STATEMENT

on the competition for the academic position
"Professor"
in professional field 4.5 Mathematics (Mathematical Logic), scientific field "Natural Sciences, Mathematics, and Informatics",
at Sofia University "St. Kliment Ohridski" (SU),
Faculty of Mathematics and Informatics,
announced in State Gazette No.59/26.07.2019 and the internet sites of FMI and SU

This statement is written and submitted by Assoc. Prof. Trifon Anchev Trifonov — FMI, 4.6. Informatics and Computer Science (Programming), appointed to the academic jury for this competition by the Rector of SU in accordance with Order РД 38–555/25.09.2019.

A **single candidate** has submitted an application for this competition:

- Assoc. Prof. Aleksandra Andreeva Soskova, PhD, FMI

I. General Description of the Submitted Documents:

1. Application Details

The documents submitted by the candidate are in full compliance with the requirements of the Academic Staff Development Act (ZRASRB), the Regulations Act for the Implementation of ZRASRB (PPZRASRB), and the Regulations Act about the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at SU (PURPNSZADSU).

For the purposes of the competition Assoc. Prof. Aleksanda Andreeva Soskova has presented a total of 11 titles, including 11 publications in domestic and international scientific issues and conferences.

The candidate has submitted a total of 2 additional documents supporting professional achievements.

The additional documents consist of two strongly positive letters of reference by Prof. Antonio Montalban of University of California, Berkeley and Prof. Valentina Harizanov of George Washington University, Washington DC. The first recommendation underlines the significance of the main result of the jump inversion theorem for degree spectra [5] for the scientific field, as well as for the research of Prof. Montalban. The second recommendation is six pages of length and describes in detail the scientific results of Assoc. Prof. Aleksanda Andreeva Soskova, including those contained in the publications submitted for this competition. The candidate's results are described in the wider context of the development of the scientific field and its community. The letter provides evidence for the collaboration of the candidate with Prof. Harizanov and the participation of Assoc. Prof. Aleksanda Andreeva Soskova in several editorial boards and conference programme committees.

2. Short Biographical Data

Assoc. Prof. Aleksanda Andreeva Soskova is an established lecturer at FMI of SU of 10 courses in BSc and MSc programmes, as well as the head of the Master of Science program "Logic and algorithms". Her interest in Mathematical Logic dates back over 40 years ago. She graduated MSc in Mathematical Logic in 1979 and successfully defended her doctoral thesis in 1990, after which she started work at FMI of SU as a

researcher, later acquiring a position of Assistant Professor (in 1993) and Associate Professor (in 2005). Her prior work experience is as a mathematician at ZIT (since 1979) and a researcher at SISTEMIZOT (since 1981). Assoc. Prof. Aleksanda Andreeva Soskova is among the most notable and active members of the Mathematical Logic group at SU with over 30 publications in her field of studies, participant in over 10 projects, and annual visits in universities and scientific research centres abroad. Her international recognition as a scientist and specialist in her field is evidenced by her participation in editorial boards, as well as in programme and organizing committees of several domestic and international conferences.

3. **General Evaluation of Scientific Work and Professional Achievements**

The scientific work of Assoc. Prof. Aleksanda Andreeva Soskova is focused almost entirely on Computability Theory, and, more precisely, on Degree Theory and Effective Model Theory. The research group in Computability Theory at Sofia, of which the candidate is a member, has well-established traditions in this scientific field and has a long-standing active and fruitful participation in international scientific research groups. A major topic of the group's research work is the study of the structure of the *enumeration degrees*. This structure contains an isomorphic copy of the structure of the *Turing degrees*, which play a central role in Effective Model Theory. In addition to an in-depth study of the properties of the structure of the enumeration degrees, which has theoretical significance in itself, the candidate's works also pay special attention to the application of the obtained properties in analyzing of several questions in the structure of Turing degrees. A current state of the scientific field and its major results are clearly described in [2]. The main problems studied by the candidate can be summarized as follows:

- study of the properties of the jump operator and theorems for jump inversion for degree spectra
- study of the properties of operators over enumeration degree spectra
- study of the properties of relativized degree spectra
- study of the properties of ω-enumeration degree spectra
- quasi-minimal degrees for degree spectra
- study of properties of joint degree spectra
- effective coding and reducibility

After a detailed review of the submitted scientific publications I confirm that:

a) the sumitted publications are in full compliance with the minimal national requirements under Art. 2B (2) and (3) of ZRASRB, as well as with the additional requirements of SU for the academic position "Professor" in the professional field of this competition;

b) none of the submitted publications have been submitted in a preceding procedure for acquiring a scientific title or an academic position;

c) there is no lawful evidence for plagiarism in the submitted publications.

4. **Description and Evaluation of Teaching Activities**

Assoc. Prof. Aleksanda Andreeva Soskova has been a lecturer in 10 courses in several BSc programmes at FMI, including:

- 7 compulsory or compulsory-elective courses
- 1 elective courses
- 2 courses that have been transformed into other courses and are no longer included in current programmes

All of the courses are among the fundamental disciplines in Theoretical Computer Science and are of major importance in the BSc programmes in the field of Informatics and Computer Science at FMI.

Assoc. Prof. Aleksandra Soskova is the long-standing head of the Master of Science programme "Logic and Algorithms", which follows a well-established teaching tradition and is internationally recognized as one of the strongest MSc programmes at FMI. She is a lecturer of 2 compulsory courses in this programme.

The candidate is actively engaged with the younger colleagues from the Department of Mathematical Logic and Applications, with whose help she successfully introduced contemporary methods and techniques for improving the quality of education in Mathematics and Theoretical Computer Science. Examples of such novelties include electronic guides and books of problems, as well as an automatic test grading system, implemented via the e-learning system Moodle and a question bank created for the purposes of electronic tests.

Assoc. Prof. Aleksandra Soskova is the scientific advisor of two graduate students — one of them, Assist. Prof. Stefan Vatev, already has obtained his degree and the other is currently pursuing it, who both previously also wrote their Master's thesis under the candidate's supervision. S. Vatev is currently a lecturer in compulsory courses at FMI and has a number of publications in well-established journals and conference proceeding, both as a sole author and in co-authorship with the candidate. In light of the above, I believe that Assoc. Prof. Aleksandra Soskova has a significant contribution in the development of the young colleagues in her department as lecturers and scientists.

The candidate has significant experience in lecturing in English, both within FMI for students in the Erasmus exchange programme, and as a guest lecturer of other universities in Bulgaria and abroad.

5. **Analysis of the Content of the Theoretical and Applied Contributions Described in the Submitted Publications**

A total of 11 publications were submitted as part of the candidate's application, including:

- 4 papers in the established Journal of Logic and Computation with Impact Factor (IF) [1, 7, 8, 11];
- 4 papers in the Lecture Notes in Computer Science series with Scopus Impact Rank (SJR), 3 of which are in proceedings of the conference Computability in Europe [2, 3, 4, 5];
- 3 papers in the proceedings of the conference Panhellenic Logic Symposium [6, 9, 10].

The candidate is a sole author in 4 of the publications [3, 4, 5, 7], and the other 7 are co-authored. For all co-authored papers, with the exception [2], the candidate has noted that the contributions of all co-authors should be considered equal. For all publications except [6] and [9] the documents include a hyperlink to an electronic version.

Based on the included citations report:

- the papers [5] и [8], whose main result is the inversion jump theorem for degree spectra, has most noted citations: 10 and 24, correspondingly, from a large variety of citing authors;
- the paper [7] has 2 citations from other members of the Computability Theory group in Sofia;

- the papers [3] and [4] have one citation each, which is in the Master's thesis of Assoc. Prof. Stefan Vatev, whose scientific advisor is Assoc. Prof. Aleksandra Soskova;
- the rest of the candidate's publications, which are not presented for this competition, have a total of 34 citations.

The scientific contribution of the candidate in the papers presented for this competition may be summarized as follows:

- introduction of new concepts (e.g. relativized spectra [4, 7], ω-degree spectra [3], jump sequence of a sequence of structures [10]) and a study of their properties;
- new results in the theory of enumeration degrees (e.g. jump inversion theorem) that are analogous to results of other related constructions (e.g. Turing degrees) via the development of new methods and the adaptation of existing techniques [1, 3, 5, 6, 7, 8, 9, 10];
- counterexamples that analogues of properties of other constructions cannot be directly transferred to the corresponding constructions in the theory of enumeration degrees [3, 9];
- application of obtained results (e.g. jump inversion theorem) as a simpler alternative method for the proof of existing results and their analogues, and for the study of properties of other structures [9, 11];
- a review of the main results in the field [2].

6. Critical Remarks and Recommendations

A have no significant critical remarks towards the candidate and the presented documents. My recommendations to the candidate are to continue her close collaboration with master and doctoral students, and to consider the preparation of notes in enumeration degree theory, which I feel may prove extremely useful to both current and future members of the Computability Theory group in Sofia.

7. Personal Impressions

I know Assoc. Prof. Aleksanda Andreeva Soskova since 2001, when she was teaching classes at the elective course of Mathematical Logic, which I was attending as a student at FMI. This was my first contact with the Mathematical Logic group, which greatly influenced by scientific interests and my development as a lecturer. My impressions from Assoc. Prof. Aleksandra Soskova as a lecturer and a colleague are extremely positive. Her brisk mind and in-depth reasoning, the ease with which she presented complicated results, and her friendly character have made a significant impact for me. Assoc. Prof. Aleksandra Soskova enjoys the respect of students and colleagues and is a recognized as an experienced lectures in the courses taught by her.

8. Conclusion

Based on the review of the documents and scientific publications submitted for this competition, as well as on the analysis of their significance and the theoretical and applied contributions, I hereby confirm that the scientific achievements of the candidate meet and exceed the requirements of ZRASRB, PPZRASRB, and PURPNSZADSU for acquiring the academit position "Professor" in the scientific and professional field of this competition. More specifically, the candidate satisfies the minimal national requirements of the professional field and no plagiarism has been detected in the submitted scientific publications submitted.

I hereby state my **positive** assessment of the application of Assoc. Prof. Aleksanda Andreeva Soskova.

II. GENERAL CONCLUSION

Based on the above, I hereby **recommend** to the scientific jury to propose to the competent authority of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" to elect Assoc. Prof. Aleksanda Andreeva Soskova to the academic position "Professor" in professional field 4.5 Mathematics (Mathematical Logic), scientific field "Natural Sciences, Mathematics, and Informatics".

November 26, 2019   Prepared by: _____

Assoc. Prof. Trifon Anchev Trifonov — FMI