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D-003-001505

Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

March – 2022

Chemistry : Paper - 501

(Inorganic & Industrial Chemistry)

(Old Course)

Faculty Code : 003

Subject Code : 001505

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Right side number indicates marks of questions.
(3) Don't do any rough work in question paper.

1 Give answer of the following questions : **20**

(1) Provide normalized wave function.
(2) Give a name of scientist who gave their contribution earlier for the development of wave mechanics.
(3) Define : Operators.
(4) Give full form of C.F.S.E..
(5) Which hybridization occurs in $\left[Fe(H_2O)_6\right]^{+3}$?
(6) What is the unit of magnetic moment?
(7) Provide set of d-orbital for e_g group.
(8) Define : π – Acid ligand.
(9) Define : Acidity of π – Acid ligand.
(10) How many terminal carbonyls are present in $Mn2(CO)_{10}$.
(11) Provide full form of C_4AF.
(12) What should be the pH of soil?
(13) Give the formula of Chile saltpetre?
(14) What is the effect of deficiency of Boron in plant?
(15) What is added to remove HCl & CO_2 during chlorination of Methane?

(16) What is the major constituent of natural gas?
(17) Which compound is used as anti-freeze for automobile industry?
(18) Provide formula of Gypsum.
(19) Give the name of secondary nutrients for plant.
(20) Define : Portland cement.

2 (A) Answer any **three** of the following : **6**

(1) Define Linear operator with example.
(2) Give the solution of R-operator.
(3) Differentiate high spin and low spin complex.
(4) Draw the sketch of five d-orbitals.
(5) Draw the structure of both isomer of $Co_2(CO)_8$.
(6) Define Metal nitrosyl with example.

(B) Answer any **three** of the following : **9**

(1) Provide orthogonality of Ψ, for particle moving on one dimensional box.
(2) Calculate lowest energy of a particle moving in one dimensional box of length $10A^{\circ}$.
(Where, $m = 9.1\times10^{-28}\ gm.,\ h = 6.62\times10^{-27}\ erg.\sec.\ and$ $c = 3\times10^{10}\ cm.\sec^{-1}$).
(3) Discuss in short, the factors affecting on the splitting energy.
(4) Give basic concepts of Crystal field theory.
(5) Describe classification of Metal carbonyl.
(6) Provide any three preparation of Metal carbonyl.

(C) Answer any **two** of the following : **10**

(1) Derive energy equation for the particle in one dimensional box and draw energy level diagram for it..
(2) Explain : del & del squared operator .
(3) Discuss : Structure of $[NiCl_4]^{-2}\ and\ [Ni(CN)_4]^{-2}$.
(4) Explain nature of $M-CO$ bond in metal carbonyl.
(5) Explain the structure of $Fe_3(CO)_{12}$.

3 (A) Answer any **three** of the following : **6**

(1) Name the raw material, necessary for the production of Portland cement.

(2) Give the uses of cement.

(3) Why fertilizer is needed for plant?

(4) Explain the action of Urea as fertilizer.

(5) What is petrochemicals? How it is useful for human being?

(6) Provide uses of Methyl chloride.

(B) Answer any **three** of the following : **9**

(1) Provide merits and demerits of dry and wet process of cement.

(2) Distinguish between concrete and RCC.

(3) Briefly explain nomenclature of fertilizer.

(4) Discuss : Classification of fertilizer.

(5) Provide diagram for petrochemicals obtained from Methane.

(6) Write reactions for Glycerol via Acrolein and provide uses of Glycerol.

(C) Answer any **two** of the following : **10**

(1) Write on briefly on properties of cement.

(2) Explain manufacture of triple super phosphate with flow diagram.

(3) Write a note on potassium fertilizer.

(4) Discuss : Manufacturing of synthetic gas from Methane with diagram.

(5) Describe Sulphuric acid process for Ethanol production with diagram & reactions.
