

B.Sc. Semester - 5 (Remedial) (CBCS) Examination**March/April-2025 (NEW COURSE)****Inorganic and Industrial Chemistry(Core)****Time: 2:30 Hours****Marks: 70****Instructions:**

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

- Que.1(A) Answer the following question. (04)**
Find out the degeneracy of a particle moving in a cubic box length at the energy level $E = 9h^2/8ma^2$.
- Que.1(B) Answer the following questions. (Any two) (10)**
1) Draw the full structure; find out the number of bridge and non-bridge CO in following
(a) $Ru_2(CO)_9$ (b) $Os_3(CO)_{12}$ (c) $Ir_4(CO)_{12}$
2) Discuss different types of CO groups in metal carbonyl.
3) Derive the normalized wave function for a particle moving in one dimensional box.
- Que.2(A) Answer the following question. (04)**
Discuss classification of fertilizer.
- Que.2(B) Answer the following questions. (Any two) (10)**
1) Discuss manufacturing of Normal Super Phosphate in details.
2) Discuss following types of cement;
(a) Sorel's cement (b) White Portland cement (c) Slag cement
3) Explain properties of cement.
- Que.3(A) Answer the following question. (04)**
CFSE value in $[Co(CN)_6]^{3-} = -27840 \text{ cm}^{-1}$ and d-orbital splitting energy is 36600 cm^{-1} . Find out pairing energy.
- Que.3(B) Answer the following questions. (Any two) (10)**
1) Explain following types of glass;
(a) Borosilicate glass (b) Optical glass (c) Lead glass
2) Discuss manufacturing of cotton seed oil by solvent extraction method.
3) Discuss splitting of d-orbitals in octahedral field with CFSE.
- Que.4(A) Answer the following question. (04)**
Calculate 18 electron and EAN for (a) $Ni(CO)_4$ and (b) $Mn_2(CO)_{10}$.
- Que.4(B) Answer the following questions. (Any two) (10)**
1) Discuss application of IR spectroscopy in the study of metal carbonyls.
2) Explain ISI specification of cement.
3) Discuss factors affecting the crystal field splitting energy.
- Que.5(A) Answer the following question. (04)**
Write note on Iodine value.
- Que.5(B) Answer the following questions. (Any two) (10)**
1) Explain normalization and orthogonality of wave function of the particle in a one-dimensional box.
2) Explain Prilling method for manufacturing of Ammonium nitrate.
3) Differentiate: Low spin complexes and High spin complexes
