MATURITNÍ TÉMATA

Školní rok:			**2025/2026**	
Ředitel školy:			PhDr. Karel Goš	
Předmětová komise:			Fyzika	
Předseda předmětové komise:			Mgr. Šárka Richterková	
Předmět:			**Physics**	
			VI.A6	Mgr. Dana Vojtovičová
			VI.B6	Mgr. Dana Vojtovičová
			VI.C6	Mgr. Dominika Korcanová
Schváleno předmětovou komisí dne:			**27. 8. 2025**	Podpis:
Schváleno ředitelem školy dne:			**28. 8. 2025**	Podpis a razítko:
Počet výtisků:	**5**	Výtisk č.:		

1. **Kinematics**
   - types of motion according to trajectory and speed
     - linear motion – steady, steadily accelerated
     - circular motion
   - relativity of motion
     - frame of reference
     - adding velocities

2. **Dynamics**
   - Newton's laws
     - 1st Newton's law – inertia, inertial and non-inertial frame of reference
     - 2nd Newton's law – acceleration, momentum and its conservation, friction, inclined plane
     - 3rd Newton's law
   - dynamics of circular motion

3. **Work, energy, power, efficiency**
   - mechanical work
   - average and instantaneous mechanical power
   - mechanical energy, energy conservation
   - efficiency

4. **Gravitational field**
   - Newton's law of universal gravitation
   - types and properties of gravitational field
     - gravitational potential, gravitational field strength
     - central and uniform gravitational field
     - motion in central and uniform gravitational field
   - Kepler's laws, Solar System

5. **Mechanics of solids**
   - adding and resolving forces
   - moment of a force, couple of forces
   - equilibrium conditions
   - kinetic energy of rotating objects, moment of inertia

6. **Mechanics of fluids**
   - ideal fluids at rest
     - pressure in a fluid, upthrust
   - ideal fluids in motion
     - law of conservation of energy
     - law of conservation of mass
   - real fluids

7. **Kinetic theory**
   - basic ideas of the kinetic theory
   - diffusion, Brownian motion
   - states of matter, bonds
   - temperature scales, temperature measurement

8. **Thermodynamics**
   - internal energy and its changes
   - 1^{st} and 2^{nd} Law of Thermodynamics
   - heat exchange, calorimetric equation

9. **Structure and properties of gases**
   - ideal gas
     - properties
     - equation of state
   - processes of an ideal gas
     - isothermal
     - isovolumetric
     - isobaric
     - adiabatic
   - heat engines

10. **Structure and properties of liquids**
    - surface tension
      - properties, occurrence
    - capillarity, bubbles and drops
    - thermal expansion of liquids

11. Structure and properties of solids

- crystalline and amorphous solids
- properties of crystalline lattice
  - formation, abnormalities of crystalline lattice
  - types of cells
- Hooke's law
- thermal expansion of solids

12. Changes in states of matter

- behaviour of crystalline and amorphous substances
- changes of states of matter
- saturated vapour
- calorimetric equations
- phase diagrams

13. Simple harmonic motion

- basic quantities, links with steady circular motion
  - displacement, speed and acceleration
- mass on a spring, simple pendulum
- dynamics of simple harmonic motion
  - free and forced oscillations
  - resonance and its uses

14. Mechanical waves

- mechanical waves
  - properties, types, examples
  - comparison with electromagnetic wave
- sound

15. Electric field

- electrostatic field, electric charge
  - Coulomb's law
  - comparison with Newton's law of universal gravitation
  - properties – el. potential, el. field strength
  - central and uniform el. field
  - work in uniform electric field
- conductor and insulator in electric field, permittivity
- capacitance, capacitors

16. Electric current in metals

- conduction in metals and temperature changes
- Ohm's law
- Kirchhoff's laws
- measurement of current and voltage
- electromotive force and internal resistance

17. Electric current in semiconductors

- types of semiconductors
- resistance of semiconductors and temperature change
- PN junction
- semiconductor components

18. Electric current in fluids

- conduction in liquids, electrolytes
  - Faraday's law
  - batteries, accumulators
- conduction in gases
  - discharge at standard pressure – types, occurrence
  - discharge at lower pressure – types, occurrence

19. Magnetic field

- properties of magnetic field
  - magnetic and electric field interactions
  - conductor in magnetic field
  - force between two current carrying conductors
  - force on a charged particle moving in a magnetic field
- types of magnetic materials

20. Electromagnetic induction

- electromagnetic induction
  - Faraday's law
  - Lenz's law
- eddy currents, self-induction
- uses of electromagnetic induction – generators, transformers …

21. Alternating current

- alternating current – production, uses
- root-mean-square values of alternating current
- RLC in series
- rectification of alternating current

22. Electromagnetic waves and oscillations

- LC oscillatory circuit, natural frequency
- electromagnetic waves and its properties
- transmission of el.mag. waves
- tuning circuits

23. Geometrical optics

- mirrors - reflection, mirror equation, ray diagrams
- lenses – refraction, absolute refractive index, thin lens equation, ray diagrams
- the eye – correcting vision
- subjective and objective optical instruments

24. Wave optics

- reflection, refraction
- interference, Young's double slit experiment
- diffraction
- polarization

25. Electromagnetic radiation

- types, properties, sources
  - radio waves, microwaves
  - IR radiation
  - UV radiation
  - X-rays
  - gamma rays
- black body radiation
- photometry

26. Atomic physics

- atomic structure
- models of atom
- uses, applications (laser, electron microscopy)

27. Nuclear physics

- nucleus
- nuclear reactions
  - radioactivity – types, detectors
  - nuclear decay
  - nuclear fusion and fission
- nuclear reactors

28. Modern physics

- relativity of motion
- quantum physics
- particle physics