REVIEW

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On the materials submitted for a participation in the competition for an occupation of the academic position "Professor" of the Naval High School "N. Y. Vaptsarov" on **Research area: 1.** Pedagogical sciences, **Professional field 1.3** "Pedagogy of education in mathematics and informatics" and subjects Mathematics - Part I, Mathematics - Part II, Mathematics - Part III, announced in the State Gazette no. 91 of 19.11.2019 and on the web site of the Naval High School "N. Y. Vaptsarov" (NHS) for a civilian employee for the needs of the Department of Mathematics and Physics within the Engineering Faculty, where Veselin Nenkov Nenkov, PhD an Assoc. Prof. from Technical University – Gabrovo participates as a candidate – **the only one** candidate.

By Order No ЛС-5, 15.01.2020 of the Head of the NHS "N. Y. Vaptsarov" I was appointed as a member of the Scientific Jury of the competition for the occupation of the academic position "Professor" in Naval High School "N. Y. Vaptsarov", on research area: 1. Pedagogical sciences, professional field 1.3 "Pedagogy of education in mathematics and informatics" within the Engineering Faculty.

As a member of the jury I, obliged to write a review, have received all the necessary documents attached to the application of Assoc. Prof. Dr. Veselin Nenkov Nenkov to the Head of NHS for participation in the competition. The documents are well designed and arranged.

For the participation in the announced competition **just one candidate** (Assoc. Prof. Veselin Nenkov Nenkov, PhD) has submitted documents. Has enclosed two reports to satisfy the minimum national requirements: for a PhD degree, already obtained in 2010, a document for an Associate Professor since 2013; a reference for the satisfaction of the minimum national requirements for occupation of the academic position "professor" in Professional field 1.3 "Pedagogy of education in ...".

The candidate has received his PhD in 2010, thus he satisfies the minimum national requirements and has a score of 50 points for the group of indicators "A".

The candidate has been an Associate Professor at the Technical University - Gabrovo from 02.10.2013 till 05.06.2017.

Appendix 3A for Professor of Pedagogical Sciences is presented.

The applicant has presented a monograph entitled "Raising Mathematical Competences with Dynamic Geometry" in 316 pages, with one author, scientific editor and one scientific reviewer, thus he satisfies the Law on the Development of the Academic Staff in the Republic of Bulgaria and therefore satisfies the requirement of a group of indicators "B" -100 points.

The applicant participates in the competition with 15 scientific publications indexed in the Web of Science database, 13 with another coauthor and 2 with a single authorship. There is a technical misprint in the group of indicators "Г", where publications 1 and 4 coincide. After reducing tof 15 points the candidate gets a total of 240 points, sufficient to satisfy the group of indicators "Г". In addition, the applicant participates with 4 other scientific publications in co-authorship with one author in journals that are indexed in the national reference list, so that the total number of points on group of indicators "Г" is 260 points.

The Assoc. Prof. Veselin Nenkov enters the competition with 10 citations from the Web of Science database, which gives him 150 points, sufficient to satisfy the group of indicators "Д". In addition, the he submits one citation from a monograph, one citation from the national reference list and one citation from a publication indexed in Cobiss. Thus, the total number of points on group of indicators "Д" is 160 points.

The applicant has 4 participations in national scientific or educational projects. He is the co-author of 7 textbooks (resource books) indexed in Cobiss. The applicant has one co-author in 5 of the textbooks, and has two co-authors in 2 of the textbooks. Thus, the total number of points on group of indicators "Е" is 123.6 points. A technical misprint was done by the candidate in the summation, where he has written just 113 points. After checking the presented textbooks, I have found that in the book „Grozdev, S. V. Nenkov, I. Sharkova: To help the math teacher. Collection of methodological developments. Sofia: Minju Balkan Foundation America for Bulgaria Foundation, 2015, ISBN 978-954-92830-5-1", S. Grozdev, S. V. Nenkov, I. Sharkova are scientific editors and only I. Sharkova has a publication in it. Therefore, I believe that the listed textbook could not qualify for the "Д" criteria group. Thus, the points of this criterion become 116.3, which are sufficient.

This short and formal review shows that all minimum national requirements are met.

GENERAL CHARACTERISTICS OF CANDIDATE ACTIVITIES

EVALUATION OF EDUCATIONAL AND PEDAGOGICAL ACTIVITY

Assoc. Prof. Veselin Nenkov, PhD was born in 1964 and graduated with a specialty Teacher in Mathematics and Informatics at the University of Plovdiv "Paisii Hilendarski" in 1989. The pedagogical activity of the applicant dates from 30 ago, as evidenced by his CV. The candidate has been a mathematics teacher at various schools in the very beginning of his career, after which he stared to work at the Lovech Technical College (now part of Technical University – Gabrovo) as a teacher in mathematics, an assistant and an associate professor until 2017, when he left, and began teaching part time as a part-time assoc. professor in mathematics at NHS from 2018 till now. It is a good impression that the applicant has an experience of working with school students since the early years of his work experience, which contributes a lot to his creative work when working with school students and university students, as demonstrated in the presented monograph. The applicant is a participant in the International Project MITE (Methodology and Information Technologies in Education). The main objective of the MITE project is to create conditions for the development of young talents from Bulgaria, Russia, Kazakhstan, Belarus and Romania. The topics presented in the monograph, which participated in the final stage of Mathematics and

Design, took first places in the fields of Mathematics as Science, Geometric Miniatures and Networking. Also, some of the topics have won awards at other competitions, such as the EUROMATH International Student Conference held in Athens in 2015.

I know personally the candidate from a conferences since 2009. Since then, we have repeatedly participated together in national conferences. I have developed the opinion, from the reports presented by him, that Assoc. Prof. Veselin Nenkov has the ability to present his results in an understandable and interesting language, according to the audience of listeners. Informal conversations and discussions with the candidate convinced me of his desire to share his knowledge and skills with all willing to listen, as well as his interest in research. I was a jury member for the academic position of associate professor of the candidate. I find that Assoc. Prof. Veselin Nenkov has achieved many new results and has expanded the field of his research after acquiring the academic position of Assistant Professor.

EVALUATION OF SCIENTIFIC AND SCIENTIFIC-APPLIED ACTIVITIES

I divide the applicant's scientific contributions into four areas:

1) Use of Dynamic Geometric Software (CBS) environment as a heuristic means of discovering and/or generalizing of new results and Algebraic Computer Systems to perform time-consuming calculations.

2) Development of a methodology for the formation of skills for research activities with the help of DGS. Application of the developed methodology in the training of students to participate in international competitions. The description of the developed methodology is correctly and comprehensively described in the monograph "Raising mathematical competences with dynamic geometry" and the PhD thesis "Formation of research skills in mathematics using information technology" [1.1.1].

3) Development of techniques for applying barycentric coordinates and complex numbers to prove geometric assertions. The methodologies thus developed and well known other techniques have been used to discover a number of new mathematical statements.

4) Perhaps the most important contribution of Assoc. Prof. Veselin Nenkov is the construction of a technique by which the circles defined in plane geometry tasks are replaced by conical sections. This technique basically consists in noticing the various properties of centers, tangents and intersections and special points of circles, as well as of special types of circles and related structures. The observed properties are naturally transmitted to the conical sections so that these properties are retained during the inverse transition from the conical section to a circle. At some points there is a difference in the received summaries due to the type of conical section

When citing scientific works, I will use their numbering from the list of abstracts and the author's reference for contributions.

A number of generalizations of known results are considered n [2.1.5; 2.1.6; 2.2.1; 2.2.2; 2.2.3; 2.2.4; 2.2.5; 2.2.7; 2.2.8; 2.2.10; 2.2.11; 2.2.12; 2.2.13; 2.2.14; 2.2.15; 2.2.16; 2.2.19; 2.2.20], where the circles defined by geometric structures generated by a triangle are replaced by

conical sections. Thus new dependencies have been found which generalizes the theorems of Droz-Farny, Cesar-Koshnica, Fontene, Griffith and other tasks that do not bear the names of mathematicians. Complete studies of generalizations depending on the types of conical sections have been made. In [2.1.1], a summary of a problem is given by the International Mathematics Olympiad 2013, where in Feuerbach's theorem the circles are replaced by conical sections. The concepts of Gergonne's point are summarized, Nagel's points and Nagel's lines. Links between the concepts mentioned above have been found. Interesting dependencies between circles formed by convex quadrilaterals are presented in [2.1.4], and as an application the new results have been used to present other proofs of problems at the International Mathematics Olympiads (2007 and 2008). Problems of geometric loci of points in the plane of a triangle have been investigated [2.2.18; 2.2.20]. An application of the principle of duality is done in [2.1.2; 2.2.13; 2.2.14]. Properties of Simpson circles and points of polygons, inscribed in a circle are investigated in [2.2.10]. The work [2.2.9] traces the step by step development of the idea of defining the concepts of the Euler line and the Euler circle of a polygon inscribed in a circle, which naturally leads to the construction of the Euler line and Eulerian conic section for a polygon. New properties of poles and polarities generated by the Cevians of a triangle are described in [2.1.6; 2.2.2]. A technique for summarizing some special types of circles connected to a triangle in terms of conic sections is presented in [2.1.5]. In most of the commented publications, mathematical calculations are time consuming and the author(s) used Maple's algebraic computer system.

A general technique for finding the dependences between the radii of tangent circles in the plane of a triangle is presented in [2.2.6]. The main result is applied to solve many different problems.

Some relationships were found between the sections and faces in some polyhedral in [2.2.15]. The result obtained in the case of a parallelepiped can be regarded as a 3 dimensional analogue of the equality, known as the Apollonian theorem, expressing the relationship between the sides and the diagonals of a parallelogram; A dependence has been found in the case of a prism with a triangle base, in the case of a pyramid with a parallel base and in the case of a tetrahedron. A vector-based technique was used for the above mentioned investigations. Summary of the classical problem for an area defined by secants dividing the sides of a triangle by a constant relation, where the constant relation is replaced by other conditions, is presented in [2.2.17]. A geometrical relationship was found between the roots of a polynomial with complex coefficients and the roots of its derivative [2.2.21].

Developing on the theory of linear programming for areas encircled by curves and surfaces of the second degree [2.1.3]. The results obtained are illustrated by numerous examples.

All this indicates that the new results obtained, in addition to their elegance, have both a scientific contribution and a teaching methodological one, that can be applied in the education of distinguished students, as well as in the geometry course for enriching the palette of tasks for exercises. The demonstrated results from the monograph convince me that the presented technique for teaching students has the potential to generate creative thinking among school and university students.

In addition, I would like to say that the scientific metrics presented for the competition are only a small part of those of Assoc. Prof. Veselin Nenkov. The candidate has 280 publications, 62 of which are indexed in WoS, over 400 citations, 59 of which are in WoS, h-index 5, according to WoS Publons.

I have not found "plagiarism" in the candidate's works within the meaning of the Law on the Development of the Academic Staff in the Republic of Bulgaria.

CRITICAL NOTES

The use of DGS in the heuristic discovery of new dependencies is a very powerful method. In future publications, I recommend to Assoc. Prof. Veselin Nenkov to pay more attention to explaining how he has used DGS in the course of his research, as he does it when reporting to conferences.

I recommend Assoc. Prof. Veselin Nenkov to diversify the journals from the date base WoS in which he publishes, since most of his publications are in only one journal from WoS.

I recommend to pay more attention, when preparing administrative documents.

CONCLUSION

In my opinion the candidate Assoc. Prof. Veselin Nenkov has obtained enough results both in quality and quantity. The presented documents meet the requirements, conditions and criteria of the Law on the Development of the Academic Staff in the Republic of Bulgaria, Rules for applying of the mentioned above law, Rules for the conditions and order for acquiring academic degrees and academic positions at Naval High School "N. Y. Vaptsarov " to occupy the academic position "Professor". Therefore I give my **strictly positive assessment and I recommend to the Scientific Jury to prepare a report-proposal to the Honorable Scientific Faculty Council of the Engeneering Faculty for the election of Assoc. Prof. Veselin Nenkov Nenkov, PhD for the academic position "Professor"** in Naval High School "N. Y. Vaptsarov " on Research area: 1. Pedagogical sciences, professional field 1.3 "Pedagogy of education in mathematics and informatics"

20.03.2020
Plovdiv

Signature: .....
/Prof. Boyan Zlatanov, PhD /