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M.Sc. RNLKWC-/CEM-303/22

2022

ADVANCE PHYSICAL CHEMISTRY-II
M.Sc. Third Semester End Examination - 2022
PAPER - CEM-303

Full Marks : 40

Time : 2 hours

*The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own
words as far as practicable.
Illustrate the answers wherever necessary.*

Group-A

Answer any four from following

$2\frac{1}{2} \times 4 = 10$

1. a) Define Geometric structure factor of a crystal.
b) What is phonon? Does Phonon have any momentum?
c) What is band gap? Compare band gap of insulator, conductor and super conductor.

(Turn Over)

(2)

- d) Difference between Boson and Fermions.
e) Discuss hypothesis of statistical mechanics.

Group - B

Answer any four from the following : **5×4=20**

2. State and prove Liouville theorem.
3. By X-ray diffraction method, the unit length of NaCl is found close 0.5627 nm. The density of NaCl is found to be 2.164 g/cm⁻³. Calculate the % of the Na⁺ and Cl⁻ ion missing.
4. Write a short note on Grain boundaries.
5. What is Gamma space and μ -space? Write importance of partition function.
6. Theoretical value and experimental value of heat capacity ratio(γ) at high temperature is similar but it differ at low temperature.
7. Write a short not on black-body radiation.

(3)

Group - C

Answer any one from the following : **1×10=10**

8. a) What is uper conductivity? Give example of different types of semi conductor.
b) What is exciton? Find the packing fraction in FCC unit cell. **5+5=10**
9. a) Briefly explain the meaning of term critical temperature and Meissner effect for a super conductor. What happens when a super conductors a critical field.
b) How does the entrophy of a super conductor vary with tempe rature why?
(c) Compare the three statistics.
(Maxwell-Boltmann, Fermi-Dirac and Bose-Einstein statistics). **3+2+5=10**