COURSE: PHYSICS 1 (PHY 1101)

SEMESTER: SPRING 2019-2020

CREDIT: 3 CREDIT HOURS

MARKS DISTRIBUTION

ATTENDANCE: 10 (10%)

PERFORMANCE: 10 (10%)

QUIZZES: TWO QUIZZES AND ONE ASSIGNEMENT/PRESENTATION: 40 (40 %)

TERM EXAM: 40 (40%)

TERM EXAM QUESTION TYPE:

QUALITATIVE MCQ: 8×1 = 8 POINTS

QUANTITATIVE/NUMERICAL/ANALYTICAL MCQ: 8×1 = 8 POINTS

CREATIVE/DESCRIPTIVE/ANALYTICAL QUESTIONS/PROBLEMS: 3 × (2×4) = 24 POINTS

TOTAL = 100 POINTS/MARKS

Physics 1

Lesson 1

Introduction about the course [Attendance/performance/Quizzes/Term exams)
Reference Book: Fundamentals of Physics (Edition: 10^{th})
Written by Halliday, Resnick and Walker

COURSE OUTCOME 1 (CO1)

Book Chapter 4

Motion in Two and Three Dimensions:

4-1 Position and Displacement :(a) Create two-dimensional and three-dimensional position vectors for a particle, indicating the components along the axes of a coordinate system.

(b) Apply the relationship between a particle's displacement vector and its initial and final position vectors.

4-2 Average Velocity and Instantaneous Velocity

(a) Define average velocity and instantaneous velocity.

(b) Create a particle's position vector as a function of time and evaluate its (instantaneous) velocity vector.

4-3 Average Acceleration and Instantaneous Acceleration

(a) Define average acceleration and instantaneous acceleration.

(b) Create a particle's velocity vector as a function of time and evaluate its (instantaneous) acceleration vector.

Related problems: 3 and 13

Physics 1

Lesson 2

CO1

4-4 Projectile Motion:

(a) Define projectile motion.

(b) On a sketch of the path taken in projectile motion, analyze the magnitudes and directions of the velocity and acceleration components during the flight.

(c) Create an equation of the projectile's path and analyze that the path is parabolic.

(d) Evaluate the *horizontal range* and the *maximum horizontal range*.

Related problem: 22

Physics 1

Lesson 3

CO1

Related problems on projectile motion: 23, 25, 30, 32

Book Chapter 5

Force and Motion-1:

(a) Analyze Newton's First and Second laws.

(b) Create and analyze a free-body diagram for an object, showing the object as a particle and drawing the forces acting on it as vectors.

Physics 1

Lesson 4

CO1

(c) Define the following terms:

i. The gravitational force

ii. Weight

iii. The normal force

iv. Friction

(d) Analyze Newton's Third law.

Related problems: 3, 33, 37

Book Chapter 6

(a) Analyze the properties of friction.

(b) Distinguish between friction in a static situation and a kinetic situation,

Physics 1

Lesson 5

CO1

QUIZ # 1 - 30 MINUTES

(c) For objects on horizontal, vertical, or inclined planes in situations involving friction, draw free-body diagrams and apply Newton's second law.

Related problems: 1, 7, 11

Book Chapter 7

(a) Define work and kinetic energy.

Physics 1

Lesson 6

CO1

(b) Create and analyze the work-kinetic energy theorem.

(c) Determine the work done by the gravitational force when an object is lifted or lowered.

(d) Evaluate the work done on an object by a spring force by integrating the force from the initial position to the final position of the object.

Related problems 1, 9, 11, and Sample Problem- 7.06

Physics 1

Lesson 7

COURSE OUTCOME 2 (CO2)

Book Chapter 9

(a) Define center of mass.

(b) Given the positions of two particles along an axis, calculate the location of their center of mass, and apply the equation to determine the velocity of the system's center of mass.

(c) Define the following terms:

i. Linear momentum

ii. Impulse

(d) Explain the law of conservation of linear momentum.

(e) Explain the elastic collisions, inelastic collisions, and completely inelastic collisions.

Physics 1

Lesson 8

CO2

(f) For isolated elastic collisions in one dimension (**a projectile hitting a stationary target**), apply the conservation laws for both the total kinetic energy and the total linear momentum of the colliding bodies to find the velocities after the collision.

(g) For isolated elastic collisions in one dimension (**a projectile hitting a moving target**), apply the conservation laws for both the total kinetic energy and the total linear momentum of the colliding bodies to find the velocities after the collision. [*Hints and home task for students*]

Related Problems: 18, 21, 25, 49

Physics 1

Lesson 9

CO2

Related Problems: 50, 54, 61, 65

Book Chapter 10

(a) Define the following rotational variables:

(i) Angular position

(ii) Angular displacement

(iii) Angular velocity

(iv) Angular acceleration

(b) For a rigid body rotating about a fixed axis, relate the angular variables of the body (angular position, angular velocity, and angular acceleration) and the linear variables of a particle on the body (position, velocity, and acceleration) at any given radius.

Physics 1

Lesson 10

CO2

(c) Distinguish between tangential acceleration and radial acceleration, and draw a vector for each in a sketch of a particle on a body rotating about an axis.

(d) Define rotational inertia.

(e) Develop a relation between rotational kinetic energy of a body, rotational inertia and its angular Speed.

QUIZ # 2 - 30 MINUTES (Based on OBE)

Physics 1

Lesson 11

CO2

(f) Explain Parallel-axis theorem. [Statement with mathematical expression]

(g) For a rigid body consisting of two particles of mass m connected by a rod of length L and negligible mass. Apply parallel-axis theorem to find the rotational inertia I_{com} about an axis through the center of mass, and perpendicular to the rod. **[Analytical problem]**

(h) For a thin, uniform rod of mass M and length L, on an X-axis with the origin at the rod's center. Determine the rotational inertia of the rod about the perpendicular rotation axis through the center. **[Analytical problem]**

(i) Define torque. Apply Newton's second law for rotation to relate the net torque on a body to the body's rotational inertia and rotational acceleration, all calculated relative to a specified rotation axis.

Related problems: 5, 6, 11, 22

Physics 1

Lesson 12

CO2

Book Chapter 11

(a) Develop a relationship between the kinetic energy of a body in smooth rolling as the sum of the translational kinetic energy of the center of mass and the rotational kinetic energy around the center of mass.

(b) Define angular momentum.

(c) Explain the law of conservation angular momentum.

Related problems: 23, 46

Review Lessons