2023

JHARGRAM RAJ COLLEGE

CHEMISTRY

TIME: 2 HOUR **M. Sc 3RD SEMESTER INTERNAL EXAMINATION** **F. M: 40**

PHYSICAL SPECIAL

Paper-301

(1) What are the conditions to observe NQR signals?
(2) What is the significance of $\mathbf{K_\alpha}$ in the X-ray light source of MgK_α used in XPS?
(3) How many ESR lines will be obtained for 'N' (I=1) in **dpph** and why?
(4) How many hyperfine peaks will obtain for anthracene anion and $^{\cdot}CPh_3$?
(5) Why **O-phen** gives turn-on response for Mg^{2+} but turn-off response for Fe^{2+}.

5x2=10

Paper-302

1. What are the four main categories of defects/imperfections observed in crystalline solids?
2. Write down the expression for the first-order correction to the wavefunction in the non-degenerate stationary-state Rayleigh-Schrödinger perturbation theory.
3. What do you mean by the term 'degeneracy pressure'?
4. Linear Stark effect is missing in case of the hydrogen atom. Why?
5. What do you mean by radiative lifetime?

5x2=10

Paper-303

(1) State the ergodic hypothesis.
(2) Show that for a one-dimensional lattice, the number of allowed states in the Brillouin zone is equal to the number of unit cells in the system.
(3) What do you mean by postulate of local equilibrium?
(4) Under what condition BE distribution reduces to Maxwell-Boltzmann (MB) distribution?
(5) Comment on the nature of particles for which Fermi-Dirac (FD) statistics is applicable.

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