**Thematics of the Professor position 10 in the staff list of the Department of Automotive, Transport and Industrial Engineering – D22**

**Thematics:**

**I. Calculation and construction of internal combustion engines**

1. Kinematics of the engine mechanism.

2. Gas pressure force and inertia forces in the engine mechanism. Resultant forces in the engine mechanism. Engine torque.

3. Engine balancing. Ignition order.

4. Piston. Piston construction. Piston materials. Mechanical analysis of the piston. Thermal analysis of the piston. Piston calculation.

5. Segments. Segment construction. Segment materials. Functional analysis of the segment. Segment calculation.

6. Pin. Pin construction. Functional analysis of the pin. Pin calculation.

7. Connecting rod. Connecting rod construction. Connecting rod materials. Functional analysis of the connecting rod. Connecting rod calculation.

**II. Transport ecology**

1. Introduction to the possibilities of increasing the economy of the internal combustion engine. Environmental protection aspects.

2. Formation of pollutant emissions in the internal combustion engine.

3. Analysis of pollutant emissions generated by conventional and unconventional fuels.

4. Active methods of reducing pollutant emissions in the spark ignition engine.

5. Active methods of reducing pollutant emissions in the compression ignition engine.

6. Passive methods of reducing pollutant emissions. Catalytic converter.

7. Anti-pollution standards.

**III. Automobile mechatronics**

1. The concept of “mechatronics”: definition; models. Evolution of technical systems. The automobile as a mechatronic product.

2. Standardized communication protocols OBD-II.

3. Communication systems used in automobiles.

4. Electronic throttle.

5. Intake manifold pressure sensor.

6. Air mass sensor.

7. Temperature sensors.

8. Speed ​​measurement sensors.

9. Oxygen sensor (Lambda probe).

**Selective Bibliography**

**I. Calculation and construction of internal combustion engines**

1. Grunwald, B., Teoria, calculul şi construcţia motoarelor pentru autovehicule rutiere, EDP, Bucureşti, 1980

2. Popa, G. M., Negurescu, N., Pană, C., Motoare diesel. Procese, Editura Matrix Rom, Bucureşti, 2003.

3. Pulkrabek, W., Engineering Fundamentals of the Internal Combustion Engine, Prentice Hall, New Jersey, 2002

4. Van Basshuysen, R., Schafer, F., Internal combustion engine handbook. Basics, components, systems, and perspectives, SAE International, 2004.

5. Pana, C., Popa, M.G., Negurescu, N., Motoare cu ardere interna. Cinematica, dinamica, echilibraj, Ed. MatrixRom, Bucuresti, 1997.

**II. Transport ecology**

1. Dan, F., Dan, C., Combustibili, poluare, mediu, Editura Dacia, Cluj-Napoca, 2002.

2. Tutunea D., Poluare în transporturi, Editura Universitaria, Craiova 2013.

3. Eran Sher, Handbook of Air Pollution from Internal Combustion Engines: Pollutant Formation and Control, 1998.

4. Asif Faiz, Christopher S. Weaver, Michael P. Walsh, Air Pollution from Motor Vehicles,

5.1996.

6. George S. Springer, Donald J. Patterson, Engine emissions pollutant formation and measurement, 1973.

**III. Automobile mechatronics**

1. Laurentiu Manea, Adriana Manea- Mecatronica automobilului modern, Editura Matrix, 2001.

2. Dumitriu, A., Mecatronică, Volumul I, Editura Universităţii „Tramsilvania” din Braşov, 2006.

3. Mătieş, V., Mândru, D., Tătar, D., Mătieş, M., Vencel, C., Actuatori în mecatronică, Editura Mediamira, ClujNapoca, 2000.

4. Tutunea D., Mecatronica autovehiculului. Noțiuni practice, Editura Sitech, 2023.

5. Reif Konrad, Automotive Mechatronics: Automotive Networking, Driving Stability Systems, Electronics, 2015.