

Ground Examination Syllabus

Commercial Pilot's Licence (Aeroplanes)

Commercial Pilot's Licence (Helicopters and Gyroplanes)

Airline Transport Pilot's Licence (Aeroplanes)

Airline Transport Pilot's Licence (Helicopters and Gyroplanes)

LOADING

1 **LOADING (MASS AND BALANCE)**

1.1 **Introduction**

1.1.1 State legislation

1.1.2 Centre of Gravity (CG)

1.1.2.1 Associated Definitions and Abbreviations: importance in relation to aircraft stability

1.1.3 Mass/weight and Balance Limits

1.1.3.1 Associated Definitions and Abbreviations; approved flight manual mass and CG limits (towing, taxi, take-off, landing, cruise, Mach. No.)

1.1.3.2 Maximum Floor Load; location, running load, point load, use of spreaders

1.1.3.3 Maximum Ramp and Taxi Mass in Relation to Stability

1.1.3.4 Factors Determining Maximum Permissible Mass; structural limitations (taxy, take-off, landing, maximum zero fuel weight), performance limitations (available distances for take-off and landing, rate of climb and performance ceiling, requirements in relation to obstacles, WAT limits, one engine inoperative), weather conditions, ambient and runway conditions, minimum equipment list (aircraft unserviceabilities)

1.1.3.5 Factors Determining CG Limits; stability, flight control considerations in respect of mass and pitching moments, CG changes in flight due to fuel consumption, landing gear configuration, wing configuration, movement of centre of lift due to changes in Mach. No.

1.2 **Weight and Balance**

1.2.1 Terminology

1.2.1.1 Associated definitions & abbreviations; empty mass, basic operating mass, maximum zero fuel weight, use of standard or actual mass in accordance with state legislation; fluids (volume/mass conversion), useful load, allowed traffic load

1.2.2 Aircraft Mass Checks

1.2.2.1 Procedures; determination of mass, documentation, requirements for re weighing, equipment list

1.2.3 Determination of aircraft's loaded mass

1.2.3.1 Procedures; load and trim sheet, trim slide-rule, documentation

1.2.4 Effects of improper loading

1.2.4.1 Overloading

1.2.4.2 Incorrect loading; CG out of limits forward & aft

- 1.3 **Centre of Gravity**
- 1.3.1 Basic calculations
- 1.3.1.1 Terms Used, associated definitions, abbreviations, explanations
- 1.3.1.2 Expression of CG in Terms of Percentage of Mean Aerodynamic Chord (%MAC)
- 1.3.2 CG Checks
- 1.3.2.1 When Aircraft Weighed
- 1.3.2.2 Documentation
- 1.3.2.3 Practical methods of calculation; units used, mathematical, trim slide-rule, computer, graph, tabular
- 1.3.3 Procedures for determining loaded CG
- 1.3.3.1 Load and Trim Sheet, slid rule, computer, graph, tabular, documentation
- 1.3.3.2 CG Limits NOT Exceeded; check
- 1.3.3.3 CG Out of Limits; re-location of load, use of ballast (dead load/fuel)
- 1.3.3.4 Determination of Pitch Trim for Take-off
- 1.3.4 Re-capitulation of Effects of CG Out of Limits Fwd/Aft
- 1.3.5 Effects of CG within limits
- 1.3.5.1 Towards Fwd. Limit
- 1.3.5.2 Towards Aft. Limit.
- 1.3.5.3 In Flight Control of CG, fuel consumption, fuel transfer, retention of fuel
- 1.3.6 Securing of load
- 1.3.6.1 Importance of Location and Adequate 'Tie Down', types of securing equipment
- 1.3.6.2 Effect of Load Shift; movement of CG (possible out of limits), structural damage due to inertia

- 1.4 **Checking of Load and Trim Sheet**
- 1.4.1 Computer and Manually Determined
- 1.4.1.1 Flight No. and Date
- 1.4.1.2 Aircraft Type and Registration
- 1.4.1.3 Correct Units Used
- 1.4.1.4 All Calculations Correct
- 1.4.1.5 Pitch Trim in Relation to CG
- 1.4.1.6 Mass & CG Within Limits
- 1.4.1.7 Additional checks for manually determined, mathematical errors, correct graph usage, correct use of tables, correct use of trim slide rule