

Board of Aeronautical Engineering

Aeronautical Engineer Licensure Examination

Syllabi of Subjects

I. AERODYNAMICS (25%)

II.

A. Objective: To determine the basic knowledge of the Examinees in the Fundamentals of Aerodynamics and Applications to Aircraft.

B. Subject Contents:

1. Standard Atmosphere
 - a. Composition and Properties of Air
 - b. Layers and Characteristics of the Earth's Atmosphere
2. Fluid Laws
 - a. Incompressible (Low-speed) and compressible (High-Speed) Flows
 - b. Energy and Thermodynamic Relations
 - c. Continuity, Bernouli, other Fluid Equations, and Flow Measurements
 - d. Supersonic Waves and Characteristics of Compression (Shock) and Expansion Waves
3. Aircraft Classification and Operating Principles
 - a. Heavier-than-Air Aircraft (Fixed and Rotary Wings) and Principles of Flight
 - b. Lighter-than-Air Aircraft and Principles of Flight
4. Airplane Aerodynamics
 - a. Aerodynamics Forces and Moments
 - b. Flight Performance - Power Required, power Available, Climb, Glide, Turn, Take-Off, Landing, Range, Endurance, Load Factors
 - c. Flight Envelope - Gust and Maneuvering Loads
 - d. Stability and Control - Static and Dynamic
5. Helicopter Aerodynamics
 - a. Aerodynamic Forces, Moments, Torque
 - b. Flight Performance, Stability and Control
6. Wind Tunnels
 - a. Classification of Wind Tunnels
 - b. Operating Principles
 - c. Applications

C. References:

1. Elements of Practical Aerodynamics - Bradley Jones
2. Technical Aerodynamics - K D Wood

3. Engineering Supersonic Aerodynamics - Bonney

4. Aerodynamic Theory (Volumes I to VI) - Durand

5. FAA Code of Federal Regulations, Parts 1 to 59 - US Printing Office

6. Basic Helicopter Handbook - US Printing Office

7. Wind Tunnel Testing - Pope

8. Aerodynamics - L.S. Clancy

III. AIRCRAFT STRUCTURES AND DESIGN (20%)

A. Objective: To determine the basic knowledge of the

Examinees in Structural Analysis and Design of Aircraft

B. Subject Contents:

1. Fundamental Principles
 - a. Structural Analysis
 - Forces, Stresses, Bending Moments, Torsion
 - Beams, Trusses, Columns, Statically Determine and Indetermine Systems
 - Factors and Margin of Safety
 - Procedures in Stress Analysis
 - b. Aircraft Design Requirements
 - Category and Specifications
 - Aircraft Utilization
2. Aircraft Design Configuration
 - a. Aircraft Parts and Systems
 - b. Structural Configuration
 - c. Aircraft Weight Distribution
 - d. Center-of-Gravity (CG) and CG Travel
3. Structural Loading Conditions
 - a. Gust and Maneuvering Loads, Load Factors, Flight Envelope
 - b. Loads on Wings, Fuselage, Control Surfaces
 - c. Loads on Landing Gears, Engine Mounts, other Structural Members (Statics and Dynamics)
4. Structural Analysis and Design

a. Structural Analysis and Design of Wings, Fuselage, Control Surfaces, Landing Gears, Engine Mount, others

b. Design of Non-Structural Parts and Systems

C. References:

1. Analysis and Design of Flight Vehicle Structures - Bruhn

2. Airplane Structural Analysis and Design - Sechler & Dunn

3. FAA Code of Federal Regulations, Parts 1 to 59 - US

Printing Office

4. Aerospace Vehicle Design, Vol - Aircraft Design - KD Wood

5. Airplane Design Manual - Teichmann

6. Mechanics of Materials - Any author

7. Engineering Mechanics - Any author

IV. AIRCRAFT CONSTRUCTION, REPAIR, AND MODIFICATION (15%)

A. Objective: To determine the basic knowledge of the Examinees on Aircraft Materials, Construction Repair, and Modification

B. Subject Contents:

1. Aircraft Materials and Processes

a. Physical and Chemical Properties of Ferrous Metals and Alloys, Non-Ferrous Metals and Alloys, Non-Metals (Wood, Fiberglass, others)

b. Identification of Metals

c. Heat Treatment processes

d. Forming/Shaping and Forging

e. Joining of Metals

2. Aircraft Hardware, Cables, and Tools/Equipment

a. Bolts, Nuts, Screws, Rivets, others

b. Control Cables and Cable Assemblies

c. Tools and Fabrication/Repair Equipment

3. Construction, Repair, and Modification

a. Aircraft Structural Components

b. Metal Structures

c. Non-Metal Structures

d. Composite Materials

4. Testing and Inspection

a. Testing of Metals - Hardness Tests

b. Non-Destructive Test and Inspection

5. Corrosion Protection and Control

a. Types of Corrosion

b. Corrosion Protection and Removal

6. Aircraft Weight and Balance

a. Weighing Procedure

b. Weight and Balance Computations

c. Weight and Balance Extreme Conditions - Most Forward and Rearward CG Positions

C. References:

1. Aircraft Materials and Processes - Titterton

2. Aircraft Inspection and Repair - US Printing Office

3. Maintenance and Repair of Aerospace Vehicle - McKinley and Bent

V. ENGINEERING ECONOMICS AND MANAGEMENT, LAWS AND ETHICS (10%)

A. Objective: To determine the basic knowledge of the

Examinees in Aeronautical Engineering Law and Ethics,

and the Principles of Engineering Economics and Management with Aeronautical Engineering Applications

B. Subject Contents:

1. Engineering Law and Ethics

a. Presidential Decree No. 1570

■ All Sections, except those presently in conflict with PRC Law/Regulations, such as Compensation of Board Members (Sec. 9) and Schedule of Fees (Sec. 11)

b. Implementing Rules and Regulations of PD 1570

■ Definition of Terms, Registration and Practice of Aeronautical Engineers

■ Code of Professional Ethics

2. Engineering Economics and Management

a. Air Transport Economics

■ Interest, Depreciation, Revenue, Expenses, Profit, others

■ Break-Even Analysis

■ Airline Operation

Passenger Load Factor, Revenues, Expenses, Profit, others

b. Aviation Industrial Organizations

■ Airline and Aviation Companies

■ Research and Development

■ Aircraft Manufacturing

C. References:

1. Presidential Decree No. 1570

2. Implementing Rules and Regulations of PD 1570

3. Republic Act 776

4. Engineering Economy Sixth Edition - Garmo, Canada, Sullivan

5. Production Operations & Management - Any Author

6. Management Theory & Practice - Any Author

VI. MATHEMATICS (10%)

A. Objective: To determine the basic knowledge of the

Examinees in Mathematics as an indispensable tool in

Aeronautical Engineering Computations

B. Subject Contents:

1. Algebra and Trigonometry

a. Algebraic Functions, Equations, and various Algebraic Operations

b. Trigonometric Functions, Plane and Spherical Trigonometry, other Topics

c. Problems in Aeronautical Engineering

2. Analytic Geometry

- a. Coordinate Systems, Equations of Lines
 - b. Conic sections, Transformation of Coordinates, other Topics
 - c. Problems in Aeronautical Engineering
3. Differential Calculus, Integral Calculus, and Differential Equations
- a. Differential Methods and Derivatives
 - b. Integration Methods and Integrals

c. Ordinary, Linear, and Partial Differentials

d. Problems in Aeronautical Engineering

C. References:

1. College Algebra - Any Author
2. Plane and Spherical Trigonometry - Any Author
3. Analytic Geometry - Any Author
4. Differential and Integral Calculus - Any Author
5. Differential Equations - Any Author