F–1961	Sub. Code
	7MCH1C1

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Chemistry

ORGANIC CHEMISTRY — I

(CBCS – 2017 onwards)
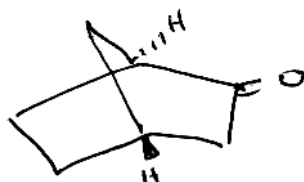
Time : 3 Hours   Maximum : 75 Marks

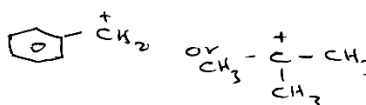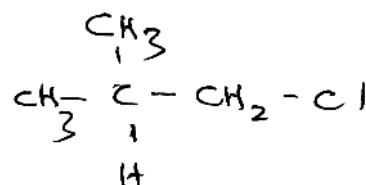**Part A**   (10 × 2 = 20)

Answer **all** questions.

1. Tri ethyl amine is a weaker base than diethyl amine. why?

2. Which of the following hybridised bond has the maximum bond length? Why? $sp^3 - s$, $sp^2 - s$ $sp - s$.
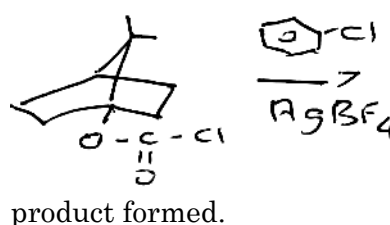
3. Assign R or S configuration to

4. What are the disadvantages of Fischer projection representation?

5. State Craigs rule.

6. Which among the following is aromatic? Cyclopenta dienyl anion or cycloheptatrienyl cation.

7. Which is more stable $\overset{\cdot}{\underset{O}{\bigcirc}} - \overset{+}{C}H_2$ or $\overset{+}{\underset{CH_3}{C}H_3} - \overset{+}{\underset{CH_3}{C}} - CH_3$ Why?

8.

$$CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{H}{|}}{C}} - CH_2 - Cl \xrightarrow{\text{hydrolysis}}$$ Give the

product formed and give reasons.

9.

$$\xrightarrow[AgBF_4]{\bigcirc - Cl} ?$$ Account for the

product formed.

10. Trans-2-chlorocyclohexanol gives epoxy cyclohexane is high yield on reacting with a base however the cis-isomer does not react. why?

Part B (5 × 5 = 25)

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

11. (a) Explain Taft equation and its significance.

Or

(b) Discuss the concept of steric inhibition of resonance.

2 **F–1961**

12. (a) How are point group classified based on symmetry elements?

Or

(b) Explain the rules followed in assigning R.S. configuration among allenes.

13. (a) Distinguish between alternant and non alternant hydrocarbons.

Or

(b) Explain the concept of homoaromaticity and antiaromaticity.

14. (a) Whether halogens are activating or deactivating groups in aromatic electrophilic substitution reactions. Explain.

Or

(b) State the Hamm and postulates and its significance.

15. (a) Account for the products formed when $CH_3CH_2CH_2CH_2OH$ is subjected to dehydration.

Or

(b) Illustrate with examples neighbouring group participation in nucleophilic substitution reaction.
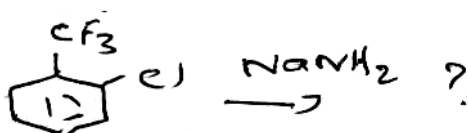
Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. (a) Explain cross conjugation.

(b) Limitations of Hammett equation.

3   **F–1961**

17. Give an account on :

    (a) Asymmetric synthesis

    (b) Molecular disymmetry.

18. Account for the aromatic properties of
    (a) Cyclopentadienyl anion and cation (b) Azulenes

19. (a) Predict the product formed and explain

    (b) Explain the mechanism of nitration in aromatic
        compounds and the concept of IPSO substitution.

20. Explain :

    (a) Concept pyrolytic cis elimination

    (b) Ambident nucleophiles and ambident substrates.

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F–1961

F–1962

Sub. Code
7MCH1C2

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Chemistry

INORGANIC CHEMISTRY – I

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1.   Arrange the following in the order of decreasing ionic radii Na^+, O^{2-}, F^- and Mg^{2+}.

2.   Calculate the effective nuclear charge at the periphery electron of chromium atom.

3.   Predict the geometry of CIO_4^- ion using VSEPR theory.

4.   Compare the bond order of O_2 and O_2^+.

5.   The mixture of SbF5 and HF is a superacid. Explain

6.   Perchlorin aciod is a very strong acid while periodic acid is a weak acid. Why.

7.   What is inorganic benzene? How is it prepared?

8.   What are silanes? How are they classified?

9.   What is line defect in solids?

10. With the increase of temperature, stoichiometric defects in the crystal increase. Explain.

Part B (5 × 5 = 25)

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

11. (a) State and explain Fajan's rule.

Or

(b) What is lattice energy? Derive the Born-Lande equation.

12. (a) How does the Bent's rule govern the pattern of hybridization.

Or

(b) What are the postulates of VSEPR theory? On the basis of VSEPR theory, deduce the geometry of IF_7.

13. (a) Discuss the chemistry of Liquid HF as solvent.

Or

(b) What is symbiosis? Give examples. What are its applications?

14. (a) Give the preparation and properties of cyclophosphazane.

Or

(b) Discuss the structures of P_4S_{10} and P_4S_3.

15. (a) Write a note on band electron theory of solids.

Or

(b) Explain the role of semiconductors in solar energy conversion.

F–1962

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) What is hydrogen bond? Discuss the applications of hydrogen bond

    (b) Explain any two methods of calculating ionic radius. (5+5)

17. (a) Construct the wave function for the sp2 hybrid orbital

    (b) Explain the MO diagram of Beryllium hydride (5+5)

18. (a) Discuss the following reactions in acetic acid solvent

    (i) acid – base reaction,

    (ii) amphoteric reaction

    (iii) solvolysis reaction

    (b) What is common ion effect? Derive the Henderson's equation. (6+4)

19. Discuss the preparation and properties of S4N4 and boron nitride

20. What is superconductivity? Explain its nature of conductivity at low and high temperature

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3 **F–1962**

F–1963

Sub. Code
7MCH1C3

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Chemistry

PHYSICAL CHEMISTRY – I

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1. Sketch the schematic diagram of OHP and IHP.

2. What will be the e.m.f. of the cell in which a $2n/2n^{2+}$ half cell is connected to a hydrogen electrode?

   The conditions are $[2n^{2+}] = 0.5m$; $P_{H_2} = 1.8$ atm and $[H^+] = 0.9m$ $E° 2n^{2+}/2n = -0.76$ V.

3. "Entropy is a measure of disorder of a system". Justify the statement.

4. Define partial molar properties.

5. State and explain the law of mass action.

6. Distinguish between spontaneous and non-spontaneous reaction.

7.   Calculate the total number of complexions in arranging for distinguishable systems among energy levels 0, 1E, 2E, 3E such that total energy is 3E.

8.   Establish a relationship between entropy and probability.

9.   Explain how colloids can be purified.

10. What are protective colloids?

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

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

11. (a)   Derive Debye-Huckel-Onsager equation.

Or

(b)   What is Over voltage? Discuss the important applications of this phenomenon.

12. (a)   Explain the term chemical potential. How does chemical potential vary with temperature and pressure?

Or

(b)   Derive expression for ΔS for the following transformations choosing typical example for each.
(i)   isothermal reversible phase transformation
(ii) isothermal irreversible phase transformation.

13. (a)   Apply phase rule to Zn-Mg system.

Or

(b)   Derive the integrated form of Van't Hoff equation.

14. (a)   What is Quantum statistics? Discuss in detail Fermi-Dirac statistics.

Or

(b)   Calculate the value of equilibrium constant in terms of partition function.

2   **F–1963**

15. (a) Discuss the origin of change on colloidal particles.

Or

(b) How does chemisorption differ from physisorption?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Derive the Butler-Volmer equation in the kinetics of the electrode reactions.

17. Define fugacity of a gas. Explain how it can be determined experimentally.

18. State phase rule and define the terms involved in it. Derive phase rule thermodynamically.

19. (a) Derive Maxwell-Boltzmann distribution law of energy.

(b) Derive the values of the following thermodynamic parameters in terms of partition function :

(i) V

(ii) S

(iii) G

(iv) H

20. (a) Explain the term heat of adsorption. Why it is always negative?

(b) Derive Langmuir's adsorption isotherm.

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3

F–1965	Sub. Code
	7MCH1E2

M.Sc. DEGREE EXAMINATION, APRIL 2019

First Semester

Chemistry

Elective : POLYMER CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** the questions.

1. What are repeating units? How do they differ from monomers?

2. Distinguish between homopolymer and copolyemer

3. How is polyethylene prepared?

4. Give the structures of melamine and polychloroprene

5. Mention the factors affecting the glass transition temperature.

6. Explain any one intrinsic properties of a polymer.

7. What is degradation of polymers? Mention their types

8. Explain the Photo degradation of polymer

9. What is reinforcing Of polymer?

10. How are fibres classified?

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

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

11. (a) Write a note on graft polymers.

Or

(b) How are polymers classified on the basis of forms and applications?

12. (a) Compare the properties of polyamide and polyimides

Or

(b) Discuss the preparation and uses of PVC.

13. (a) Define glass transition temperature. How is the glass transition temperature related to molecular weight and melting point?

Or

(b) Describe the sedimentation viscosity method of determining the molar mass of polymers.

14. (a) Write short notes on mechanical and thermal degradation.

Or

(b) Write short notes on Bulk polymerization techniques.

15. (a) Distinguish between fibres and rubbers.

Or

(b) Explain the applications of biopolymers in dental, Artificial heart and blood cells.

2

F–1965

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

Answer any **three** questions.

16. Discuss the mechanisms of

    (a) ionic polymerization and

    (b) co-ordination polymerization   (5+5)

17. Describe the following:

    (a) Polymethylmethacrylate and

    (b) Epoxy resin   (5+5)

18. (a) The intrinsic viscosity of myosin is 217 cm-1g-1.
         Calculate the approximate concentration of myosin
         in water which would have a relative viscosity of
         1.5.

    (b) Discuss briefly the kinetics of condensation
         polymerization.   (5+5)

19. (a) Explain the role of antioxidants used in oxidative
         degradation of polymer.

    (b) Discuss the interfacial polycondensation
         polymerization techniques   (5+5)

20. Using schematic diagram, explain the process of following
    techniques

    (a) Injection moulding and

    (b) rotational casting   (5+5)

    _____

3   **F–1965**

F–1966	Sub. Code
	7MCH2C1

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry

ORGANIC CHEMISTRY — II

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks
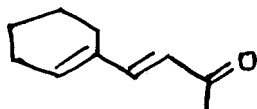
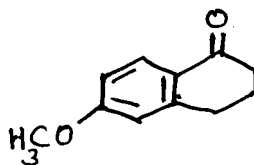**Part A** $(10 \times 2 = 20)$

Answer **all** questions.

1. Draw the favourable conformations of
   (a) 2-bromocyclohexanone
   (b) 2-bromo-4, 4-dimethylcyclohexanone.

2. 1,1-disubstituted cyclohexanes cannot exhibit any configurational isomerism. Explain.

3. Calculate the λ_{max} for the following compounds :

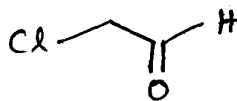   (a)   (b)

4. The mass spectrum of 3-butyn-2-ol shows the base peak at m/z 55. Explain why the fragment giving rise to this peak would be very stable.

5. Comment : Acetylene protons are more shielded than ethylenic protons.

6. Identify all chemical shift equivalent carbons for the following compounds :

7. Reduction of cyclobutanone is much easy as compared to cyclo-octanone of $NaBH_4$. Explain.

8. Draw the molecular structure of any two PTC.

9. How will you prove that the ring B of ergosterol contains the conjugated system?

10. What is meant by adrenocortical hormones? Give examples.

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

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

11. (a) Explain the determination of free energy difference by Eliel-Ro equation.

                    Or

    (b) Discuss the stereo electronic and steric factors with suitable example.

12. (a) Discuss the various factors influencing group frequencies in IR spectroscopy.

                    Or

    (b) Write a brief note on $n - \pi^*$ transition in UV-visible spectroscopy.

13. (a) Write a detailed notes on geminal and vicinal coupling by taking suitable examples.

                    Or

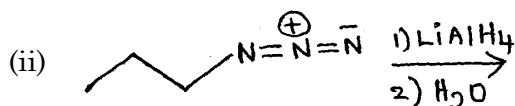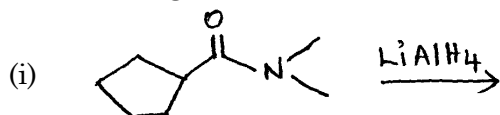   (b) Write notes on :

         (i)   Shift reagents.

         (ii) Off-resonance decoupling. $(2.5 + 2.5)$

F–1966

14. (a) Discuss the synthetic application of lithium dimethyl cuprate and 1,3-dithiane with appropriate examples.

Or

(b) Predict the product(s) and suggest mechanism for the following :

(i)

(ii)

(2.5 + 2.5)

15. (a) Establish the position of hydroxyl group and double bond in cholestrol.

Or

(b) Explain the constitution of progesterone. Give its synthesis from diosgenin.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Explain the conformation effect on intramolecular rearrangements in cyclic systems with suitable example. (5)

(b) Write a brief note on the conformation of simple acyclic compounds. (5)

17. (a) The force constant for carbon monoxide molecule is 1840 Nm^{-1}. Calculate the vibrational frequency (in cm^{-1}). Given atomic masses are :

$^{12}C = 19.9 \times 10^{-27}$ kg; $^{16}O = 26.6 \times 10^{-27}$ kg . (3)

3

$\boxed{\textbf{F–1966}}$

(b) Predict the fragmentation pattern of diphenyl ether. (3)

(c) Illustrate Mc Lafferety rearrangement with suitable example. (4)

18. (a) A compound having molecular formula $C_9H_{11}Br$ showed the following signals in PMR data :

(i) Multiplet $(\delta\ 2.25)$, 2H;

(ii) Triplet $(\delta\ 2.75)$, 2H;

(iii) Triplet $(\delta\ 3.38)$, 2H;

(iv) Singlet $(\delta\ 7.22)$, 5H.

Predict the structure of the compound with reasoning. (4)

(b) Explain the theory of spin-spin interaction for an ABC type molecule. (3)

(c) Discuss the basic principles of FT technique. (3)

19. (a) Give an account on :
(i) N-bromo succinimide.
(ii) Oppenauer oxidation. (2.5 + 2.5)

(b) Explain MPV reduction with suitable example. (3)

(c) Predict the product(s). (2)

$$Ph \cdot CO \cdot CH_2 \cdot Ph\ \dfrac{SeO_2/\Delta}{H_2O/HOAc}.$$

20. (a) How will you synthesize the following from cholesterol?

(i) Testosterone.

(ii) Androsterone. (7)

(b) Give the synthesis of erogcalciferol. (3)

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4

F–1966

F–1967	Sub. Code
	7MCH2C2

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Chemistry

INORGANIC CHEMISTRY – II

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** the questions.

1. It is very difficult to resolve the optical isomers of tetrahedral metal complexes. Why?

2. What is CFSE? Calculate the CFSE of low spin d^4 metal complexes.

3. What is meant by base hydrolysis reaction? Give an example.

4. The d^{10} systems are expected to be labile in terms of both VBT and CFT theories. Explain.

5. What is Hill constant? How does it depend upon the pH?

6. How are copper protein classified? Give an example for each.

7. Activation of the C-H bond can be done through the oxidative addition. Explain.

8. What are the disadvantages of homogeneous and heterogeneous catalysts?

9. Elucidate the source of energy in the Sun.

10. Explain the working of breeder reactor.

Part B (5 × 5 = 25)

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

11. (a) What are labile and inert complexes? Explain their kinetic and thermodynamic stabilities?

Or

(b) Discuss the VB theory to explain the magnetic behavior of complexes.

12. (a) Discuss the mechanism of anation reaction with suitable example.

Or

(b) How are electron transfer reactions? How are they classified? Explain the mechanism of inner electron transfer reactions.

13. (a) Explain the structure of ferridoxin. In what ways, it differs from rubredoxin?

Or

(b) Explain Cooperativity effect in hemoglobin.

14. (a) Explain Wacker's process. Discuss its mechanistic aspects.

Or

(b) What is Ziegler-Natta catalyst? How does it catalyze the polymerization reaction?

15. (a) Explain the theory of nuclear fission.

Or

(b) Describe the different types of nuclear reactions with suitable examples.

2 **F–1967**

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) What is stability constant? Mention their types. How is it determined by Job's method?

    (b) Explain the origin of Jahn Teller distortion by CFT. What are the conditions of J.T distortion in the octahedral complexes? (5 + 5)

17. What is trans effect? Explain the σ bonding theory of trans effect. Discuss the synthesis of cis– and trans–$[PtCl_2(NH_3)_2]$ using trans effect.

18. Discuss the structures and functions of

    (a) Chlorophyll and

    (b) Cytochrome (5 + 5)

19. Discuss the mechanistic steps in the following reactions

    (a) Oxo process

    (b) Hydrogenation of olefins (5 + 5)

20. (a) Discuss any two nuclear reactors in detail.

    (b) Describe the applications of radioactive isotopes in age determination and agriculture. (5 + 5)

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3 **F–1967**

F–1968

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Chemistry

PHYSICAL CHEMISTRY — II

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1. What is meant by the order and molecularity of a reaction?

2. What are chain reactions?

3. Define Einstein coefficient.

4. Give the important criteria for a molecule to be IR active.

5. Explain chemical shift in ESCA.

6. Define mutual exclusion principle.

7. How does the electric field gradient arise in NQR?

8. Explain hyperfine splitting in ESR Spectroscopy.

9. State the criteria for elements to form a group.

10. Illustrate the H_2O molecule is Abelian where as NH_3 is non-abelian.

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

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

11. (a) Explain how energy of activation is determined with the help of Arrhenius equation.

Or

(b) Discuss the mechanism and kinetics of decomposition of acetaldehyde.

12. (a) How do you determine the bond length of a molecule from its rotational spectra?

Or

(b) Write a note on fermi resonance.

13. (a) Describe the different types of electronic transitions possible in polyatomic molecules.

Or

(b) Give a concise account of fortrat diagram.

14. (a) Write a note on chemical shift and relaxation time.

Or

(b) Distinguish between EPR spectroscopy and NMR spectroscopy.

15. (a) Construct the character table for C_2V point group.

Or

(b) State and explain great orthogonality theorem.

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

Answer any **three** questions.

16. Discuss the Lindemann theory of unimolecular reactions.

17. (a) Discuss the principle of FT-IR Spectroscopy.

(b) Deduce an expression for Einstein's coefficient of induced absorption. (4+6)

F–1968

18. (a) Outline the classical theory of Raman effect.

    (b) Explain the basic principles of photo electron spectroscopy. (5+5)

19. (a) How is NQR spectroscopy helpful in getting information regarding hybridisation and the ionic character of the bond?

    (b) How do chemical shift arise in NMR spectra of molecules? (5+5)

20. (a) Using group theory, discuss the type of hybridisation that exist in BF_3 molecule.

    (b) Give a concise note on the application of group theory to normal mode analysis. (5+5)

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3

F–1968

F–1969	Sub. Code
	7MCH2E1

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry

Elective — ENVIRONMENTAL CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1. What is the difference between pollutant and contaminant?

2. Define : Acid rain.

3. What are water pollutants?

4. What is sewage?

5. Define: Soil erosion.

6. Mention the micro and macro nutrients in soil.

7. Name four sources which contribute to radiation pollution

8. How hazardous waste is identified?

9. Define : Cyclone.

10. State briefly the reason for earthquakes.

Part B   (5 × 5 = 25)

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

11. (a) Write any five differences between classical smog and photochemical smog.

Or

(b) Write a note on control of air pollution.

12. (a) What is sewage? What are the problems? How it is disposed?

Or

(b) Discuss the flourosis and deflouridation.

13. (a) Describe in detail about soil analysis.

Or

(b) Explain how fertilizers and pesticides create soil pollution?

14. (a) Discuss the Bhopal gas tragedy and how it affected the people there?

Or

(b) What are the causes of industrial pollution?

15. (a) Describe disaster prevention

Or

(b) What are the impacts of earthquake?

F–1969

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) What are the major sources of air pollutants?

    (b) Explain green house effect and give the causes.

17. (a) What are effluents? Give their harmful effects. How are they controlled?

    (b) Mention the radioactive pollutants in water.

18. (a) Discuss the ion exchange reactions in soil.

    (b) Write a note on the sources and classification of soil pollutants.

19. Describe in detail about the effects of ionizing and non-ionizing radiations.

20. Discuss in detail about the formation and types of cyclones.

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F–1969

F–1970

Sub. Code
7MCH2E2

M.Sc. DEGREE EXAMINATION, APRIL 2019

Second Semester

Chemistry

Elective – COMPUTER IN CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1. Distinguish between RAM and ROM.

2. Draw a flow chart to calculate the normality of a solution.

3. Give the basic structure of C language.

4. What are the different types of 'C' constants?

5. How do we calculate the number of resonating structures?

6. What is meant by arrays?

7. Write a procedure for obtaining internet using dial-up way.

8. Mention any two search engine and explain.

9. Define Cheminformatics

10. Name any two chemistry softwares and give its use.

Part B (5 × 5 = 25)

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

11. (a) Describe, any two output devices and explain them briefly.

Or

(b) Explain the various components of computer .

12. (a) Write a C program to calculate enthalpy of a solution.

Or

(b) Write a C program to calculate cell constant of a solution.

13. (a) Using array manipulation, write a C program to balance the chemical equation.

Or

(b) Write a C program to calculate half life and. average life of a radioactive nuclei.

14. (a) Discuss any three popular websites in chemistry.

Or

(b) List out the tips for effective use e-mail using smile keys.

15. (a) Discuss the applications of cheminformatics in drug discovery.

Or

(b) List the procedures to draw a chemical structures using Chemsketch.

2 **F–1970**

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

Answer any **three** questions.

16. (a) Explain the various generations of computers.

    (b) Write a note on output devices.

17. Write a C program to calculate:

    (a) Lattice energy (using Born-Haber cycle)

    (b) Molecular weight of organic compound. (5+5)

18. Write a C program to evaluate equilibrium using quadratic equation

19. (a) Discuss the preparation articles for e-publications.

    (b) Write short notes on accessing e-journals and Intranet.

20. (a) Explain the five steps to develop a drug in drug industry.

    (b) Describe the use of softwares in drug design.

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3 **F–1970**

F–1971	Sub. Code
	7MCH3C1

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Chemistry

ORGANIC CHEMISTRY - III

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1. How will you prove that Favorski rearrangement follows a cyclopropanone pathway?

2. Fries rearrangement is intermolecular. Prove that statement.

3. What is Darzen's reaction?

4. Complete the following reaction

$$\begin{matrix} H_3C \\ \diagdown \\ C = CH - \overset{\overset{O}{\|}}{C} - CH_3 \\ \diagup \\ H_3C \end{matrix} \xrightarrow{\ CH_3ngBr\ } A+B$$
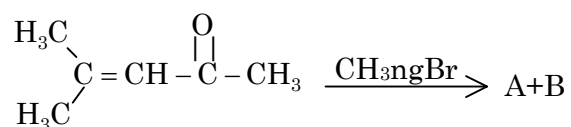
5. Formulate the following:

   Zingiberene+ Acetylenedicarboxylate $\longrightarrow$ product $\xrightarrow{\ \Delta\ }$?
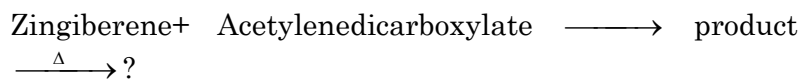
6. Show that Bredt's rule is useful in identifying the correct structure for α - pinene.

7. What do you understand by the term convergent approach to total synthesis?

8. Explain the term retro synthetic analysis with an example.

9. Give one example each for a [1, 3] and [3, 3] sigmatropic rearrangements.

10. Distinguish between intersystem crossing and internal conversion.

Part B   (5 × 5 = 25)

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

11. (a) Write notes on di-pi-methane rearrangement.

Or

(b) Discuss the mechanism of vilsmeir haak reaction.

12. (a) Explain the mechanism of Claisen ester condensation.

Or

(b) Narrate the stereo chemistry of electrophilic and free radical addition of HB_r to alkenes.

13. (a) Write a note on biosysthesis of terpenoids.

Or

(b) Outline a total synthesis of camphor.

2   **F–1971**

14. (a) What are protecting groups and explain their applications?

Or

(b) Write briefly on umpolung synthesis.

15. (a) Write a note on photo sensitization.

Or

(b) Give a short account of Norrish type I reactions.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the mechanism of the following:

(a) Dienone – phenol rearrangement

(b) Demjanov rearrangement

(c) Curtius rearrangement. (4+3+3)

17. Write an account on:

(a) Michael addition,

(b) Mannich reaction

(c) Sharpless asymmetric epoxidation. (3+3+4)

18. Elucidate the structure of abietic acid. Give a method of synthesis also.

19. (a) Write a note on homogeneous hydrogenation.

(b) Discuss the synthesis of 2, 4 – dimethyl – 2 – hydroxy pentanoic acid. (5+5)

20. Construct a correlation diagram for the disrotatory opening of 1, 3 – Cyclohexadiene to 1, 3, 5 – hexatriene. Consider whether the reaction is thermally (or) photo chemically allowed.

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3

F–1971

F–1972	Sub. Code
	7MCH3C2

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Chemistry

INORGANIC CHEMISTRY — III

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1. Mention the important conditions for MB spectroscopy.

2. What is meant by Fermi resonance?

3. What is Laporte selection rule?

4. Predict the ^{19}F-NMR spectrum of CIF_3.

5. Mention the preparation and uses of selenic acid.

6. How is Ferrocene prepared?

7. Filling of 5f sublevel is not regular in the lanthanide series. Explain.

8. What is actinide contraction?

9. Calculate the styx number of B_4H_{10}.

10. Draw and give the properties of ferrocene.

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

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

11. (a) Distinguish the following linkage isomers by IR spectroscopy M-SCN and M-NCS; M-NO and M-ON.

Or

(b) Illustrate the nature of magnetic hyper fine splitting of the MB signal for ^{57}Fe and ^{119}Sn.

12. (a) Explain the terms Contact shift and shift reagents.

Or

(b) What is charge transfer transition? Mention the characteristics of CT spectra.

13. (a) How is lead extracted for its ore? Mention any three uses.

Or

(b) What are metal carbonyls? How are they classified? Explain EAN rule as applied to metal carbonyls.

14. (a) What is lanthanide contraction? Explain their consequences.

Or

(b) Explain the separation of Pu from fission products.

15. (a) Discuss the structure of 12-tungstophosphate ion.

Or

(b) Describe the synthesis, structure and bonding of tetraborane.

2 **F–1972**

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

Answer any **three** questions.

16. (a) Distinguish between cis- and trans-isomers by using IR and Raman Spectra.

 (b) Discuss the applications of MB spectroscopy of tin compounds. $(5 + 5)$

17. (a) Discuss the evaluation of 10 Dq and β values of an octahedral complex by taking suitable example.

 (b) Explain the NMR spectra of fluxional molecules.

$(6 + 4)$

18. (a) Explain the synthesis and structure of any two ferrocene complexes.

 (b) Discuss the preparation and uses any two compounds of selenium and beryllium. $(5 + 5)$

19. (a) Compare lanthanides and Actinides.

 (b) Describe the extraction of lanthanides from selective reduction and oxidation methods. $(5 + 5)$

20. What are Wade's rules? Discuss the applications of these rules in classifying carboranes into closo, nide and arachno carboranes. Draw the structure of various isomers of $C_2B_{10}H_{12}$.

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3　　　　　　　　　 **F–1972**

F–1973	Sub. Code
	7MCH3C3

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Chemistry

PHYSICAL CHEMISTRY — III

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1.   What is meant by 'p'-type delayed fluorescence?

2.   Explain the concept of photosensitization with examples.

3.   When a clean surface of silver is irradiated with light of wavelength 230 nm, the stopping potential of the ejected electrons is found to be 0.80 V. Calculate the work function and the threshold frequency of silver.

4.   Find the general solutions of the following differential equations:

(a) $\dfrac{d^2 y}{dx^2} + 6\dfrac{dy}{dx} = 0$

(b) $\dfrac{d^2 y}{dx^2} - 3\dfrac{dy}{dx} + 2y = 0$.

5. What is the zero-point energy of a particle in a one-dimensional box of infinite height?

6. Using particle in a 3-D box model, explain the meaning for degeneracy.

7. Write down the slater determinant for B atom.

8. Draw the radial probability distribution curve of 3s and 2p orbitals.

9. Determine the possible member of vibration modes of C_6H_6 and SO_2 molecule.

10. What are fast reactions?

<div align="center">

Part B (5 × 5 = 25)

</div>

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

11. (a) Discuss the photochemical kinetics of $H_2 - Br_2$ reaction.

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

(b) Draw and explain Jablonski diagram.

12. (a) Evaluate the computation $\left[\hat{A}, \hat{B}\right]$, where $\hat{A}$ and $\hat{B}$ are given below:

$\hat{A}$ $\hat{B}$

(i) d^2/dx^2 x

(ii) $\int_0^x dx'$ $\dfrac{d}{dx}$.

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

2 $\boxed{\textbf{F–1973}}$

(b) What is black body? How classical theory failed to explain behaviour of black body radiations. Discuss Max-planck treatment of black body radiation.

13. (a) Derive time – independent schrodinger wave equation.

Or

(b) Bring out the importance of orthogonality and normalization of wave functions.

14. (a) Apply HMO theory to obtain the energies and eigen functions of ethylene molecule.

Or

(b) Explain briefly the quantum mechanical treatment of simple harmonic oscillator.

15. (a) What are transport properties? Explain viscosity property of a gas in detail.

Or

(b) Describe stopped flow method for studying kinetics of fast reaction.

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

Answer any **three** questions.

16. Write a detailed account on photochemical conversion and storage of Solar energy.

17. What are Hermitian operators? Explain its properties.

3

F–1973

18. Apply quantum mechanical treatment to rigid rotor and solve schrodinger equation for the same.

19. Explain variation method choosing helium atom.

20. Discuss the kinetics and mechanism of acid-base catalyzed reaction.

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4

F–1973

F–1974

M.Sc. DEGREE EXAMINATION, APRIL 2019

Third Semester

Chemistry

Elective — PHARMACEUTICAL CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1.   What is meant by lead compounds?

2.   How are drugs classified? Give examples.

3.   Give the structure of terramycin.

4.   Define antibiotics.

5.   What are neurotransmitters? Give examples.

6.   Mention the role of antimetalbolites in treatment of cancer.

7.   Give the structure of veerapamil.

8.   What are local antiinfective drugs?

9.   Mention the therapeutic action of sodium nitroprusside.

10. What are Intravenous anaesthetics? Give example.

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

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

11. (a) Explain the rate theory of drug activity.

Or

(b) Write notes on isoterism and bio-isoterism.

12. (a) Explain the synthesis of chloroquine.

Or

(b) Explain SAR of erythromycin.

13. (a) Discuss the mode of action of hypnotics and sedatives.

Or

(b) Explain the synthetic route of cyclophosphamide.

14. (a) Discuss the synthetic route of atenolol.

Or

(b) Describe the action of drug inhibitors used in cardiovascular diseases.

15. (a) Explain the synthesis and therapeutic action of Nifedipine.

Or

(b) Write a note on local anaesthetics.

2 **F–1974**

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

Answer any **three** questions.

16. (a) Discuss the development of QSAR studies in drug discovery.

    (b) Explain any three physicochemical parameters used in drug discovery.

17. (a) What are cephalosphorins? How does a substiturent at position-3 affect its activity? Mention its use.

    (b) Explain the synthesis of penicillin G.

18. (a) Discuss the neurochemistry of mental diseases.

    (b) Explain the synthetic route of chlormbucil.

19. Discuss the synthesis of the following:

    (a) methyldopa

    (b) sorbitrate.

20. (a) Explain the synthesis and therapeutic action of Captopril.

    (b) Discuss the analgesic action of Morphine and paracetamol.

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3   **F–1974**

F–1975

Sub. Code
7MCH4C1

M.Sc. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Chemistry

INSTRUMENTAL METHODS OF ANALYSIS

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** the questions.

1. Express the results with the significant figures: 2.12+0.88+5.27+3.8.

2. What are absolute errors and relative errors? How are they related?

3. What are the advantages of organic precipitating reagents?

4. Give any two properties of precipitates.

5. Distinguish between coulometric titration and volumetric titration.

6. Draw a neat diagram of an electrolytic cell.

7. What is meant by glass transition temperature?

8. Draw a thermogram of Zinc hexafluorosilicate.

9. State and explain Beer's and Lambert's law.

10. Write the principle of AAS.

Part B (5 × 5 = 25)

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

11. (a) Write a note on *F* test to compare the precision of two methods.

Or

(b) Define accuracy and precision. How are precision expressed for a set a data?

12. (a) Discuss the applications of gravimetric methods.

Or

(b) Describe the techniques of precipitation from homogeneous solution.

13. (a) Explain the theory of electrogravimetry.

Or

(b) How will you estimate the metal ions using coulometry?

14. (a) Distinguish between TG and DTA.

Or

(b) Explain the factors affecting the TG curves.

15. (a) Discuss the instrumentation of Flame photometry.

Or

(b) Explain the principle and applications of Turbidimetry.

2   **F–1975**

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) What are determinate errors? How can they minimised?

    (b) What do you mean by correlation coefficient? What is the principle of least square method applied to have the linear regression expression? (5 + 5)

17. What is meant by co-precipitation? How does it differ from post-precipitation? Mention their advantages and disadvantages.

18. Discuss the principle and applications of (a) chronopotentiometry and (b) amperometry. (5 + 5)

19. (a) Describe the theory and applications of DTA.

    (b) Explain the thermal behaviour of copper sulphate and calcium oxalate monohydrate using TG and DTA. (5 + 5)

20. (a) How will you determine copper in the presence of Nickel using colorimetric analysis?

    (b) Discuss the principle and applications of Fluorimetry. (5 + 5)

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F–1975

F–1976

M.Sc. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Chemistry

Elective — CORROSION CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1.   What is dry corrosion?

2.   Define wet corrosion

3.   What is dezincification?

4.   What is pitting?

5.   Give examples for heat resistant paint

6.   What is the function of the drier in paint?

7.   What is secondary cell?

8.   Define : polarization

9.   Write two advantages of fuel cells

10. What is mercury porosimetry?

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

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

11. (a) Explain how the nature of metal affects the rate of the corrosion.

Or

(b) Discuss the principle of cathodic protection.

12. (a) What is microbiological corrosion? Explain how activity of microorganisms affect it.

Or

(b) Describe galvanic corrosion.

13. (a) What is anodizing? How is it carried out?

Or

(b) Write the applications of electroplating.

14. (a) Describe thermodynamic reversibility and performance criteria.

Or

(b) What are the different types of primary and secondary cells?

15. (a) Write a note on various fuel systems.

Or

(b) Discuss the oxygen reduction in detail.

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

Answer any **three** questions.

16. (a) Describe corrosion control methods.

(b) Discuss the theory of electrochemical corrosion.

$(5 + 5)$

2

F–1976

17. Explain in detail about stress corrosion and erosion corrosion.

18. (a) Discuss the pre-treatment of surface of a material.

    (b) What are the requirements of paint?   (5 + 5)

19. (a) What are the different types of cells?

    (b) Discuss the thermodynamic reversibility.   (5 + 5)

20. (a) Write a note on various fuel systems.

    (b) Describe in detail about porous electrodes.   (5 + 5)

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F–1976

F–1977

Sub. Code
7MCH4E3

M.Sc. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Chemistry

Elective — GREEN CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer **all** questions.

1. Mention any two methods of recycling solid waste materials.

2. Suggest any two preventive measure for CO_2 pollution.

3. Give any two scope for green chemistry.

4. Mention any two principles of green chemistry.

5. List any two health impacts of lead on humanity.

6. What are heavy metals? Give suitable examples.

7. What are supercritical fluids? Give any one example.

8. Explain how does the choice of solvents impact green synthesis.

9. List any two merits of microwave assisted synthesis.

10. Give the reasons behind need to carryout organic reactions in water.

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

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

11. (a)   Explain the following terms with suitable examples:

(i)   eco-efficiency

(ii)   green products.   (2+3)

Or

(b)   Describe briefly the need for green chemistry in the present scenario.

12. (a)   Discuss the international organisations promoting green chemistry.

Or

(b)   Discuss the various awards given for green chemistry in the present scenario.

13. (a)   Discuss the methods of removing arsenic and mercury from water.

Or

(b)   Describe the impact of selenium and cobalt on human health.

14. (a)   What are ionic liquids? Classify them. Give any one synthesis of ionic liquid.

Or

(b)   Describe Suzuki coupling reaction using ionic liquids.

15. (a)   What are bio-catalysts? Explain microbial oxidation with suitable examples.

Or

2   **F–1977**

(b)   What are phase transfer catalyst? Describe their types, advantages and applications in synthesis of nitriles from alkyl and aryl halides.

Part C (3 × 10 = 30)

Answer any **three** questions.

16.   Write a short note on the following:

(a)   Green chemistry education

(b)   Environmental protection laws. (5+5)

17.   State and explain twelve principles of green chemistry.

18.   Discuss the methods for removing uranium, cadmium and vanadium heavy metals. List out the hazardous effect of cobalt, nickel and thallium on human health.

19.   (a)   What are super critical fluids? Write a note on super critical CO_2.

(b)   Comment on the choice of catalyst in green synthesis. (5+5)

20.   Define sonochemical reactions. Explain with one example each for different types of sonochemical reactions.

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3   **F–1977**

F–2145	Sub. Code
	7MCH4E1

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry

Elective — NANO CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1.   What are zero dimensional materials? Give an example.

2.   Define sonochemical cavitation.

3.   Differentiate carbon nanotube and graphene.

4.   What are nanofibres? Give example.

5.   What are larger and smaller fullerenes?

6.   Give a preparation of nano CdS.

7.   List the differences between AFM and SEM.

8.   Give the basic principle of Auger Emission Spectroscopy.

9.   What are nanopipettes?

10.   What are DNA junctions?

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

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

11. (a)   Write short notes on classification of nanomaterials.

Or

(b)   Explain polymer mediated synthesis of nanoparticles with examples.

12. (a)   List the various applications of carbon nanotubes.

Or

(b)   What are semiconductor quantum dots? Explain with example.

13. (a)   Write notes on Catenanes and Rotaxanes.

Or

(b)   Explain superconductivity in C_{60}.

14. (a)   Give the principles and applications of X-ray diffraction technique.

Or

(b)   Discuss the principles and applications of Electron Spectroscopy for Chemical Analysis (ESCA).

15. (a)   Give a brief account of molecular diodes.

Or

(b)   Explain the force measurements in simple protein molecules.

2   **F–2145**

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

Answer any **three** questions.

16. Explain

    (a) Sol-Gel mediated synthesis of nanomaterials

    (b) Synthesis of nanomaterials using microorganisms.

    $(5 + 5)$

17. Describe the applications of nanomaterials in various fields.

18. (a) What are carbon clusters? Explain their advantages.

    (b) Discuss the synthesis and applications of nano TiO_2 and nano ZnO. $(5 + 5)$

19. Give the principles and applications of Transmission Electron Microscopy (TEM) Scanning Tunneling microscopy (STM).

20. Write notes on :

    (a) DNA based sensors.

    (b) Molecular recognition.

    (c) Protein nano array. $(3 + 3 + 4)$

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F–2145

F–2146

Sub. Code
7MCH4E4

M.Sc. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Chemistry

Elective : MOLECULAR PHOTOCHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1.   What is meant by intersystem crossing?

2.   What do you mean by radiational transitions?

3.   Outline the mechanism of photoreduction.

4.   What is singlet oxygen?

5.   Give any one photo substitution reaction of transition metal complexes.

6.   Mention any one photo rearrangement reaction of transition metal complexes.

7.   Illustrate Barton reaction.

8.   What is photo cleavages? Give an example.

9.   What is the principle involved in Reinecke's salt actionometer?

10.   What do you understand by the term lasers?

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

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

11. (a) Write a brief note on phosphorescence emission.

Or

(b) Give an account of fluorescence emission.

12. (a) Illustrate oxetane formation with suitable example.

Or

(b) Write a short note on photodimerisation.

13. (a) Give an account of photoredox reactions.

Or

(b) Discuss the photochemistry of metallocenes.

14. (a) Write brief note on di-π methane rearrangement.

Or

(b) Write a note on Hoffmann-Loefller-Freytag reaction.

15. (a) Discuss the function of photochroic actinometer.

Or

(b) A system absorbs 3×10^{18} quanta of radiation per second. When it was irradiated for 10 minutes it was found that 3.0×10^{-3} mole of the reactant had reacted. What is the quantum yield of the reaction?

2 **F–2146**

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What are the properties of an excited state? Explain the various unimolecular and bimolecular photo physical processes of an excited species.

17. Write notes on :

    (a) Photo oxidation

    (b) Chemiluminescence. (5 + 5)

18. Narrate the applications of inorganic photochemistry in photochemical conversion and storage of solar energy.

19. Write a brief account on the following :

    (a) Photo-Fries rearrangement of anilides.

    (b) Photochemical isomerisation.

    (c) Photochemical substitution reactions. (4 + 3 + 3)

20. Explain any five important applications of lasers.

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3 **F–2146**