 'flight path' of a rocket.  
(b) How does the apogee altitude of a rocket depend upon the flight path angle in flight?
- 7 (a) Define transonic speed.  
(b) Describe the variation of lift and drag coefficients of an aircraft in subsonic, transonic and supersonic regimes.  
(c) Transonic flights are hazardous - justify.
- 8 Derive the equations of motion of an aircraft.

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