**Contest topics for the academic position of Professor, position no. 10**

**1. Specific transmissions for hybrid, electric and autonomous vehicles:**

1.1. Structural analysis of transmissions specific to hybrid, electric, and autonomous vehicles. Architectures of mechanical transmissions in the structure of electric and hybrid vehicles.

1.2. Integration of mechanical transmissions into the structure of electric and hybrid vehicles.

1.3. Single-speed transmissions – power spectrums.

1.4. CVT (Continuously Variable Transmission) systems: general concepts regarding the structure and operation of mechanical variators; calculus and design elements for mechanical variators; transfer functions.

1.5. Single-speed transmissions: calculus and design elements of gear wheels; shafts used in the structure of single-speed gearboxes; bearings used in the structure of gearboxes specific to electric and hybrid vehicles.

1.6. Efficiency improvement elements for gearboxes in electric and hybrid vehicles: methods for determining gearbox efficiency; efficiency maps for single-speed and two-speed transmissions.

**2. Finite element method:**

2.1. Finite element method introduction.

2.2. General procedures used in the finite element method.

2.3. Structure modelling in a static mode with finite elements.

2.4. Elastic structure modelling in a dynamic mode with finite elements.

2.5. Aspects of using the finite element method in solving some mechanical engineering problems.

**3. Machine Elements I:**

3.1. Machine elements design basics.

3.2. Screw-nut mechanical transmissions.

3.3. Gear transmissions.

3.4. Chain transmissions.

3.5. Belt transmissions.

3.6. CVT and friction mechanical transmissions.

3.7. Straight shafts and axles.

**SELECTIVE BIBLIOGRAPHY**

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**2. Finite Element Method:**

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**3. Machine Elements I:**

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