REVIEW

to occupy the academic position:

''Professor''	X
''Associate Professor''	
	one of the academic positions indicated shall be marked with the sign "X"

Candidates to occupy the position:

1	Associate Professor	PhD	Juliana	Javorova	Georgieva	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5	Technical Sciences
code	name

Professional area:

5.1	Mechanical Engineering
code	name

Scientific specialty:

Applied Mechanics (incl. Tribology) with teaching in German language

The competition has been announced:

39	27.05.2022	Applied Mechanics	Metallurgy and Materials Science
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	PhD	Victor	Iliev	Rizov	UACEG, Sofia
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Associate Professor	PhD	Juliana	Javorova	Georgieva
academic position	scientific degree	name	middle name	last name

1.1. Completion of the provided documents:

A) The competition documents are in full compliance with the Regulations	3 points	**X**
B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	
C) The documents are not completed in accordance with the requirements of the Regulations	0 points	
		one of the answers given is marked with the sign "X"

Missing documents and violated requirements must be described if response C is marked.

1.2. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.
The candidate, Associate Prof. PhD Eng. Juliana Javorova Georgieva meets the minimum requirements for the occupation of the academic position 'Professor', specified in the law for development of the academic staff in Bulgaria and the Regulations of UCTM, Sofia in the scientific field 5. Technical Sciences, Professional field 5.1 Mechanical Engineering, speciality 'Applied mechanics' (including Tribology) with teaching in German language. The total points of the candidate are 1735.86 at necessary 600 for academic position 'Professor' in UCTM. The points of the candidate according to indicators G-7 and G-8 are 117.32 and 290.54, respectively (the sum of the points according to indicators G-7 and G-8 is 407.86). The points of the candidate according to indicator B are 264. The candidate has a PhD thesis for which she has 50 points. The candidate has 620 points for citations of her works in scientific issues, indexed in worldwide data bases or in monographs and collective volumes. The points of the candidate for citations in monographs and collective volumes with scientific reviewing are 93. For citations or reviews in non-indexed journals the candidate has 56 points. The total number of citations of the works of the candidate presented for participations in the current competition is 96. For supervising of one PhD student whit successfully accomplished work the candidate has 40 points. For participation in a national scientific and educational project the points of the candidate are 40. For participation in an international scientific and educational project the candidate has 60 points. The points of the candidate for supervising of an international scientific and educational project are 40. For providing funds on projects, supervised by the candidate the points are 25. For publication of a university textbook or textbook which is used in school net the candidate has 20 points. For publication of a university aid or an aid which is used in school net the candidate has 20 points.

1.3. Relevance of scientific and / or applied research:

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	7 points	X
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	3 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.
The scientific activities of the candidate are concentrated mainly in the following fields: - Hydrodynamic lubrication of journal bearings - Biotribology - Friction and wear in different tribological systems - Investigation of physical-mechanical and tribological characteristics of materials in industry - Technical mechanics - Investigation of other topical engineering problems The investigations performed by the candidate are topical since they treat important contemporary problems in the field of tribology and technical mechanics. These investigations contribute for increasing of the efficiency of the lubricants. Also, the investigations contribute for the development of biotribology and biotribology and for clarifying the processes of friction and wear in the tribological systems. The investigations in the area of topologies of high-tech energy convertors as elements of renewable energy sources systems and charges for electric vehicles represent topical problem in full correspondence with the directives of EU.

1.4. Knowledge of the problems subject of research:

A) The candidate knows in detail the achievements of other authors on the researched topics and/or applications	6 points	X
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	
C) The candidate has no prior knowledge of the status of the researched problems	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.
The candidate knows very well the up-to-date investigations and achievements of other authors in the

research field. In her research activity, the candidate conscientiously cites and creatively applies the investigations of other researchers which contribute considerably for improving the quality of the research.

1.5. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	X
C) Theoretical with application elements	4 points	
D) It does not correspond to the level specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

1.6. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	4 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.
The objectives of the research of the candidate are realistic and present significant scientific and scientifically-applied interest. For achieving of these objectives the candidate applies up-to-date research methods.

1.7. Methods of research:

A) Adequate to research and set scientific objectives and /or applications	8 points	X
B) Partially appropriate, enabling part of the scientific objectives and / or applications to be achieved	4 points	
C) Inappropriate methods	0 points	
		one of the answers given is marked with

		the sign "X"

Methods must be specified. The type of methods used is justified.
The scientific methods used by the candidate are up-to-date which is an important condition for achieving the scientific purposes, namely: - Mathematical modelling (development of mechanic-mathematical models) in the area of hydrodynamic lubrication of journal bearings (A3, A4, A5, A9, A11, A12, C1, C2, C3, C6, C14, C18, C20, C21, C24); - A new model for lubrication of the hip joint with using a non-Newtonian fluid is introduced (A4, C27); - Investigations in the area of friction and wear in various tribological systems (wear of composite and non-composite coatings, determination of the moment of friction in a bearing seal) (A1, A2, A7, A10, C4, C7, C8, C10, C16, C17, C30); - Development of teaching aids for joint preparation of PhD students in the process of work on the first CEEPUS project in the field of tribology (C13); - Investigations of physical-mechanical and tribological characteristics of materials in industry (mechanical behaviour of structural polymers, theoretical and experimental investigation of transmission oils with or without additives, investigations of mechanical properties of steels and alloys) (B2, B3, B5, C5, C19, C22, C25, C28, C33); - Development of methodology for design of experiment for measuring of rheological parameters of transmission oils (C19); - Detailed literature survey in the area of theoretical and experimental investigations of mineral oils with viscosity-index additives (C22); - Dilatometric analyses for identification of the temperatures of the critical points in solid-state phase transmission of samples of several types two-phase steels (C28, C33); - Development of mechanic-mathematical models of the flight of sports balls, including the equations of kinematics, dynamics and fluid mechanics (C23, B4); - Development of models by using Simetrix software for new or modified topologies of high-tech energy convertors in renewable energy systems and charges for electric vehicles (B6, B7, B9, C29, C31).

1.8. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	X
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.
The contributions of the candidate have scientific, scientific-applied and applied character. The scientific research of the candidate is in the following fields: - Hydrodynamic lubrication of journal bearings. Here a modified non-linear equation of Reynolds

is derived. A mechanic-mathematical model of radial journal bearing is developed. A model of dynamically loaded journal bearing is created and verified. The generalized equation of Reynolds, the equations of the theory of elasticity for determination of the contact strains of the coating and differential equations of the motion of rigid rotor are solved simultaneously. A problem and analytical literature survey that aims for the first time to unify the achievements of the western and the Russian schools in the area of hydrodynamic theory of lubrication is presented.

- Biotribology. A new model for lubrication of the hip joint is introduced. The importance of 3D bioprinting is reasoned.
- Friction and wear in various tribological systems. Investigations under conditions of dry reciprocating friction are carried-out. It is proved that the adhesion wear is the dominating factor for composite materials, while the basic mechanism of wear of brass and bronze is the abrasive. Also, it is proved that the composite materials have lower intensity of the wear. It is shown that the wear resistance of the composite coating of the working bodies of drilling machines in not a constant value with the time of duration of friction. It is found that the reinforced composite materials are good candidates for repair of metal details of brass and bronze. It is found also that applying of HVOF-coatings improves the wear-resistance of materials. A solution of an identification problem for determination of the moment of friction in a bearing seal is proposed. For this purpose, the methods of variation calculus are applied.
- Investigation of the physical-mechanical and tribological characteristics of materials in the industry. It is found that a small amount of nanodiamonds in elastomeric mixtures leads to an improvement in the elastohysteresis properties of the vulcanizates. A methodology for design of experiment for measuring of the rheological parameters of transmission oils is created. It is found that the mineral oils with viscosity-index improvers have non-Newtonian behaviour. The mechanical properties of two-phase low-manganese steel are investigated. Dilatometric analyses are performed.
- Technical mechanics. A mechanic-mathematic model of the flight of sport balls for golf and football is developed. Damping characteristics of polymer concrete outrigger are investigated based on the derived non-homogeneous differential equation of transverse vibrations. Solution of two problems of the theoretical mechanics is presented. It is shown that for solving of more complicated problems one can use modern software mathematical packages in the teaching process.
- Investigation of other up-to-date engineering problems. Here, new or modified topologies of high-tech energy convertors used in renewable energy sources systems are presented. It is confirmed that the statistics is a powerful instrument for analysis of measurements data.

1.9. Participation of the candidate in the achievement of the presented results:

A) The candidate has at least an equal participation in the submitted papers	8 points	X
B) The candidate has at least an equal participation in most of the submitted papers	7 points	
C) The candidate has a secondary participation in most of the submitted papers	4 points	
D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items C or D is marked.

I accept that the candidate has equal contribution in the collective works presented for participation in the present competition.

1.10. Pedagogical activity:

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	X
B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.
The candidate leads the following lecture courses in UCTM: Technical mechanics for regular students; Technical mechanics for external students, Technical mechanics – 1 statics (German language teaching), Technical mechanics – 2 elastic-static (German language teaching), Technical mechanics – 3 kinetics (German language teaching). In previous years, the candidate leaded lecture course in Technical mechanics, Hydrodynamic lubrication and Tribology in English language. Also, the candidate successfully supervised 3 graduate students in the field of web-design. The candidate is author/co-author of a university textbook and a teaching aid. Assoc. Prof. Dr. Eng. Juliana Javorova Georgieva supervised a PhD student which successfully defended at year 2017.

1.11. Critical notes:

A) Lack of critical notes	8 points	X
B) Critical notes of a technical nature	7 points	
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	
D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.
I would recommend to the candidate to continue her scientific research activities and to write a Monograph on Hydrodynamic lubrication of journal bearings.

1.12. Conclusion

A) The evaluation of the candidate's activity is **POSITIVE**	This evaluation is assigned to a total number of at least 65 points	X
B) The evaluation of the candidate's activity is **NEGATIVE**	This evaluation is assigned to a total number below 65 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the reviewer
The analysis of the candidate publications presented for participation in the current competition, the perfect pedagogical activity of the candidate and the full implementation of the minimum requirements for holding the academic position 'Professor' gives me reason to recommend to the respectable Scientific Jury to propose to the Scientific Council of the Faculty of Metallurgy and Materials Science at UCTM to award to Assoc. Prof. Dr. Eng Juliana Javorova Georgieva the academic position 'Professor' in scientific area 5 'Technical Sciences', professional area 5.1 'Mechanical Engineering', scientific speciality 'Applied Mechanics' (incl. Tribology) with teaching in German language.

September 1, 2022	The review was written by: Prof. Dr. Eng. Victor Iliev Rizov	
date		signature