Approved:

Dean:

/ Prof. G. Rainovsky, Dr. Habil. /

Exam Questionnaire
for a candidates for doctoral program
"Radiophysics and Physical Electronics"
(Regular treining program for PhD)

1. Current in Vacuum at the absence and presence of space charge. Child-Langmuir's Law.
2. Gas discharge and plasma. Plasma quasi-neutrality. Movement of charged particles in plasma. Main types of discharges - classification, characteristics.
3. RF and Microwave Discharges.
4. Electronic emission of metals - types. Thermoelectric emission. Emission of electrons induced by an electrostatic field.
5. Free oscillations in conservative systems with one degree of freedom. Dissipation Systems.
6. Weakly non-linear systems with dissipatiom. Methods of analysis.
7. Wave propagation. Wave equation. Complex dielectric permeability. Wave Polarization.
8. Refraction and absorption index for EM waves. Depth of penetration of EM waves. Dispersion. Wave package and group speed.
9. Wave-channeling structures. Coaxial and microstrip lines.
10. Metal waveguides. Dielectric waveguides.
11. Resonators - coaxial, microstrip, waveguide, dielectric.
12. Antennas - basic features. Small antennas.
13. Vibrator antennas. Radiation pattern.
14. Antenna arays. Slow-wave Antennas.
15. Aperture antennas.
16. Propagation of electromagnetic waves in the Earth's atmosphere.
17. Path loss of EM waves. Types of obstacles. Fresnel zones.
18. Fluctuation phenomena in radiophysics. Methods of description. Correlation-spectral analysis.

Literature:
1. S. Ivanov (2004) "Radiation and Propagation of Electromagnetic Waves", University Publishing House, SU
2. I. Zhelyazkov (2000) "Vibration and Waves", University Publishing House, SU
3. D Misra (2001) "RF and Microwave Communication Circuits: Analysis and Design" (John Wiley and Sons)
4. S Ahmanov, Yu Diakov, A Chirkin (1981) "Introduction to Statistical Radiophysics and Optics", Science, Moscow
5. Ya. P. Raizer (1991) "Gas Discharge Physics" (Springer)

25.07.2023

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/ Assoc. Prof. Dr. St. Kolev /