



## REVIEW

On the competition for the academic position "*Associate Professor*" in the field of higher education - 5. "*Technical sciences*", professional field – 5.2. "*Electrical engineering, electronics and automation*", scientific specialty "*Electrical power supply and electrical equipment*" announced in the State Gazette no. 97 / 21.11.2023 with candidate *Ch. Asst. Prof. eng. Mladen Antonov Proykov, PhD*

Reviewer *Prof. Dr. Eng. Vasil Dimitrov Dimitrov*  
"Todor Kableshkov" Higher School of Transport - Sofia

The review was prepared on the basis of Order for the approval of the Scientific Jury No. RD-67/26.02.2024 of the Rector of the University "Prof. Dr. Asen Zlatarov" - Burgas and in accordance with the decisions of the jury, taken at its first meeting on 07.03.2024.

### 1. General and biographical data

The proposal to announce a competition for the academic position (AP) "Associate Professor" in professional field 5.2. "Electrical engineering, electronics and automation", scientific specialty "Electrical power supply and electrical equipment", has been announced for the needs of Department of "Electronics, Electrical Engineering and Mechanical Science" at the Faculty of Technical Sciences.

The only candidate for participation in the competition is Ch. Assistant Professor Mladen Antonov Proykov, PhD. He graduated from the Technical University - Varna in 1999, majoring in "Electrical power supply and electrical equipment of industrial enterprises", Master's degree. In the period 2016-2018, he was a PhD student at the Technical University - Varna, majoring in "Electrical power supply and electrical equipment". From 2014 to 2019 he held the position of "Assistant", and from 01.04.2019 until now he holds the position of "Chief Assistant Professor" at the Department of "Electronics, Electrical Engineering and Mechanical Science" at the University "Prof. Dr. Asen Zlatarov" - Burgas. He has a certificate for successfully completed specialized courses in English (for PF 5.2) and in "Skills for saving, implementing and managing digital educational content".

### 2. General description of the presented materials

The candidate Ch. Asst. Prof. eng. Mladen Proykov, PhD, has submitted all the necessary documents required under Art. 67, para. (2) of the REGULATIONS on the terms and conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Asen Zlatarov" - Burgas (RTCASDHAP):

- Copy of the announcement in the State Gazette;
- Diploma for educational and scientific degree "Doctor";
- Creative resume with two certificates for additional courses;
- Certificate of work experience as assistant and chief assistant professor;

- List and copies of scientific publications - a total of 30 scientific works that are accepted for review (I have no publications in common with the candidate), including a monograph;
- List of published educational literature - 2 textbooks and 2 manuals for exercises;
- Reference to the implementation of the minimum national requirements and the requirements of RTCASDHAP for participation in the competition;
- Documents certifying the teaching and research activity of the candidate, etc.

According to RTCASDHAP, to occupy AP "Associate Professor" in the field of higher education 5. Technical sciences, it is necessary to meet the requirements for Groups of indicators: A (50 points), V (100 points), G (300 points), D (100 points), E (100 points).

After a thorough review of the submitted documents, it can be concluded that the requirements have been met:

**Indicator A - 50 p.:** the candidate holds the ESD "Doctor" for a developed and defended dissertation on the topic "Research, analysis and recommendations for achieving electromagnetic compatibility in power supply systems in reduced load mode" - Diploma No. TUV-NS-2018-107 / 12.09.2018 on the scientific specialty "Electrical power supply and electrical equipment", issued by the Technical University - Varna. A list of scientific works used in the acquisition of the PhD Degree is presented to the documents of this competition.

**Indicator V3:** the candidate is a co-author of a published monograph: M. Proykov, R. Kirov, "Reliability of power supply (*Theoretical foundations of reliability in power supply systems*)", 313 pages, ISBN: 978-619-7559-42-2, University "Prof. Dr. Asen Zlatarov" - Burgas, 2023. From the separation protocol for co-authorship to the monograph, it is clear that the candidate wrote over 160 pages of the habilitation thesis - **100 p.**

**Indicator G -** for participation in the competition, the candidate submitted 29 scientific publications. 17 of them are in English and 12 - in Bulgarian. They are divided into groups as follows:

*Indicator G7 -* Scientific publications in editions, referenced and indexed in world-famous databases with scientific information – 8 publications in co-authorship (5 of them are with 2 authors, 2 - with 3 authors and 1 - with 5 authors). The candidate is the first author of 7 of the publications, in one he is the third.

One report was presented abroad - at the 10<sup>th</sup> International Scientific Symposium on Electrical Power Engineering, ELEKTROENERGETIKA 2019, Slovakia, and is published in Curran Associates, Inc. - Red Hook, USA. Seven reports have been presented at international scientific conferences in Bulgaria and published in IEEE Xplore Digital Library - "ELMA" 2021 and 2023 (5 publications), "BULEF" 2023 (2 publications) and Energy Efficiency and Agricultural Engineering - "EE&AE" 2022 (1 publication). All these publications are indexed in Scopus - a total of **184.66 p.**

*Indicator G8 -* Scientific publications in non-refereed journals with scientific review or in edited collective works: 21 publications: 9 of them are in sole authorship - published in Annuals with scientific works of the University "Prof. Dr. Asen Zlatarov" - Burgas and of the National

Military University - Veliko Tarnovo. The rest are co-authored: 5 publications with 2 authors, 3– with 3 authors, 2 – with 4 authors and 2 – with 5 authors. In 4 of them the candidate is the first author, in 4 he is the second, in 3 he is the third, in 1 he is the fourth. Reports have been presented at international university scientific conferences in Bulgaria: "*Trans MotAuto World*", "*KEIT*", "*UniTech*", "*Energy Forum*", etc., subsequently published in Collections of papers, specialized scientific journals ("*Mechanics, transport, communications*", "*Industry 4.0*", etc.)-in total **268 p.**

Total number of points under **Indicator G – 452.66 p.**, which significantly exceeds the requirements.

**Indicator D** - for participation in the competition, the candidate submitted 22 citations of his publications. They can be divided into groups as follows:

*Indicator D12* - citations in scientific publications, referenced and indexed on the Web of Science / Scopus - 15 citations, 1 of which is by foreign authors (**150 p.**).

*Indicator D13* - citations in peer-reviewed collective volumes - 6 citations (**18 p.**).

The citation presented under No. 6.1 of the Reference-declaration for the implementation of the Minimum national requirements is a self-citation of I. Iliev.

Total number of points under **Indicator D – 168 p.**, which exceeds the requirements.

**Indicator E** – to participate in the competition, the candidate submitted published educational literature as follows:

*Indicator E23*: two university textbooks - co-authored (separation protocols are presented for the candidate's contribution of 75%) - **60 p.**:

Rumen Kirov, **Mladen Proykov**, *Operation of electrical systems (theoretical and practical foundations of operation of electrical systems). part I*, University "Prof. Dr. Asen Zlatarov" - Burgas, ISBN 978-619-7559-58-3, 2023.

Rumen Kirov, **Mladen Proykov**, *Operation of electrical systems (theoretical and practical foundations of operation of electrical systems). part II*, Ed. Libra Scorp, ISBN 978-619-273-012-3, 2024

*Indicator E24*: two manuals for exercises, in sole authorship - **40 p.**:

**Mladen Proykov**, *Manual for laboratory exercises on Relay Protection and Automation*, University "Prof. Dr. Asen Zlatarov" - Burgas, ISBN 978-619-7559-40-8, 2023.

**Mladen Proykov**, *Reliability of the Electrical Power supply - guide for seminar exercises*, University "Prof. Dr. Asen Zlatarov" - Burgas, ISBN 978-619-7559-41-5, 2023.

Total number of points according to **Indicator E – 100 p.**, which satisfies the requirements.

*In conclusion, I believe that the submitted materials for the competition fully meet the minimum national requirements and those of the University "Prof. Dr. Asen Zlatarov" - Burgas for occupying the academic position of "associate professor".*

### **3. General characteristics of the candidate's scientific research and applied scientific activity**

The scientific research and applied scientific activity of Ch. Asst. Prof. Mladen Proykov, PhD, are mainly focused on research and analysis of electrical networks, models of photovoltaic systems and their influence on power supply systems, devices for managing and protecting electrical networks and electrical equipment, with particular attention being paid to the possibilities of increasing energy efficiency and reliability. The analyzes and conducted experiments are related to the evaluation of the indicators of the quality of electrical energy and electromagnetic compatibility - the negative consequences of the increased consumption of reactive power and the lowering of the power factor, the effect of installing LED lighting and introducing a lighting control system were evaluated in existing lighting arrangements. Methods for rationalizing the schematic characteristics of photovoltaic systems and improving their energy performance are proposed. The main concepts, indicators and characteristics of reliability in power supply systems are commented and analyzed in detail. Mathematical reliability models have been created for real power supply systems of varying complexity.

According to the Report from the Vice-Rector for Research and Project Activities of the University "Prof. Dr. Asen Zlatarov" - Burgas, for the period 2014-2020 Ch. Asst. Prof. Proykov participated in five intra-university research projects financed by the "Research and Artistic and Creative Activity" fund, one of which he was the supervisor. He also was a member of the team of a scientific research project at the TU-Varna.

Ch. Asst. Prof. Proykov has participated in 9 engineering investment projects, and Official Notes from "BMF Port Burgas", "Moto" OOD and "Elkabel" AD have been presented. It also made a significant contribution to the modernization of the material and technical base of the Department of Electronics, Electrical Engineering and Mechanical Science at the Faculty of Technical Sciences through the development of new laboratory setups and boards - a report from the Head of the Department was presented.

From 2023 Ch. Asst. Prof. Proykov participates in the Editorial Board of the Annuals of the University "Prof. Dr. Asen Zlatarov" - Burgas, ISSN 2603-3968. He is a member of the Chamber of Engineers in Investment Design with full design legal capacity.

*All this shows initiative and proves the candidate's abilities and desire to conduct scientific research and scientific-applied activities.*

*The extensive composition of the author collectives in the publications is evidence of teamwork skills.*

### **4. Assessment of the candidate's pedagogical preparation and activity**

The candidate has submitted a Reference certified by the Rector of the University "Prof. Dr. Asen Zlatarov" - Burgas: during the last 3 academic years Ch. Asst. Prof. Proykov has held lectures on several disciplines of the competition's specialty:

- "Theoretical Electrical Engineering" - Part I and II; "Lighting equipment"; "Electrical drives"; "Electrical Engineering and Electrical Measurements"; "Electrical power supply" for various programmes in Educational Qualification Degree "Bachelor" and "Professional bachelor" - a total of over 970 hours;

- "Relay Protection and Automation"; "Technique of high voltages"; "Electrical networks of populated areas" for the programme "Electrical Engineering", Master's degree - a total of 480 hours.

He also conducted laboratory exercises in most of the disciplines.

A reference is presented for developed study programs in 17 disciplines.

The candidate actively works with students in conducting scientific research and participating in the "Scientific session for students, PhD students and young researchers", evident from the Reference submitted by the Vice-Rector for Research and Project Activities of the University "Prof. Dr. Asen Zlatarov" - Burgas.

He is the supervisor of 18 graduates who have successfully defended their Master theses (report presented by the Head of the Department of Electronics, Electrical Engineering and Mechanical Science).

*It can be concluded that the candidate's pedagogical training and teaching activities are at a high professional level and are precisely related to the specialty of the competition.*

## **5. Basic scientific and scientific-applied contributions**

I agree in substance with the contributions proposed by the applicant. They can mainly be attributed to *Creation of new classifications, methods, models, constructions, technologies; Proving by new means substantial new aspects of already existing scientific problems; Obtaining corroborating facts.*

The contributions can be summarized as follows:

### ***5.1. Scientific - applied contributions in the monograph***

✓ The main concepts, indicators and characteristics of reliability in power supply systems are systematized, energy criteria for their practical evaluation are specified, methods are proposed for forecasting and improving reliability;

✓ Based on developed models, an analysis of the reliability of real power supply systems of different complexity was carried out;

✓ The losses of the industrial facilities as a result of the interruption of the power supply were analyzed, and methods for their determination were proposed.

### ***5.2. Contributions in the publications***

#### ***Scientific - applied contributions***

✓ Energy efficiency, work modes and energy processes in specific industrial sites, resort and residential complexes, ports, etc. have been studied. Improvement measures by minimizing losses and compensation of reactive power are proposed;

- ✓ The influence of a number of powerful electrical consumers (power transformers, electric arc furnaces, welding units, electrolysis and compensating devices, crane systems, etc.) on the indicators of the quality of electrical energy and electromagnetic compatibility has been studied;
- ✓ A phase-controlled inverter model for a photovoltaic plant has been synthesized and analyzed;
- ✓ The operation of operating photovoltaic plants has been studied and analyzed, recommendations have been made to increase the quality of the generated electrical energy;
- ✓ By applying probabilistic-statistical methods, a correlation between electromagnetic compatibility and the reliability of the power supply has been established.

#### ***Applied Contributions***

- ✓ Specific solutions are proposed for the rehabilitation of existing lighting systems;
- ✓ The positive effect of the introduction of the "intelligent home" system in a single-family residential building has been proven in a new way;
- ✓ A laboratory model was developed and the operation of a power supply system for consumers of the first category was studied, an opportunity was created to determine the reliability indicators of the power supply;
- ✓ A laboratory model was developed and the working characteristics of a digital relay protection were studied;
- ✓ A laboratory model was developed and the operation of a "soft-starter - asynchronous motor" system at different settings of the soft-starter was studied;
- ✓ A laboratory model was developed and the operation of a "frequency regulator - asynchronous motor" system was investigated during start-up and speed stabilization;
- ✓ A laboratory model was developed and the operating characteristics of AC and DC relays were studied.

*The contributions also have **an educational aspect** - the developed laboratory models and methods for conducting research and experiments can be introduced into the education of students in appropriate disciplines related to power supply, electrical equipment and drives.*

*Contributions are **the personal work of the candidate**, which is evident from the scientific research presented in the publications - a large part of them are prepared by the candidate or with a leading his role, as well as from his participation in a large number of research and investment projects.*

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

Based on the candidate's participation in prestigious scientific forums (in 11 international conferences in six years), as well as the citations of publications in editions visible in world-renowned databases of scientific information, I assess the contributions in the presented scientific works as significant. The necessary publicity and recognition in front of the professional community at home and abroad has been achieved.

## 7. Critical notes and recommendations

I have no significant objections to the scientific production presented. The documents are systematized and described precisely, professionally and at a high level. I have some recommendations, mostly regarding the candidate's future development, as well as notes of a technical nature;

- To participate in scientific forums abroad and to develop and present reports and articles to be published in editions with an impact factor IF or an impact rank SJR;
- A reference made in the world-famous database of scientific information Scopus shows the presence of two profiles for the applicant - it is desirable that they be combined;
- To share his teaching experience with universities abroad (e.g. by giving lectures under the Erasmus programme);
- To correctly fill in the information under Indicator D from *the Reference-declaration for the implementation of the Minimum national requirements and those of the University "Prof. Dr. Asen Zlatarov" - Burgas for the academic position of "Associate Professor"*;
- To present summaries of the publications, as required by the LDASRB - Art. 27, para (1).

## 8. Personal impressions and opinion of the reviewer

I do not personally know Ch. Asst. Prof. Eng. Mladen Proykov, PhD. The general characteristic of the candidate is that he is an authoritative teacher who has a high level of research and applied activity, a well-known scientist at home and abroad.

## CONCLUSION

The submitted materials for participation in the competition meet the requirements of the LDASRB, the regulations for its application and *RTCASDHAP at the University "Prof. Dr. Asen Zlatarov" - Burgas*. Sufficient scientific-applied and applied contributions have been received. Prominence has been achieved in academia and the professional engineering community.

The requirements for the candidate's scientific and teaching activity have been fulfilled - the total number of points significantly exceeds the required minimum:

A group of metrics	Points as required	Candidate Points	Indicator points
A	50	50	Indicator A1 – <b>50 points.</b>
V	100	100	Indicator V3 – <b>100 points.</b>
G	300	452.66	Indicator G7 – <b>184.66 points.</b> Indicator G8 – <b>268 points.</b>
D	100	168	Indicator D12 – <b>150 points.</b> Indicator D13 – <b>18 points.</b>
E	100	100	Indicator E23 – <b>60 points.</b> Indicator E24 – <b>40 points.</b>
<b>Total</b>	<b>650</b>	<b>870.66</b>	

Based on acquaintance with the presented scientific works, their significance, the scientific-applied and applied contributions contained in them, I find it reasonable **to propose Ch. Asst. Prof. Mladen Antonov Proykov, PhD to occupy the academic position "Associate Professor"** in the field of higher education - **5. "Technical sciences"**, professional field - **5.2. "Electrical engineering, electronics and automation"**, scientific specialty **"Electrical power supply and electrical equipment"**.

**02.04.2024**

**REVIEWER:**

**/ Prof. Dr. Eng. Vasil Dimitrov /**