DP-003-2016006   Seat No. _____

B. Sc. (Sem. VI) (CBCS) (W.E.F. 2019) Examination

March - 2022

Chemistry : C-601

(Inorganic Chemistry & Industrial Chemistry)

(New Course)

Faculty Code : 003

Subject Code : 2016006

Time : **2.30** Hours]   [Total Marks : **70**

Instruction :   (1)   All questions are compulsory.

(2)   All questions carry 14 marks each.

1   (A)   Answer the following.   **4**

(1)   What is zero point energy for one dimensional box ?

(2)   Define addition of operators.

(3)   Give equation to calculate energy for a particle in cubic box.

(4)   Write down Schrodinger's equation for a particle moving in one dimensional box.

(B)   Answer any one.   **2**

(1)   Normalize the wave function $\Psi = Ne^{im\phi} \, (0 \le \phi \le 2\pi)$.

(2)   Calculate degeneracy of energy level $E = \dfrac{9h^2}{8ma^2}$ for a particle moving in a cubic box of length 'a'.

(C)   Answer any one.   **3**

(1)   Explain 'Commutator of Operators'

(2)   Give transformation of cartesian coordinates into polar coordinates.

(D) Answer any one. **5**

    (1) Write Schrodinger's equation in polar coordinates and derive $R_{(r)}$, $\theta_{(\theta)}$ and $\phi_{(\phi)}$ equation by variable separation method.

    (2) Discuss linear polyenses as one dimansional box system and explain calculation of its c-c bond length.

2 (A) Answer the following. **4**

    (1) What is the relation between χ_{para} and Temperature.

    (2) Give equation of magnetic induction.

    (3) Define, 'Unit Pole'

    (4) What is the value of permeability for para and diamagnetic compound ?

(B) Answer any one. **2**

    (1) Explain, 'Diamagnetism'

    (2) Explain the term, 'Magnetic Permeability'

(C) Answer any one. **3**

    (1) Explain about magnetic susceptibility and its types.

    (2) Explain, "Ferro and Anti ferro magnetic compunds".

(D) Answer any one. **5**

    (1) Explain types of magnetism and effect of temperature on magnetic bodies.

    (2) Derive equation for the diamagnetic momentum and list the characteristics of diamagnetic susceptibility.

3 (A) Answer the following. **4**

    (1) Give one example of each mononuclear and poly-nuclear metal carbonyl.

    (2) Define π-acid ligand

    (3) What is stand oil ?

    (4) List the uses of animal fat.

(B) Answer any one.   **2**

    (1) List any five properties of fat.

    (2) Give chemical reaction for the hydrogenation of oil in presence of Raney Nickel.

(C) Answer any.   **3**

    (1) Explain Dry Process of Hydrogenation of oil.

    (2) Define saponification value and give equation to calculate it.

(D) Answer any one.   **5**

    (1) Discuss the structure of $Co_2(CO)_8$

    (2) Describe the importance of IR spectra in the study of metal carbonyls.

4 (A) Answer the following.   **4**

    (1) List any five sources of water pollution.

    (2) Define COD.

    (3) What is Pollutant ?

    (4) What are the sources of production of SO_x and NO_x ?

(B) Answer any one.   **2**

    (1) Give chain reaction of CFC depleting Ozone at stratosphere.

    (2) List the Green House Gases along with their % contribution towards GWP.

(C) Answer any one.   **3**

    (1) Write a short note on "Petrochemical Smog".

    (2) What is thermal pollution ? Discuss the effects of thermal pollution.

(D) Answer any one.   **5**

    (1) Discuss "Green House Effect".

    (2) Discuss how acid rain occurs with proper chemical reactions involved.

5 (A) Answer the following. **4**

     (1) What is Soap ?

     (2) What is semipolar detergent ?

     (3) Give types of surfactants besed on lyophobic part present in it.

     (4) Define sulphur soap and neem soap.

  (B) Answer any one. **2**

     (1) Give basic principle of soap manufacture with its chemical reaction.

     (2) List the row material used for manufacture of soap.

  (C) Answer any one. **3**

     (1) Explain cationic and anionic detergents.

     (2) Discuss recovery of Glycerine from spent lye.

  (D) Answer any one. **5**

     (1) Discuss synthesis of anionic detergent by Alfol method.

     (2) Describe Hot process of soap manufacturing.

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