June-2024

BLDE (DEEMED TO BE UNIVERSITY)

Master of Science in Chemistry

[Time: 3 Hours] [Max. Marks: 80]

I SEMESTER

PAPER - I (Inorganic Chemistry)

QP CODE: 7711

Your answer should be specific to the questions asked.
Write Question No. in left side of margin.

Long Question (Any – 3) **10 X 3= 30 Marks**

1. Write a note on Crystal Field Theory. Explain the splitting of d-orbitals in octahedral.
2. Write structure, preparation and properties of XeO3 and XeOF4.
3. i) Write a note on the Born-Haber cycle. ii) Describe the electron sea model and band theory.
4. What is hybridization? Write the various types of hybridization with suitable examples.

Short Essays: (Any – 7) **5 X 7 = 35 Marks**

5. What is bonding? Write the formation of N2 molecules.
6. Write a note on the Hammett acidity function.
7. What are Bent's rules and postulate of Bent's rule?
8. Write back bonding in dinitrogen complex.
9. Explain the HSAB theory.
10. Explain why PCl5 is trigonal bipyramidal whereas IF5 is square pyramidal.
11. Lux-Flood theory.
12. Define Polarizability and Polarizing power.

Short Answers: (Any – 5) **3 X 5 = 15 Marks**

13. Write the synthesis and structure of B5H9.
14. The solubility of ionic solids is low in non-polar solvents but high in polar solvents. Why
15. Explain the resonance theory.
16. What is solvation energy?
17. Synthesis of nitrosyl complexes
18. What are metalloborane? Give an example.

June-2024.

BLDE (DEEMED TO BE UNIVERSITY)

Master of Science in Chemistry

[Time: 3 Hours] [Max. Marks: 80]

I SEMESTER

PAPER - II (Organic Chemistry - I)

QP CODE: 7712

Your answer should be specific to the questions asked.
Write Question No. in left side of margin.

Long Question (Any – 3) **10 X 3= 30 Marks**

1. Explain the different types of the organic reactions with suitable examples.
2. List out the major differences between SN1 and SN2 reactions, draw neat energy profile diagram, and explain various factors effecting the reactions.
3. Explain sp, sp2, sp3 hybridization, and how these would be useful in explaining the observed the 3D structure, steric factors, bond energies. Explain taking examples.
4. i) Explain Cram's and Prelog's Rules with suitable examples. ii) Give an example of retention and inversion configuration.

Short Essays: (Any – 7) **5 X 7 = 35 Marks**

5. Give a brief account of the stability and reactions of carbocations.
6. Discuss briefly the mechanism of the addition of HCl to 1-butene.
7. Explain Saytzeff's elimination reaction with suitable example.
8. Explain the dehalogenation of vicinal dihalides.
9. Write a note on the Chugave reaction and its applications.
10. What is a racemic mixture? Describe the chemical and biochemical method of separation of a racemic mixture.
11. Discuss the importance of cross over experiments in understanding reaction mechanism.
12. Write the reaction and mechanism for an electrophilic substation for halogen.

Short Answers: (Any – 5) **3 X 5 = 15 Marks**

13. Explain the product analysis.
14. Write the different types of Isomers.
15. Explain the concept of resonance giving example.
16. Define the term hyper-conjugation with a suitable example.
17. Difference between enantiomers and diastereomers with suitable examples.
18. Explain the Hoffmann degradation.

June-2024.

BLDE (DEEMED TO BE UNIVERSITY)

Master of Science in Chemistry

[Time: 3 Hours] [Max. Marks: 80]

I SEMESTER

PAPER - III (Physical Chemistry I)

QP CODE: 7713

Your answer should be specific to the questions asked.
Write Question No. in left side of margin.

Long Question (Any – 3) **10 X 3= 30 Marks**

1. i) Write postulates of Debye-Huckel theory. ii) Derive Debye-Huckel Onsagar equation.
2. i) Write a note on solid oxide fuel cells. ii) What are fuel cells? Write the applications of fuel cells.
3. i) Derive the black body radiation. ii) State the Raoult's law and Henry's law.
4. Derive the expression for the Clausius-Clapeyron equation. Write their applications.

Short Essays: (Any – 7) **5 X 7 = 35 Marks**

5. Write the construction and applications of proton exchange fuel cells.
6. Difference between primary and secondary battery.
7. Derive Schrodinger equation for the particle in a one-dimensional box with boundary conditions. $V = 0$ with in the box, $V = \infty$ outside the box and $0 < x < a$.
8. Write variation of free energy with T & P.
9. Write the note on entropy change in a reversible process.
10. Write a note on Alkaline MnO_2 battery.
11. Write preparation polyurethanes and their applications.
12. What are copolymers? Give an examples.

Short Answers: (Any – 5) **3 X 5 = 15 Marks**

13. Define thermodynamics, system and boundary.
14. Write the equilibrium constant of a reaction doubles on raising the temperature from 25° C to 35° C. Calculate the ΔH for the constant.
15. Derive de Broglie's equation.
16. Heisenberg's uncertainty principle.
17. Derive fugacity.
18. Explain Gibb's free energy.

June-2024,

BLDE (DEEMED TO BE UNIVERSITY)

Master of Science in Chemistry

[Time: 3 Hours] [Max. Marks: 80]

I SEMESTER

PAPER - IV (Analytical Chemistry)

QP CODE: 7714

Your answer should be specific to the questions asked.
Write Question No. in left side of margin.

Long Question (Any – 3) **10 X 3= 30 Marks**

1. Discuss the principle, instrumentation, and applications of HPLC.
2. What are the different types of electrophoresis techniques? Illustrate the principles and applications of zone electrophoresis.
3. Write principles and applications of Polarography, with sketch of the dropping mercury electrodes and explain its working.
4. With neat diagram, discuss cyclic voltametry including basic principles, instrumentation, the voltammogram graphs and analytical applications.

Short Essays: (Any – 7) **5 X 7 = 35 Marks**

5. Write a note on types of errors.
6. Write the principles and applications of TLC.
7. Write the Van-Deemeters equation. Explain the variables that affect the column efficiency.
8. Write a note formation and characteristic of liquid junction potential.
9. Write a short note on thermo gravimetric analysis- Principles and applications.
10. Write the difference between normal distribution versus calibration curve.
11. What are the principles and applications of Gas Chromatography?
12. Write a note on column resolution and factors influencing resolution.

Short Answers: (Any – 5) **3 X 5 = 15 Marks**

13. Define the salting method. How this method is useful in metal ion extraction.
14. Write the applications of DTA.
15. Define the ion exchange capacity of the resin.
16. What are masking agents? Mention any two common agents used.
17. What is the difference among mean, median and mode?
18. What is the principle of ion exchange chromatography?