

## STATEMENT

Regarding a competition for the occupation of an academic position of "associate professor" in professional direction 5.2 Electrical engineering, electronics and automation, scientific specialty "Electrical power supply and electrical equipment", for the needs of the Faculty of Technical Sciences, department "Electronics, Electrical engineering and mechanical science", announced in the State Gazette issue 97/21.11.2023, with candidate: chief assistant professor Mladen Antonov Proykov, Ph.D.

Member of the scientific jury: Anatoly Trifonov Alexandrov, Ph.D., professor (according to the order of the Rector of the University "Prof. Dr. Asen Zlatarov" No. RD-67 dated 26.02.24).

### 1. General characteristics of the candidate's research and scientific - applied activity

In the competition for the academic position of "associate professor" chief assistant professor Mladen Antonov Proykov, participates with 30 scientific works, including a monograph - 1 (B3), 8 scientific publications (Г7.1 – Г7.8) in editions referenced and indexed in world-renowned scientific information databases (Scopus) and 21 scientific publications (Г8.1 – Г8.21) in non - refereed journals with scientific review or in edited collective volumes.

The publications can be classified as follows:

- By place of publication: reports in proceedings of international scientific conferences abroad - 1 [Г7.1]; articles in national journals – 5 [Г8.1, Г8.2, Г8.9, Г8.13, Г8.14]; reports in proceedings of international scientific conferences in Bulgaria – 12 [Г7.2 – Г7.8, Г8.3, Г8.4, Г8.17, Г8.18, Г8.21]; reports in proceedings of national scientific conferences, sessions and seminars – 5 [Г8.7, Г8.8, Г8.10, Г8.15, Г8.16]; reports in scientific proceedings of universities - 6 [Г8.5, Г8.6, Г8.11, Г8.12, Г8.19, Г8.20].

- According to the language in which they were written: in English – 15 [Г7.1 – Г7.8, Г8.9, Г8.11 – Г8.14, Г8.19, Г8.20]; in Bulgarian – 14 [Г8.1 – Г8.8, Г8.10, Г8.15 – Г8.18, Г8.21].

- By the number of co-authors: independent – 9 [Г8.5 – Г8.8, Г8.11, Г8.12, Г8.15, Г8.16, Г8.19]; with one co-author – 10 [Г7.2, Г7.4, Г7.5, Г7.7, Г7.8, Г8.9, Г8.10, Г8.13, Г8.14, Г8.20]; with two co-authors – 5 [Г7.3, Г7.6, Г8.17, Г8.18, Г8.21]; with three or more co-authors – 5 issues [Г7.1, Г8.1 – Г8.4, ]. In 20 of the publications, Mladen Proykov, PhD, is the first co-author and the first co-author in the published monograph.

Chief assistant professor Mladen Proykov, PhD, meets and, by certain indicators, exceeds the minimum national requirements and the requirements of the Regulations on the conditions and order for acquiring academic positions at the University "Prof. Dr. Asen Zlatarov" - Burgas. He has defended a dissertation on the topic: "Research, analysis and recommendations for achieving electromagnetic compatibility in power supply systems in reduced load mode", professional direction 5.2 Electrical engineering, electronics and automation, scientific specialty "Electrical power supply and electrical equipment", diploma No. TUV-NS-2018-107/12.09.2018 (indicator A – 50 p.). He presented a habilitation thesis - monograph (indicator B3 - 100 p.), 8 scientific publications in editions referenced and indexed in world-renowned scientific information databases (Scopus) (indicator Г7 – 184,66 p.), 21 scientific publications in non - refereed journals with scientific review or in edited collective volumes (indicator Г8 – 268,01 p.), 22 citations (indicator Д – 164 p.). The candidate has a scientific and implementation activity (indicator E – 120 p.): participation in a national scientific or educational project (indicator E18 – 40 p.); management of a national scientific or educational project (indicator E20 – 20 p.); publication of a university textbook (indicator E23 – 40 p.); publication of a university handbook (indicator E24 – 20 p.).

According to the presented reference for scientific research chief assistant professor Mladen Proykov, PhD, has participated in 5 contracts, being the leader in one of them, and a member of the scientific team in the remaining 4 contracts. All contracts are internally funded by the university.



## **2. Assessment of the candidate's pedagogical training and activity**

From October 2014 to March 2019, Mladen Proykov, PhD, was an assistant, and from April 2019 to now he was the chief assistant in the Department of "Electrical Engineering, Electronics and Mechanical Science" at the Faculty of Technical Sciences at the University "Prof. Dr. Asen Zlatarov", Burgas. He has 9 years and 6 months of work experience as a teacher.

According to the presented report on the horarium of the classes conducted in the last three years chief assistant professor Mladen Proykov, PhD, has held 1,546 hours of lectures on the disciplines: "Electrical engineering and electrical measurements", "Theoretical electrical engineering", "Theoretical electrical engineering I part", "Theoretical electrical engineering II part", "Electric drive", "Lighting technology", "Electricity supply", "Technique of high voltages", "Relay protection and automation", "Electrical networks of urban areas".

Based on the above data, I consider the pedagogical preparation and activity of chief assistant professor Mladen Proykov, PhD, to be very good.

## **3.3. Main scientific and applied contributions**

I accept the formulated contributions in the presented works. They have a scientific-applied character and are related to proving with new means essential new aspects in existing scientific problems and obtaining confirmatory facts in the field of electrical networks.

### *3.1. Contributions to the habilitation work – monograph:*

- Basic concepts, indicators and characteristics of reliability in power supply systems have been systematized, and energy criteria for its practical assessment have been examined. Methods for predicting and improving reliability have been proposed;
- Mathematical models of the reliability of power supply systems have been presented and an analysis of the reliability of real power supply systems has been conducted;
- The influence of the human factor on predicting the reliability of power supply systems has been evaluated. The losses of industrial sites due to interruption of the power supply have been examined.

### *3.2. Contributions in publications other than these with habilitation equivalent:*

- Contributions in the field of research, analysis and improvement of energy efficiency of electrical networks:
  - The energy efficiency of residential buildings has been investigated. The effect of implementing control and energy management systems has been analyzed. The power quality indicators have been calculated [Г7.3, Г8.6].
  - The reactive powers in the power supply systems under the conditions of non-symmetrical and non-sinusoidal mode have been optimized. A method for reducing power losses by using reactive power compensation devices and power grid balancing has been proposed [Г7.2, Г7.5, Г8.4].
  - The operating modes and energy processes in the power supply systems of several sites have been studied. The losses of electrical energy for individual groups of electrical equipment, the losses in the power transformers and for their entire power supply system have been determined. The influence of the load on the power factor and active power losses has been established. The contribution of different power quality indicators has been evaluated [Г7.8, Г8.15];
  - Solutions for the rehabilitation of existing street lighting systems have been presented. A comparative analysis has been conducted between solutions with different types of street LED lighting fixtures based on the achieved lighting technical indicators and realized energy efficiency. A method for automated control of lighting systems has been proposed [Г8.3, Г8.5].



- *Contributions in the field of research, analysis and evaluation of indicators of the quality of electrical power and electromagnetic compatibility in electrical networks:*
  - The relationship between energy efficiency, power quality and electromagnetic compatibility and the influence of voltage deviation on specific power consumption at different load levels has been determined. Recommended values of various indicators and characteristics to increase electromagnetic compatibility have been formulated [Г7.1];
  - The work of power consumers of large industrial facilities under different loads has been studied. Load schedules have been made and harmonic components of current and voltage have been recorded. The influence of higher harmonics on active power and voltage losses in supply lines and on the life of power transformers has been determined [Г7.4, Г8.14];
  - The influence of powerful electrical consumers on the indicators of the quality of electrical energy and on electromagnetic compatibility has been studied. The possibility of generation of current and voltage higher harmonics and the probability of occurrence of current and voltage resonance have been considered [Г7.7, Г8.1].
- *Contributions in the field of research on photovoltaic system models and their impact on power supply systems;*
  - A phase control inverter model has been synthesized in Matlab/Simulink programming environment. The performance of the inverter has been analyzed. Active power losses, total harmonic distortion and harmonic composition of the output voltage and current have been determined [Г7.6];
  - A study has been conducted and an analysis has been carried out of the energy efficiency of an operating photovoltaic plant. The influence of the location, angle of inclination and type of photovoltaic panels on the operation of the plant has been investigated. The coefficient of useful and the maximum value of the generated electrical energy have been determined. Recommendations have been given to optimize the operation of the photovoltaic plant and to increase the quality of the generated electrical energy [Г8.19, Г8.20].
- *Contributions in the field of reliability research on power supply systems:*
  - A study has been carried out on the multiplicity of overvoltages during commutation of a group of powerful synchronous motors. The probability of penetration of electromagnetic disturbances into automation, control and protection systems has been confirmed [Г8.12];
  - The correlation between electromagnetic compatibility and reliability of power supply reliability has been established. The operation of a power supply system for consumers of the first category has been studied [Г8.13, Г8.18].
- *Contributions in the field of research on the operation of devices for the control and protection of electrical networks and energy equipment*
  - The operating characteristics of digital relay protection, the operation of a system: soft starter - asynchronous motor and system: frequency regulator - asynchronous motor and the operating characteristics of relays for alternating and constant voltage have been investigated [Г8.8, Г8.9, Г8.17, Г8.21].

#### **4. Significance of contributions to science and practice**

An assessment of the significance of the candidate's contributions is the citations indicated in the competition documents. A list of 22 citations in scientific publications, referenced and indexed in world-renowned databases of scientific information, has been presented. This gives me reason to conclude that chief assistant professor Mladen Proykov, PhD, is a well-known author and has published in significant scientific forums in the field of the competition.

### **5. Critical notes and recommendations**

I did not find any significant shortcomings in the works of Mladen Proykov, PhD. I believe the contributions can be summarized. I recommend preparing publications with IF and independent publications.

### **CONCLUSION**

In conclusion, I can give a positive assessment of the overall scientific research and pedagogical activity of chief assistant professor eng. Mladen Proykov, PhD, which fully meet the requirements for holding the academic position of "associate professor". Sufficient and significant scientific and applied contributions have been received.

Based on my review of the presented scientific works, their significance, the scientific and applied contributions contained in them, I find it justified to propose chief assistant professor Mladen Proykov, PhD, to hold the academic position of "associate professor" in professional direction 5.2 Electrical engineering, electronics and automation, scientific specialty "Electrical power supply and electrical equipment".

Date: 05.04.2024

MEMBER OF THE JURY:

/Prof. A. Alexandrov/