

13/12/23



DOON UNIVERSITY, DEHRADUN
Final Semester Examination, Ist Semester, 2023
 Academic Year 2023-24 (Odd Semester)
 School of Physical Science, Department of Physics
 Programme Name – Integrated M.Sc.
 Course Code: Fundamental topic of Physics (PHC-102)

Time Allowed 2.00 Hours

Maximum Marks: 50

SECTION: A

(Very Short Answer Type Questions) (5*2 = 10)

Q1. The relation between electric field vector **E**, displacement vector **D** and polarisation vector **P** is:

A	$D = P + E$	
B	$D = P/E$	
C	$D = \epsilon E + P$	
D	$D = \epsilon(E + P)$	

Q2. The conductivity of an ideal dielectric is

A	Zero	
B	Infinity	
C	Positive	
D	Negative	

Q3. CO₂ molecule is:

A	Polar	
B	Non-polar	
C	Polar at absolute zero but non-polar at room temperature	
D	Non-polar at absolute zero but polar at room temperature	

Q4. A dipole of electric dipole moment p is placed in a uniform electric field of strength E . if Θ is the angle between positive direction of p and E then the potential energy of the electric dipole is largest when Θ is

A	0	
B	$\Pi/2$	
C	Π	
D	$\Pi/4$	

Q5. A hollow metallic sphere of radius 10cm is given a charge of 3.2×10^{-9} coulomb. The electric potential at a point 4cm from the centre is

A	9×10^{-9} volt	
B	288 volt	
C	2.88 volt	
D	0	

SECTION: B

(Short Answer Type Questions) (2*5=10)

Attempt any two

Q1. What is displacement vector D ? Write down boundary condition for D .

Q3. Write down work and kinetic energy theorem and prove it.

Q4. Explain law of conservation of energy, momentum and charge.

SECTION: C

(Long Answer Type Questions) (3*10=30)

Attempt any 3

Q1. (a) Write a note on Elastic potential energy.

(b) Prove that Force can be expressed as gradient of potential energy.

Q2. Use Gauss's law to calculate the electric field intensity due to a uniformly charged sphere at an

- (i) External point
- (ii) Internal point

Q3. (a) State and explain Gauss's law of dielectrics.

(b) Explain why the introduction of a dielectric between the plates of a capacitor changes its capacitance.

Q4. Write a note on

- (i) Conservative nature of Electrostatic field
- (ii) Laplace's and Poisson equation