Department of Energy and Industrial Apparatus

1. Explain the need for modelling operation of energy conversion systems by means of comparative thermodynamic cycles on the example of two cases.
2. Describe production of electricity from chemical energy of fossil fuels or non-conventional sources of energy on the example of two cases.
3. Explain and justify the phenomenon of the greenhouse effect on the example of energy conversion installation for production of electricity.
4. Ways of improvement of efficiency of energy conversion on the basis of two thermodynamic cycles.
5. Perspectives for the development of different technologies of electricity production on the basis of a selected technology.

Department of Machine Design and Vehicles

1. Which of the two components can be regarded as a better model of the rumple zone in a car body: a coil spring or telescopic shock absorber (e.g. hydraulic type)? Justify the answer.
2. At which conditions the handlebar on a bicycle is subjected to greater loading: a steep uphill climb or a similar but downhill descent? Assume the road is smooth and the influence of bumps can be neglected. Give some substantiation to the answer.
3. Name known differences between the instantaneous and fatigue damage mechanism in machine components. How do engineering calculations methods used for the two types of damage mechanism differ?
4. Explain the difference between a theoretical and empirical (experimental) model of a physical phenomenon.
5. Why is it necessary to include a safety factor in engineering calculations?

Department of Materials Science and Joining Technology

1. Weldable steels with elevated and high strength - mechanical properties and factors affecting them and advantages associated with their use.
2. Modern technologies of shaping of the steel microstructure – microalloying and thermomechanical treatment.
3. Stainless steels - classification, chemical composition and properties.
4. Modern, heat resistant materials based on Ni - alloy additives, properties, applications
5. Composite materials - classification, properties and applications

Department of Mechanics and Mechatronics

1. Description of dynamics of the material point in a complex motion.
2. Dynamics of the rigid body in a spherical motion.
3. Gyroscopic phenomena theory.
4. General equation of analytical dynamics.
5. Lagrange's equations of the first order.

Department of Production Engineering and Automation

1. The factors determining the integration range of machining operations in parts manufacture for industrial machinery.

2. The concept of total (complete) manufacturing and possibilities for its realization of the with the use of machining centres.
3. Typologies of production systems considering machinist participation and automation capabilities of machine working cycles in machinery operation.
4. Modular structures of machinery equipment with regard to the requirements for flexible manufacturing of varied pars spectrum.
5. The functional structure of a flexible manufacturing system and the resources for the integration of related materials flow versus demands of up-to-date integrated production.

30 09 2015

Prodziekan ds. Kształcenia

ir hab. inż. Jacek Kropiwnicki
WYDZIAŁ MECHANICZNY