

Roll No. ....

**94175**

**B. Sc. Bio-Technology 6th Semester  
(New Scheme)**

**Examination – December, 2024**

**PHYSICAL CHEMISTRY**

**Paper : BT-605/CH-602/305**

*Time : Three Hours ]*

*[ Maximum Marks : 40*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt **five** questions in all, selecting **one** question from each Section. Question No. **1** is **compulsory**. All questions carry equal marks.*

1. (a) What are chromophores ?  $8 \times 1 = 8$
- (b) Define Quenching.
- (c) What are thermal reactions ?
- (d) What is the normality of 1.5M  $H_2SO_4$  ?

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- (e) Give an example of solution containing solid solute and solid solvent.
- (f) Is phase rule applicable to homogenous system ?
- (g) Define metastable equilibrium.
- (h) What is spin multiplicity ?

### SECTION – A

- 2. (a) Distinguish between  $\pi$  and  $\pi^*$  orbital's and discuss their characteristics. 4
- (b) Explain how the excited molecule can be in a single or triplet state who has lower energy ? 4
- 3. (a) Explain Franck-Condon Principle. 2
- (b) Explain the different possible electronic transitions in between  $\sigma$ ,  $\pi$ , n and  $\pi^*$  orbitals. 4
- (c) What do you mean by gerade and ungerade orbitals. 2

### SECTION – B

- 4. (a) Explain : 4
  - (i) Non-radiative process
  - (ii) Beer's Law

- (b) What are photophysical processes ? Explain with examples. 4
5. (a) Define quantum efficiency. How would you explain very high and very low quantum efficiency of some photochemical reactions. 4
- (b) Explain the following : 4
- (i) Grotthus-Drapper Law
- (ii) Stark-Einstein Law

### SECTION – C

6. (a) Derive a relationship between depression in freezing point and molality of a dilute solution. 4
- (b) Define Roult's Law and derive it for a solution having non-volatile solute. 4
7. Give reason :
- (i) A little common salt is added to water during boiling eggs. 2
- (ii) Why equimolar solution of NaCl and sugar doesn't have same osmotic pressure. 2

- (iii) Gargling with conc. NaCl solution gives relief in tonsils. 2
- (b) What is Van't Haff's factor ? Explain its uses. 2

### SECTION - D

8. (a) Draw a well labelled phase diagram of water system. What do you interpret from slope of the melting point curve. 4
- (b) Give thermodynamic derivation of Gibb's phase rule. 4
9. (a) Explain : 4
- (i) Triple point
  - (ii) Eutectic point
  - (iii) Cryohydric point
  - (iv) Degree of freedom
- (b) Draw phase diagram of lead-silver system and discuss de silverisation of lead on the basis of this diagram. 4
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**B. Sc. Bio-Technology 6th Semester  
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**Examination – December, 2024**

**INORGANIC CHEMISTRY**

**Paper : BT-607/CH-601/304**

*Time : Three Hours ]*

*[ Maximum Marks : 40*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.*

1. (a) What are sandwich compounds ?  $8 \times 1 = 8$
- (b) Calculate EAN of Fe in  $Fe_2(CO)_9$ .
- (c) What is Wilkinson's catalyst ?
- (d) What are silicones ?
- (e) Why  $BeF_2$  is more stable than  $BeI_2$  ?

- (f) Define Arrhenius Acids.
- (g) Which metal is present in Vitamin  $B_{12}$  ?
- (h) What is oxidation state of phosphorus in phosphazene ?

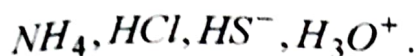
### SECTION - A

2. (a) What are the factors which increases the stability of metal alkyl organometallic compounds ? Explain. 4
- (b) Write IUPAC names of following complexes : 4
- (i)  $[C_6H_6]Mo[CO]_3$
- (ii)  $[CO]_5Mn - Mn(CO)_5$
- (iii)  $[PtCl_3(C_2H_4)]^{-1}$
- (iv)  $Ni(\pi - C_5H_5)_2$
3. (a) Discuss the structure and uses of organolithium and organotin compounds. 4
- (b) What are metal-ethylenic complexes ? Discuss the structure of Zeise's salt. 4

### SECTION - B

4. (a) Which one is stronger and why ?  $BCl_3$  or  $BF_3$ . 3
- (b) Explain why  $AgI_2^-$  complex is stable but  $AgF_2^-$  is not. 2

- (c) Write short note on Arrhenius concept of acid and bases. 3
5. (a) What lead to hard-hard and soft-soft interaction ? Give evidence in support. 4
- (b) Write conjugate base of the following : 2



- (c) How hardness of an acid is related to electro negativity. 2

### SECTION - C

6. (a) What is  $Na^+ - K^+$  Pump ? Explain its working. 4
- (b) What is meant by Nitrogen fixation ? What are main fundamental requirements of biological nitrogen fixation ? 4
7. (a) Explain the structure of Haemoglobin and myoglobin. 4
- (b) What is co-operatively in Haemoglobin ? 2
- (c) Explain role of  $Ca^{2+}$  and  $Mg^{2+}$  ion in our body. 2

### SECTION - D

8. (a) Discuss  $d\pi - p\pi$  bonding model for cyclotriphosphazones. 4
- (b) Give important properties and method of preparations of silicones. 2
- (c) Give important uses of Silicone polymers. 2

9. (a) What are silicone rubber and silicone fluids ?  
Explain. 4
- (b) Complete the following : 2
- (i)  $S_1HCl_3 + C_6H_6 \rightarrow$
- (ii)  $(NPh_2)_3 + C_6H_5MgI \rightarrow$
- (c) Write uses of phosphazene polymers 2
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