

B.Sc. Semester - 5 (Remedial) (CBCS) Examination**February/March. -2020****INORGANIC AND INDUSTRIAL CHEMISTRY(CORE)****Time: 2:30 Hours****Marks: 70****Instructions:**

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

Q. 1 (A) Explain High Spin and Low Spin complexes with examples. [04]

Q. 1 (B) Answer the following (Any Two) [10]

- (1) Describe: d-orbital splitting in T_d complexes.
- (2) Calculate total CFSE for $[\text{Fe}(\text{CN})_6]^{-4}$, Where, $\Delta_o = 32850 \text{ cm}^{-1}$ & $P = 17800 \text{ cm}^{-1}$
- (3) Explain: Factor affecting on d- orbital splitting energy (Δ_o).

Q. 2 (A) Answer the following: [04]

Calculate 18 electrons & EAN for following metal carbonyl:

- (1) $\text{Ni}(\text{CO})_4$, (2) $\text{Fe}(\text{CO})_5$

Q. 2 (B) Answer the following (Any Two) [10]

- (1) Draw the full structure; find the number of bridge CO & non-bridge CO in
(a) $\text{Mn}_2(\text{CO})_{10}$, (b) $\text{Fe}_2(\text{CO})_9$ & (c) $\text{Fe}_3(\text{CO})_{12}$
- (2) Discuss: Linear & bent NO with examples.
- (3) Discuss: Structure & valence bond theory of $\text{Co}_2(\text{CO})_8$.

Q. 3 (A) Answer the following: [04]

Prove that $\psi = A \sin ax + B \cos ax$ is a solution for the equation $\frac{d^2\psi}{dx^2} + \alpha^2\psi = 0$.

Q. 3 (B) Answer the following (Any Two) [10]

- (1) Write note on: Fused silica glass and photosensitive glass.
- (2) Explain raw materials used in manufacture of glass.
- (3) Derive equation of wave function for particle moving in one dimensional box and show quantization of energy from that.

Q. 4 (A) Answer the following: [04]

- (1) Explain Sorel's cement and Acid resistant cement.

Q. 4 (B) Answer the following (Any Two) [10]

- (1) Explain: Dry process and Wet process.
- (2) Explain burning process with equation in manufacture of Portland cement.
- (3) Explain: Mortar and Concrete.

Q. 5 (A) Answer the following. [04]

- (1) Explain the function of primary and secondary plant nutrients.

Q. 5 (B) Answer the following (Any Two) [10]

- (1) Explain manufacture of Urea by Sindri method and action of urea as a fertilizer.
- (2) Explain manufacture of triple super phosphate with flow diagram.
- (3) Explain the manufacture of calcium cyanamide with diagram.