**Physics 1 [Final Lesson Plan]**

**MARKS DISTRIBUTION**

**ATTENDANCE AND PERFORMANCE: 10 (10%)**

**ASSESSMENTS (QUIZZES): BEST TWO OUT OF THREE: 40 (40 %)**

**FINAL EXAM: 50 (40%)**

**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 Books:** *(1)* ***Fundamentals of Physics*** *(Edition: 10th) Written by Halliday, Resnick and Walker; (2)* ***University Physics*** *(13/14th Edition) written by* *Hugh D. Young and Roger A. Freedman*

**Lesson: 1**

* Attendance [10 min]

**Book Chapter 22**

**[Electric Fields]**

* 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]
* Problems:5, 6, and 7 (book chapter 22)[to be solved in the class time] [30 Min]

**Lesson 2**

* Attendance [10 min]

(Continuation of book chapter 22)

* Define (i) electric dipole and (ii) electric dipole moment [10 min]
* Derive the equation for The Electric Field Due to an Electric Dipole. [20 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]

* Problem: 30 (book chapter 22) [to be solved in the class time] [15 Min]

**Lesson: 3**

* Attendance [10 min]

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*] [20 Min]
* Problems: 5, 25 (book chapter 22) [to be solved in the class time] [15 Min]

Book Chapter: 24

[Electric Potential]

* Define the following terms: i) Electric potential ii) Equipotential surfaces [10 Min]
* Develop the general equation of electric Potential from the electric Field. [15 Min]

**Lesson: 4**

* Attendance [10 min]

(Continuation of book chapter 24)

* 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]
* Problems: 4, 6, 16, 17 (book chapter 24) [to be solved in the class time] [30 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**

* Attendance [10 min]
* **QUIZ 1** [20 min]
* Arrangement time for Quiz 1 [10 min]

(Continuation of book chapter 24)

* 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 the electric potential. [25 Min]

**Lesson: 6**

* Attendance [10 min]

(Continuation of book chapter 24)

* Problems: 21, 36, 37 (book chapter 24) [to be solved in the class time] [30 Min]

**Book Chapter: 25**

**[Capacitance]**

* Define the capacitance. (ii) Sketch a schematic diagram of a circuit with a parallel-plate

capacitor, a battery, and an open or closed switch. [20 Min]

* Apply Gauss’ law to find the expression for the capacitance of a parallel-plate. [30 Min]

**Lesson: 7**

* Attendance [10 min]

(Continuation of book chapter 25)

* Apply Gauss’ law to find the expression for the capacitance of a Spherical capacitor.

[25 Min]

* Calculate the capacitance of an isolated sphere. [10 min]
* Problem: 2, 3, 4 and 6 (book chapter 25) [to be solved in the class time] [30 Min]
* 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]

**Lesson: 8**

* Attendance [10 min]
* **QUIZ 2** [20 min]
* Arrangement time for Quiz 2 [10 min]

(Continuation of book chapter 25)

* 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]
* Problems: 10 and 11 (book chapter 25) [to be solved in the class time] [20 Min]

* Sample Problem 25.02 (a) [book chapter 25; Home task]

* 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. [15 Min]

**Lesson: 9**

* Attendance [10 min]

(Continuation of book chapter 25)

* 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]
* Problem: 29, 31, 32, 33 (book chapter 25) [to be solved in the class time] [30 Min]
* Sample Problem 25.04 (a) [book chapter 25; Home task]

**Book Chapter 26**

**[Current and Resistance]**

* Explain the following terms: [40 min]

(i) Electric current

(ii) Electric current density.

(iii) Resistance

(iv) Resistivity

(v) Ohm’s law

(vi) Kirchhoff’s voltage law

**Lesson: 10**

* Attendance [10 min]

**Book Chapter 27**

**[Circuits]**

**RC 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]
* Problems:58, 61 and 65 (book chapter 25) [to be solved in the class time] [30 min]

**Lesson 11**

* Attendance [10 min]

**Book Chapter 28**

**[Magnetic Fields]**

* Explain the terms: (i) Magnetic Field and (ii) Magnetic Force. [20 min]
* Problems:1 and 8 (book chapter 28) [to be solved in the class time] [20 min]

**Book Chapter 29**

**[Magnetic Field Due to Current]**

* Explain the Biot–Savart Law [20 Min]
* Explain the Ampere’s Law [20 Min]

**Lesson: 12**

* Attendance [10 min]
* **QUIZ 3** [20 min]
* Arrangement time for Quiz 3 [10 min]

(Continuation of book chapter 29)

* Apply Ampere’s law to find magnetic field outside a long straight wire with current

[20 min]

* Problems:3, 7 and 9 (book chapter 29) [to be solved in the class time] [30 min]