

**RSM SNDP YOGAM ARTS AND SCIENCE COLLEGE, KOYILANDY**  
**PG DEPARTMENT OF CHEMISTRY**  
**PG ENTRANCE COACHING 2018-19**

**SYLLABUS**

***Unit 1: Catalysis***

Homogeneous catalysis—mechanism -Arrhenius intermediates and van't Hoff intermediates - acid base catalysis – specific and general acid catalysis – enzyme catalysis-Michaelis-Menten Mechanism- Auto catalysis - oscillating reactions – mechanisms of oscillating reactions (Lotko - Volterra, brusselator and oregonator) Heterogenous catalysis –adsorption and catalysis-unimolecular surface reactions –bimolecular surface reaction –Langmuir-Hinshelwood mechanism and Eley-Rideal mechanism – illustration using the reaction  $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$

***UNIT 2: Stereochemistry***

Optical Isomerism: Definition – Specific rotation – Chirality and elements of symmetry – DL configuration - Enantiomers - Optical isomerism in glyceraldehyde, lactic acid and tartaric acid - Diastereomers – Meso compounds – Cahn-Ingold-Prelog rules - RS notations for acyclic optical isomers with one and two asymmetric carbon atoms - Erythro and threo representations (elementary idea only) - Racemic mixture - Resolution methods - Enantiomeric excess. Optical isomerism in compounds lacking asymmetric carbon atoms: Biphenyls and allenes. Asymmetric synthesis. Geometrical Isomerism: cis-trans, syn-anti and EZ notations with examples - Methods of distinguishing geometrical isomers using melting point, dipole moment, solubility, cyclisation and heat of hydrogenation

***UNIT 3: Reaction Mechanism:***

Reaction Intermediates: Carbocations, carbanions, free radicals and carbenes (definition, hybridization, structure, classification, formation, stability and important reactions) - Rearrangement of carbocations – Nitrenes (mention only). Types and Subtypes of Organic Reactions: Substitution, addition, elimination and rearrangement (definition and simple examples only)

### ***Unit 5: Chemistry of Transition and Inner Transition Elements***

Heteropoly and isopoly anions of W, Mo, V. Standard reduction potentials and their diagrammatic representations Ellingham diagram. Latimer and Frost diagrams. Pourbaix diagram.

Differences between 4f and 5f orbitals. Magnetic and spectroscopic properties. Uranyl compounds. Trans-actinide elements. Super heavy elements – production and chemistry

### ***UNIT 5: Spectroscopy***

Interaction of electromagnetic radiation with matter - Energy levels in molecules - Born-Oppenheimer approximation. Rotational Spectroscopy: Introduction - Rigid rotor - Expression for energy - Selection rules - Intensities of spectral lines - Determination of bond lengths of diatomic molecules. Vibrational Spectroscopy: Simple harmonic oscillator - Energy levels - Force constant - Selection rules - Anharmonicity - Fundamental frequencies - Overtones - Fingerprint region - Group frequency concept - Degree of freedom for polyatomic molecules - Modes of vibrations of CO<sub>2</sub> and H<sub>2</sub>O. Raman Spectroscopy: Basic principles - Qualitative treatment of rotational Raman effect - Vibrational Raman spectra - Stokes & anti-stokes lines and their intensity difference - Selection rules - Mutual exclusion principle. Electronic Spectroscopy: Basic principles - Frank-Condon principle - Electronic transitions - Singlet and triplet states - Dissociation energy of diatomic molecules - Chromophore and auxochrome - Bathochromic and hypsochromic shifts. Nuclear Magnetic Resonance (NMR) Spectroscopy: Proton NMR and <sup>13</sup>C NMR - Principle - Number and position of signals - Chemical shift - Intensity of signals - Different scales - Spin-spin coupling. Electron Spin Resonance (ESR) Spectroscopy: Principle - Hyperfine structure - ESR of methyl, phenyl and cycloheptatrienyl radicals.

### ***UNIT 6: Coordination Chemistry***

Crystal field theory - Splitting of d-orbitals in octahedral, tetrahedral, tetragonal and square planar complexes - Factors affecting crystal field splitting - CFSE of low spin and high spin octahedral complexes - Spectrochemical series - Explanation of geometry, magnetism and colour - Merits and demerits of Crystal field theory. Molecular orbital theory for octahedral complexes (with sigma bonds only). Stability of complexes: Inert and labile complexes - Factors influencing stability. Application of complexes in qualitative and quantitative analysis.

**UNIT 7: Organometallic Compounds**

Definition – Classification based on the nature of metal-carbon bond – Zeise's salt - Metal carbonyls – 18 electron rule – Mononuclear and polynuclear carbonyls of Fe, Co and metal carbonyls. Ferrocene: Preparation, properties and bonding (VBT only). Zeigler Natta catalyst in the polymerization of alkene and Wilkinson catalyst in the hydrogenation of alkene (mechanism not expected), d Ni (structure only) – Bonding

**UNIT 8: Electrochemistry**

Galvanic cells - Reversible cells - Reversible electrodes - Types of reversible electrodes - Reference electrodes - Standard hydrogen electrode, calomel electrode and quinhydrone electrode - Standard electrode potential - Electrochemical series - Nernst equation for electrode potential and EMF of a cell - Relationship between free energy and electrical energy - Gibbs Helmholtz equation to galvanic cells. Concentration cells: Concentration cells with and without transference - Liquid junction potential. Application of EMF measurements: Solubility of sparingly soluble salts - Determination of pH - pH measurement using glass electrode - Potentiometric titrations - Hydrogen-oxygen fuel cell - Electrochemical theory of corrosion of metals.



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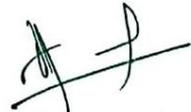
PG Department of Chemistry

PG entrance Coaching Programme 2018-19

Attendance Sheet

Sl No	Name	2.2.19	3.2.19	4.2.19	5.2.19	6.2.19	9.2.19	10.2.19
		9.30-12.30	9.30-12.30	3.30-4.30	3.30-4.30	3.30-4.30	9.30-12.30	9.30-12.30
1	Navya B S	Nav	Nav	Nav	Nav	Nav	Nav	Nav
2	Siva Kumar K	Siva	Siva	Siva	Siva	Siva	Siva	Siva
3	Sreepriya T k	S	S	S	S	S	S	S
4	Sruthi T P	Sruthi	Sruthi	Sruthi	Sruthi	Sruthi	Sruthi	Sruthi
5	Bincy K	Bincy	Bincy	Bincy	Bincy	Bincy	Bincy	Bincy
6	Abhirami Krishna	A	A	A	A	A	A	A
7	Anagha Sudhan	Anagha	Anagha	Anagha	Anagha	Anagha	Anagha	Anagha
8	Anju Aravind	Anju	Anju	Anju	Anju	Anju	Anju	Anju
9	Archana Sreenivasan	A	A	A	A	A	A	A
10	Arunima Ashok	Arunima	Arunima	Arunima	Arunima	Arunima	Arunima	Arunima
11	Arya Pramod	A	A	A	A	A	A	A
12	Aswathy A	A	A	A	A	A	A	A
13	Chandhana S	C	C	C	C	C	C	C
14	Geethanjali D	G	G	G	G	G	G	G
15	Punya V P	P	P	P	P	P	P	P
16	Sayana S	S	S	S	S	S	S	S

  
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Sl No	Name	16.2.19 9:30-12:30	17.2.19 9:30-12:30	18.2.19 3:30-4:30	19.2.19 3:30-4:30	23.2.19 9:30-12:30	24.2.19 9:30-12:30	27.2.19 3:30-4:30
1	Navya B S	<i>Navya</i>	<i>Navya</i>	<i>Navya</i>	<i>Navya</i>	<i>Navya</i>	<i>Navya</i>	<i>Navya</i>
2	Siva Kumar K	<i>Siva</i>	<i>Siva</i>	<i>Siva</i>	<i>Siva</i>	<i>Siva</i>	<i>Siva</i>	<i>Siva</i>
3	Sreepriya T k	<i>Sreepriya</i>	<i>Sreepriya</i>	<i>Sreepriya</i>	<i>Sreepriya</i>	<i>Sreepriya</i>	<i>Sreepriya</i>	<i>Sreepriya</i>
4	Sruthi T P	<i>Sruthi</i>	<i>Sruthi</i>	<i>Sruthi</i>	<i>Sruthi</i>	<i>Sruthi</i>	<i>Sruthi</i>	<i>Sruthi</i>
5	Bincy K	<i>Bincy</i>	<i>Bincy</i>	<i>Bincy</i>	<i>Bincy</i>	<i>Bincy</i>	<i>Bincy</i>	<i>Bincy</i>
6	Abhirami Krishna	<i>Abhirami</i>	<i>Abhirami</i>	<i>Abhirami</i>	<i>Abhirami</i>	<i>Abhirami</i>	<i>Abhirami</i>	<i>Abhirami</i>
7	Anagha Sudhan	<i>Anagha</i>	<i>Anagha</i>	<i>Anagha</i>	<i>Anagha</i>	<i>Anagha</i>	<i>Anagha</i>	<i>Anagha</i>
8	Anju Aravind	<i>Anju</i>	<i>Anju</i>	<i>Anju</i>	<i>Anju</i>	<i>Anju</i>	<i>Anju</i>	<i>Anju</i>
9	Archana Sreenivasan	<i>Archana</i>	<i>Archana</i>	<i>Archana</i>	<i>Archana</i>	<i>Archana</i>	<i>Archana</i>	<i>Archana</i>
10	Arunima Ashok	<i>Arunima</i>	<i>Arunima</i>	<i>Arunima</i>	<i>Arunima</i>	<i>Arunima</i>	<i>Arunima</i>	<i>Arunima</i>
11	Arya Pramod	<i>Arya</i>	<i>Arya</i>	<i>Arya</i>	<i>Arya</i>	<i>Arya</i>	<i>Arya</i>	<i>Arya</i>
12	Aswathy A	<i>Aswathy</i>	<i>Aswathy</i>	<i>Aswathy</i>	<i>Aswathy</i>	<i>Aswathy</i>	<i>Aswathy</i>	<i>Aswathy</i>
13	Chandhana S	<i>Chandhana</i>	<i>Chandhana</i>	<i>Chandhana</i>	<i>Chandhana</i>	<i>Chandhana</i>	<i>Chandhana</i>	<i>Chandhana</i>
14	Geethanjali D	<i>Geethanjali</i>	<i>Geethanjali</i>	<i>Geethanjali</i>	<i>Geethanjali</i>	<i>Geethanjali</i>	<i>Geethanjali</i>	<i>Geethanjali</i>
15	Punya V P	<i>Punya</i>	<i>Punya</i>	<i>Punya</i>	<i>Punya</i>	<i>Punya</i>	<i>Punya</i>	<i>Punya</i>
16	Sayana S	<i>Sayana</i>	<i>Sayana</i>	<i>Sayana</i>	<i>Sayana</i>	<i>Sayana</i>	<i>Sayana</i>	<i>Sayana</i>

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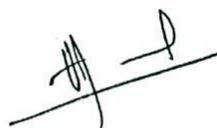
**PG DEPARTMENT OF CHEMISTRY  
REPORT ONPG ENTRANCE COACHING 2018-19**

In Central Universities and other National Institutions selection procedure is on the basis of entrance test. So the Department of Chemistry decided to start a coaching programme for final year B.Sc chemistry students. The Department designed a separate syllabus based on the syllabus of JAM and other entrance test. Classes were conducted by Dr. J S Ampily (Head of The Department) Dr. Deepa K P, Namitha R and Amrutha Raj. The classes were from 02.02 2018 to 27.02.2018. The Department announced the program and 16 students enrolled. At the end of the program a mock test and interview were conducted. Two students were selected in various universities.

No. of students attended	No. of students benefitted
16	16



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**PG DEPARTMENT OF CHEMISTRY**

**PG ENTRANCE COACHING 2017-18**

**SYLLABUS**

**UNIT 1: Chemical bonding in diatomic molecule**

Schrödinger equation for a molecule, Born - Oppenheimer approximation; Valence Bond (VB) theory - VB theory of H<sub>2</sub> molecule, singlet and triplet state functions (spin orbitals) of H<sub>2</sub>; Molecular Orbital (MO) theory - MO theory of H<sub>2</sub><sup>+</sup> ion, MO theory of H<sub>2</sub> molecule, MO treatment of homonuclear diatomic molecules - Li<sub>2</sub>, Be<sub>2</sub>, C<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> & F<sub>2</sub> and hetero nuclear diatomic molecules - LiH, CO, NO & HF, bond order, correlation diagrams, non-crossing rule; Spectroscopic term symbols for diatomic molecules; Comparison of MO and VB theories.

**UNIT 2: Stereochemistry**

Optical Isomerism: Definition - Specific rotation - Chirality and elements of symmetry - DL configuration - Enantiomers - Optical isomerism in glyceraldehyde, lactic acid and tartaric acid - Diastereomers - Meso compounds - Cahn-Ingold-Prelog rules - RS notations for acyclic optical isomers with one and two asymmetric carbon atoms - Erythro and threo representations (elementary idea only) - Racemic mixture - Resolution methods - Enantiomeric excess. Optical isomerism in compounds lacking asymmetric carbon atoms: Biphenyls and allenes. Asymmetric synthesis. Geometrical Isomerism: cis-trans, syn-anti and EZ notations with examples - Methods of distinguishing geometrical isomers using melting point, dipole moment, solubility, cyclisation and heat of hydrogenation

**UNIT 3: Concepts of Acids and Bases**

Major acid-base concepts, Arrhenius, Bronsted-Lowry, Solvent system, Lux-Flood, Lewis and Usanovich concepts. Classification of acids and bases as hard and soft. HSAB principle. Theoretical basis of hardness and softness. The Drago-Wayland equation, E and C parameters - Symbiosis. Applications of HSAB concept. Chemistry of nonaqueous solvents - NH<sub>3</sub>, SO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub>, BrF<sub>3</sub>, HF, N<sub>2</sub>O<sub>4</sub> and HSO<sub>3</sub> F. Nonaqueous solvents and acid-base strength. Super acids - surface acidity.

**UNIT 4: Spectroscopy**

Interaction of electromagnetic radiation with matter - Energy levels in molecules - Born-Oppenheimer approximation. Rotational Spectroscopy: Introduction - Rigid rotor - Expression for energy - Selection rules - Intensities of spectral lines - Determination of bond lengths of diatomic molecules. Vibrational Spectroscopy: Simple harmonic oscillator - Energy levels - Force constant - Selection rules -

  
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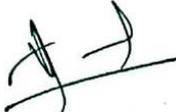
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Attendance Sheet

Sl No	Name	3.2.18	4.2.18	10.2.18	11.2.18	17.2.18	18.2.18	19.2.18
		9.30-12.30	9.30-12.30	9.30-12.30	9.30-12.30	9.30-12.30	9.30-12.30	9.30-12.30
1	Akshay.p	Ab						
2	Punya.V	Pu						
3	Anjitha.A	Anj						
4	Aparna.S	AP						
5	Arya.P	Ary						
6	Sarangi Surendran	Sa						
7	Varsha.N.M	Var						
8	Harikrishnan.K.P	Har						
9	Amitha.A.S	Ami						
10	Anuroopa.A.S	A	A	A	A	A	A	A
11	Anusree.P.K	Am						
12	Ardra.A.K	Ar						
13	Karthika.S	Ka						
14	Yamuna.P.S	Ya						

  
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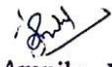
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Sl No	Name	20.2.18	21.2.18	22.2.18	23.2.18	24.2.18	25.2.18	26.2.18.
		3.30-4.30	3.30-4.30	3.30-4.30	3.30-4.30	9.30-12.30	9.30-12.30	3.30-4.30
1	Akshay.p	AP	AP	AP	AP	AP	AP	AP
2	Punya.V	P	P	P	P	P	P	P
3	Anjitha.A	Anjitha	Anjitha	Anjitha	Anjitha	Anjitha	Anjitha	Anjitha
4	Aparna.S	AP	AP	AP	AP	AP	AP	AP
5	Arya.P	Arya	Arya	Arya	Arya	Arya	Arya	Arya
6	Sarangi Surendran	Sa	Sa	Sa	Sa	Sa	Sa	Sa
7	Varsha.N.M	Varsh	Varsh	Varsh	Varsh	Varsh	Varsh	Varsh
8	Harikrishnan.K.P	Har	Har	Har	Har	Har	Har	Har
9	Amitha.A.S	Amitha	Amitha	Amitha	Amitha	Amitha	Amitha	Amitha
10	Anuroopa.A.S	A	A	A	A	A	A	A
11	Anusree.P.K	Ann	Ann	Ann	Ann	Ann	Ann	Ann
12	Ardra.A.K	Ar	Ar	Ar	Ar	Ar	Ar	Ar
13	Karthika.S	Ka	Ka	Ka	Ka	Ka	Ka	Ka
14	Yamuna.P.S	Yam	Yam	Yam	Yam	Yam	Yam	Yam

  
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No. of students attended	No. of students benefitted
14	14

  
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