1B3N23023 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Chemistry Degree Examination, November 2023

BCH3B03 – Physical Chemistry – I

(2022 Admission onwards)

Time: 2 hours Max. Marks: 60

Section A (Short answers)
(Answer questions up to 20 marks. Each questions carries 2 marks)

1. Give the relationship that connects the RMS velocity of a gas with temperature.
2. Define *collision frequency* of a gas.
3. Give the statement of first law of thermodynamics.
4. What is meant by *Joule-Thomson effect?*
5. Mention two application of *Gibbs-Helmholtz equation.*
6. Define the term *chemical potential.*
7. What does the term '*ensemble*' mean?
8. Give the *van't Hoff equation* and its integrated form.
9. Explain the effect of pressure on the equilibrium : $2SO_2\,(g) + O_2\,(g) \leftrightharpoons 2\,SO_3\,(g)$
10. Identify the symmetry elements and assign the point group of the following molecules (i) trans- 1,2-dicloroethene and (ii) Allene
11. Name a molecule belonging to the point group (i) C_{3h} and (ii) D_{3h}
12. What are the symmetry elements associated with the point group C_{2h}

(Ceiling of marks: 20)

Section B (Paragraph)
(Answer questions up to 30 marks. Each questions carries 5 marks)

13. Define *mean free path.* How does it vary with (i) increase in temperature and (ii) decrease of pressure.
14. How do the *critical temperature* and *critical pressure* of a gas determined?
15. Show that $C_p - C_v = R$ for one mole of an ideal gas.
16. Calculate the entropy change accompanying the heating of 1 mole of an ideal gas from 300 K to 600 K (i) at constant volume and (ii) at constant pressure. Assume that $C_v = (3/2)R$
17. One mole of PCl_5 was heated in a closed 2 litre vessel at 300 K. When equilibrium was attained, the concentration of PCl_5 was reduced to 20%. Calculate the equilibrium constant K_c for the reaction : $PCl_5 \leftrightharpoons PCl_3 + Cl_2$, at this temperature.
18. Define the *point group.* What are the rules for a set of elements to form a point group?
19. What is the *group multiplication table*? Give the group multiplication table for C_{2h}.

(Ceiling of marks: 30)

Section C (Essay)

(Answer any one question. Each questions carries 10 marks)

20. Derive the expression connecting *Joule – Thomson Coefficient* and *inversion temperature* with *van der Waals* constants.

21. Derive *van't Hoff equation* showing temperature dependence of equilibrium constant and arrive its integrated form.

(1x10 = 10 Marks)

1B3N23024 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2023

BCH3C03 – Organic Chemistry

(2022 Admission onwards)

Time: 2 hours Max. Marks: 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2 marks)

1. Briefly compare the basicity of ammonia and methyl amine
2. Explain Huckel's rule by taking pyrrole as an example
3. Draw the structure of alpha -D-glucose
4. What is an electrophile ? Give two examples of neutral electrophiles.
5. What are diastereomers ?
6. Comment on the reactivity of 1^0,2^0 and 3^0 alcohols with Lucas reagent
7. What is Fittig reaction? Illustrate with an example.
8. Distinguish between fibrous and globular protein.
9. Draw the structure of nicotine.
10. What are deactivating groups? Give two examples.
11. Draw the resonance structure of aniline.
12. Define the term i) specific rotation ii) Plane polarised light.

[Ceiling of marks: 20]

Section B (Paragraph)
(Answer questions up to 30 marks. Each question carries 5 marks)

13. Give a note on the primary, secondary and tertiary structure of proteins.
14. Write a brief note on the optical activity of Tartaric acid.
15. Explain Iodoform test by using proper reactions.
16. Discuss the hybridisation and stability of Carbocations.
17. Give an example for the sulphonation of benzene and give its mechanism.
18. How is methyl orange prepared? What are its uses?
19. Explain the term inductive effect. What are its characteristics?

[Ceiling of marks: 30]

Section C (Essay)

(Answer any one. Each question carries 10 marks)

20. (a) What is meant by vulcanisation ? What are its advantages ?

(b)Give any five characteristics of enzyme action.

21. (a) Discuss the mechanism of S_N^2 reaction in alkyl halide.

(b)Give any five synthetic applications of benzene diazonium chloride.

(1 x 10 = 10 Marks)