

Aeronautical Engineering (5400-5402) Subspecialty Code Review

Educational Skill Requirement Fulfillment:

 Aircraft Structures and Materials: Be able to apply U.S. military standards and practices to analyze structural components of tactical and transport aircraft, using engineering analytic methods on idealized models and automated finite element methods on realistic models to determine stresses, strains, deformations and appropriate limiting conditions of yielding, fracture, buckling and fatigue. These analytical skills should be built upon a fundamental understanding of aircraft materials and familiarity with nondestructive means of experimental evaluation, which includes detection of hidden damage and repair of military flight vehicles that might be done up to the depot level.

 Flight Mechanics: Be able to calculate all performance parameters for both propeller driven and jet powered military aircraft, and to determine their longitudinal and lateral-directional, static and dynamic stability characteristics. Be able to analyze and design aircraft and missile guidance and control systems, including feedback stabilization schemes and stochastic processes, using classical and modern control techniques.

 Aircraft and Missile Propulsion: Understand the principles and operating characteristics of aircraft and missile propulsion engines and be able to analyze the performance of gas turbines through knowledge of the behavior and design characteristics of the individual components. Be able to perform on-design and off-design cycle analysis and to understand the principles used to position the gas generator operating line on the compressor map. Be able to calculate performance parameters used in engine selection and know the state-of-the-art reasons for limitations on gas turbine engine performance, as well as the potential for future gains in the field. Be able to analyze the performance of rockets and ramjets through knowledge of the behavior of individual components, and be able to make steady-state, internal ballistic calculations for solid rocket motors.

 Aerodynamics: Be able to use classical analytic, experimental and modern computational techniques of subsonic and supersonic aerodynamics, including laminar and turbulent boundary-layer viscous effects, without heat addition, to calculate internal flow properties through inlets, nozzles and engines and external air flow pressure distributions over wings, canards, tails, and other lifting surfaces to determine the resulting lift, drag and pitching moment.

 Information Processing: Be able to use current computer methods to solve aeronautical engineering problems and possess knowledge of the application of dedicated avionic and systems computers on board Naval aircraft.

 Engineering Mathematics: Demonstrate analytic ability to apply differential and integral calculus, ordinary and partial differential

equations, complex variables, vector calculus, matrix algebra, probability and statistics and numerical analysis in the development of engineering theory and its application to Naval engineering problems.

_____ **Electrical Engineering:** Understand basic electrical circuits, systems and electronic devices as a foundation for interfacing mechanical and electronic systems in aircraft.

_____ **Systems Design:** Be able to integrate all of the disciplines of aeronautics into a design of an aircraft or missile in response to a realistic set of military requirements, specifications, constraints and cost limitations. The design must include considerations for safety, reliability, maintainability and survivability.

Subspecialty Code Recommendation: _____

SME/Reviewer Name: _____ **Date** _____

Signature _____