"Approved"
Head of engineering department
Kindrachuk M.V.

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"____" _____ 2019

Topics
for students home task #1
on **«Science of Aviation Materials»**

**Field of Study:** **17 «Electronics and Telecommunications»**
**Specialty:** **173 «Avionics»**
**Specialization:** **«Piloting and Navigation Equipment Complexes»**

1. **Conductive alloys** (Properties. Metals and alloys. Alloys for thermocouples. Materials for terminals. Cermets and contactols)

2. **Classification of conductive materials** (The requirements to conductive materials. Classification of conductive materials. Application of conductive materials with low and high specific resistance)

3. **Metals with high conductivity** (Requirements and application. Basic types of metals and alloys. Influence of impurities on their conductivity)

4. **Metal-based high resistivity alloys for high temperature applications** (Why it is necessary to have these alloys. Variety of heaters. Nichroms. Fechrlals. Rhesistom)

5. **Superconductivity (**Definitions. Properties of superconductors. Two types of superconductivity. Basic varieties and application of superconductors)

6. **Cryogenic conductivity** (Definitions. Advantages and disadvantages. The variety of cryogenic materials and their application).

7. **High resistance metallic alloys** (Application of high resistance alloys. Requirements. Reference resistors. Constantan. Nickelin. Neizilber)

8. **Nonmetellic conductive materials** (Conductivity of nonmetals. Graphite-based materials. Application of graphite-based materials)

**9. Dielectric materials** (Definitions. Properties. Classification. Polarization. Application of dielectrics for electrical insulation)

**10. Conductivity of dielectrics** (Definitions. Properties and application. Factors, influencing conductivity of dielectrics.)

**11. The variety of dielectric materials** (Classification of dielectric materials. Organic and inorganic dielectrics.)

**12. Electrical strength of dielectrics** (Definitions and classification of dielectrics. Conductivity of dielectrics. The break-down of dielectrics)

**13. Gaseous dielectric materials** (Definitions and characteristics. Types of dielectrics. Application of gaseous dielectrics. Properties of most frequently used liquid dielectrics (at least 10). Break-down of gaseous dielectrics).

**14. Liquid dielectric materials** (Definitions and characteristics. Types of liquid dielectrics. Influence of impurities on their conductivity. Application of liquid dielectrics. Properties of most frequently used liquid dielectrics (at least 10)).

**15. Polarisation of dielectric materials** (Definition of polarisation. Dielectric permeability. Types of polarisation and its influence on break-down. The influence of external factors on polarisation)

**16. Solid dielecrical materials** (Definitions and characteristics. Types of dielectrics. Application of solid dielectrics. Properties of most frequently used solid dielectrics (at least 10). Natural (rocks an biological) materials. Polymeric materials)

**17. Properties of conductive materials** (Definitions and properties of conductors. Conductivity, its physical nature. Factors influencing conductivity)

**18. Active dielectrics** (Properties and classification of dielectrics. Isolators and active dielectrics. Peisoelectrics. Segnetoelectrics, alloy “Invar”. Application of pieso- and segnetoelectrics)

**19. Phisical properties of active dielectrics** (Definitions and properties. Electrooptical materials. Electrets. Pyroelectrics. Sun batteries. Application of listed materials)

**20. The variety of active dielectrics** (Definitions and classification. Pieso- and pyroelectrics. Electrets. Segnetoelectrics. The properties of active dielectrics (at least 10 materials)