MAHATMA GANDHI UNIVERSITY

B Sc PROGRAMME IN CHEMISTRY

Second Semester

Core Course CH2CRT02 – THEORETICAL AND INORGANIC CHEMISTRY

MODEL QUESTIONS

Time : 3 Hrs Total Marks : 60

SECTION A

(Answer any 10 questions. Each question carries 1 mark)

1. Define photoelectric effect.
2. Define and explain Aufbau principle.
3. Give Schrodinger wave equation. Explain the terms involved in it.
4. What is octet rule? What are its limitations?
5. Explain polarity of bond. Define dipole moment.
6. What is lattice energy? Illustrate with example.
7. Define and explain free electron theory.
8. What are dipole-dipole and ion-dipole interactions? Give examples.
9. What are important factors favouring the formation of ionic bond?
10. Define “inert pair effect”.
11. What are the differences between ionization energy and electro negativity?
12. Explain the electronic transitions involved in $KMnO_4$ and $K_2Cr_2O_7$

(10 x 1 = 10 marks)

SECTION B

(Answer any 6 questions. Each question carries 5 marks)

13. Write a brief note on Planck’s quantum hypothesis.
14. State and explain Pauli’s exclusion principle and Heisenberg’s uncertainty principle.
15. Derive Born-Lande equation. Explain the terms and their significance.
16. Explain Born-Haber cycle and its applications.
17. Write a note on intermolecular forces with special reference to hydrogen bond, van der Waals forces and ion-dipole interactions.
18. Explain metallic bonds and theories of metallic bonds.
19. Discuss the general characteristics of lanthanides.

20. Write a note on lanthanide contraction. What are the consequences of lanthanide contraction?
21. Discuss the electronic configuration of lanthanides.

(6x 5 = 30 marks)

SECTION C
(Answer any 2questions. Each question carries 10 marks)

22. Write an essay on the quantum numbers and shapes of atomic orbitals.
23. Discuss the postulates, applications and limitations of Valence Bond Theory.
24. Explain the atomic spectra of hydrogen and hydrogen-like atoms.
25. Write an essay on the postulates of VSEPR theory. Explain the shapes of molecules such as $BeCl_2$, C_2H_2, BF_3, C_2H_4, CH_4, NH_3 and H_2O.

(2x 10 = 20 marks)

MAHATMA GANDHI UNIVERSITY

B Sc PROGRAMME-CHEMISTRY COMPLEMENTARY COURSE

Second Semester

Complementary Course – BASIC ORGANIC CHEMISTRY

(Common for Students who have opted Life Sciences, Family& Community Science, Physical Sciences and Geology as core)

MODEL QUESTIONS

Time : 3 Hrs Total Marks : 60

SECTION A

(Answer any 10 questions. Each question carries 1 mark)

1. Define and explain position isomerism and functional group isomerism.
2. What are homologous series? Explain with examples.
3. Define homolytic and heterolytic bond fission. Give examples of both.
4. What are the different types of inductive effects? Illustrate with examples.
5. What are +M and –M effects? Give examples.
6. Define and explain baker-Nathan effect.
7. Draw various isomeric structures exhibited by the compound 2-butene. Comment on their stabilities.
8. Define chirality. What are the essential features of chiral atoms?
9. Show the optical isomers given by lactic acid. Comment on their properties.
10. Define the terms plastic and elestomers. Illustrate with examples.
11. What are homopolymers and copolymers? Give examples.
12. Comment on the formation and structure of phenol-formaldehyde polymers.

(10 x 1 = 10 marks)

SECTION B

(Answer any 6 questions. Each question carries 5 marks)

13. Discuss the synthesis, structure and application of nylons.
14. Briefly discuss the latex processing techniques for processing natural rubber.
15. Write a note on the conformation of ethane and n-butane.
16. Discuss the important aspects of E-Z nomenclature of geometric isomers..
17. Write a note on the fundamental aspects of racemisation and resolution. Give examples.
18. Explain substituent effect on acidity and basicity. Explain with suitable examples.
19. Write a note on the cause and consequences of steric effect.

20. Write griefly on the arrow formalism in organic chemistry. Illustrate with an example.
21. Explain what are electrophiles and nucleophiles.

(6x 5 = 30 marks)

SECTION C
(Answer any 2questions. Each question carries 10 marks)

22. Write an essay on various types of intermediates and important types of reactions in organic chemistry.
23. Discuss various methods of electron displacement in organic reaction mechanism.
24. Discuss the mechanism of electrophilic substitution on benzene.
25. Write notes on: (a) Classification of polymers (b) Important synthetic polymers and (c) Biodegadable polymers.

(2x 10 = 20 marks)