

[4]

$4 \times 10 = 40$

SECTION 'C'

Long Answer questions (Word limit 400-450 words.)

- Q. 1. What do you understand by electrostatic screening? Derive the expression for coulomb potential arising due to the electrostatic screening.

OR

What are alkali metals? Why they appear transparent when exposed to ultraviolet radiations.

- Q. 2. What is Polarizability? Discuss different kinds of polarizations possible in a dielectric.

OR

What is Landau's theory of phase transition? Explain.

- Q. 3. What are paramagnetic materials? Discuss quantum theory of paramagnetism.

OR

How cooling is achieved by isentropic demagnetization? Discuss.

- Q. 4. What are magnons? Explain the phenomena of quantization of spin waves.

OR

What is Ferromagnetic order? Derive the expression for curie temperature.

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[1]

ROLL NO.....

**PHY. 401/22**

**IV SEMESTER EXAMINATION, 2022**

**M.Sc. (PHYSICS)**

**PAPER-I**

**SOLID STATE PHYSICS-II**

**TIME: 3 HOURS**

**MAX.- 80**

**MIN.- 16**

**Note: The question paper consists of three sections A, B & C. All questions are compulsory.**

**Section A- Attempt all MCQ questions**

**Section B- Attempt one question from each unit.**

**Section C- Attempt one question from each unit.**

SECTION 'A'

$2 \times 8 = 16$

**Multiple Choice Questions**

- In principle plasma waves can add how much energy per cm.  
(a) 10 Mev                      (b) 1 Mev                      (c) 1 Gev                      (d) 1 Kev
- Which is applications of plasma in industry?  
(a) Magnetron                      (b) Ares  
(c) Exe Glassed                      (d) All of the above
- The unit of dipole electric moment is -  
(a) Coulomb<sup>2</sup>- meter                      (b) Coulomb – meter<sup>2</sup>  
(c) Debye                      (d) Dioptr

[2]

4. The ferroelectric material with single curie point is -  
(a) Rochelle salt (b) Zine oxide  
(c) sodium chloride (d) Potassium dehydrogen phosphate
5. The area of hysteresis' loop is equal to -  
(a) Energy loss due to magnetization  
(b) Charge in momentum  
(c) Residual magnetization  
(d) Current in the sample.
6. The easy direction of magnetization of bcc iron is  
(a) [100] (b) [110]  
(c) [111] (d) [101]
7. Bloch wall is the -  
(a) Separation between the two adjacent domains  
(b) Separation between the two similar domains  
(c) Separation between ferromagnetic and antiferromagnetic ordering  
(d) Ordering in ferromagnetics
8. Spontaneous magnetization in the ferromagnetic materials happen.  
(a) Above the curie temperature  
(b) Below the curie temperature  
(c) Above the Neel temperature  
(d) Below the Neel temperature

[3]

SECTION 'B'  $4 \times 6 = 24$

**Short Answer Type Questions**

- Q.1.** Write down the dispersion relation for electromagnetic waves in plasma.

**OR**

What do you understand by plasma oscillation? What are longitudinal oscillations.

- Q.2.** Write down the Maxwell's equations for em waves in a dielectric medium.

**OR**

What is Piezoelectric effect? Explain.

- Q.3.** What do you mean by nuclear magnetization? Explain.

**OR**

Discuss how paramagnetic susceptibility arises in a material due to conduction electron?

- Q.4.** What do you understand by Ferromagnetic order? Explain.

**OR**

What are Ferromagnetic domains? Discuss in brief.