1028/1029/1355
C: 120

Air University

Student ID 241503

Mid Semester Examinations: Spring 2025

Subjective Part
(To be solved on Answer Books only)

Subject: Applied Physics
Class: BSCYS-II
Section(s): A & B
Course Code: PHY-111

Time Allowed: 120 Minutes
Max Marks: 50
FM's Name: Shamaila Fatima
FM's Signature:

INSTRUCTIONS

- Attempt responses on the answer book only.
- Nothing is to be written on the question paper.
- Rough work or writing on question paper will be considered as use of unfair means.
- Tables / calculators are allowed / not allowed.

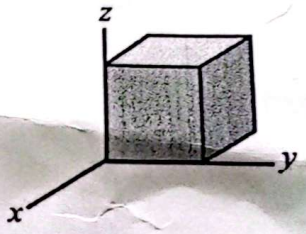
Q1. C2, PLO2 (2*10=20 Marks)

(a) Drive the expression for electric field "E" due to a Ring with radius 'R' have uniform positive linear charge density 'λ' in x-y plane:
at point 'P' distance 'z' along z-axis **(b)** at center of ring (z = 0) **(c)** at z >> R

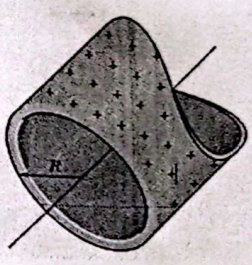
(b) Derive the expression for the electric potential due to dipole at arbitrary point 'p'.

Q2. C3, PLO3 (3*10=30 Marks)

(a) Fig. shows a closed Gaussian surface in the shape of a cube of edge length 2m. It lies in a region where the non-uniform electric field is given by $E=3xi+4i+6j+7k$ N/C with x in meters. **Calculate** the net charge contained by the cube?



(b) Fig. shows a section of a long, thin-walled metal tube of radius R3.00 cm, with a charge per unit length of A 2.00×10-8C/m. Determine the magnitude E of the electric field at radial distance (a) r = R/2.00 and (b) r2.00R? (c) Graph E versus r for the ranger = 0 to 2.00R.



(c) In Fig., particles 2 and 4, of charge -e, are fixed in place on a y axis, at y_2 = -10.0 cm and y4 = 5.00 cm. Particles 1 and 3, of charge -e, can be moved along the x axis. Particle 5, of charge +e, is fixed at the origin. Initially particle 1 is at x_1 = -10.0 cm and particle 3 is at x3 = 10.0 cm. (a) To what x value must particle 1 be moved to rotate the direction of the net electric force F_{net} on particle 5 by 30° counter- clockwise? (b) With particle 1 fixed at its new position, to what x value must you move particle 3 to rotate F_{net} back to its original direction?