R E V I E W

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of the materials submitted for participation in the competition for the academic position of 'Associate Professor' in the field of higher education: 5. Technical Sciences, professional direction: 5.2. Electrical Engineering, Electronics and Automation, specialty 'Electric Power Supply and Equipment'

1. Brief biographical data

The competition for 'Associate Professor' has been announced by the Technical University - Gabrovo in the specialty 'Electric Power Supply and Equipment' for the needs of the Department of Electric Power Supply and Equipment at the Faculty of Electrical Engineering and Electronics. The announcement has been published in the State Gazette, issue 48/13-06-2025 and on the website of the Technical University - Gabrovo.

The only candidate in the competition is Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD from the Department of 'Electric Power Supply and Equipment', Technical University - Gabrovo. He was born on 21 February 1984 in the town of Sevlievo. He obtained his Bachelor's degree in 2002 at Technical University - Gabrovo, majoring in 'Electric Power Energetics and Electrical Equipment", and his Master's degree in 2009 at Technical University - Sofia with the same major. Two years later, he obtained a second master's degree in 'Occupational Safety'.

The candidate's research work began in 2012 as a full-time PhD student at the Department of Electric Power Supply and Equipment, Technical University - Gabrovo. He defended his PhD thesis in 2015 on the topic 'Research of transient processes in the electric drive of electric vehicles" in the specialty 'Electric Power Supply and Equipment' - diploma 0045 of 14.12.2015.

The professional experience of Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD is as follows::

- 2007-2010 – electrical mechanic at the company "NBI Consortium", Gabrovo;
- 2010-2014 – in 2010, after winning a competition, he was selected and appointed as an Assistant Professor in the Department of Electric Power Supply and Equipment of the Technical University - Gabrovo;
- 2014-2016 – Engineer Electrical Equipment - with activity of installing new and maintaining existing hardware resources of technical configurations in the laboratories of the Department of Electric Power Supply and Equipment in the Technical University - Gabrovo;
- from 2016 to present he is a Chief Assistant Professor at the same department.

In the period 2012-2024, the candidate participated in training courses and received the relevant certificates in 'Development and Management of EU-Funded Projects', 'English Language Training', *'Autodesk AutoCAD Electrical'*, 'Continuing Professional Training' - University of Craiova, Romania, 'Proficient Training in Entrepreneurship'. He has been awarded by the Union of Electronics, Electrical Engineering and Communications for the best paper at the UNITECH 2024 conference, Gabrovo..

He is a member of the 'Territorial Organization of Scientific and Technical Unions - Gabrovo' and the 'Chamber of Engineers in Investment Design' - designer with limited design capacity - certificate No.20058. He is fluent in English and Russian, at levels B2 and A1, respectively, which is a prerequisite for maintaining useful contacts and exchanging information with colleagues from abroad working in his scientific field..

2. General description of the materials submitted

The candidate has submitted a list of publications on the dissertation – 8 issues, which should not be reviewed in this case. In this competition, 37 scientific papers and 2 textbooks, which were published after the defense of the thesis for the the educational and scientific degree 'PhD', have been submitted for review. Of the peer-reviewed scientific papers, 4 are scientific publications in conference proceedings in Romania, 3 in Greece, 1 in Moldova and 4 in Bulgaria, which are referenced in Scopus [V.4.1 - V.4.10, G7.1 - G7.2]. The remaining 25 papers [G8.1 - G.8.25] have been presented at scientific forums in Bulgaria – 1 issue in the journal 'Energetika' [G.8.10] and 24 scientific papers at international and national scientific conferences in Bulgaria.

20 papers are written in Latin, and 17 in Cyrillic, there are 4 independent, with one co-author – 5, with two co-authors – 15; the remaining 13 have three or more co-authors. The candidate is in first place in 8 (22%) publications, in second place in 10 (27%) and in third place in 19 (51%).

For the groups of indicators for the implementation of the minimum national requirements, Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD has presented evidence for the points collected, as follows:

Group of indicators A (at least 50 points) **–** PhD thessis. **Total 50 points**;

Group of indicators V (at least 100 points) **– V4** scientific publications equivalent to a monography – 10 publications with different numbers of authors. **Total 142 points;**

Group of indicators G (at least 200 points) – **G7** scientific publications in publications that are referenced and indexed in world-renowned databases of scientific information – 2 publications with different numbers of authors – 21.33 points; **G8** scientific publications in non-refereed journals with scientific review or in edited collective works – 25 publications with different numbers of authors – 225.04 points. **Total for indicator G – 246.37 points.**

Group of indicators D (at least 50 points) - **D12** quotations in scientific publications, referenced and indexed in world-renowned databases – 6 publications are cited a total of 24 times – 240 points. **Total for indicator D – 240 points**. To interpret the information on this indicator, additional reference to the databases is necessary, as it is not clearly presented in the documents.

The minimum number of points required by the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Acquisition of Scientific Degrees and Holding Academic Positions at the Technical University - Gabrovo is 400 points. The points of Chief Assistant Lyubomir Diyanov Dimitrov, PhD, submitted for participation in the competition, are 678.37, i.e. the performance of the indicators is 170%.

With the materials submitted – scientific publications – 10, equivalent to a monography, scientific publications – 27, quotations – 24, the candidate fully meets the minimum national requirements for occupying the academic position of 'Associate Professor' in the field of 'Technical Sciences' in higher education, as set out in Art. 2b of the Law on the Development of the Academic Staff in the Republic of Bulgaria.

3. Reflection of the candidate's scientific publications in the scientific community (known quotations)

The publications of Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD are known to the community in the scientific field for which the reference is presented. It is indicated that 6 papers have been cited 24 times in scientific papers of other scientists. The attached list of quotations includes citations or reviews in scientific publications, referenced and indexed in world-renowned databases of scientific information – 12 in Scopus and citations or reviews in non-refereed journals with scientific review – 12. A significant part of

the papers are cited in foreign scientific publications. As a result of the publication activity, the author currently has a Hirsch index of 3 (excluding self-citations).

4. Overview of the content and results in the presented papers

The 37 scientific publications presented are related to the specialty for which the competition has been announced and according to their content and results they can be grouped as follows:

4.1. Studies of the behavior and characteristics of electric vehicles and their associated components

The publications in this thematic area are from the period 2016–2023 (a total of 8, of which 3 are referenced in Scopus) and are related to research, analysis and conclusions on the electric drive of electric vehicles.

The first scientific papers in this field are dedicated to a general overview of the current state and modern trends in the development of electric vehicles [G.8.12], [G.8.13]. An analysis of the current situation in Bulgaria regarding the use of electric vehicles and the infrastructure for charging stations has been done. The results have been summarized, analyzed and recommendations have been formulated regarding the future development of electric transport [G.8.16], [G.8.17]. The influence of mechanical equipment on the drive characteristics of an electric vehicle has also been studied [V.4.9]. The electrical energy losses in steel and the optimal values of the speed range of a squirrel-cage induction motor driving a compact electric vehicle under different operating modes have been evaluated [V.4.4], [G.7.1].

4.2. Research of electrical equipment units, machines and mechanisms

Work in this field is broad-spectrum and encompasses research into various types of electrical units, machines and mechanisms. In [V.4.6] and [V.4.7], a study and practical solution for increasing the energy efficiency of ventilation and pumping systems has been carried out, and in [G.8.5] for the dynamic behavior of an induction motor with a squirrel-cage rotor for medium voltage, driving a centrifugal pump. For the studied operating modes, computer modeling has been performed to estimate electrical losses in electric motors and the components of the electric drive [G.8.5]. Additionally, measurements have been done of the harmonic components of frequency-controlled electric drives [G.8.14] and of the electrical quantities during operation of an electric hoist [G.8.15]. In connection with measures to improve energy efficiency, the indicators of the quality of electrical energy during the operation of an air conditioning system have been measured [G.8.20]. The results obtained have been analyzed and the main parameters influencing the energy compatibility with the power supply grid have been formulated [G.8.21].

4.3. Studies of the operational behavior of squirrel-cage induction motors

These are papers corresponding to the technical parameters, characteristics and electromechanical model of high voltage squirrel-cage induction motors [V.4.1], [V.4.2], [G.8.4]. An assessment has been made of the combined influence of the values of the supply voltage, frequency [V.4.3] and the parameters of a high-voltage induction motor on the losses of electrical energy in a frequency-controlled electric drive [V.4.5], [G.8.1]. Some of the publications investigated the influence of the supply voltage on the dynamic behavior of a low-voltage induction motor and the dynamic behavior of new three-phase induction motors [G.8.5], [G.8.8]. In [G.8.9] and [G.8.10] the practical work carried out on the development of a test bench for studying an inductionmotor in generator mode and experimental research of a new energy-efficient three-phase induction motor from a unified series is presented.

4.4. Researches on the change of characteristic electrical quantities of electrical equipment and objects

The work done in this area is related to:

- characteristics and operation of an elevator driven by an induction motor with a squirrel-cage rotor and a power transformer [V.4.8];
- processing of data on the electrical energy generated by hydroelectric power plants [G.7.2], as well as energy audit of the street lighting system in the city of Gabrovo;
- analysis of operating modes and energy-efficient practices in the operation of industrial induction furnaces with mains and medium frequency [G.8.7], [G.8.11].
- analysis of the operation of power transformers supplying combined nonlinear loads in the public sector [G.8.15], [G.8.18].

4.5. Practical measurements with digital measuring equipment

Publications in this thematic area have a practical focus and cover measurements regarding the quality of electrical energy. A number of measurements and analysis of the consumed electrical energy in a public facility [G.8.22], during the operation of borehole pumps [G.8.23], of induction motors with frequency control [G.8.24], as well as electrical measurements for assessing the performance of an industrial compressor system have been carried out [G.8.25].

5. General description of the candidate's activities

5.1. Teaching and pedagogical activities (work with students and PhD students)

The candidate, Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD has 15 years of experience as a university lecturer in the Department of Electric Power Supply and Equipment at the Faculty of Electrical Engineering and Electronics of Technical University - Gabrovo. During this period, he has led lectures and exercises in subjects related to the topic of the competition – 4 for the Bachelor's and 3 for the Master's degree. Among these disciplines, the following stand out: ‘Relay Protection’, ‘Operation of Automatic Devices and Systems’, ‘Electrical Equipment’, ‘Electrical Equipment of Production Machines and Processes’, ‘Electrical Equipment of Automated and Robotic Devices’.

He participated in the development of the training documentation for the subjects ‘Electrical Equipment’, ‘Electrical Equipment of Production Machines and Processes’, ‘Electrical Vehicles’ and ‘Electrical Equipment of Automated and Robotic Devices’.

Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD is one of the creators of two educational laboratories – ‘Electrical Equipment’ and ‘Operation of Automatic Devices and Systems’. He is a co-author of educational literature – ‘Electrical Drive and Electrical Equipment’, 2011 and ‘Electrical Equipment’, 2018.

5.2. Scientific and scientific-applied activities

The candidate's first publications (8 issues) are in the period 2013-2014, and are related to the PhD thesis. His main scientific and applied activity, which is relevant to the competition, began after 2015 as an Assistant Professor at the Technical University - Gabrovo and is represented by 37 papers (12 in Scopus), 3 textbooks and 24 quotations. He participated in 2 projects under operational programs and 13 university research projects funded by the Scientific Research Fund at Technical University - Gabrovo.

The scientific research and applied activities of the candidate for ‘Associate Professor’ are aimed at studying the behavior and characteristics of electric drive systems with various applications. The volume of this activity is significant, and at the same time the level of

research is at a professional level. This is a prerequisite for successfully solving a number of problems in the field of electric drives and renewable energy sources.

5.3. Implementation activity

The experimental work carried out and a large part of the content of the publications submitted for the competition are successfully used in the educational process in the disciplines ‘Relay Protection’, ‘Operation of Automatic Devices and Systems’, ‘Electrical Equipment’, ‘Electrical Equipment of Production Machines and Processes’, ‘Electrical Equipment of Automated and Robotic Devices’.

When reviewing the attached papers, it is clear that much of the candidate's scientific output is narrowly focused on solving a number of practical problems related to the topic of the competition – electric power supply and electrical equipment. The materials submitted for the competition lack implementation documents, and such undoubtedly exist, taking into account the successes in this regard of the team in which he works.

6. Contributions (scientific, scientifically applied, applied)

I accept the contributions formulated by the candidate regarding 37 publications and 3 textbooks with which he participates in the competition for Associate Professor. They consist in creating new classifications, methods and technologies. Application of the developed models and analytical apparatus and obtaining confirmatory facts in the development and research of new and existing algorithms and methodologies for synthesizing, designing and controlling units, machines and mechanisms of electrical equipment.

The contributions in the materials with which Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD participated in the competition can be systematized in the following way:

Scientifically applied contributions

1. An analysis of the state of modern electric transport of electric vehicles in Bulgaria has been done and development trends have been formulated, taking into account current European directives [G.8.12], [G.8.13].

2. The technical characteristics and future development directions of electric vehicle charging stations have been analyzed. The expansion of electromobility applications has been assessed [G.8.16], [G.8.17].

3. Energy-efficient solutions have been proposed to improve the performance of machines and mechanisms in electrical equipment [V.4.6], [V.4.7].

4. Development of a computer mathematical model for estimating the electrical losses occurring in drive motors, as well as the energy losses of electric drives under various operating conditions [V.4.2], [V.4.3], [G.8.4].

5. Analytical modeling of the components of the electric drives under different operating modes has been performed and the electrical losses in them and their efficiency have been estimated [G.8.5].

6. An electromechanical model has been created and the operating modes of an electric drive with an induction motor with a squirrel-cage rotor for high voltage are presented, as well as an assessment of the energy losses of a high-voltage induction motor when changing its electromechanical parameters [V.4.5], [G.8.1].

7. Analyzing operating modes and energy-efficient practices in the operation of industrial induction furnaces with mains and medium frequency [G.8.7], [G.8.11], [G.8.15], [G.8.16], [G.8.18].

Applied contributions

1. Studies have been carried out on the operational functionality of electric vehicles and characteristics of the electromechanical system have been obtained under various dynamic modes [V.4.4], [V.4.9], [G.7.1].

2. The electrical energy losses of an induction motor driving a compact electric vehicle have been measured when changing electrical parameters and mechanical loads [G.8.12], [G.8.13].

3. Studies have been carried out on the behavior of a new type of traction DC motor for driving electric vehicles [G.8.1].

4. Studies of the operational behavior of squirrel-cage induction motors for low and high voltage and of a new type of energy-efficient three-phase induction motor [V.4.1].

5. Compilation of a methodology for practical measurements to analyze the quality of electrical energy when operating various types of electrical loads [G.8.9], [G.8.10].

6. A number of practical measurements and analysis of the data obtained during operation in operational conditions of various types of powerful consumers have been carried out, significantly influencing the quality indicators of electrical energy [G.8.22], [G.8.23], [G.8.24], [G.8.25].

7. Evaluation of the candidate's personal contribution

I believe that the contributions are the personal work of the candidate. Proof of this are the 37 scientific papers submitted for the competition (4 independent, in 8 the candidate is in first place), 2 textbooks and 43 known quotations.

The personal contribution of the Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD to educational activities is also serious and successful, since a large part of his scientific and applied activities is related to the educational process. In general, all necessary requirements and indicators have been met 1.7 times, taking into account the minimum national requirements from the current law and regulations.

I am convinced that the formulated scientific and applied contributions and his teaching and methodological activities are the personal work of the candidate and show that the work done by him as a teacher and researcher is largely innovative and fully complies with the requirements of the competition for the academic position of ‘Associate Professor’.

8. Critical notes and recommendations

I have no significant critical remarks on the materials submitted for the competition. There is a certain diversity in the candidate's scientific activity, which is why it is good to concentrate the research on fewer thematic areas. It can be recommended that in the future the candidate should focus on publishing the results of his scientific work in journals with IF and quartiles Q1 and Q2. This will contribute to increasing the number of points on indicators V and G, where the implementation is 142% and 123% respectively. In addition to this recommendation is participation in national and international scientific and educational projects and implementations related to business.

9. Personal impressions

I have known the candidate, Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD, since he joined the Technical University - Gabrovo. He is distinguished by a high degree of responsibility, in-depth treatment of problems and search for ways to solve them. He knows how to work in a team, is not conflictual. He enjoys great authority among his colleagues and students.

From the submitted materials for the competition and my personal impression of the candidate's educational, pedagogical, scientific and design activities, I believe that he is a

highly qualified and well-prepared lecturer in ‘Electric Power Supply and Equipment. I have no participation in joint publications and projects.

10. Conclusion

Considering the above, I propose that Chief Assistant Professor Lyubomir Diyanov Dimitrov, PhD be elected as an ‘Associate Professor’ in the field of higher education 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation, specialty ‘Power Supply and Electrical Equipment’.

24 October 2025

Reviewer:
/Prof. Nikolay Dimitrov Madzharov, PhD/