F–8503	Sub. Code
	7MCH2C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022.

Second Semester

Chemistry

ORGANIC CHEMISTRY – II

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1.   What do you mean by conformational energy difference?

2.   Draw the stable conformation of 1, 3-disubstituted cyclohexane. Give reason.

3.   State and explain Mc Lafferty rearrangement.

4.   Give one example each for stretching and bending vibrations in IR spectra.

5.   Give one example of shift reagent and mention its role in NMR spectra.

6.   Give the spin-spin splitting pattern in ethanol with a neat sketch.

7.   Mention the selectivity of N-Bromo Succinimide in organic synthesis

8.   Mention any one role of phase transfer catalyst with example.

9.   What are A/B C is steroids? Give one example.

10. Draw the structure of cholesterol.

Part B $(5 \times 5 = 25)$

Answer **all** questions.

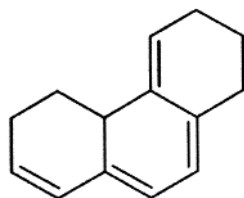11. (a)   Describe the conformations that arise in n-butane due to rotation about C-C bond.

Or

(b)   Review the factors that determine the stability of a conformation.

12. (a)   Write a note on finger print region in IR spectroscopy.

Or

(b)   Calculate the λ max for the following compound.

13. (a)   Draw and explain the NMR spectrum of ethanol. How does it differ from dimethyl ether?

Or

(b)   Briefly explain the factors influencing chemical shift of protons with suitable example each.

14. (a)   Describe with mechanism, Woodward-Prevost hydroxylation reaction.

Or

(b)   Write a short note on hydroboration reactions.

F–8503

15. (a) Briefly discuss the synthesis of cortisone.

Or

(b) Describe the structure and stereochemistry of vitamin D_2.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Briefly discuss the stability of cyclohexane, l,2-disubstituted cyclohexane, 1,3-disubstituted cyclohexane and 1,4-disubstituted cyclohexane.

17. (a) Briefly describe the principle of Mass spectroscopy. (4)

(b) Explain with suitable examples for the following:

(i) Base peak

(ii) Parent ion

(iii) Metastable ion

(iv) Isotopic ions (4 × 1.5 =6)

18. Describe the basic principle of C-13 NMR spectroscopy. How the signals are assigned? What is meant by off resonance decoupling? When it becomes necessary?

19. Compare and contrast the role of Organo lithium and Gilman reagents in organic synthesis.

20. Describe the chemistry and stereochemistry of ergosterol.

_____

F–8503

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

Second Semester

Chemistry

INORGANIC CHEMISTRY – II

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Draw the structure of [Co(EDTA)] complex.

2. $[Ni(en)3]^{2+}$ is more stable than $[Ni(NH_3)_6]^{2+}$. Why?

3. Define acid hydrolysis reaction.

4. What is dissociative S_N^1 mechanism?

5. Write any two functions of cytochrome.

6. Give the number of copper ions and imidazole unit of histidine coordinated in the active site of oxy-hemecyanin.

7. What are the conditions to be satisfied by a metal to act as a catalyst?

8. What is the metal used in the conversion of ethane to ethanal? Mention its role.

9. How does the magic number explain the nuclear stability?

10. Distinguish between artificial and natural radioactivity.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) State and explain Jahn-Teller distortion.

Or

(b) Determine the stability constant by Job's method.

12. (a) Discuss complementary and non-Complementary reactions with suitable examples.

Or

(b) Explain the mechanism of $S_{Ni}CB$ reaction of metal complexes.

13. (a) Discuss the structure of chlorophyll.

Or

(b) Write short notes on blue copper protein.

14. (a) Write short notes on Ligand dissociation and association reaction.

Or

(b) Bring out the importance of Zeigler-Natta catalyst in the polymerization of olefin.

15. (a) Write a note on the origin of stellar energy.

Or

(b) Give a detail account on shell model for nuclear structure.

F–8504

Answer any **three** questions.

16. (a) What is spinel? CO_3O_4 adopts normal spinel whereas Fe_3O_4 adopts inverse spinel. Why?

    (b) What is spectrochemical series? Mention its significances. (5+5)

17. Discuss the applications of trans-effect series in the preparation of isomers of Pt(II) complexes. Mention any one theory of *trans*-effect.

18. (a) Write short notes on iron-sulphur protein.

    (b) Discuss Perutz's mechanism of binding of oxygen to hemoglobin. (5+5)

19. Discuss the mechanisms of (a) Wacker's process (b) oxo process. (5+5)

20. Describe the applications of radioactive isotopes in different fields.

————————————

F–8504

F–8505	Sub. Code
	7MCH3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

Third Semester

Chemistry

ORGANIC CHEMISTRY – III

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

SECTION A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Draw the structure of the intermediate involved in Curtius rearrangement reaction.

2. "Cope rearrangement is sigmatropic rearrangement". Simply Justify.

3. What is a carbenoid? With an example explain its addition to an alkene.

4. Explain Diels-Alder reaction with an example.

5. State Isoprene rule. Give the number of isoprene units in sesquiterpenoids.

6. Mention the ring systems present in a-pinene?

7. What is FGI reaction? Give examples.

8. Explain the utility of nitro group as a blocking group in organic synthesis.

9. What is meant by intersystem crossing and internal conversion?

10. Illustrate Paterno-Buchi reaction with an example.

SECTION B   (5 × 5 = 25)

Answer **all** questions

11. (a) Write a short note on Baeyer-Villeger rearrangement reaction.

Or

(b) Briefly explain the importance of Demjanov rearrangement reaction.

12. (a) Illustrate Michael addition with suitable examples.

Or

(b) Discuss on the regioselectivity of electrophilic addition reaction.

13. (a) Give the synthesis of zingiberene.

Or

(b) How will you establish the following?

(i) The presence of four membered ring system in a-pinene.

(ii) Abietic acid has modified l-methy l-7- isopropyl phenanthrene nuclues.   (3+2)

F–8505

14. (a) Discuss the convergent approach to total synthesis with suitable example, Bring out the advantage of convergent method over linear approach.

Or

(b) Write notes on:

(i) Robinson-annelation reaction

(ii) Umpolung synthesis.

15. (a) Illustrate Norrish Type I and Type II reaction of an excited ketone with examples.

Or

(b) Bring out the essential differences between thermal and photochemical reactions.

SECTION C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the mechanisms of Favorskii and Dienone-phenol rearrangement reactions.

17. Write a short note on:

(a) Sharpless asymmetric epoxidation

(b) Shapiro reaction   (5+5)

3   **F–8505**

18. Elucidate the structure of camphor.

19. Briefly discuss various stereo chemical problems associated with organic synthesis.

20. With the help of correlation diagram, discuss the disrotatory and Conrotatory Interconversion of cyclobutane-butadiene system.

————————

F–8506		Sub. Code
		7MCH3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Chemistry

INORGANIC CHEMISTRY-III

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all the** questions.

1. What is meant by Mossbauer effect?

2. Compare the vibrational spectra of $\left[Cr(CO)_6\right]$ and $\left[V(CO)_6\right]$.

3. Distinguish between RS and JJ couplings.

4. Predict ^{31}P-NMR spectrum for HPF_2.

5. Give the ores of Beryllium.

6. Calculate EAN of Fe in $Fe(CO)_s$.

7. Why F block elements are placed separately?

8. Why La(OH) is more basic than other lanthanide hydroxide'?

9. Are BCl_3 and $SiCl_4$ electron deficient species?

10. Give the preparation of any one heteropoly acid.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the terms Doppler shift and Doppler peak broadening.

Or

(b) Discuss the applications of IR and Raman spectra to detect the hydrogen bonding.

12. (a) A tetrahedral complex of Co (II) exhibits two absorption bands in the visible range at 7135 cm^{-1} and a doublet peak (18185 and 19605 cm^{-1}). Determine its spectral parameters 10 Dq and β (Given $15\,B_\circ = 15505\,cm^{-1}$).

Or

(b) Explain the term Contact shift.

13. (a) Mention the ores of Germanium. How is it extracted from its ore?

Or

(b) How is ferrocene synthesised? Explain its structure and bonding.

14. (a) Discuss the position of lanthanides in the periodic table.

Or

(b) Explain the process of separation of Pu from Uranium fuel.

15. (a) Discuss the structure of $\left[Mo_7O_{24}\right]^{6-}$.

Or

(b) What is styx numbers? Calculate the styx number for B_4H_{10}.

F–8506

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Explain the vibrational spectra of metal complexes containing sulphate ligands.

    (b) What is meant by recoilless nuclear transition? What are the conditions to satisfy for the recoilless nuclear transition? (5+5)

17. (a) Discuss Laborate selection rule and spin selection rule of electron absorption spectroscopy.

    (b) How is the rate constant evaluated from the line-width of the NMR signals? (5+5)

18. (a) Discuss the preparation and properties of any two lead compounds.

    (b) Discuss the nature of bonding in metal carbonyls. (5+5)

19. (a) What is a shift reagent? Explain the importance of the shift reagent in the elucidation of complex NMR spectra.

    (b) Give the comparative study of magnetic property of Lanthanide and Actinide elements. (5+5)

20. (a) What are Wade's rule? Apply Wade's rules classify carboranes into different types.

    (b) Draw and discuss of $\left[MnMo_9O_{32}\right]^{6-}$. (5+5)

———————

3

F–8506

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

Third Semester

Chemistry

PHYSICAL CHEMISTRY - III

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1. Explain interval conversion and intersystem crossing.

2. Explain the temperature on emission process.

3. State Heisenberg's uncertainty principle.

4. Give operator for position and momentum.

5. What are eigen functions and eigen values?

6. List out the characteristics of wave function.

7. What are Hermite polynomials?

8. Using radial distribution, predict the shapes of P-atomic orbitals.

9. What is Heterogenous catalysis? Give an example.

10. What is thermal conductivity?

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Derive Stern – volmer equation and mention its uses.

Or

(b) Write an explanatory note on a chemical actinometer.

12. (a) Explain the following with suitable example.

(i) Kinetic energy operator

(ii) Angular momentum operator

Or

(b) What is Hermicity? How to prove the quantum mechanical operators are Hermitian?

13. (a) Derive time independent Schrodinger wave equation.

Or

(b) Write down the Schrodinger wave equation for Rigid rotator.

14. (a) Explain the variation methods for the hydrogen atom.

Or

(b) What are secular determinant and slater determinant wave function?

15. (a) Describe flash photolysis with a diagram.

Or

(b) State and explain the principle of equipartition of energy.

F–8507

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. (a) Explain the photophysical process by using the Jablonski's diagram.

 (b) Write the photochemical kinetics of $H_2 - Br_2$ reaction. (5+5)

17. (a) List out the postulates of quantum mechanics.

 (b) Write a note on vanishing and non-vanishing commutators. (5+5)

18. (a) Explain the orthogonality and normalization of wave functions.

 (b) For a particle in a one – dimensional box, show that the average value of the momentum along the X-axis is zero. (5+5)

19. (a) Set up the schrodinger wave equation for a simple harmonic oscillator.

 (b) Explain the shapes of various atomic orbitals.

 (5+5)

20. Derive Michaelis – Menton equation for enzyme catalysis.

————————

F–8507

M.Sc., DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Chemistry

Elective: PHARMACEUTICAL CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1.   What are prodrugs? Give suitable example.

2.   Define bioisoterism with suitable example.

3.   Give one use of chloramphenicol and chloroquine.

4.   Define antibiotic. Mention its use.

5.   What do you mean by the term "cancer chemotherapy".

6.   Give any two examples of sedatives.

7.   What are local anti-infective drugs? Give one example.

8.   Give any two uses of amyl-nitrate.

9.   What are local anaesthetics? Give one example.

10. Draw the structure of paracetomol.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the concept of structure-activity relationship (SAR) in drug design.

Or

(b) Describe the concept of lead and lead modification in drug design with suitable examples.

12. (a) Briefly discuss the synthesis of pencillin-V.

Or

(b) What are β-lactam antibiotics? Explain their mode of action with suitable examples.

13. (a) What are CNS depressants? Explain their mode of action. List out the side effects of extensive use of CNS depressants.

Or

(b) Describe the synthesis of chlorambucil. Give its uses and side- effects of extensive use.

14. (a) Write a note on different types of cardiovascular diseases.

Or

(b) Discuss the synthesis of methyl dopa. Mention its use and side effects of extensive use.

15. (a) Briefly discuss the synthesis of phenacetin and methyl salicylate.

Or

(b) Discuss the merits and demerits of volatile and non-volatile anaesthetics in general.

2

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Write a short note on various physico-chemical parameters regarding drug receptor interactions.

17. Describe the structural features of cephalosporin. Comment on the structure activity relationship.

18. Define neurotramitters. Explain in detail neurochemistry of mental diseases.

19. Briefly describe the synthesis of verampamil and atenelol.

20. Outline the synthesis and therapeutic action of Nifedipine, and hydralazine.

_____

F–8508

F–8509

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

Third Semester

Chemistry

Elective: MATERIAL CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** the questions.

1.   What is meant by secondary bond? Give examples.

2.   What are grain boundaries?

3.   Define the term Crystallinity.

4.   What is meant by work hardening?

5.   Write notes on macroscopic composites.

6.   What are the nanomaterials?

7.   Give examples for soft magnetic materials.

8.   Write note on optoelectronic devices.

9.   What is meant by phase transition?

10. Give examples for switches.

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the influence of radius ratio on coronation.

    Or

    (b) Describe wave mechanical model.

12. (a) Explain Griffith's criterion.

    Or

    (b) What are conducting and ferroelectric polymers? Explain.

13. (a) Explain the mechanical properties of ceramic structures.

    Or

    (b) Write notes on lyotropic phases.

14. (a) What are ceramic magnets? Explain with examples.

    Or

    (b) Describe the thermal properties of materials.

15. (a) Write notes on molecular hyper polarizability.

    Or

    (b) Give the applications of ionic conductors.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss the uses of x-ray diffraction for the determination of point and surface defects.

F–8509

17. (a) Explain failure of materials due to creep and fatigues. (5)

    (b) Describe the atomic model of Electronic behaviours. (5)

18. Discuss the preparation procedures and properties of nanocrystalline phase.

19. (a) Explain the magnetic behaviour of paramagnetic and Ferromagnetic substances. (6)

    (b) Discuss the applications of LASERS. (4)

20. (a) Write notes on doped fullerenes as super conductors. (5)

    (b) Explain the mechanism of Ionic conduction. (5)

_____

F–8509

F–8510	Sub. Code
	7MCH4E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

Fourth Semester

Chemistry

Elective – NANO-CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours　　　　　　　　Maximum : 75 Marks

Part A　　　　　　(10 × 2 = 20)

Answer **all** the questions.

1. Write about sono chemical synthesis.

2. What are quantum dots?

3. What are SWNTs and MWNTs?

4. Define Graphenes.

5. What are inorganic nano materials?

6. Write about larger and smaller fullerness.

7. What is the information derived from XRD?

8. Write about the technique used to find the size distribution.

9. What is DNA-junctions?

10. Write about nano pipettes.

Part B $(5 \times 5 = 25)$

Answer **all** the questions, choosing either (a) or (b).

11. (a)   Illustrate unique properties due to nano size of nano materials.

Or

(b)   Write notes on reverse-micelle synthesis of nano materials.

12. (a)   What are fullerness? Give the unique properties of fullerness.

Or

(b)   Write about polymer nano particles.

13. (a)   Explain the property of super conductivity in C_{60}.

Or

(b)   Write about the Rotaxanes and Catenanes.

14. (a)   Discuss the principles and applications of Atomic Force Microscopy (AFM).

Or

(b)   Discuss the principles and applications of ESCA.

15. (a)   Describe the nano mechanical device designed by Seeman.

Or

(b)   Give a brief account of force measurements in polymerase.

F–8510

(3 × 10 = 30)

Answer any **three** questions.

16. Explain

    (a) Hydrodynamic cavitation.

    (b) Polymer mediated synthesis. (6+4)

17. Discuss the applications nano materials in the field of

    (a) Pharmaceuticals

    (b) Environment. (5+5)

18. Discuss the preparation and properties of nano-TiO_2 and nano-ZnO.

19. Give the principles and applications of

    (a) TEM

    (b) SEM. (5+5)

20. Give detailed account of nano particle mediated transfection.

_____

F–8510