

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov.– 2019

INORGANIC AND INDUSTRIAL CHEMISTRY (CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Q. 1 (A) Answer the following question. (4)
(1) Prove that $[\text{Ni}(\text{CN})_4]^{-2}$ is diamagnetic while $[\text{NiCl}_4]^{-2}$ is paramagnetic.
- Q.1 (B) Answer the following questions. (Any two) (10)
(1) Explain splitting of d-orbital in tetrahedral field with CFSE.
(2) Splitting energy (Δ_0) of d-orbital in $[\text{Co}(\text{CN})_6]^{-3}$ is 33750 cm^{-1} and pairing energy is 18000 cm^{-1} . Find out CFSE and Magnetic moment. [$1 \text{ kJ/mole} = 83.7 \text{ cm}^{-1}$]
(3) Discuss factors affecting the crystal field splitting energy.
- Q. 2 (A) Answer the following question. (4)
(1) Give classification of metal carbonyls.
- Q. 2 (B) Answer the following questions. (Any two) (10)
(1) Discuss metal nitrosyls containing NO^+ as ligand.
(2) Explain structure of $\text{Fe}_2(\text{CO})_9$.
(3) Discuss the usefulness of IR spectroscopy in the study of metal carbonyls.
- Q. 3 (A) Answer the following question. (4)
(1) Write chemical reaction involved in the manufacturing of glass.
- Q. 3 (B) Answer the following questions. (Any two) (10)
(1) Derive the wave and energy equation for a particle moving in three dimensional box.
(2) Discuss different types of glass.
(3) Explain normalization and orthogonality of wave function of the particle in one dimensional box.
- Q. 4 (A) Answer the following question. (4)
(1) Write note on ISI specification of cement.
- Q. 4 (B) Answer the following questions. (Any two) (10)
(1) Discuss Mortars and Concrete.
(2) Explain manufacturing of Portland cement with reactions.
(3) Discuss different types of cement.
- Q. 5 (A) Answer the following question. (4)
(1) Write note on role of micro nutrients in plant growth.
- Q. 5 (B) Answer the following questions. (Any two) (10)
(1) Explain manufacturing of mono ammonium phosphate with flow diagram.
(2) Discuss Sindri method for the production of Urea.
(3) Explain production of NPK fertilizer with flow diagram.
