THIRD SEMESTER (CBCSS–UG) DEGREE EXAMINATION NOVEMBER 2021

Chemistry/Industrial Chemistry/Polymer Chemistry

CHE 3B 03—PHYSICAL CHEMISTRY—I

(2019—2020 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A

Answer atleast **eight** *questions.*
Each question carries 3 marks.
All questions can be attended.
Overall ceiling 24.

1. Calculate RMS velocity of O_2 at : (a) STP ; and (b) at 288 K.

2. Calculate number of collisions per second per molecule of O_2 at 25°C and at 1 atm pressure. Collision diameter of oxygen is 361 pm.

3. Distinguish extensive and intensive properties with example.

4. State Carnot's theorem and second law of thermodynamics.

5. What is meant by chemical potential ? What is its significance ?

6. What is entropy ? Give its unit.

7. Why chemical equilibrium is termed dynamic ?

8. What is reaction quotient ?

9. Define order of a group. Give example.

10. Define principal axis.

11. Name point group to which water belongs. Write down its symmetry elements.

12. What is meant by plane of symmetry ? Illustrate with an example.

(8 × 3 = 24 marks)

Turn over

Section B

Answer atleast **five** *questions.*
Each question carries 5 marks.
All questions can be attended.
Overall ceiling 25.

13. Derive expressions for critical constants in terms of Vander Waals constant.

14. Derive RMS and average velocity from Maxwell Boltzmann equation.

15. Six moles of an ideal gas expands isothermally and reversibly from a volume of 1dm3 to volume of 10dm3 at 27ºC. What is the maximum work done ?

16. Derive an expression for relation between entropy and probability.

17. Explain Nernst heat theorem. How does it lead to third law of thermodynamics ?

18. Derive Gibbs-Helmholtz equation. What is its significance ?

19. Give group multiplication table of symmetry operations of H_2O molecule.

(5 × 5 = 25 marks)

Section C

Answer any **one** *question.*
Each question carries 11 marks.

20. (a) What is meant by efficiency of heat engine ? Derive an expression.

    (b) What do you understand by heat capacity of a system ? Show from thermodynamic consideration that $Cp - Cv = R$.

21. Derive relation between Kp and Kc.

(1 × 11 = 11 marks)

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Chemistry/Industrial Chemistry/Polymer Chemistry

CHE 3C 03—ORGANIC CHEMISTRY

(2019—2020 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A (Short Answers)

*Answer at least **eight** questions.*
Each question carries 3 marks.
All questions can be attended.
Overall Ceiling 24.

1. What are free radicals ? How are they formed ?

2. Which is more acidic, acetic acid or chloroacetic acid ? Why ?

3. What are enantiomers ?

4. Write the possible conformations of ethane. Which is more stable ?

5. What is Wurtz reaction ?

6. How will you prepare phenol from chlorobenzene ?

7. Which is more basic, ammonia or methyl amine ? Why ?

8. What are zwitter ions ? Give examples.

9. What are enzymes ? Give examples.

10. What do you meant by 1° structure of a protein ?

11. What is isoprene rule ?

12. Write the structure of citral and menthol.

(8 × 3 = 24 marks)

Section B (Short Answers)

*Answer at least **five** questions.*
Each question carries 5 marks.
All questions can be attended.
Overall Ceiling 25.

13. What is inductive effect ? What are its characteristics ?

14. What are geometrical isomers ? How are they distinguished ?

Turn over

15. State Huckel's rule. Apply Huckel's rule to predict the aromaticity of benzene and naphthalene.

16. How will you prepare 1°, 2° and 3° alcohols using Grignard reagent ?

17. Explain Lucas test for distinguishing 1°, 2° and 3° alcohols.

18. What is Hofmann's Bromamide reaction ?

19. Explain the difference between DNA and RNA.

$(5 \times 5 = 25$ marks$)$

Section C (Essay)

Answer any **one** *question.*
The question carries 11 *marks.*

20. How benzene diazonium chloride is prepared ? Discuss the synthetic applications of benzene diazonium chloride.

21. Discuss the mechanism of the following aromatic electrophilic substitutions

Halogenation