M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

First Year

Chemistry

GENERAL CHEMISTRY

Time : Three hours   Maximum : 70 marks

SECTION A — (4 × 7½ = 30 marks)

Answer any FOUR questions

1. Explain types of molecular spectroscopy sources of different radiation.

2. Write basic principles of NMR and ESR spectroscopy.

3. Explain vibration spectra of diatomic molecules.

4. Explain vibration spectra of anhormonic oscillator.

5. Write about the collection of different liquid samples for analysis.

6. Explain Regression analysis.

7. Discuss constants in FORTRAN and Explain WRITE format.

8. Discuss arithmetic expressions and arithmetic statements.

SECTION B — (4 × 10 = 40 marks)

Answer ALL questions

9. (a) Discuss isotopic effect in rotation spectra and explain spectra of rigid rotor.

Or

(b) Explain applications of N.M.R. and E.S.R. spectroscopy.

10. (a) Write classification of bands and explain vibrational structure of electronic transition.

Or

(b) Explain rotational fine structure of electronic vibration transitions.

11. (a) Explain t-test and F-test.

Or

(b) Discuss application to a finite sample and explain measures of centre value and dispersion.

12. (a) Explain READ, E and F formates.

Or

(b) Discuss list directed INPUT and OUTPUT statements.

M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

First Year

Chemistry

INORGANIC CHEMISTRY

Time : Three hours   Maximum : 70 marks

SECTION A — ($4 \times 7\frac{1}{2}$ = 30 marks)

Answer any FOUR questions

1. Write a note on Debroglie hypothesis.

2. Explain about Term symbols and spectroscopic states.

3. Explain LCAO theory.

4. Discuss concept of hybridization and different types of hybridization.

5. Explain Jahn-Teller effect on octahedral complex.

6. Draw Orgel diagrams of d^2, d^3, d^7 and d^8 electronic configurations.

7. Explain about intercalation compounds and nobel gas compounds.

8. Explain valence bond theory.

3

SECTION B — (4 × 10 = 40 marks)

Answer ALL questions

9. (a) Discuss variation method and application to determination of ground state energy of hydrogen atom.

Or

(b) Discuss Black body radiation and Planck's temperature radiation law.

10. (a) Explain types of solids with examples.

Or

(b) Explain VSEPR theory with applications.

11. (a) Discuss crystal field splitting of d-orbitals in octahedral geometries.

Or

(b) Explain Chelate effect and discuss structural factors affecting stability.

12. (a) Discuss about electron transfer reactions.

Or

(b) Discus synthesis and properties of silicates.

M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

First Year

Chemistry

ORGANIC CHEMISTRY

Time : Three hours   Maximum : 70 marks

SECTION A — ($4 \times 7\frac{1}{2}$ = 30 marks)

Answer any FOUR questions.

1. Explain Aromaticity with examples.

2. Discuss Stereospecific and Stereoselective Synthesis.

3. Write effect of structure on reactivity.

4. Write nucleophilic substitution at allylic and vinylic carbon.

5. Write a note on Diazonium Coupling with examples.

6. Discuss generation, availability and reactivity of free radical.

7. Explain mechanism and orientation in pyrolytic elimination.

8. Explain :

    (a) Aldol reaction

    (b) Stobbe reaction.

SECTION B — (4 × 10 = 40 marks)

Answer ALL questions.

9. (a) Discuss effect of conformation on reactivity in cyclohexane derivatives.

Or

    (b) Explain :

        (i)   Hyper conjugation

        (ii) Homo aromaticity.

10. (a) Discuss structure, stability and reactivity of Nitrene.

Or

    (b) Explain the neighbouring group mechanism and neighbouring group participation with examples.

11. (a) Explain :
        (i)   Gattermann – Koch reaction
        (ii) Arenium ion mechanism.

6

<div align="center">Or</div>

(b) Discuss hydrogenation of double, triple and aromatic rings with examples.

12. (a) Explain :

(i) Knoevenagel reaction

(ii) Benzoin reaction.

<div align="center">Or</div>

(b) Discuss E_1, E_2 and E_{1CB} mechanism with examples.

———————

M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

First Year

Chemistry

PHYSICAL CHEMISTRY

Time : Three hours   Maximum : 70 marks

SECTION A — $(4 \times 7\frac{1}{2} = 30 \text{ marks})$

Answer any FOUR questions.

1. Write Maxwell's partial relations.

2. Explain Classius – Clapeyron equation.

3. Explain Beta decay and Beta spectra.

4. Write mechanism of nuclear reactions.

5. Write Schottky and Frenkel defects.

6. Describe anomalous behavior of strong electrolytes.

7. Explain about micelles and reverse micelles.

8. Write a note on chemiluminiscence.

9. SECTION B — (4 × 10 = 40 marks)

10. Answer ALL questions.

11. (a) Discuss Van't Hoff equation and partial molar quantities.

Or

12. (b) Explain Entropy changes in isolated systems in reversible and irreversible process.

13. (a) Explain :

14. (i) G.M. Counters

15. (ii) Scintillation Counters.

Or

16. (b) Discuss application of radio-isotopes and radiometric analysis.

17. (a) Discuss specific and equivalent conductance with applications.

Or

18. (b) Describe surface tension and discuss Langmuir adsorption isotherm.

19. (a) Write a note on Collision theory and discuss theories of reaction rates.

Or

20. (b) Explain mechanism of Homogeneous catalysis and Heterogeneous Catalysis.