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M-003-001505-N Seat No. _____

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

October / November – 2016

Chemistry : C-501

[Inorganic & Industrial Chemistry]

(New Course)

Faculty Code : 003

Subject Code : 001505-N

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

Instruction : All questions are **compulsory**.

1 Answer the following : **20**

(1) What is zero point energy ?

(2) Define Operator.

(3) The zero point energy for particle moving in one dimensional box is _____.

(4) If ψ_1 and ψ_2 are orthogonal to each other then $\psi_1 \times \psi_2 = 1$.

True or False ?

(5) What is synergic effect ?

(6) In crystal field thoery, P symbol is related to _____.

(7) Define crystal field stabilization energy.

(8) Bridging carbonyl group is found in _____ carbonyl.

(9) For the multiplication of operators, multiplication should be from _____ to _____.

(10) Which will be paramagnetic – $\left[Ni(CN)_4\right]^{2-}$ or $\left[Ni(Cl_4)\right]^{2-}$?

(11) Name the water proofing agent in water - proof cement.

(12) The constituent of cement responsible for its initial setting is _____.

(13) What is slag cement ?

(14) Necrosis in plants is caused by deficiency of _____.

(15) A fertilizer representing 45-0-0 indicates absence of _____.

(16) The catalyst used for the manufacture of ethyl alcohol for ethylene by catalytic hydration process is _____.

(17) _____ is formed by the reaction of lime with coke in electric furnace.

(18) Name secondary nutrients for plants.

(19) _____ catalyst is used in manufacture of acrylonitrile from propylene.

(20) The chlorination of methane is as _____ reaction.

2 (a) Answer the following : (any **three**) **6**

(1) Explain energy related to particle moving in one dimensional box.

(2) Define High spin and Low spin complex.

(3) Write about addition of operator.

(4) What is non-magnetic doublets ?

(5) Explain chemical properties of metal carbonyls.

(6) Discuss types of CO groups in metal carbonyls.

(b) Answer the following : (any **three**) **9**

(1) Normalize the equation $\phi = A \sin m\phi$.

(2) Write a note on Laplasian operator.

(3) How magnetic momentum helps to determine the ML_4 type complex structure and hybridization ?

(4) Explain structure of $Ni(CO)_4$.

(5) Write short note on splitting of d orbitals in tetrahedral complexes.

(6) Briefly explain metal carbonyls.

(c) Answer the following : (any **two**) **10**

(1) Write the Schrodinger equation in polar coordinates and derive R, ϕ, ϕ equation by variable separation.

(2) Discuss the particle moving in three dimensional box in detail.

(3) Describe the factors affecting splitting energy.

(4) Discuss the splitting of d orbitals in octahedral complexes.

(5) Explain the use of IR spectroscopy in metal carbonyl study.

3 (a) Answer the following : (any **three**) **6**

(1) Give the definition of setting and hardening of cement.

(2) Write the advantages of RCC over plain concrete.

(3) Name the elements acting as primary and secondary plant nutrients.

(4) Give two examples of natural inorganic fertilizer.

(5) Give the chemical reactions for manufacture of glycerol via acrolein.

(6) Write the uses of chloromethanes.

(b) Answer the following : (any **three**) **9**

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

(2) What is cement rock benefication ?

(3) Give classification of fertilizer with example.

(4) Explain the role of micro-nutrients in plant growth.

(5) Give the summary of compounds obtained from C_1 (methane).

(6) Draw the process flow diagram for the manufacture of acrylonitrile from propylene.

(c) Answer the following : (any **two**) **10**

(1) Explain manufacturing of Portland Cement with reactions and neat diagram.

(2) Explain Stengel process with process diagram for production of ammonium nitrate.

(3) Describe manufacture of normal super phosphate by Den process with flow diagram.

(4) Explain the production of glycerol via allyl chloride with reactions and diagram.

(5) Describe the sulphuric acid process for ethanol from ethylene with diagram and reactions involved in it.