VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]
M.Sc. Chemistry Degree (Semester) Examinations, November 2016
Part – III : Core Subject : First Semester : Paper – I

ORGANIC CHEMISTRY – I
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions : $(10 \times 2 = 20)$

1. Why chloroacetic acid is more acidic than acetic acid?

2. The boiling point of ethanol is 78.5^{o}C compared to dimethylether - 24.9^{o}C. Account it.

3. Tropolone fails to react with 2,4-dinitrophenylhydrazine. Why?

4. How niterens can be used as an intermediate ? Give an example.

5. Define Prochiral centre and give example of a molecule that possess Prochiral centre.

6. Write the nomenclature of the following
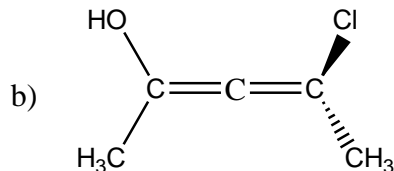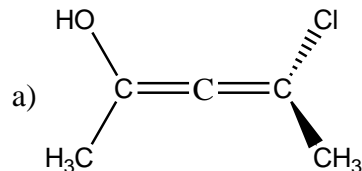
7. Which conformation is stable in cyclohexane. Why?

8. What is meant by 1, 3 diaxial interaction with an example.

9. What happens when α- terpene is treated with alcoholic H_2SO_4?

10. Write down the structure of maltose indicating the reducing and non-reducing part.

SECTION – B

Answer ALL Questions : $(5 \times 5 = 25)$

11. a) Dicuss the nature of cyclodextrins.
    (OR)
    b) Write notes on hyperconjugation and cross conjugation.

12. a) Discuss How Craig's rule can be applied in determining the aromaticity.
    (OR)
    b) How primary kinetic isotopic effect is employed in the mechanism of reaction?

13. a) Is it possible that compounds with no chiral carbon can be optically active? If so illustrate.
    (OR)
    b) Write notes on enantiomeric excess.

14. a) Determine the conformational free energy difference by Curtin - Hammett principle.
    (OR)
    b) Discuss the reactivity of cyclohexanes.

15. a) How will you derrmine the size of ring in sugars?
    (OR)
    b) Discuss the stereochemistry of morphine.

SECTION – C

Answer any THREE Questions : $(3 \times 10 = 30)$

16. Discuss the significance of σ and ρ in Hammett equation.

17. a) Discuss the kinetic and thermodynamic control in various reactions. **(5)**
    b) Explain the reactivity and stability of carbocations and free radicals. **(5)**

18. Give one reaction for each of the following: a) stereospecificity **(4 × 2½ = 10)**
    b) enantioselectivity   c) stereoselectivity d) diasteroselectivity

19. Give an account on the conformational stability of decalin with potential energy diagram.

20. Elucidate the strucuture of α- santonine.

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M.Sc. Chemistry Degree (Semester) Examinations, November 2016

Part – III : Core Subject : First Semester : Paper – II

ORGANIC CHEMISTRY – I

Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions : $(10 \times 2 = 20)$

1. State and explain radius ration rules.

2. Define the term electronegativity.

3. What are solvents? How are they classified?
   Give an example for each type.

4. Write the Usanovich concepts of acids and bases.

5. How are $S_4 N_4$ and $S_2 N_2$ prepared?

6. What are Zeolites? Mention its uses.

7. Define ORD and CD.

8. Name the following Co-Ordination complexes
      i) $[Co(NH_3)_5 CO_3]Cl$ ii) $[Pt (NH_2CH_2CH_2NH_2)_3]Br_4$

9. What is meant by Template effect?

10. Write the Jahn – Teller effect.

SECTION – B

Answer ALL Questions : $(5 \times 5 = 25)$

11. a) Draw and explain the M .O diagram of NO and CO molecules.
       (OR)
    b) What is meant by lattice energy? Explain the Born – Haber cycle
       for the formation of NaCl crystal from its elements.

12. a) What are non- aqueous solvents? Give any four examples.
       Liquid ammonia acts as a solvent. Briefly explain.
       (OR)
    b) Explain the theories and application of HSAB principle.

13. a) i) State and explain Wade's rule. And STYX number.   **(3)**
       ii) What are isopoly and heteropolyacids?   **(2)**
       (OR)
    b) What are borazines and phosphazenes? Explain their preparation,
       properties and uses.

14. a) What is meant by stereo isomerism? Explain Ionization, Hydrate
       and Ligand isomerism in co – ordination complexes.
       (OR)
    b) Define optical activity. Explain optical isomerism exhibited in
       tetrahedral complexes with a suitable example.

15. a) What is meant by stability constants of complexes?
       How is it determined by Job's continuous variation Method?
       (OR)
    b) i) Give an account of Molecular Orbital Theory (MOT).   **(3)**
       ii) What are the consequences of John – Teller distortion? **(2)**

SECTION – C

Answer any THREE Questions : $(3 \times 10 = 30)$

16. a) Define hybridization. What are the postulate of VSEPR theory.
       Mention its applications.   **(6 + 4)**
    b) Discuss about Born –Lande equation and Kapustinkii equation.

17. a) Explain the classification of hard and soft acids and bases. **(6 + 4)**
    b) Liquid SO_2 and HF acts as a solvent. Briefly explain.

18. a) What are Carbides? How are they classified?
       Explain with suitable examples.   **(3 + 4 + 3)**
    b) What are silicates? How are they classified?
       Explain their structure briefly.
    c) Discuss about preparation and properties of Boranes.

19. Explain the geometrical isomerism exhibited in Octahedral and
    square planar complexes.

20. a) compare CFT and VBT   b) Define CFSE   **(7 + 3)**

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M.Sc. Chemistry Degree (Semester) Examinations, November 2016
Part – III : Core Subject : First Semester : Paper – III

PHYSICAL CHEMISTRY – I
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 2 = 20)**

1. Define mean free path.

2. Write the principle of equipartition of energy.

3. What is meant by partial molar volume?

4. Give two applications of Gibbs Duhem equation.

5. What is linear operator?

6. Explain the term 'Orthogonality'.

7. Discuss the concept of tunnelling.

8. Write a note on spin angular momentum.

9. Discuss the factors influencing the rate of a reaction.

10. Give the signifance of activation energy.

SECTION – B

Answer ALL Questions :   **(5 × 5 = 25)**

11. a) Discuss the types of molecular velocities.

(OR)

b) Write short notes on principle of equipartition of energy.

12. a) Derive Gibbs Duhem equation.

(OR)

b) Explain the detailed account on thermodynamic equation of state.

13. a) What is an operator? Explain with suitable example of commutator and laplacian operators.

(OR)

b) Explain the 'Heisenberg Uncertainty Principle'.

14. a) Apply the Schrodinger equation to a particle in one dimensional box in which the potential is zero when $0 < x < a$. Obtain the expression for energy of the particle.

(OR)

b) Discuss the shapes of s and $p-$ type of atomic orbitals.

15. a) Write the kinetic study of pseudo unimolecular reaction with suitable example.

(OR)

b) Discuss the limitations of collision theory of bimolecular reactions.

SECTION – C

Answer any THREE Questions :   **(3 × 10 = 30)**

16. Define liquid crystals. Discuss the theory and applications of liquid crystals.

17. How will you determine the fugacity of real gases?

18. Write the postulates of quantum mechanics.

19. Derive an expression for the energy of a rigid rotator using Schrodinger wave equation.

20. Describe a comparison of collision theory and ARRT.

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M.Sc. Chemistry Degree (Semester) Examinations, November 2016
Part – III : Core Subject : Third Semester : Paper – I

ORGANIC CHEMISTRY – III
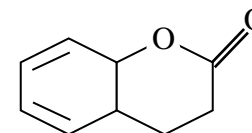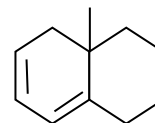Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

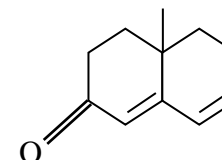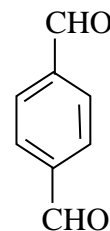**Answer ALL Questions :**   **(10 × 2 = 20)**

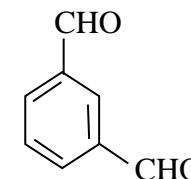1. How can IR spectrum differentiate the following compounds?
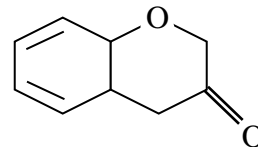
and

2. Calculate the λ_{max} for the following molecules.

and

3. How ^1H NMR be used to differentiate the following molecules?

and

4. How will you distinguish ethylbenzoate and methylbenzylether by ^{13}C NMR?

5. Give an example of functional group interconversion in synthesis.

6. What are the requirements of an ideal synthesis?

7. What is Paterno – Buchi reaction? Explain with an example.

8. What is Barton reaction?

9. What is meant by a plain curve? Give an example.

10. Give the mass spectral fragmentation of $C_6H_5OCOCH_3$.

SECTION – B

Answer ALL Questions :   **(5 × 5 = 25)**

11. a) Discuss the various vibrational modes in a molecule.

(OR)

b) Write briefly on IR spectroscopy of organic molecules with respect to inter and intra molecular hydrogen bonding.

12. a) Give a brief account of the double resonance technique in $^1H\ NMR$.

(OR)

b) Write an account on NOE.

13. a) Write short notes on use of activating and blocking groups.

(OR)

b) Discuss the convergent approach to total synthesis.

14. a) Explain how cis-trans isomerizations can be achieved by photochemistry?

(OR)

b) Give an Huckel – Mobius analysis of pericyclic reactions.

15. a) Write short notes on M_C Lafferty rearrangement.

(OR)

b) What is axial α - haloketone rule? Explain with a suitable example.

SECTION – C

Answer any THREE Questions :   **(3 × 10 = 30)**

16. Write brief notes on :   **(6 + 4)**

a) Effect of reaction medium and pH on the absorption maxima of molecules.

b) Finger print region.

17. a) What is spin – spin coupling? Explain the coupling involved in 1, 1, 2 – tribromo ethane and 1, 2 – dibromo – 1 – phenyl ethane.

b) An organic compound of molecular formula of $C_{10}H_{14}O$ showed *UV and IR* characteristics of an aromatic compound. Proton *NMR* showed the following features.

δ Values : 1.1 (doublet 6H), 2.2 (singlet, 3H), 4.0 (septet, 1H) and multiplet between 6.3 – 7.0 (4H). Based on the NMR data, assign a suitable structure for the organic compound.   **(5 + 5)**

18. Write short notes on   a) Retro synthetic analysis   **(5 + 5)**

b) Stereo selectivity

19. a) Apply the FMO method to controtatory and disrotatory ring closures of 1, 3 – butadiene.   **(5 + 5)**

b) Discuss the mechanism of photoreduction of benzopheone.

20. a) Write a short note on octant rule.   **(6 + 4)**

b) MASS of heptan – 3 – one gives ions of m/e 114, 85, 72 *and* 57. Identify the fragments.

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M.Sc. Chemistry Degree (Semester) Examinations, November -2016
Part – III : Core Subject : Third Semester : Paper - III

INORGANIC CHEMISTRY – III
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 2 = 20)**

1. Write any two biological functions of Myoglobin.

2. Define co-operativity?

3. What is nitration fixation?

4. Give the definition of photosynthesis?

5. What are point groups ?

6. Write a short note on HM notation ?

7. What are contact shifts ?

8. Write the theory of quadrupole interactions in MB Spectroscopy ?

9. Write any two spectral properties of Actinides ?

10. What is lanthanides contraction?

SECTION – B

Answer ALL Questions :   **(5 × 5 = 25)**

11.a) Write about the oxygen transport and storage in Haemoglobin.

(OR)

b) Explain the calcium Biochemistry.

12.a) Explain the chemistry of vitamin B_{12}.

(OR)

b) Write an account of Cytochrome P-450 enzymes.

13.a) Discuss the different dislocations in solids.

(OR)

b) Explain the experimental methods of study of non-Stoichiometry.

14.a) Explain about the ESR spectra of Mn (II) complexes.

(OR)

b) Discuss the applications of metal carbonyls by using MB spectroscopy.

15.a) Give a brief account of magnetic properties of lanthanides.

(OR)

b) Explain the use of lanthanide complexes as shift agents.

SECTION – C

Answer any THREE Questions :   **(3 × 10 = 30)**

16. Discuss the enzymes exploiting acid catalysis with examples.

17. Discuss the structure and mechanism of PS II with example.

18. Describe in detailed the electrical properties in solid state.

19. Write note on,
    i) NMR is used in structure determination
    ii) NMR of paramagnetic complexes.

20. Compare a detailed account of lanthanides and actinides.

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M.Sc. Chemistry Degree (Semester) Examinations, November 2016
Part – III : Core Subject : Third Semester : Paper – III

PHYSICAL CHEMISTRY – III
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions : $(10 \times 2 = 20)$

1. Define symmetry operations.

2. Give the group multiplication table for water molecule.

3. Write the symmetry selection rules for IR spectra.

4. Define projection operator.

5. What is meant by shielding of magnetic nuclei?

6. What is meant by Nuclear Overhauser Effect?

7. Define Electron Spin Resonance Spectra.

8. Explain electric quadruple moment in NQR spectra.

9. Write any two significance of viscosity in biological systems.

10. What are the factors affecting surface tension?

SECTION – B

Answer ALL Questions : $(5 \times 5 = 25)$

11. a) Explain the matrix representation of symmetry operations.

(OR)

b) State and explain the great orthogonality theorem.

12. a) Write the differences between Raman and IR spectra.

(OR)

b) Apply group theory on the electronic spectra of ethylene molecule.

13. a) Write a brief note on the position of NMR signals.

(OR)

b) Discuss the relaxation process in NMR spectroscopy.

14. a) Explain the basic principle in ESR spectroscopy.

(OR)

b) Discuss the applications of NQR spectra.

15. a) Explain the interfacial tension and Daniel Davison model.

(OR)

b) Discuss the limitations of tracer experiments.

SECTION – C

Answer any THREE Questions : $(3 \times 10 = 30)$

16. Discuss the reducible and irreducible representation in group matrices.

17. Explain in detail the delocalisation energy for butadiene molecule.

18. Describe a detail account on spin-spin coupling in NMR spectroscopy.

19. Describe the applications of ESR spectroscopy.

20. Define tracer technique. Discuss the general tracer requirements.

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M.Sc. Chemistry Degree (Semester) Examinations, November 2016
Part – III : Elective Subject : First Semester : Paper – I

COMPUTER APPLICATIONS IN CHEMISTRY
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 2 = 20)**

1. Write any two rules for declaring variables.

2. State the purpose of increment and decrement operators.

3. Define array.

4. How do you access the address of a variable?

5. What is network?

6. What is MODEM? Mention its purpose.

7. What are the salient feature of windows?

8. How to create a database in MS-Access?

9. Define WWW.

10. Write about web browsers.

SECTION – B

Answer ALL Questions :   **(5 × 5 = 25)**

11. a) Write about data types and symbolic constants.

(OR)

b) Explain formatted input and output in C.

12. a) Explain any five library functions.

(OR)

b) Write a C program for calculation of cell parameters.

13. a) List out the advantages and disadvantages of distributed system.

(OR)

b) Explain any one of communication system.

14. a) Discuss the salient features of MS-Word.

(OR)

b) How to create and manipulate tables in MS-Word?

15. a) How to receive and send E-mail?

(OR)

b) Describe any two internet protocols.

SECTION – C

Answer any THREE Questions :   **(3 × 10 = 30)**

16. Explain all operators in C.

17. Write a C program to calculate concentration of Beer – Lamberts Law and determination of rate constants in kinetics.

18. Explain network architecture with neat diagram.

19. How to draw chemical structure and pasting them in text? Explain.

20. What is internet? Discuss the applications of internet in chemistry.

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M.Sc. / M.Com. Degree (Semester) Examinations, November 2016

Part – III : Non-Major Elective Subject : Third Semester : Paper – I

FORENSIC CHEMISTRY

Under CBCS – Credit 5

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 2 = 20)**

1. What is the drug administrative route?

2. How will you identify drug addiction?

3. What is the forensic science?

4. Define forensic department sector.

5. What is a polygraph?

6. What is mean by paternity test?

7. Which type of questions is asked in polygraph test?

8. What is meant by serology?

9. What is a finger print?

10. What do you mean by ridges?

SECTION – B

Answer ALL Questions :   **(5 × 5 = 25)**

11. a) Discuss the classification of poison.

(OR)

b) How will you distinguish between Drunkenness and Concussion?

12. a) Write and explain briefly about forensic chemistry department.

(OR)

b) Discuss about forensic physics department.

13. a) What is a DNA profiling? Explain in details.

(OR)

b) Discuss the applications of DNA finger prints.

14. a) Explain Blood strain pattern analysis.

(OR)

b) Discuss TRANSFER and SPATTER.

15. a) Write a note on patent finger prints.

(OR)

b) Write a note on crime seine of finger print.

SECTION – C

Answer any THREE Questions :   **(3 × 10 = 30)**

16. Discuss the symptoms and treatment of Arsenic poison and how will you detect the Arsenic poisons.

17. Explain blood stain analysis and its useful to detect Crime in effective manner.

18. Briefly explain blood stain pattern analysis.

19. i) Discuss the principle and applications of polygraph analysis.

ii) Write the sources of DNA.

20. Discuss the physical and chemical methods in development of finger prints.

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