This question paper contains **2** printed pages]

NEPWT—1001—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(NEP-2020)

RESEARCH METHODOLOGY

(Tuesday, 10-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—60

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Of the remaining solve any *three* questions.

(*iii*) Calculator and log table is allowed.

1. Attempt any *three* of the following : 15

   (*a*) Motivation in research

   (*b*) Need for research designing

   (*c*) ANOCOVA

   (*d*) Statistical measure in research.

2. (*a*) What do you mean by research ? Describe the different steps involved in a research process. 8

   (*b*) Discuss the observation method as a technique of data collection. 7

P.T.O.

3. (*a*) Calculate the mean, median and mode of the following data : 8

3, 6, 3, 7, 4, 3, 9

(*b*) Draw the flow diagram for hypothesis testing. 7

4. (*a*) What is Sampling ? Explain steps in sample design. 8

(*b*) Calculate the chi-square value of the following data : 7

Fully Agree	**Not Sure**	**Not Agree**	**Total**
102	108	75	285

5. (*a*) Define case study. Give their characteristics. 8

(*b*) Explain dependent and independent variables. 7

6. Write short notes on : 15

(*a*) Fundamental type of research

(*b*) Parametric test

(*c*) Secondary data sources.

This question paper contains **3** printed pages]

NEPWT—318—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper SCHEE-401

(Physical Methods in Chemistry)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—60

Note :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from Q. No. **2** to Q. No. **6**.

(*iii*) Use of logarithm table and simple non-programmable calculator is allowed.

1. Answer the following questions : 15

(*a*) Explain plane of symmetry and improper axis of rotation with suitable example.

(*b*) What is error ? Explain different types of errors.

(*c*) Explain the scattering of neutrons by solids and liquids.

P.T.O.

2. Answer the following questions : 4+4=8

(*a*) (*i*) Distinguish between reducible and irreducible representation.

(*ii*) Define the group and give various postulates of the group.

(*b*) Explain what is meant by deviation and standard deviation with suitable example. 7

3. Solve the following questions :

(*a*) Explain Ramachandran diagram. Diffraction angle (2θ) equal to 16.8° for crystal having interplanar distance in crystal 0.400 nm, second order diffraction was observed for X-ray. Calculate wavelength of X-ray used (sin 8.4° = 0.146). 8

(*b*) What is character table ? Construct character table for C_{3v} point group. 7

4. Solve the following questions :

(*a*) Distinguish between accuracy and precision.

"Suppose an object is weighted five times and the following values obtained are as

0.1010, 0.1020, 0.1005, 0.1030, 0.1015,

then calculate mean deviation and standard deviation for these values. 8

(*b*) Explain the Laue's method of X-ray structural analysis of crystal. 7

5. Attempt the following questions :

(*a*) Derive equation for the relation between scattering intensity and scattering angle in electron diffraction. 8

(*b*) List symmetry elements, show it diagrammatically and find the point groups for PCl_5, HOCl and XeF_4 molecules. 7

6. Write short notes : 15

(*a*) Abelian and non-abelian point groups

(*b*) Miller indices

(*c*) Principle of neutron diffraction.

This question paper contains **2** printed pages]

NEPWT—51—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper SCHEC-401

(Inorganic Chemistry—I)

(Thursday, 12-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (1) Question No. **1** is compulsory and solve any *three* from remaining five.

(2) Calculator and log table is allowed.

1. (*a*) Give the characteristics of reactions occurring through inner sphere mechanism. 5

(*b*) How will you prepare cis and trans $[Pt(C_2H_4)(NH_3)Cl_2]$ complex compounds ? 5

(*c*) Explain semiconducting nanoparticles a novel optical property of nano-materials. 5

(*d*) Explain, *d-d* transition spectra in metal complexes. 5

2. (*a*) Explain with suitable examples the role of conjugated base in SN^1CB mechanism. 10

P.T.O.

(*b*) List bottom-up approaches for the synthesis of nanoscale structures and explain synthesis of metallic nanoparticles in detail. 10

3. (*a*) Write about the synthesis and uses of carbon nano tubes. 10

(*b*) One of the excited state of Ti has electronic configuration [Ar] $4s^2 3d^1 4p^1$. Calculate the number of microstates. 10

4. (*a*) What is trans effect ? Explain π-bonding theory of trans effect. 10

(*b*) Draw and explain Orgel diagram for d^4 and d^6 configurations in octahedral complexes. 10

5. (*a*) Give an account about scanning probe microscopy. 10

(*b*) Determine the spectroscopic ground state term symbol for d^3 and d^6 configuration. 10

6. (*a*) Explain electron transfer between $[Fe(CN)_6]^{3-}$ and $[Fe(CN)_6]^{4-}$ is much faster than between $[Co(NH_3)_6]^{3+}$ and $[Co(NH_3)_6]^{2+}$. 5

(*b*) Write a note on cis effect. 5

(*c*) Give an account of bionanocomposite. 5

(*d*) Explain cooperative magnetism in brief. 5

This question paper contains **2** printed pages]

NEPWT—319—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper-SCHEE-402

(Bio-organic Chemistry)

(Thursday, 19-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—60

Note :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* questions from remaining five.

1. Answer the following questions : 15

(*a*) How will you distinguish between prokaryotic cell and eukaryotic cell ?

(*b*) Define monosaccharide, disaccharide and polysaccharide with suitable examples.

(*c*) Discuss chemical and enzymatic hydrolysis of proteins to peptides.

2. (*a*) Write a note on purine and pyrimidine bases of nucleic acids. 8

(*b*) Explain structure and biological functions of glucosaminoglycans. 7

P.T.O.

3. (*a*) Discuss properties and biological functions of lipid aggregates-micelles and bilayers. 8

(*b*) Write a note on amino acid metabolism degradation. 7

4. (*a*) Discuss Kreb's cycle in detail. 8

(*b*) What are lipoproteins ? Give their composition and function. 7

5. (*a*) Discuss metabolic processes in detail. 8

(*b*) Discuss transcription and replication of DNA. 7

6. Write short notes on the following : 15

(*a*) Chemistry of tryptophan releasing hormones

(*b*) Structure and function of triacylglycerols

(*c*) Functions of intracellular organelles.

This question paper contains **4** printed pages]

NEPWT—117—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper–SCHEC-402

(Organic Chemistry)

(Saturday, 14-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* questions from remaining five questions.

(*iii*) Figures to the right indicate full marks.

1. Solve the following : 20

(*i*) Explain the terms homoaromaticity and antiaromaticity with examples.

(*ii*) Explain with example homotopic, enantiotopic groups and faces.

(*iii*) Write a note on Anchimeric Assistance.

(*iv*) Explain Arenium ion mechanism with suitable example.

P.T.O.

2. Solve the following : 20

(*i*) Discuss the following :

(*a*) Neighbouring group participation by σ and π bonds

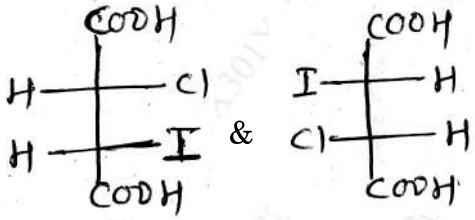
(*b*) Classical and non-classical carbocation.

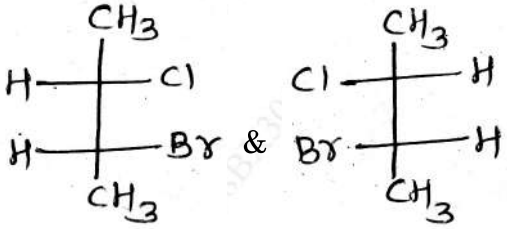
(*ii*) (*a*) What are annulenes ? Explain aromaticity of 14 Annulenes.

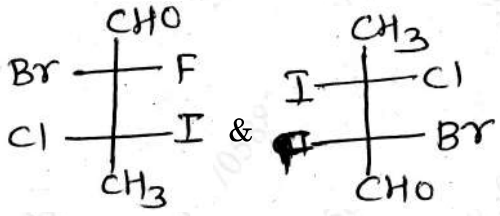
(*b*) Taft equation.

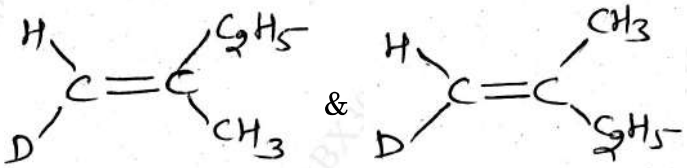
3. Answer the following : 20

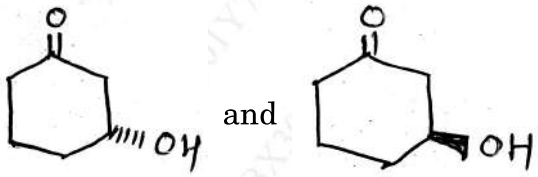
(*i*) Assign the configuration and describe their relationship :

(*a*) 

(*b*) 

(*c*)  &

(*d*) 

(*e*)  and

(*ii*) Explain the following :

(*a*) IPSO substitution

(*b*) Gattermann Koch reaction.

4. Explain the following : 20

(*i*) Give the generation, structure and stability of carbocation and carbanion

(*ii*) Explain the confirmation of 1, 2 and 1, 3-dimethyl cyclohexane.

5. Discuss the following : 20

(*i*) Explain the following :

(*a*) Ambident Nucleophile

(*b*) Vinyl chloride is unreactive towards S_N1 and S_N2 reaction.

P.T.O.

(*ii*) Explain the orientation and reactivity of aniline and Nitrobenzene towards electrophilic substitution reaction.

6. Write short notes on the following : 20

(*i*) Stereoselective and stereospecific reactions

(*ii*) Sommlet-Hauser rearrangement

(*iii*) Diazonium coupling reaction

(*iv*) Cross-conjugation.

This question paper contains **3** printed pages]

NEPWT—184—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

SCHEC–403

(Physical Chemistry)

(Tuesday, 17-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. *:—* (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* questions from Q. No. **2** to Q. No. **6**.

(*iii*) Use of log table and simple calculator is allowed.

Given :

(*i*) $h = 6.626 \times 10^{-34}$ Js

(*ii*) Mass of electron, $m_e = 9.109 \times 10^{-31}$ kg

(*iii*) Velocity of light = $c = 3 \times 10^{8}$ ms^{-1}

(*iv*) Gas constant, R = 8.314 $JK^{-1}mol^{-1}$.

P.T.O.

1. Solve the following : 20

(*a*) What is Russel-Sander's coupling ? Determine the ground state term symbol for p^4 and d^5 configurations.

(*b*) Calculate the ionic strength of 0.20 molal Na_2SO_4 solution and 0.125 molal $AlCl_3$ solution.

(*c*) Explain Debye-Huckel theory of strong electrolytes.

(*d*) Explain N and P-type semiconductors. What is the effect of temperature on them ?

2. Attempt the following : 20

(*a*) Derive an equation for energy of particle in 1-D box. Calculate the energies in eV of an electron moving in an infinite 1-D box of width 1 A° and show them in a suitable energy level diagram.

(*b*) Derive Lipmann equation for surface excess phenomenon.

3. Attempt the following : 20

(*a*) (*i*) State Onsagar equation applicable to strong electrolytes. Explain its verification and the need of Onsager equation to explain behaviour of strong electrolytes.

(*ii*) Calculate mean activity coefficient, $r_{\pm}$ of

(*a*) 0.01 molal NaCl

(*b*) 0.001 molal Na_2SO_4 solution at 25°C.

(*b*) State the phase rule for three component system. Explain ternary system with phase diagram containing one pair of partially miscible liquids.

4. Attempt the following : 20

(*a*) (*i*) Define Ladder operator and prove that :

$$\left[\hat{J}^2, \hat{J}_+\right] = 0$$

(*ii*) State postulates of quantum mechanics.

(*b*) What is fugacity ? Explain graphical method of determination of fugacity.

5. Solve the following : 20

(*a*) Explain Zeta-potential. Describe :

(*i*) Gouy-Chapmann theory of electrical double layer.

(*ii*) Describe Debye-Huckel limiting law with its significance.

(*b*) What are solid state defects ? Explain in detail.

6. Write short notes on the following : 20

(1) Partial molar properties and its significance

(2) Zeeman effect

(3) Debye-Falkenhagen effect

(4) Two solid and a liquid component eutectic systems.

This question paper contains **2** printed pages]

NEPWT—32—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper SCHEC-451

(Inorganic Chemistry)

(Wednesday, 11-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

Note :— (*i*) Question No. **1** is compulsory and solve any *three* from remaining five questions.

(*ii*) Calculator and log table is allowed.

1. (*a*) Explain importance of essential elements. 5

(*b*) Explain role of catalyst in alkene hydrogenation reaction. 5

(*c*) Explain isolobal fragmentation of transition elements. 5

(*d*) Calculate EPR line predicted for $\dot{C}F_2H$ radical : 5

(12_C, I = 0, F, H = I = 1/2)

P.T.O.

2. (*a*) What is catalyst ? Explain the role of catalyst in alkene polymerisation. 10

(*b*) Calculate the force constant for Ni–N bond in nickel dimethyl glyoxime complex. IR spectrum of dimethyl glyoxime does not show band in the region of 500 to 600 cm^{-1} but $Ni(CMG)_2$ shows medium intensity band at 550 cm^{-1}. (Atommic weight of Ni = 58.71, N = 14, No = 6.022×10^{23}) 10

3. (*a*) Explain Mossbauer spectrum of $K_3[Fe(CN)_6]$. 10

(*b*) What is isolobal analogy ? What are the Hofmann conditions for isolability. Explain isolability, between $Fe(CO)_4$ and $Cr(CO)_5$. 10

4 (*a*) Explain Waker's oxidation of alkene in detail. 10

(*b*) Describe the structure and functions of myoglobin. 10

5 (*a*) Explain number of lines, spectrums, hyperfine splitting and relative intensities of $\dot{C}H_3$ radicals. 10

(*b*) Give importance of Na^+/K^+ pump in biological system. 10

6. (*a*) Write a short note on Bohr's effect. 5

(*b*) Write a short note on Fischer Tropsch synthesis. 5

(*c*) Write a short note on isolobal analogy. 5

(*d*) Reference compound in ESR. 5

This question paper contains **3** printed pages]

NEPWT—98—2024

FACULTY OF SCIENCE & TECHNOLOGY

M.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper SCHEC-1452

(Organic Chemistry)

(Friday, 13-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (1) Question No. **1** is compulsory.

(2) Solve any *three* questions from the remaining five questions.

(3) Simple calculator and log table is allowed.

1. Solve the following : 20

(*a*) Explain Wittig reaction. Give its mechanism. How would you synthesis C_6H_5—CH = CH—CH_3 ?

(*b*) Illustrate the mechanism for Mannich reaction.

(*c*) Explain [3, 3] sigmatropic rearrangement.

(*d*) Complete the reaction with mechanism :

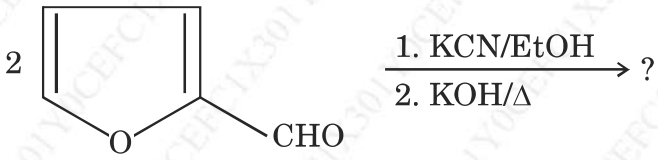
$$(C_6H_5)_2\ CO + Ph—C \equiv C—Ph \xrightarrow{h\nu} ?$$

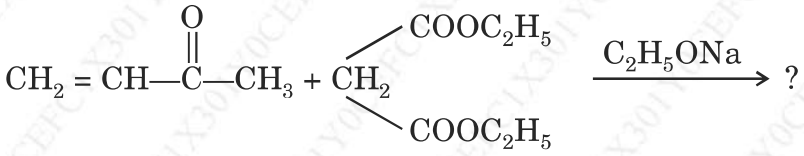
P.T.O.

2. Solve the following : 20

(*a*) What is hydroboration ? Explain the regioselectivity of hydroboration with suitable example and mechanism.

(*b*) Predict the product of the following :

(*i*) 

(*ii*) 

3. Answer the following : 20

(*a*) Interconversion of :

1, 3, 5 hexatriene $\rightleftharpoons$ 1, 3 cyclohexadiene

under thermal and photochemical condition can be explained by FMO method.

(*b*) With the help of correlation diagram method, show that Diel's Alder reaction is a thermally allowed process.

4. Discuss the following : 20

(*a*) What are Norrish type-I and II reaction ? Explain its mechanism with suitable example.

(*b*) Explain the Paterno-Buchi reaction with suitable example and its stereochemistry.

5. Explain the following : 20

(*a*) What is photoreduction ? Explain the photoreduction of Benzophenone with mechanism.

(*b*) Explain cycloaddition of 1, 3-butadiene and ethylene by FMO and PMO method.

6. Write short notes on the following : 20

(*a*) 1, 3 dipolar cycloaddition

(*b*) E^1CB mechanism

(*c*) Aldol condensation

(*d*) Stobbe reaction.

This question paper contains **3** printed pages]

NEPWT—165—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper SCHEC-453

(Physical Chemistry—II)

(Monday, 16-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (1) Question No. **1** is compulsory.

(2) Solve any *three* questions from Q. No. **2** to Q. No. **6**.

(3) Use of log table and calculator is allowed.

(4) Figures to the right indicate full marks.

1. Solve the following : 20

(*a*) What is Micellisation ? Explain thermodynamics of micellisation.

(*b*) A protein sample has an equimolar mixture of heamoglobin (M_1 = 15.5 kg mol^{-1}), ribonuclease (M_2 = 13.7 kg mol^{-1}) and myoglobin (M_3 = 17.2 kg mol^{-1}). Calculate $\bar{M}_N$ and $\bar{M}_M$. Which is greater ?

(*c*) Derive the Ilkovic equation of diffusion current in polarographic cell.

(*d*) What are fast reactions ? Explain :

(*i*) Flash photolysis, and

(*ii*) NMR method.

P.T.O.

2. Solve the following : 20

(*a*) Derive BET equation of multilayer adsorption and state its importance.

(*b*) What is overpotential ? Explain in detail :

(*i*) Hydrogen over-voltage, and

(*ii*) Oxygen overpotential.

3. Solve the following : 20

(*a*) What are :

(*i*) isotactic

(*ii*) atactic, and

(*iii*) syndiotactic polymer ?

Explain Osmometry method of determination of molar masses of polymers.

(*b*) What are oscillatory reactions ? The half-life for the radioactive decay of ^{14}C is 5730 years. An archaeological artifact containing wood had only 80% of the ^{14}C found in living tree. Estimate the age of the sample.

4. Attempt the following : 20

(*a*) The intrinsic viscosity of a solution of polyisobutylene at 20°C is 1.80 decilitre per gram and molecular weight is 6.0×10^5 gm per mole. Determine constant k if $a = 0.64$.

(*b*) Write an account on surface films on liquids and catalytic activity at surfaces.

5. Solve the following : 20

(*a*) What is basic principle of Polarography ? Explain half-wave potential and any *three* applications of polarography.

(*b*) Describe the kinetics of a reaction, decomposition of Ethane.

6. Write short notes on the following : 20

(*a*) Surface active agents and its classification

(*b*) Butler-Volmer equation and its significance

(*c*) Michaelis-Menten equation and its importance in enzyme catalysis

(*d*) (*i*) Polymers and macromolecules

(*ii*) Liquid crystal polymers.

This question paper contains **3** printed pages]

NEPWT—274—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

(SCHEE-1451)

(Principles of Spectroscopy)

(Wednesday, 18-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—60

N.B. :— (*i*) Question No. 1 is compulsory.

(*ii*) Attempt any *three* questions from Q. No. **2** to Q. No. **6**.

(*iii*) Use of logarithm table and simple non-programmable calculator is allowed.

1. Answer the following questions : 15

(*a*) Explain the effect of isotopic substitution of rotational spectrum of diatomic molecule.

(*b*) Find out the fundamental modes of vibrations for molecules :

(*i*) CO_2

(*ii*) SO_2.

(*c*) Explain the energies of atomic orbitals.

P.T.O.

2. Answer the following questions :

(*a*) (*i*) The pure rotational spectrum of gaseous diatomic molecule consists of a series of equally spaced lines separated by 10 cm^{-1}. Calculate the bond length of the molecule. The reduced mass of molecule is 1.70×10^{-27} kg.

($h = 6.626 \times 10^{-34}$ J.s., $C = 3 \times 10^{8}$ m/s)

(*ii*) Explain the factors affecting width of spectral line. 8

(*b*) Discuss the vibrational spectrum of anharmonic oscillator. 7

3. Attempt the following questions :

(*a*) State and explain Frank-Condon principle. 8

(*b*) Explain rotational vibrational spectra of diatomic molecule. 7

4. Attempt the following questions :

(*a*) (*i*) The force constant for a diatomic molecule is 860 Nm^{-1}. If the reduced mass of molecule is 1.76×10^{-27} kg, then determine the fundamental vibrational frequency. 4

(*ii*) Explain principle of IR-spectroscopy. 4

(*b*) Derive equation for the energy of diatomic molecule as rigid rotator. 7

5. Answer the following questions :

(*a*) Explain the electronic spectra of polyatomic molecule. 8

(*b*) What is Raman effect ? Explain pure rotational Raman spectrum. 7

6. Write short notes on the following : 15

(*i*) Koopman theorem

(*ii*) Mutual exclusion principle

(*iii*) Spectra of alkali metal atom.

This question paper contains **2** printed pages]

NEPWT—275—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

SCHEE-1452

(Laboratory Safety)

(Wednesday, 18-12-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—60

N.B. :— (*i*) First question is compulsory.

(*ii*) Solve any *three* questions from remaining five.

1. Attempt all questions : 15

(*a*) Give an account on health risks in fertilizer sector.

(*b*) Write in detail on safety rules.

(*c*) Explain in brief disposal of biological materials.

2. Answer the following questions :

(*a*) Discuss Health risks in electrical and radioactive sectors. 7

(*b*) Give an account on case studies of chemical incidences. 8

P.T.O.

3. Answer the following questions :

(*a*) Discuss in detail compressed gases and storage. 8

(*b*) Discuss Health risks in physical, chemical and biological sectors. 7

4. Answer the following questions :

(*a*) Give an account on preparation for emergencies. 8

(*b*) How will you working with highly reactive substance ? Explain it in detail. 7

5. Answer the following questions :

(*a*) Explain in detail types of toxins. 7

(*b*) Discuss health risks in pharmacy and cracker industries. 8

6. Write short notes on : 15

(*a*) Health risks in pesticide sector

(*b*) Explosive substances

(*c*) Vizag gas leak incidence.

This question paper contains **2** printed pages]

NEPWT—252—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(NEP 2020)

ZOOLOGY

Paper SZOOET-501

(Appllied Parasitology-I(A))

(Trematodes and Cestodes)

(Tuesday, 17-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—60

Note :— (*i*) Question Number **1** is compulsory.

(*ii*) Out of remaining 5 questions (Q. No. **2** to Q. No. **6**) answer any **3** questions.

(*iii*) *All* questions carry equal marks.

(*iv*) Illustrate your answers with suitable labelled diagrams, wherever necessary.

1. Answer any *three* of the following : 15

(*a*) Give an account on Aspidobothria.

(*b*) Give a brief account of innate immunity of Trematodes.

(*c*) Give a brief account of modification of uterus in Cestodes.

(*d*) Give an account of general organization of Acanthocephala.

P.T.O.

2. (*a*) Give an account of general organization of Trematodes. 8

(*b*) Give an account of Egg shell formation in Trematodes. 7

3. (*a*) Give an account of different larval forms in Trematodes. 8

(*b*) Describe the morphology, life cycle and pathogenicity of *Paragonimus westermani*.

4. (*a*) Give an account of general organization of Cestodes. 8

(*b*) Give an account of Hold Fast organs in Cestodes. 7

5. (*a*) Describe the morphology, life cycle and pathogenicity of *Taenia solium*. 8

(*b*) Describe the morphology, life cycle and pathogenicity of *Hymenolepis nana*.

6. Answer any *three* of the following : 15

(*a*) Write a note on Helminth Metabolism

(*b*) Write a note on *Fasciolopsis buski*.

(*c*) Describe the salient features of Proteocephalidea.

(*d*) Give an account on Hydatid Cyst.

This question paper contains **5** printed pages]

NEPWT—21—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

ORGANIC CHEMISTRY

SCHECT-1501

(Advanced Spectroscopic Methods)

(Tuesday, 10-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (1) *First* question is compulsory.

(2) Solve any *three* questions from remaining five.

1. Solve the following : 20

(*a*) Explain, why conjugated diene absorb at longer wavelength, whereas nonconjugated diene absorb at shorter wavelength in U.V. spectroscopy.

(*b*) Why TMS solvent is used as standard reference in NMR spectroscopy ?

(*c*) Explain the metastable ion peak and its application in the spectroscopy.

(*d*) Calculate the fundamental modes of vibrations in the following :

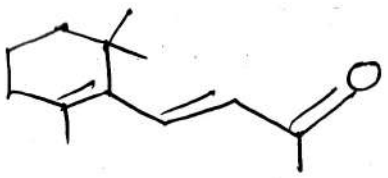
(*i*) H_2S

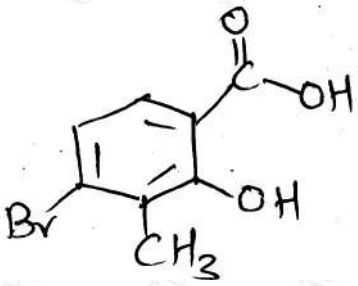
(*ii*) C_2H_2.

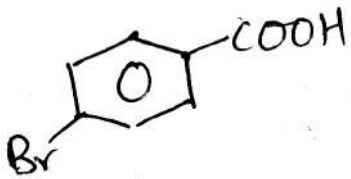
P.T.O.

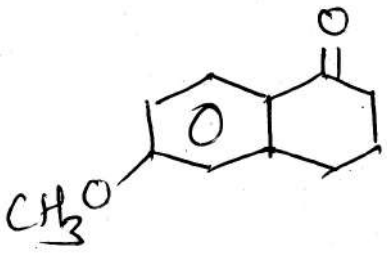
2. Answer the following : 20

(*a*) Calculate the λ_{max} of the following compounds :

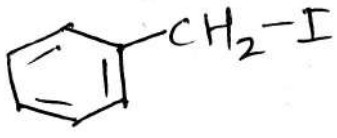
(*i*) 

(*ii*) 

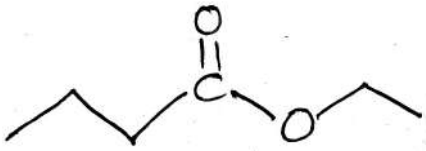
(*iii*) 

(*iv*) 

(*b*) Explain the genesis of the following compounds :

(*i*) 

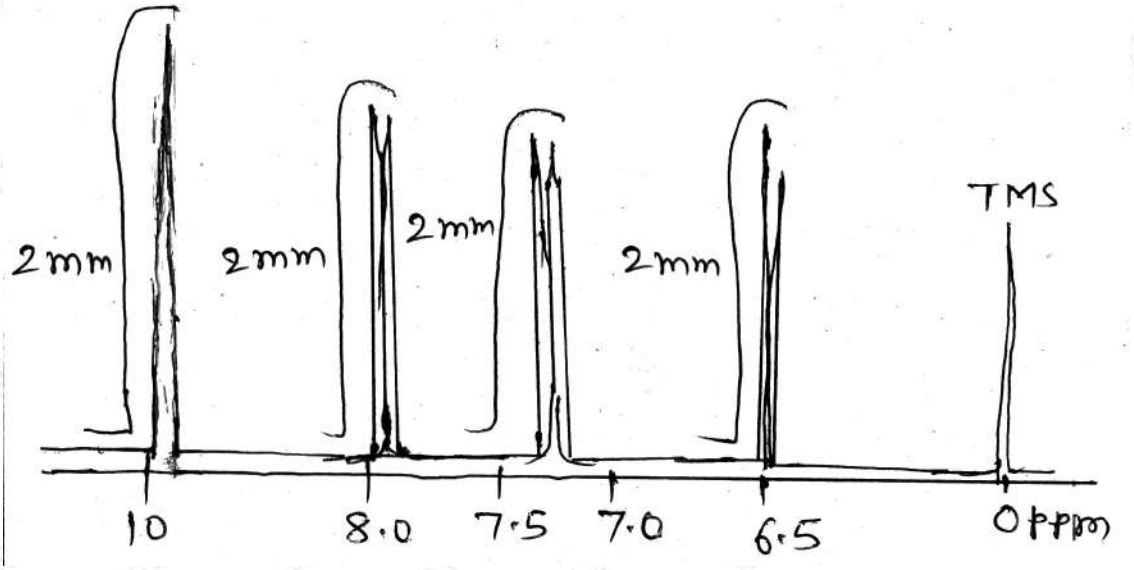
m/z = 218, 91, 65, 39.

(*ii*) 

m/z = 116, 88, 60

3. Solve the following : 20

(*a*) Compound having M.F. $C_5H_4O_2$ shows the following NMR spectrum, deduce its structure :



(*b*) An organic compound with molecular mass 174, having M.F. $C_8H_{14}O_4$ exhibits following spectral data :

UV:213 nm $\in_{max}$: 60

P.T.O.

IR:(cm^{-1}) 2941 – 2857, 1745, 1458.

NMR :(δ ppm) :

(*i*) 4.14, q, 4H, J = 7.2 CPS.

(*ii*) 2.6, s, 4H

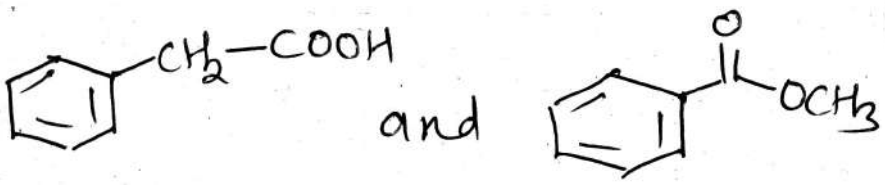
(*iii*) 1.27, t, 6H, J = 7.2 CPS

Deduce the structure of compound.

4. Answer the following : 20

(*a*) Solve the following :

(*i*) Differentiate the following by using IR :



(*ii*) Write a note on fingerprint region.

(*b*) An organic compound having M.F. $C_4H_8OBr_2$ exhibits the following spectral data, deduce the structure of compound :

IR (cm^{-1}) : 3000 – 2900, 1425, 1279, 1117.

PMR (δ, ppm) : 3.75, t, 4H, 3.40, t, 4H

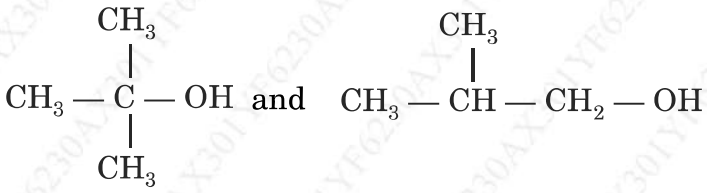
Mass : 234 (M + 4), 232 (M + 2), 230 (M+), 139, 137, 109, 107, 95, 93.

5. Answer the following : 20

(*a*) Solve the following :

(*i*) Explain deshielding of proton in benzene and shielding effect in acetylene.

(*ii*) How will you distinguish the following compounds by using off-resonance decoupled ^{13}C-NMR :



(*b*) A compound with M.F. $C_{10}H_{12}O_2$ displays the following spectral data :

IR IR (cm^{-1}) : 1690, 1600, 1580, 1490, 770, 690.

PMR (δ, PPM) : 1.3, d, 6H

5.3, septet, 1H

7.3 – 7.7, m, 5H

^{13}C-NMR : (δ) : 22 (q), 68 (d), 128 (d), 129 (d), 131 (s), 135 (d), 175 (s).

6. Write short notes on : 20

(*a*) McLafferty rearrangement

(*b*) Spin-spin coupling in PMR

(*c*) Chemical shift in PMR

(*d*) Electronic effect on absorption frequency of carbonyls.

This question paper contains **5** printed pages]

NEPWT—87—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

ORGANIC CHEMISTRY

Paper–I (SCHECT-1502)

(Organic Synthesis)

(Thursday, 12-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

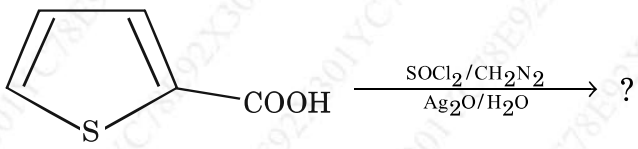
Time—3 *Hours* *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* from remaining five questions.

1. Solve the following : 20

(*a*) Predict the product of the following reaction with mechanism :

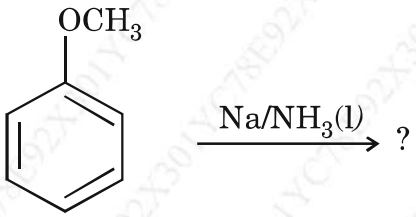


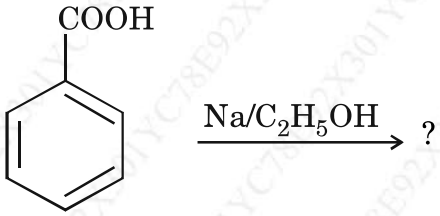
(*b*) Explain Vilsmeier-Haack reaction with mechanism.

(*c*) Predict the product of the following reaction ? Comment on its chemoselectivity :

P.T.O.

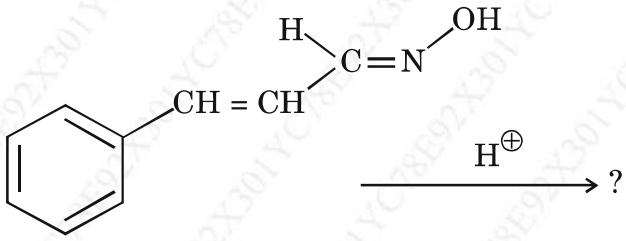
(*d*) Complete the following reaction :

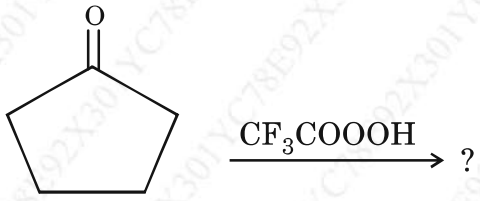
(*i*) 

(*ii*) 

2. Answer the following : 20

(*a*) Complete and outline the mechnism of the following reaction :

(*i*) 

(*ii*) 

(*b*) Give the uses of the following oxidising agent with mechanism in organic synthesis :

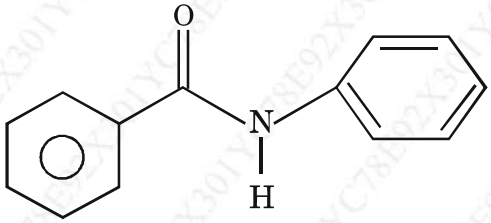
(*i*) OsO_4

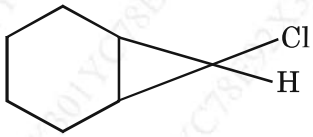
(*ii*) HIO_4.

3. Explain the following : 20

(*a*) What is Corey-Winter olefication ? Explain with suitable example and mechanism.

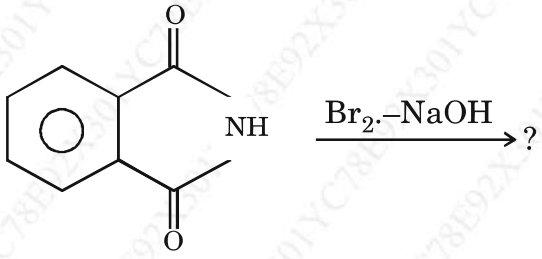
(*b*) How will you obtain the following compounds using suitable reagent ? Explain with mechanism :

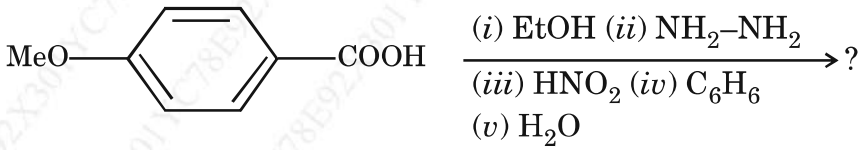
(*i*)  using DCC

(*ii*)  using red Alumina.

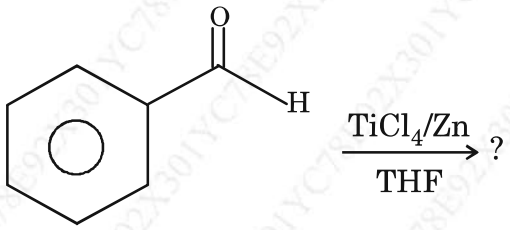
4. Solve the following :

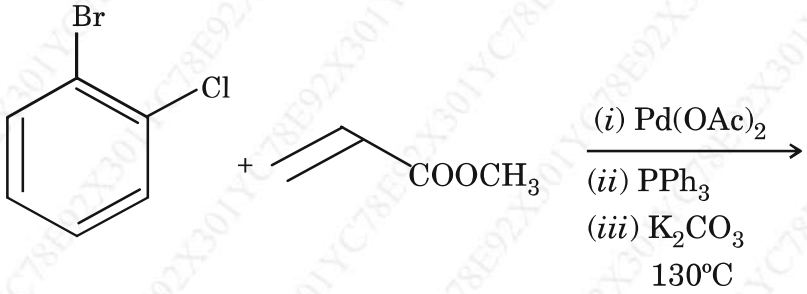
(*a*) Predict the product of the following reaction with mechanism : 20

(*i*) 

(*ii*) 

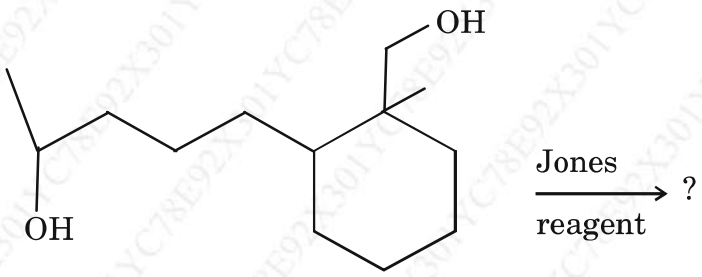
(*b*) Predict the product of the following reactions with mechanism :

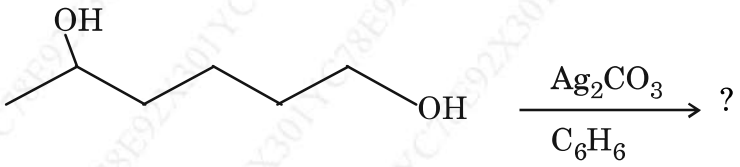
(*i*) 

(*ii*) 

5. Solve the following : 20

(*a*) Predict the product of the following reaction with mechanism :

(*i*) 

(*ii*) 

(*b*) How will you convert carboxylic acid into alcohol using the following reagents, explain with mechanism :

(*i*) BH_3

(*ii*) $LiAlH_4$.

6. Write short notes on the following : 20

(*a*) Pinacol-pinacolone rearrangement

(*b*) Bathford Steven's and discuss role of solvent

(*c*) Lead tetraacetate

(*d*) Hydrogenolysis using BBr_3 and HI.

This question paper contains **2** printed pages]

NEPWT—154—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(NEP-2020)

ORGANIC CHEMISTRY

Paper–SCHECT-1503

(Natural Product)

(Saturday, 14-12-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from remaining questions.

(*iii*) *All* questions carry equal marks.

1. Solve the following : 10

(*a*) Presence of β-ionone nucleus in vitamin A_1.

(*b*) Write a note on isoprene rule.

(*c*) Explain size of Ring 'A' and 'B' in cholesterol.

(*d*) Explain presence of tertiary Nitrogen in Morphine.

2. Answer the following : 10

(*a*) Give a detailed structure determination of Zingiberene.

(*b*) Write a note on Diels Hydrocarbon.

P.T.O.

3. Answer the following : 10

(*a*) Offer synthesis for Ascorbic acid.

(*b*) Explain structure of methyl morphol.

4. Answer the following : 10

(*a*) Discuss structure determination of Menthol.

(*b*) Give synthesis of testosterone.

5. Answer the following : 10

(*a*) What are Vitamins ? Give a detailed classification. Give sources and deficiency diseases of vitamin A, C, E.

(*b*) Give synthesis of Quininic acid.

6. Solve the following : 10

(*a*) Give introduction, nomenclature of terpenoids.

(*b*) Explain the position of angular methyl group at C_{13}.

(*c*) Give conversion of vitamin A_1 to Vitamin A_2.

(*d*) Explain presence of secondary alcoholic —OH group in Quinine.

This question paper contains **3** printed pages]

NEPWT—250—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(NEP-2020 Pattern)

ORGANIC CHEMISTRY

Paper–SCHEET-1501

(Medicinal Chemistry)

(Tuesday, 17-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* questions from remaining five questions.

1. Solve the following : 20

(*i*) Explain the terms :

(1) Pharmaceutics

(2) Pharmacodynamics.

(*ii*) What is Prodrug ? Discuss prodrugs designing and types of prodrugs.

(*iii*) Explain the reduction reaction in drug metabolism with suitable example.

(*iv*) Explain inhibition of cell wall synthesis as mechanism of action of antibiotics.

P.T.O.

2. Discuss the following : 20

(*i*) Biological defences and Chemical defences.

(*ii*) Procedures followed in drug design.

3. Answer the following : 20

(*i*) Discuss the theories of drug activity ?

(*ii*) Give synthesis and SAR of 4-amino salicylic acid and isoniazid.

4. Solve the following : 20

(*i*) How will you design the enzyme inhibitors by :

(1) Competitive inhibitors, and

(2) Suicide enzyme inactivation ?

(*ii*) Explain the following :

(1) Structure activity of tetracycline and synthesis of Chlortetracycline,

(2) Synthesis and SAR of Chloramphenicol.

5. Explain the following : 20

(*i*) SAR of sulphones as antileprotic drugs

(*ii*) Structure and activity of :

(1) Coumarin derivatives, and

(2) Benzyl penicillin.

6. Write short notes on the following : 20

(*i*) Biological assay

(*ii*) Free-Wilson method in QSAR studies

(*iii*) Oxidation reaction involved in drug metabolism

(*iv*) Vitamin-K analogues.

This question paper contains **3** printed pages]

NEPWT—251—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(NEP-2020)

ORGANIC CHEMISTRY

Paper–SCHEET-1502

(Applied Chemistry)

(Tuesday, 17-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* questions from remaining five questions.

(*iii*) Simple calculator and log table is allowed.

1. Solve the following : 20

(*a*) Explain the following suprameolecules with suitable example :

(*i*) Cryptands

(*ii*) Cyclophane.

(*b*) Explain piezoelectric and pyroelectric organic materials.

(*c*) Discuss Asphyxia and stress analysis.

(*d*) Explain analgesic and tranquilizer.

P.T.O.

2. Discuss the following : 20

(*a*) Explain π-π stacking interactions in supramolecular chemistry. Comment on π-π stacking of porphyrin and nanocarbon.

(*b*) Discuss collection and preservation of physical evidences and evidentiary documentation. Explain its significance.

3. Answer the following : 20

(*a*) Explain photochromic organic materials and their classes.

(*b*) Explain analysis of the following :

(*i*) Analgesic poison

(*ii*) Irritant poison

(*iii*) Hypnotic poison

(*iv*) Ant-histamine.

4. Explain the following : 20

(*a*) Discuss the following terminology with sutaible example :

(*i*) Molecular channels and transport process

(*ii*) Molecular device and nanotechnology.

(*b*) Explain the following terms :

(*i*) TTFTCNQ

(*ii*) Molecular electronics and logic architecture.

5. Discuss the following : 20

(*a*) How will you perform the following analysis ?

(*i*) Liquor analysis

(*ii*) Petroleum analysis

(*iii*) Fire and Debris analysis.

(*b*) Discuss importance of physiological test in forensic analysis. Comment on explosive analysis.

6. Write short notes on the following : 20

(*a*) Molecular association of biological molecules

(*b*) Organomagnet

(*c*) Crime-scene investigation

(*d*) Explosive and explosion residue analysis.