Physics 1 [Final Term Lesson Plan]

MARKS DISTRIBUTION

ATTENDANCE: 10 (10%)

PERFORMANCE: 10 (10%)

QUIZZES: TWO QUIZZES AND ONE ASSIGNEMENT/PRESENTATION/QUIZ: 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

Reference Book: Fundamentals of Physics (Edition: 10th) Written by Halliday, Resnick and Walker

COURSE OUTCOME 3 (CO3)

Lesson: 1 [Book Chapter 22: The Electric Field]

- Define the Electric Field in terms of the electrostatic force. [10 Min]

- Sketch Electric Field lines around : [25 Min]

(i) a positive point charge in space;

(ii) a negative point charge in space;

(iii) two point charges (a positive and a negative charge) are in electrostatic Interaction in space;

(iv) two positive point charges are in electrostatic interaction in space;

(v) two negative charges in space.

- Create an equation for the Electric Field Due to a Point Charge. **[25 Min]**

Related problems: 5, 6, and 7 [30 Min]

Lesson 2

- Define electric dipole moment. [5 Min]

- Derive the equation for The Electric Field Due to an Electric Dipole. [30 Min]

- Define linear charge density. [5 Min]

- For charge that is distributed uniformly over a ring, determine the net electric field at a given point on the axis of the ring (at a distance z from the center of the ring). **[Analytical problem]**

[30 Min]

Related problem: 30 [15 Min]

Lesson: 3

Book Chapter 23 [Gauss' Law]

- Analyze electric fluxes for (i) an open plane surface (ii) a closed surface. [10 Min]

- Explain Gauss' law. [10 Min]

- Explain how Gauss' law is used to derive the electric field magnitude outside a line of charge or a cylindrical surface (such as a plastic rod) with a uniform linear charge density λ. **[Analytical problem] [25 Min]**

- **Related problems: 5, 25 [15 Min]**

Book Chapter: 24 [Electric Potential]

- Define the following terms: i) Electric potential ii) Equipotential surfaces (iii) Electric dipole **[15 Min]**

- **Develop the** general equation of electric Potential from the electric Field. **[15 Min]**

Lesson: 4

- For a given point in the electric field of a charged particle, **determine** the relationship between the electric potential *V*, the charge of the particle *q*, and the distance *r* from the particle.

[20 Min]

Related Problem: 4, 6, 16, 17 [40 Min]

- Develop the expression for the potential *V* at any given point due to an electric dipole, in terms of the magnitude *p* of the dipole moment or the product of the charge separation *d* and the magnitude *q* of either charge.

[30 Min]

Lesson: 5

Quiz: [30 Minutes]
Arrangement: [10 Minutes]

- Distribute a charge q uniformly to a thin rod along a line and develop the expression for net potential at a given point *P*, a perpendicular distance *d* from the left end of the rod. **[25Min]**

- **Determine** the electric field from electric potential.

[25 Min]

Lesson: 6

- **Related Problems: 21, 36, 37 [30 Min]**

Book Chapter: 25 [Capacitance]

- Define the capacitor and explain the capacitance by sketching a schematic diagram of a circuit containing a battery, a switch, and a capacitor. [20 Min]

- Explain the Gauss's law and develop the expressions for the capacitance for the following cases by applying the Gauss's law
  (a) Parallel Plate capacitor [30 Min]

Lesson: 7

(b) Spherical plate capacitor [30 Min]

Related Problem: 2, 6, 3, and 4 [40 Min]

- Analysis and develop the equation of capacitance to a positively charged single isolated spherical conductor of radius *R* by assuming that the “missing plate” is a conducting sphere of infinite radius. [20 Min]

Lesson: 8

- Design a circuit with a battery, a switch, and three capacitors in parallel combination and find the expression for equivalent capacitance for the circuit. [15 Min]

- Design the circuit with a battery, a switch, and three capacitors in series combination and find the expression for equivalent capacitance for the circuit. **[15 Min]**

Related Problem: Sample Problem 25.02 (a), 11 [25 Min]

- Develop the expression for the electric potential energy stored in an electric field where a charge is transferred from one plate of capacitor to the other. **[35 Min]**

Lesson: 9

Quiz-2 [30 Minutes]

Arrangement [10 Minutes]

- Calculate the energy (U) per unit volume (Ad) in a parallel plate capacitor where electric field is same for all points between the plates. **[10 Min]**

Related problem: 29, 31, 32, 33, sample problem 25.04 [30 Min]

Lesson: 10

Book Chapter 27 [Circuits]

- Define (i) RC Circuit (ii) Time Constant [15 min]
- Develop the loop equation (a differential equation) for a charging RC circuit. [20 min]
- Develop the loop equation (a differential equation) for a discharging RC circuit. [15 min]

Related problems 58, 61, 65 [30 min]

Assignment Submission [10 Min]

Lesson 11

Book Chapter 28 [Magnetic Fields]

- Define Magnetic Field [10 min]
- Define Magnetic force [10 min]

Related problems from chapter 28: 1, 8 [20 min]

Book Chapter 29 [Magnetic Field Due to Current]

- Explain The Biot–Savart Law [25 Min]
- Explain The Ampere's Law [25 Min]

Lesson: 12

- Apply Ampere's law to a loop that encircles current. [10 Min]

Related problems from chapter 29: 2, 9, 50 [30 min]

Course Review