

## STATEMENT

on the materials, submitted for participation in the competition, announced in State Gazette, issue 42/ 12.05.2023 for taking the academic position of **'Associate Professor' for the needs of "Professor Assen Zlatarov" University, Burgas**, in the area of higher education 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation, scientific specialty "Electric power engineering (Electrical networks and systems)"

Documents for participation in the competition has submitted the candidate **Head Assistant Dipl. Eng. Mehmed Kadir Hassan, PhD**

The statement has been prepared by **Associate Professor Dipl.Eng. Ginko Angelov Georgiev, PhD, Center for Informatics and Computer Sciences, BSU – Burgas**

### I. Education and professional qualification of the candidate

Mehmed Kadir Hassan completed his secondary education in 1989 at the High Technical School of Mechanical Engineering - Burgas, majoring in "Industrial Electronics". In 1994 he graduated with the specialty "Electrical machines and apparatus" from the Institute of Mechanical Engineering "Hristo Smirnenski" in Burgas. In the years 1994-1995 he worked as a practice teacher at IPF in the town of Sliven.

In the year of 2000 Mehmed Hassan acquired the educational degree Master of Science in Electrical Engineering from the Technical University in Varna.

In 2010-2011 he specialized in Spain in the field of automotive electronics, in particular, "Electrical and electronic systems in the car".

In 2021 Mehmed Kadir Hassan successfully defended a dissertation on the scientific specialty "Electrical networks and systems" at the Technical University of Sofia.

Mehmed Kadir Hassan worked at "Professor Assen Zlatarov" University in Burgas in the following periods: 1997-2002 at the associated Technical College, from 2018-2022 at the University as an Assistant Professor, and after 2022 – as a Head Assistant.

### II. General characteristic of the submitted materials for the competition

The materials, provided by the candidate Mehmed Hassan for participation in the competition, mentioned above, meet the requirements of Art. 24. (1) of ZRASPB and Art. 67 of the Terms and Conditions and the procedure for acquiring scientific degrees and occupying academic positions of "Professor. Assen Zlatarov" University in that:

1. Mehmed Hassan is a holder of the educational and scientific degree 'Doctor of Philosophy (PhD)' in the scientific specialty "Electrical networks and systems", 2021, diploma №. 9. TUS-IPF45-HC1-67/16.05.2021 IPF – Sliven;
2. He held the academic position of 'Assistant Professor' for more than two years (4 years in the period 2018÷2022 at "Professor Assen Zlatarov" University and 'Head Assistant' after the year of 2022;
3. The submitted published monographic work titled "Active - adaptive electrical networks" does not repeat the presented thesis on the topic "Optimal configuration of smart distribution electric grids" for the acquisition of the educational and scientific degree 'Doctor of Philosophy (PhD)'. The candidate has also provided the required documents in compliance with Art. 67 of the Regulations, listing the terms and conditions for acquiring scientific degrees and holding academic positions at "Professor Assen Zlatarov" University, namely:
  - Reference and certificates of participation in projects ("Degree of construction of decentralized energy sources in active-adaptive electrical distribution networks", "Electricity audit for the construction of a wind energy complex" etc.);
  - Reference to developed curricula and developed teaching aids - textbooks;
  - Reference on the fulfillment of the minimum requirements specified in Annex one of the Regulations on the terms and conditions for the acquisition of scientific degrees and holding academic positions at "Professor Assen Zlatarov" University and an authorship reference, listing the scientific contributions in his research works;
  - Reference to the citations of the candidate's publications.

### **III. Evaluation of the scientific works of the candidate in terms of his overall academic development**

### **3.1. General characteristic of the scientific production and the publication activity of the candidate**

The reference to the original scientific contributions provided by the applicant shows, that his main developments and research have a decidedly scientific-applied and educational - methodical direction. His scientific developments are related to research and optimization mainly in the areas of:

- the energy efficiency of the electric power system in power distribution networks;
- the connection of decentralized generating sources to the Electric Power Grid (EPG);
- the reliability of the EPG;
- the new technologies for converting RES into electricity.

### **3.2. Scientific activity - dissemination among the scientific community and application of the candidate's scientific and practical achievements**

Mehmed Kadir Hassan is the author of a monographic work on "Active-adaptive electrical networks". He is also the author of a textbook on "Electrical machines" in three parts (three separate books). He co-authored another textbook on "Electricity from renewable energy sources", in three parts as well (three separate books). In addition, he is also the author of "Reliability of Electric Power Plants" paper.

The main scientific areas, to which the publications provided by the candidate fall, are:

- Electrical networks. 1 monograph provided; 26 articles (numbered 1, 2, 3, 6, 7, 8, 9, 10, 11, 13, 14, 15, 18, 20, 24, 26, 28, 29, 30, 31, 32, 33, 34, 39, 41, 42);
- Energy efficiency. 9 articles are provided (numbered 4, 5, 12, 16, 17, 21, 22, 25, 27);
- Electrical machines and apparatus. 4 articles (numbered 36, 37, 38, 43);
- Use of energy from renewable sources and energy storage. 3 articles provided (numbered 19, 23, 35).



The scientific - applied contributions, presented in the candidate's scientific works, are result of conducted research and the use of mathematical models on the basis of analytical and statistical methods. Based on the obtained results, options for optimization are proposed. New technologies for electricity production have also been studied and analyzed. The in-depth study of the details is impressive, along with the skillful use of the mathematical theory of probability and mathematical statistics. The trends in the development of the "smart transformers" and smart grids have been outlined.

The scientific contribution in the monograph as the main habilitation work is the introduction of an integral criterion for evaluating the effectiveness of the active-adaptive electrical networks (AAEN). Electrical networks are thoroughly studied in it, which determines the following scientific-applied contributions:

- Justification of a criterion for evaluating the structural and functional reliability of AAEN;
- Creation of a new methodology for the analysis of the structural and functional reliability, taking into account the peculiarities of AAEN;
- Optimization of the integral criterion for evaluating the efficiency of AAEN.

**Table 1. SCIENTOMETRICAL INDICATORS**

Area 5. Technical Sciences PF 5.2. Electrical engineering, electronics and automation

<b>Indicators</b>	<b>Content</b>	<b>Requirement (number of points)</b>	<b>Fulfillment (number of points)</b>
<b>A</b>	<b>Indicator 1.</b> Dissertation for awarding the educational and scientific degree 'Doctor of Philosophy' - PhD	<b>50</b>	<b>50</b>
<b>B</b>	<b>Indicator 3 or 4.</b> Habilitation work – a monograph	<b>100</b>	<b>100</b>
<b>Г</b>	<b>Sum of the indicators 5 to 11</b>	<b>300</b>	<b>380</b>

D	Sum of the indicators 12 to 15	100	122
E	Sum of the indicators 16 to 28	100	163,3

Mehmed Kadir Hasan's papers receive the required number of points that are

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**Participation in the implementation and management of projects**

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**IV. Participation in educational - teaching activities**

Mehmed Hasan has developed curricula and teaches classes:

- At the Technical College, specialty "Electrical Engineering", the subjects 'Electrical machines', 'Electrical apparatus', 'Electric Power Engineering', 'Electrical installation', 'Educational Practice';
- At the Technical College, specialty 'Automotive electronics: educational practice';
- At the Faculty of Technical Sciences, specialty "Electric engineering", the subjects 'Non-traditional and renewable energy sources in the electric power industry', 'Switching and protective equipment', 'Electrical machines and apparatus';

**V. Evaluation of the monographic work, submitted by the candidate for participation in the competition for taking the academic position of 'Associate Professor'**

The monograph "Active - adaptive electrical networks", published in 2021, contains five chapters, a conclusion, references, and amounts at 107 pages.

The object of research in the monographic work is a smart power grid with active - adaptive electrical networks (AAEN). The goal of the research is to find a balance between reliability, efficiency and economy in the design and operation of the active - adaptive electrical networks.

In the first chapter, the features of an intelligent EPG with AAEN are discussed and research tasks are defined. Chapter two is devoted to the structural and functional reliability of distribution AAENs and the selection of connections for provision of two-way

chapter five, characteristic features of AAEN are discussed. An integral criterion for evaluating AAEN is proposed, which is determined on the basis of the functional reliability parameter combined with energy and economic efficiency.

The conducted research and the obtained results, presented in the monograph, are useful both for the design and construction of AAEN, and as a component of the future

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**VI. Reflection (citation) of the candidate's publications in the national and foreign literature (publication image)**

29 citations of the candidate's publications are provided. The citations are mainly of publications in the Journal "Announcements" of TU Sliven and also of papers, presented at international conferences, indexed by SCOPUS.

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**VII. Critical notes and recommendations**

The main recommendation to the candidate is to continue to actively work in the direction of modernizing the laboratory base of "Professor Assen Zlatarov" University.

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**VIII. Conclusion**

The analysis of the documents, provided by Head Assistant Dipl. Eng. Mehmed Kadir Hassan shows that the requirements of the ZRASPB and the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at "Professor Assen Zlatarov" University in the professional field 5.2 ELECTRICAL ENGINEERING, ELECTRONICS AND AUTOMATICS, scientific specialty "Electric power Engineering (Electrical networks and systems)" are met, which is why I propose that the application be approved.

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Date: September, 08, 2023

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(Assoc. Prof. Dipl.Eng. G. Georgiev, PhD)



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**Participation in the implementation and management of projects**

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(Assoc. Prof. Dipl.Eng. G. Georgiev, PhD)