Course Unit Title Physics - Bridging Course

Language of instruction English

Faculty/

Name of lecturer(s)

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Planned learning activities and teaching methods

Lec.	Tut.	Lab.	Proj.	Sem.	Other	Total of teaching hours
7	22				1	30

Objectives of the course unit

To enable students to acquire skills in mathematical description of physical phenomena.
To get general comprehension of constructing models of physical phenomena and apply them to practical engineering problems.
To introduce methodology of carrying out simple experiments and perform appropriate data analysis.

Learning Outcomes

Student:

1. applies correctly methodology of analysis of physical experiments.
2. recognizes and uses vector form of dynamical equation for the motion, solves these equations with analysis of acceleration, velocity and radius vector of a particle.
3. applies basic calculus for kinematics and dynamics problems
4. applies rules of conservation of energy and linear momentum in typical problems of dynamics.
5. recognises Simple Harmonic Motion (SHM) and uses kinematical and dynamical description of this motion.
6. describes components of equation of damped and forced harmonic motions.
7. analyses wave equation of mechanical wave, evaluates speed of wave, its frequency, period of oscillation of particles of the medium, amplitude of their vibrations.

Assessment methods and criteria of learning outcomes

Learning outcomes 1-7: current assessment of work during tutorials,
Learning outcomes 1-7: multiple-choice written test

Prerequisites and co-requisites

Basic physics and mathematics at Standard Level for Secondary School

Course contents

LECTURE AND TUTORIALS

1. SI units. Conversion of units. Dimensional analysis. Problems solving.
2. Calculus and its application in physics. Examples.
3. System of coordinates. Vector operations - addition, scalar and vector products. Resolution of a vector into rectangular components. Examples.
4. Kinematics. Radius vector, displacement, velocity, acceleration. Examples
5. Equation of motion in 1D and 2D. Problems solving
6. Particle dynamics. Free body diagrams: problems solving..
7. Newtons laws. Formulating and solving equations of motion.
8. Inertial and non-inertial frames of reference. Examples.
9. Work and energy. Examples
10. Conservation of energy. Conservative forces.
11. Potential energy. Equilibrium types.
12. Momentum. Conservation of momentum. Problems solving using conservation of energy and momentum.

13. Elastic and inelastic collisions. Problems solving.
14. Simple harmonic motion. Problems solving.
15. Damped and forced oscillations. Basic information.
16. Transverse and longitudinal waves.
17. Harmonic waves.
18. Interference of waves. Standing waves. Simple problems solving.
19. Sound waves. Simple problems solving.
20. Example of presentation and analysis of experimental data.

OTHER FORMS

Classroom demonstration : Harmonic motion and mechanical waves (1 hrs)

Recommended and required reading

1. D.Halliday, R.Resnick, K.S.Krane, Physics, vol.1, and 2, extended version, J.Wiley - Sons, Inc., New York 1992.
2. J. R. Taylor; An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements, University Science Books, 1997

Comments

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