

U.G. DEGREE EXAMINATION – JUNE 2021

Chemistry
First Year
GENERAL CHEMISTRY - I

Time: 3 Hours**Maximum Marks: 75****PART - A****(3 x 5 = 15 Marks)****Answer any THREE questions.**

1. Discuss about the viscosity and surface tension.
2. What is inductive effect? Chloroacetic acid is stronger than acetic acid. Justify the statement.
3. (a) Define Atomic radii.
(b) State and explain the shielding effect.
4. (a) Explain why ice has lower density than water?
(b) Why does He₂ not exist?
5. Define the various gas law's derived based on kinetic theory of gases?

PART - B**(4 x 15 = 60 Marks)****Answer any FOUR questions.**

6. a) Discuss the classification of organic compounds based on carbon skeleton with suitable examples.
b) Define Fajan's rule.
7. a) Explain with suitable examples for the naming of organic compounds with two functional groups.
b) What are the conditions for the "resonance"?
8. a) Describe the variation in ionization energy in the periodic table?

b) What are the different blocks that constituting the periodic table?

9. a) With the help of Born-Haber cycle, how will you determine the lattice energy of an ionic compound?

b) (i) Define the term “Polarizing power”.

(ii) BeCO_3 is less stable than MgCO_3 . Justify.

10. a) Discuss the basic postulates of kinetic theory of gases.

b) Write a short note on Liquid crystals

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CHEMISTRY

FIRSTYEAR

GENERAL CHEMISTRY-I

Time: 3 Hours

Maximum Marks: 70

PART - A

(5x2 = 10 Marks)

Answer all five questions.

1. What are organic compounds? Give an example.
2. Define Capillary rise.
3. What is meant by Inductive effect?
4. Define Octet rule.
5. What is Electronegativity? Give its trend along periods and groups?

PART - B

(4 x 5 = 20 Marks)

Answer any FOUR questions.

6. Discuss about the Viscosity and Surface tension.
7. Classify the organic compounds based on carbon skeleton.
8. Explain about Pauling and Mulliken's scale of electronegativity.
9. State the Polarizing power and Polarisability.
10. Define the Mesomerism and Hyperconjugation with examples.
11. Discuss about the classification of elements based on electronic configuration.
12. Define the vander Waals equation.

PART - C

(4 x 10 = 40 Marks)

Answer any FOUR questions.

13. Discuss about the following
 - (i) Atomic size
 - (ii) Atomic radii
 - (iii) Ionic radii
 - (iv) Bond angle
 - (v) Bond length
14. Explain about the naming of organic compounds with one and two hetero atoms in six membered ring systems.

15. Describe the naming of organic compounds with one functional group with examples.
16. Define the following
 - (i) Fajan's rule
 - (ii) Born-Haber cycle
17. Describe the IUPAC system of nomenclature of Alkane, Alkenes, Alkynes, Cycloalkanes and Aromatic compounds.
18. Explain about the types and applications of liquid crystals.
19. Discuss in detail about the Ideal gas laws.

U.G. DEGREE EXAMINATION - JUNE 2021

CHEMISTRY

FIRST YEAR

GENERAL CHEMISTRY- II

Time: 3 Hours

Maximum Marks: 75

PART - A

(3 x 5 = 15 Marks)

Answer any THREE questions.

1. What is Hund's rule and Pauli Exclusion Principle? Explain with suitable example.
2. Write a note on Cope elimination and Hofmann degradation.
3. Define surface tension. What is the influence of temperature on surface tension?
4. a) What is called pesticide?
b) Explain any two organic pesticides.
5. a) Differentiate the terms homolysis and heterolysis.
b) Outline the preparation of alkanes.

PART - B

(4 x 15 = 60 Marks)

Answer any FOUR questions.

6. a) Define hybridization. What are the types of hybridization?
b) List down the postulates of VSEPR theory.
c) Explain the shapes of the BeCl_2 and SF_6 molecules using VSEPR theory.
7. Discuss the following:
a) Michael addition b) Mannich reaction c) Stobbe condensation.
8. a) Write a note on i) Refraction ii) Viscosity.
b) What are liquid crystals? Explain its types and applications.
9. a) What are natural and chemical fertilizers?
b) How chemical fertilizers are classified? Explain.
c) Write a note on natural gas.
10. a) Discuss the preparation and reactions of cycloalkane.
b) Explain the following
i) Bayer's strain theory ii) Diel's Alder reaction.

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CHEMISTRY

FIRST YEAR

GENERAL CHEMISTRY-II

Time: 3 Hours

Maximum Marks: 70

PART - A

(5x2 = 10 Marks)

Answer all Five questions

1. Define Hund's rule .
2. Write any two characteristic features of a liquid.
3. What is Pesticide? Give an example.
4. What is addition reaction? Give an example.
5. What is Bond cleavage? Give the examples.

PART - B

(4 x 5 = 20 Marks)

Answer any FOUR questions

6. Describe Pauli's Exclusion principle.
7. Discuss about the Trouton's rule.
8. Explain about the Elimination reactions.
9. State the Baeyer Strain Theory.
10. Define the classifications of pesticides.
11. Discuss about the Inert Pair Effect.
12. Define the Benzoin and Stobbe condensation reactions.

PART - C

(4 x 10 = 40 Marks)

Answer any FOUR questions

13. Define the following reactions
 - (i) Michael addition
 - (ii) Wittig
 - (iii) Mannich
 - (iv) Hydroxylation
 - (v) Hydroboration
14. Explain about the principle and types of Hybridization.
15. Describe the classification of Pesticides.

16. Define the following theories

(i) VSEPR

(ii) MO

17. Define the following reactions

(i) Cycloaddition

(ii) Dehalogenation

(iii) Wurtz

(iv) Diels-Alder

(v) Ozonolysis

18. Explain about the fertilizers.

19. Discuss in detail about Refraction.

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CHEMISTRY

SECOND YEAR

GENERAL CHEMISTRY-III

Time: 3 Hours

Maximum Marks: 75

PART - A

(3 x 5 = 15 Marks)

Answer any THREE questions.

1.
 - a. What is the reason for anomalous behavior of lithium?
 - b. List down the uses of Magnesium
2. Describe the types and manufacturing of glass.
3. Explain the following electrophilic substitution reactions of benzene.
 - i. Nitration
 - ii. Sulphonation
4.
 - a. What is meant by the energy of activation?
 - b. Explain how energy of activation is determined with the help of the Arrhenius equation.
5. Discuss the general methods of determining the structure of alkaloids.

PART - B

(4 x 15 = 60 Marks)

Answer any FOUR questions.

6.
 - a. List down the general characteristics of S-block elements
 - b. Explain in detail about the extraction of beryllium from its ore
 - c. Write a note on biological importance of sodium and potassium
7. Discuss the physical and chemical properties of the following compounds
 - i. Borax
 - ii. Diborane
 - iii. $AlCl_3$
8. Write notes on the following
 - a. Reimer Tiemann Reaction
 - b. Ziegler alkylation
 - c. Chichibabin Reaction
9.
 - a. Define the terms
 - i. Order
 - ii. Molecularity
 - b. Derive the rate constant for second order reaction
 - c. Explain the various methods to determine the order of the reaction
10.
 - a. What is isoprene rule?
 - b. How will you synthesize camphor from camphoric acid?
 - c. Discuss the structural elucidation of coniine

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CHEMISTRY

SECOND YEAR

GENERAL CHEMISTRY - IV

Time: 3 Hours

Maximum Marks: 75

PART – A

(3x5 =15 Marks)

Answer any **THREE** questions.

1. (a) What is roasting? Explain with an example.
(b) Explain Aluminothermic process.
2. Write short notes on solvent free reactions.
3. (a) How is PH_3 prepared?
(b) What are Interhalogen compounds? How is Chlorine fluoride prepared?
4. Give a short account on Lanthanide contraction.
5. How are carbohydrates classified? Explain with example.

PART - B

(4 x 15 = 60 Marks)

Answer any **FOUR** questions.

6. Write a short note on the following :
 - (a) Calcination.
 - (b) Froth floatation.
 - (c) Zone refining.
7. (a) Explain the basic principles of green chemistry.
(b) Explain the green chemical synthesis of paracetamol.
8. (a) Explain the structure and shape of XeF_2 and XeOF_2 .
(b) How Tellurium is extracted from anode mud?
9. Discuss the occurrence and metallurgical extraction of Uranium.
10. (a) What are Antiseptics and disinfectants? Write the uses of Chloramine T and Iodoform.
(b) Discuss about the occurrence of Vitamin D and deficiency disease caused by its absence.

U.G. DEGREE EXAMINATION - JUNE 2021

CHEMISTRY

THIRD YEAR

INORGANIC CHEMISTRY

Time: 3 Hours

Maximum Marks: 75

PART – A

(5 x 3 = 15 Marks)

Answer any THREE questions.

1.
 - a. What are Covalent crystals? Write their important characteristics.
 - b. Differentiate Crystalline and Amorphous solids.

2.
 - a. What is Effective Atomic Number? Calculate the EAN of $[P(NH_3)_6]^{4+}$ (Atomic number of Pt: 78)
 - b. What are monodentate and bidentate ligands? Give example

3.
 - a. Explain induced Radioactivity
 - b. Discuss about the nature of radiations from radioactive elements.

4.
 - a. Explain the general characteristics of ionizing solvents.
 - b. Explain the acid-base reactions of liquid ammonia.

5. Explain the preparation, properties and uses of Organomagnesium compounds.

PART - B

(4 x 15 = 60 Marks)

Answer all FIVE of the following.

6.
 - a) Write short notes on Schottky and Frenkel defects
 - b) Derive Born equation.

7. a) How does VBT account for the following fact?
(i) $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic and square planar
(ii) $[\text{NiCl}_4]^{2-}$ is paramagnetic and tetrahedral
- b) How does CFT account for the fact that $[\text{CoF}_6]^{3-}$ is paramagnetic but $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic though both are octahedral.
8. a. Briefly explain about Fast Breeder reactors
b. Explain Geiger Muller Counter
c. List any five uses of Radioisotopes
9. a. Explain Bronsted-Lowry theory on Acid and Bases
b. How does a mixture of weak acid and its salt act as buffer?
c. Discuss the merits and demerits of liquid HF as a non-aqueous solvent. How does it show precipitation reactions?
10. a. Explain 18 electron rule with $\text{Fe}(\text{CO})_5$ as an example
b. Write short notes on Zeigler Natta Catalyst.

U.G. DEGREE EXAMINATION - JUNE 2021

CHEMISTRY

THIRD YEAR

ORGANIC CHEMISTRY

Time: 3 Hours

Maximum Marks: 75

PART - A

(3 x 5 = 15 Marks)

Answer any **THREE** questions.

1. Describe the Skraup synthesis of Quinoline.
2. Explain the following.
 - a) Enantiomer
 - b) Diastereomer
 - c) Epimers
3. Explain cis, trans and E-Z notations with suitable examples.
4.
 - a) Write the Fries rearrangement.
 - b) Write the mechanism of benzidine rearrangement.
5. Explain the basic principle of Mass spectrometry.

PART - B

(4 x 15 = 60 Marks)

Answer any **FOUR** questions.

6. Sketch and explain the primary, secondary and tertiary structure of proteins.
7. Explain various inter translation representation of molecules (any five like Fischer to Sawhorse).
8. Explain the conformational analysis of ethane, n-butane, 1, 2-glycol, cyclopentane and cyclohexane.

9 Complete the following equations

a)

b)

10. a. What is the significance of TMS? (3+8+4)

b. Explain the theory behind electronic spectroscopy.

c. Enumerate the applications of electronic spectroscopy for conjugated molecules.

U.G. DEGREE EXAMINATION - JUNE 2021

CHEMISTRY

THIRD YEAR

PHYSICAL CHEMISTRY

Time: 3 Hours

Maximum Marks: 75

PART - A

(3x5 = 15 Marks)

Answer any THREE questions.

1. Derive Gibbs – Helmholds equation.
2. Explain various symmetry elements present in the H₂O molecule and prepare the group multiplication table for H₂O molecule.
3. Write a brief note on calomel electrode.
4. Explain the electrical double layer phenomenon of colloids.
5. Write the principle behind vibrational spectra.

PART - B

(4 x 15 = 60 Marks)

Answer any FOUR questions.

6. Explain Carnot's cycle and its efficiency.
7. a) Describe the concept of freezing point depression.
b) An aqueous solution containing 0.25 g of solute dissolved in 20 g of water froze at 0.42 °C. Calculate the molar mass of solute using freezing point depression; $k_f = 1.84 \text{ K kg mol}^{-1}$.
8. What are fuel cells? Discuss about the Hydrogen – Oxygen fuel cell and its application.
9. Explain chemical synthetic methods of any three nanoparticles and their applications.
10. How do you explain the IR spectroscopy of H₂O and CO₂.

U.G. DEGREE EXAMINATION - JUNE 2021

CHEMISTRY
FIRST YEAR
GENERAL PHYSICS

Time: 3 Hours

Maximum Marks: 75

PART - A

(5x3 =15 Marks)

Answer all the questions.

1. State kepler's laws of planetary motion.
2. What do you understand by reversible and irreversible processes?
3. State and explain Coulomb's law.
4. Explain briefly mutual induction.
5. Describe the working of LED.

PART - B

(5 x 12 = 60 Marks)

Answer all questions.

6. a) What is simple harmonic motion? Obtain the differential equation of simple harmonic motion.

Or

- b) Explain reverberation time and absorption coefficient. Mention the requirements of a good auditorium.
7. a) State and prove Carnot's theorem.

Or

- b) Deduce an expression for Poisson's ratio and explain an experiment to determine it.

8. a) Give the theory of Raman effect. Discuss its applications.

Or

b) Explain the principle of a capacitor. Obtain an expression for the energy stored in a capacitor.

9. a) Draw the circuit of a Carey – Foster bridge and explain its working with necessary theory.

Or

b) State and explain Kirchhoff's laws with suitable diagrams.

10. a) Explain octal and hexadecimal number systems.

Or

b) Explain the construction and working of FET.

U.G. DEGREE EXAMINATION - JUNE 2021**CHEMISTRY****FIRST YEAR****GENERAL PHYSICS****Time: 3 Hours****Maximum Marks: 70****PART – A****(5x2=10 Marks)****Answer all the questions.**

1. Define absorption coefficient of a material.
2. State Hooke's law.
3. What is a capacitor?
4. Write down the working principle of Carey Foster Bridge.
5. Mention any two applications of LED's.

PART - B**(4 x 5 = 20 Marks)****Answer any FOUR questions.**

6. What are Lissajous figures? How they are produced?
7. State the laws of Thermodynamics.
8. Obtain the expression for the energy of a charged capacitor.
9. Show that resistance varies with temperature using a Carey Foster bridge.
10. Explain the working principle of FET.
11. Mention the conditions for good acoustics of buildings.
12. Write a short note on electromagnetic spectrum.

PART – C

(4 x 10 = 40 Marks)

Answer any FOUR questions.

13. Derive an expression for Sabine's formula for Reverberation time.
14. Describe the experimental method of finding the Young's modulus by non-uniform bending.
15. Explain the theory of Raman Effect. Mention any 3 applications of it.
16. Write down the laws of electromagnetic induction. Write a short note on mutual induction.
17. Explain hexa and octal number system.
18. Define Centre of gravity. Determine the centre of gravity of a solid hemisphere.
19. Draw and explain the V-I characteristics of a Zener diode.

U.G. DEGREE EXAMINATION - JUNE 2021**CHEMISTRY****SECOND YEAR****ANIMAL DIVERSITY****Time: 3 Hours****Maximum Marks: 75****PART - A****(5 x 5 = 25 Marks)****Answer any FIVE questions.**

1. Classify phylum- mollusca with examples up to class level.
2. Describe the structure and role of contractile vacuoles in paramecium.
3. Explain the digestive system of Earthworm.
4. Give an account on physiology of digestion in prawn.
5. Write short note on external features of calotes.
6. Explain the types of respiration in frog.
7. Describe the types of feather in pigeon.
8. Give an account on the arterial system of Rabbit.

PART – B**(5 x 10 = 50 Marks)****Answer any FIVE questions.**

9. Analyse the outline classification of phylum platyhelminthes upto classes with examples.
10. Bring out the life history of obelia.
11. Write an explanation on the feeding and excretory system of prawn.
12. Give an account of the water vascular system in starfish.
13. Describe the respiratory mechanism of shark.
14. Describe the structure and working mechanism of heart in frog.
15. Explain the reproductive system of calotes with sketches.
16. Explain the Urinogenital system of Rabbit.