# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: **Third** **LESSON PLAN** Subject: **Chemistry III (Basic Physical-I) (CH-211)**

Session: **Odd 2016–2017** **Theory**/Sessional

Branch/Course:**Int.M.Sc.(5yr)** Name of the Faculty Member: **Dr. Monalisa Mohapatra**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Dilute Solutions: Vapour pressure | |
| **2** | **I** | Thermodynamic derivation of vapour pressure | |
| **3** | **I** | Colligative properties | |
| **4** | **I** | Raoults law | |
| **5** | **I** | Thermodynamic derivation of laws relating to elevation of boiling point | |
| **6** | **I** | Depression of freezing point | |
| **7** | **I** | Osmotic pressure | |
| **8** | **I** | Ideal and nonideal solution | |
| **9** | **I** | Association and dissociation | |
| **10** | **II** | Homogenous equilibrium: Law of mass action | |
| **11** | **II** | Thermodynamic derivation of the expression for equilibrium constant | |
| **12** | **II** | Different forms of equilibrium constants | |
| **13** | **II** | Lechatelier's principle, Illustrations with some gaseous reactions | |
| **14** | **II** | Effect of temperature on equilibrium Vant-hoff`s equation and its integration | |
| **15** | **III** | Chemical kinetics: Order and molecularity | |
| **16** | **III** | Kinetics of 1st order reactions | |
| **17** | **III** | Kinetics of 2nd order reactions | |
| **18** | **III** | Simple opposing (A&B) reaction | |
| **19** | **III** | Consecutive of Sequential (A-B-C) reaction | |
| **20** | **III** | Chain reaction ($H_2$ + $Br_2$) | |

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| **21** | **III** | Effect of temperature on reaction rate | |
| **22** | **III** | Collision theory of reaction rate | |
| **23** | **III** | Qualitative treatment of transition theory | |
| **24** | **IV** | Thermodynamic concept: Heat content and heat capacity | |
| **25** | **IV** | Work done for Isothermal change | |
| **26** | **IV** | Work done for Adiabaic change | |
| **27** | **IV** | Work done for Ideal gases | |
| **28** | **IV** | Work done for van der Waal gases | |
| **29** | **IV** | Thermochemistry: Heat changes in chemical reactions | |
| **30** | **IV** | Hess's law | |
| **31** | **IV** | Kirchoff s equation | |
| **32** | **IV** | 2nd law of thermodynamics: Spontaneous process | |
| **33** | **IV** | Carnot's theorem and Carnot's cycle | |
| **34** | **IV** | Efficiency of heat engine | |
| **35** | **IV** | Entropy changes in revercible processes | |
| **36** | **IV** | Entropy changes in irrevercible processes | |
| **37** | **IV** | Free energy Condition for equilibrium | |
| **38** | **IV** | Work function Condition for equilibrium | |
| **39** | **IV** | Claypeyeron and Claussisus equation | |
| **40** | **IV** | Gibbs Helmholtz equation | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

# LESSON PLAN

Semester: **3rd**

Subject: **ENVIRONMENTAL SCIENCE (CH-212)**

Session: Odd **2016–2017** **Theory**/Sessional

Branch/Course: **Int. M. Sc.** Name of the Faculty Member: **Prof. R. B. Panda**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| 1-2 | **I** | Scope of Ecology, Component of Ecosystem | |
| 3-4 | **I** | Concept and Definition of Environmental Pollution | |
| 5-6 | **I** | Types and Classification of Pollution, Pollution and Source of Pollution. History of Major Pollution Episodes | |
| 7-8 | **I** | Concept of Hydrosphere, Concept of Atmosphere and its Pollution | |
| 9-10 | **I** | Major and Minor Pollutants in Atmosphere ($SO_x$, $NO_x$, $CO_2$, Fluoride, Hydrocarbon) | |
| 11-12 | **II** | Classification and Types of Water Pollution | |
| 13-14 | **II** | Industrial Waste, Municipal Waste | |
| 15-16 | **II** | Agriculture Chemicals, Oil Pollution | |
| 17-18 | **II** | Heavy Metals Ground Water Pollution (Mercury). | |
| 19-20 | **II** | Heavy Metals Ground Water Pollution (Lead, Arsenic). | |
| 21-22 | **III** | Acid Rain, Photochemical Smog, Greenhouse Effect | |
| 23-24 | **III** | Ozone Layer Depletion, Eutrophication, Ecological Magnification | |
| 25-26 | **III** | Concept of Lithosphere, Sources of Soil Pollution | |
| 27-28 | **III** | Pollution Effect of Pesticides and Fertilizer in Soil | |
| 29-30 | **III** | Use of Flora for Control of Pollution | |
| 31-32 | **IV** | ***Pollution by radiation:*** Sources of Radioactive Pollution | |
| 33-34 | **IV** | ffect of Radiation Protection and Control from Radiation | |
| 35-36 | **IV** | Disposal of Radioactive Waste | |
| 37-38 | **IV** | Sources of Noise, Noise Levels in Decibel Scale | |
| 39-40 | **IV** | Effect of Noise on Human Health, Prevention and Control of Noise | |

**Signature of Faculty Member:**

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**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

# LESSON PLAN

Semester: **4th** Subject: **Basic Organic I (CH-221)**

Session: Even **2016–2017** **Theory**/Sessional

Branch/Course: **Int. M. Sc.** Name of the Faculty Member: **Prof. R. B. Panda**

| Period | Module /Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| 1-2 | **I** | Formation, Stability and Structure of Free Radicals and Carbenes | |
| 3-4 | **I** | Nitrene, Enamine, and Benzyne | |
| 5-6 | **I** | Reaction in Organic Compounds, *Classification of Reactions:* Substitution, addition | |
| 7-8 | **I** | Elimination, Electron Transfer Reaction, Molecularity, Order of Reactions | |
| 9-10 | **I** | Transition State and Intermediates, Nucleophiles and Electrophiles | |
| 11-12 | **II** | *Configurational Isomerism:* Optical Isomerism: Introduction, Conditions for Optical Activity, Optical Rotation, Specific Rotation | |
| 13-14 | **II** | D & L Convention, R & S Notations, Optical Isomers of Lactic, and Tartaric Acids | |
| 15-16 | **II** | Enantiomers and Diastereomers, Threo and Erythro Nomenclature, Meso Compounds, Racimic Modification, Methods of Resolution | |
| 17-18 | **II** | Introduction, Structural Requirement (Cis & Trans, Syn & Anti), E- Z Convention, Configuration of Oximes. | |
| 19-20 | **II** | Introduction, Conformations of Ethane and n-Butanes & Cyclohexane, Baeyer Strain Theory | |
| 21-22 | **III** | *Grignard's Reagent:* Preparation, Structure, Synthetic Uses | |
| 23-24 | **III** | *Esters Containing Active Methylene Groups:* Acetoacetic Ester: Synthesis, Synthetic Uses, structure and Keto-Enol Tautomerism | |
| 25-26 | **III** | *Malonic Ester:* Preparation and Synthesis Uses. | |
| 27-28 | **III** | Classification, Configuration of Sugars, Glucose and Fructose (Occurrence, Reaction: Osazone formation with Felhings Solution | |
| 29-30 | **III** | Mutarotaion, Elucidation of Structure of D-Glucose (Open Chain and Ring Structure) | |
| 31-32 | **IV** | Five Membered heterocyclics: Pyrrole, Thiophene and Furan: Synthesis (from Sugar, Dicarbonyl Compound) | |
| 33-34 | **IV** | operties (Aromaticity, Electrophillic Substitution Reactions) of Five Membered heterocyclics | |
| 35-36 | **IV** | *Acyclic Compounds:* Preparation, Reactions and Stability. | |
| 37-38 | **IV** | *Aryl Nitrogen Compounds* Nitro Hydrocarbons, Preparations | |
| 39-40 | **IV** | *Aryl Nitrogen Compounds*: Properties, Reduction of Nitro Benzene, TNT, Amines | |

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## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: **5th** **LESSON PLAN** Subject: **Basic Organic-II (CH-311)**

Session: **Odd** **Theory**/Sessional

Branch/Course:**Int.M.Sc.(5yr)** Name of the Faculty Member: **Dr A. K. Panda**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Types of mechanisms, types of reactions | |
| **2** | **I** | Aliphatic substitution reaction: SN1 Kinetics, stereochemistry, structural and environmental aspects), Neighboring group participation reactions | |
| **3** | **I** | Aliphatic substitution reaction: SN2 Kinetics, stereochemistry, structural and environmental aspects) | |
| **4** | **I** | Aliphatic substitution reaction: SNi reactions, Neighboring group participation reactions | |
| **5** | **I** | Conformational Isomerism: Introduction conformations of cyclohexane | |
| **6** | **I** | Conformational analysis, mono and di substituted cyclohexanes | |
| **7** | **I** | Dyes: Colour and constitution | |
| **8** | **I** | Classification of dyes | |
| **9** | **I** | Chemistry and synthesis of methyl orange | |
| **10** | **II** | Chemistry and synthesis of Bismarck brown. | |
| **11** | **II** | Heterocyclic compounds: Six membered heterocylces | |
| **12** | **II** | Pyridine (Preparation and Reactions) | |
| **13** | **II** | Quinoline (Preparation and Reactions) | |
| **14** | **II** | Fused heterocycles: Urides | |
| **15** | **II** | Elucidation of structure of Uric acid | |
| **16** | **II** | Purines | |
| **17** | **II** | Indigo: Structure and Use | |
| **18** | **II** | Polynuclear Hydrocarbons: Naphthalene and Anthracene). | |
| **19** | **II** | Addition and electrophilic substitution reactions of Naphthalene and Anthracene | |
| **20** | **II** | Elucidation of their structures Naphthalene and Anthracene | |
| **21** | **III** | Alkaloids: Introduction | |

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| **22** | **III** | Elucidation of structure of nicotine | |
| **23** | **III** | Synthesis of nicotine | |
| **24** | **III** | Elucidation of structure of papavarine | |
| **25** | **III** | Synthesis of papavarine | |
| **26** | **III** | Terpenes: Introduction Isoprene rule | |
| **27** | **III** | Elucidation of the structure of the camphor | |
| **28** | **III** | Synthesis of Camphor | |
| **29** | **III** | Vitamines: Introduction | |
| **30** | **III** | Elucidation of the structure of the Vitamine C | |
| **31** | **IV** | Mechanism and applications of Molecular rearrangements: Pinacole-pinacolone | |
| **32** | **IV** | Mechanism and applications of Demnzenov | |
| **33** | **IV** | Mechanism and applications of Dienone-phenol | |
| **34** | **IV** | Mechanism and applications of Beckmann and Benzidene. | |
| **35** | **IV** | Principle mechanism and application of Name reactions: Diels-Alder, Fries | |
| **36** | **IV** | Principle mechanism and application of Michael, Mannich reaction | |
| **37** | **IV** | Principle mechanism and application of Reformatsky, Cleisen and Dickmann reactions | |
| **38** | **IV** | Preparation properties and application of Reagent: LiAlH4, NaBH4 | |
| **39** | **IV** | Preparation properties and application of Reagent: HIO4, PhI(OAc)4 | |
| **40** | **IV** | Preparation properties and application of Reagent: PCC and DCC | |

**Signature of Faculty Member:**

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**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

# LESSON PLAN

Semester: **5th** Subject: **Solid State Chemistry (CH-312)**

Session: Odd **2016–2017** **Theory**/Sessional

Branch/Course: **Int. M. Sc.** Name of the Faculty Member: **Dr. Biswa Nath Ghosh**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| 1-2 | **I** | Description of Crystalline and Amorphous Solids; Crystal Systems | |
| 3-4 | **I** | Point Groups, Methods of Characterizing Crystal Structure - Powder X-ray Diffraction, Electron and Neutron Diffraction | |
| 5-6 | **I** | Close Packing - HCP and CCP, Packing Efficiency, Radius Ratios | |
| 7-8 | **I** | Description of Solids-NaCl, ZnS, $Na_2O$, $CdCl_2$, Wurtzite, Nickel Arsenide | |
| 9-10 | **I** | Description of Solids-CsCl, $CdI_2$, Rutile and $Cs_2O$, Perovskite $ABO_3$, $K_2NiF_4$, Spinels. | |
| 11-12 | **II** | ***Preparative Methods:*** Solid State Reaction, Chemical Precursor Method | |
| 13-14 | **II** | ***Preparative Methods:*** Co-precipitation, Sol-Gel, Metathesis | |
| 15-16 | **II** | Self-propagating High Temperature Synthesis, Ion Exchange Reactions | |
| 17-18 | **II** | Intercalation/Deintercalation Reactions; Template Synthesis | |
| 19-20 | **II** | Hydrothermal: High Pressure Synthesis. | |
| 21-22 | **III** | ***Characterization:*** Thermal Analysis - TGA, DTA, DSC | |
| 23-24 | **III** | Electrical Properties: Band Theory of Solids -Metals and their Properties | |
| 25-26 | **III** | Semiconductors - Extrinsic and Intrinsic; Hall effect | |
| 27-28 | **III** | Thermoelectric Effects (Thomson, Peltier and Seebeck) | |
| 29-30 | **III** | Insulators - Dielectric, Ferroelectric, Pyroelectric and Piezoelectric Properties; Ionic Conductors. | |
| 31-32 | **IV** | ***Magnetic Properties:*** Dia, Para, Ferro, Ferri, and Antiferro | |
| 33-34 | **IV** | agnetic Types; Soft and Hard Magnetic Materials; Select Magnetic Materials such as Spinels, Garnets and Perovskites, Hexaferrites | |
| 35-36 | **IV** | Lanthanide-Transition Metal Compounds; Magnetoresistance. | |
| 37-38 | **IV** | ***Optical Properties:*** Luminescence of d- and f- block ions; Structural Probes; | |
| 39-40 | **IV** | Up and Down Conversion Materials | |

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# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: 5 th M.Sc **Lesson Plan** Subject: **Green Chemistry (CH-313)**

Session: **Odd 2016-17** **Theory**

Course: **5-Year** Int.**M.Sc (Chemistry)** Name of the Faculty Member: **Dr. Ramakrishna D.S.**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | **Green alternatives to synthesis Organic Transformations:** Principles of green chemistry | |
| **2** | **I** | Planning of a green organic synthesis | |
| **3** | **I** | Aqueous phase Transformations | |
| **4** | **I** | p-Acetylaminophenol | |
| **5** | **I** | 3 Aminopyridine, Anthranilic acid | |
| **6** | **I** | Benzoin, n-butyl bromide | |
| **7** | **I** | cycloheptanone, 2,4- dihydroxy benzoinc acid, | |
| **8** | **I** | Hippuric acid | |
| **9** | **I** | Pinacolone | |
| **10** | **I** | Miscellaneous transformations in water | |
| **11** | **III** | **Transformations Using Phase transfer catalysis** | |
| **12** | **III** | Benzoic acid, benzonitrile, | |
| **13** | **III** | n-butyl benzyl ether, | |
| **14** | **III** | 4,6-dimethyl-3-phenyl coumarin, | |
| **15** | **III** | flavone, phenylisocyanide, salicylaldehyde, | |
| **16** | **III** | Applications: Benzoin condensation, | |
| **17** | **III** | Darzen's reaction, Michael reaction, | |
| **18** | **III** | Welliamson ether synthesis | |
| **19** | **III** | Wittig reaction, | |
| **20** | **III** | Wittig Horner reaction. | |

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| 22 | **II** | 2-Allyl phenol, anthraquinone, | |
| 23 | **II** | benzil, 2,5-dimethylpyrrole, flavone, | |
| 24 | **II** | Applications: Oxidation of alcohols to carbonyl compounds, | |
| 25 | **II** | oxidation of sulphides to sulphoxides, Pinacol-Pinacolone rearrangement, | |
| 26 | **II** | Beckmann Rearrangement, Crossed Cannizzaro reaction. | |
| 27 | **II** | Cis-azobenzene, Benzopinacol, Maleic acid, cis-stilbene, | |
| 28 | **II** | Applications: Photochemical cycloaddition reactions, Paterno-Buchi reaction, | |
| 29 | **II** | Photoinduced substitution, Photochlorination, | |
| 30 | **II** | Photochemical reaction in solid state | |
| 31 | **IV** | **Transformations using sonication** | |
| 32 | **IV** | Benzyl cyanide, biphenyl, cannizzaro reaction, | |
| 33 | **IV** | cinnamaldehyde, cyclohexanone, ethyl phenyl ether, | |
| 34 | **IV** | Applications: Hydrolysis of nitriles, solvolysis, | |
| 35 | **IV** | Strecker synthesis, Reformatsky reaction, | |
| 36 | **IV** | Curtius rearrangement, | |
| 37 | **IV** | oxymercuration of olefins, | |
| 38 | **IV** | Dieckmann cyclisation, | |
| 39 | **IV** | Isomerization of maleic acid to fumaric acid. | |
| 40 | **IV** | Overview on all topics | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: 5 th M.Sc **Lesson Plan** Subject: CIM **(CH-315)**

Session: **Odd 2016-17** **Theory**

Course: **5-Year** Int.**M.Sc (Chemistry)** Name of the Faculty Member: **Dr A. K. Panda**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | *Fuel and combustion:* Introduction, classification | |
| **2** | **I** | Calorific value, Petroleum and coal based chemicals | |
| **3** | **I** | Composition of petroleum, fractional distillation | |
| **4** | **I** | Thermal and catalytic cracking of petroleum | |
| **5** | **I** | Fractional distillation of coal tar | |
| **6** | **I** | Fractional distillation of coal tar | |
| **7** | **I** | Diesel engine fuels, Biodiesel | |
| **8** | **I** | Composition, preparation and uses of water gas | |
| **9** | **I** | Composition, preparation and uses of CNG | |
| **10** | **I** | Composition, preparation and uses ofLPG | |
| **11** | **III** | Polymers: Functionality, degree of polymerisation | |
| **12** | **III** | Polymerization mechanisms, | |
| **13** | **III** | Addition or chain growth polymerisation with example | |
| **14** | **III** | Condensation or step growth polymerisation | |
| **15** | **III** | Application of polymers | |
| **16** | **III** | Dyes and pigments: Properties and requirement | |
| **17** | **III** | Types of dyes based on the structure | |
| **18** | **III** | Types of dyes based on application | |
| **19** | **III** | Paints, composition, uses | |
| **20** | **III** | Varnishes, composition, uses | |
| 21 | **II** | Oils and fats: difference, | |
| 22 | **II** | properties of oil | |
| 23 | **II** | Solvent extraction of oils, hydrogenation of oil, | |
| 24 | **II** | Analysis of oil | |
| 25 | **II** | Soap, type, composition, | |
| 26 | **II** | use of oil in the manufacturing of soap | |
| 27 | **II** | Detergents, Definition, classification, | |

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| 28 | **II** | Manufacturing of detergents | |
| 29 | **II** | Surface-active agents | |
| 30 | **IV** | Cleansing action of soap and detergents. | |
| 31 | **IV** | Components of cement, classification of cement, raw materials for cement manufacture | |
| 32 | **IV** | Preparation of cement by wet and dry process | |
| 33 | **IV** | Reactions in the kiln | |
| 34 | **IV** | Additives in cements, setting of cement. | |
| 35 | **IV** | Metal extraction I | |
| 36 | **IV** | Metal extraction II | |
| 37 | **IV** | Metal extraction III | |
| 38 | **IV** | Pesticides: DDT manufacture | |
| 39 | **IV** | BHC manufacture | |
| **40** | **IV** | Parathion manufactur | |

**Signature of Faculty Member:**

**ate:** **Counter Signature of H.O.D.**

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: 6th M.Sc **Lesson Plan** Subject: **Natural products (**CH–321**)**

Session: **Even 2016-17** **Theory**

Course: **5-Year** Int.**M.Sc (Chemistry)** Name of the Faculty Member: **Dr Sukalyan Dash**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Natural Colouring Matter, General Classification | |
| **2** | **I** | Synthesis of Anthocyanins (Cyanine), | |
| **3** | **I** | Synthesis of Anthocyanins (Cyanine), | |
| **4** | **I** | Synthesis of Flavones (Chryosin) and Flavanol (Querecetin) | |
| **5** | **I** | Synthesis of Flavones (Chryosin) and Flavanol (Querecetin) | |
| **6** | **I** | Porphyrin: Structure, Spectral Properties, Biological Importance | |
| **7** | **I** | Porphyrin: Structure, Spectral Properties, Biological Importance | |
| **8** | **I** | Synthesis of Haemoglobin | |
| **9** | **I** | Synthesis of Chlorophyll-A | |
| **10** | **I** | Synthesis of Chlorophyll-A | |

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| **11** | **II** | General Method of Structure Elucidation of Alkaloids | |
| **12** | **II** | General Method of Structure Elucidation of Alkaloids | |
| **13** | **II** | Structure Elucidation of Quinine | |
| **14** | **II** | Structure Elucidation of Quinine | |
| **15** | **II** | Biological Importance and Synthesis of Morphine | |
| **16** | **II** | *Vitamins:* Introduction | |
| **17** | **II** | Synthesis and Biochemical Importance of Vitamin $B_1$ (Thiamine), Vitamin H (Biotin) | |
| **18** | **II** | Synthesis and Biochemical Importance of Vitamin $B_1$ (Thiamine), Vitamin H (Biotin) | |
| **19** | **II** | Synthesis and Biochemical Importance of α-Tocopherol (Vitamin E), and Vitamin C | |
| **20** | **II** | Synthesis and Biochemical Importance of α-Tocopherol (Vitamin E), and Vitamin C | |
| 21 | **III** | Introduction and Stereochemistry of Steroids | |
| 22 | **III** | Structure Elucidation of Cholesterol | |
| 23 | **III** | Structure Elucidation of Cholesterol | |
| 24 | **III** | Structure Elucidation of Cholesterol | |
| 25 | **III** | Structure Elucidation of Cholesterol | |
| 26 | **III** | Biological Importance of Bile Acid | |
| 27 | **III** | Biological Importance of Androgens | |
| 28 | **III** | Biological Importance of Oestrogens, Gestrogens | |
| 29 | **III** | Biological Importance of Adrenocortical Hormones | |
| 30 | **III** | Biological Importance of Cortisone | |
| 31 | **IV** | *Terpenoids:* Classification | |
| 32 | **IV** | Nomenclature | |
| 33 | **IV** | General Methods of Structure Determination | |
| 34 | **IV** | General Methods of Structure Determination | |
| 35 | **IV** | Structure Elucidation of Abietic Acid | |
| 36 | **IV** | Structure Elucidation of Abietic Acid | |
| 37 | **IV** | Structure Elucidation of Abietic Acid | |
| 38 | **IV** | Synthesis and Biological Importance of Farnesol | |

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| 39 | **IV** | Synthesis and Biological Importance of Zingeberine | |
| **40** | **IV** | Synthesis and Biological Importance of Squalene | |

**Signature of Faculty Member:**

**ate:** **Counter Signature of H.O.D.**

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: 6th M.Sc **Lesson Plan** Subject: Basic physical Chemistry-II (CH-324)

Session: **Even 2016-17** **Theory**

Course: **5-Year** Int.**M.Sc (Chemistry)** Name of the Faculty Member: **Dr Sukalyan Dash**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Natural Colouring Matter, General Classification | |
| **2** | **I** | Synthesis of Anthocyanins (Cyanine), | |
| **3** | **I** | Synthesis of Anthocyanins (Cyanine), | |
| **4** | **I** | Synthesis of Flavones (Chryosin) and Flavanol (Querecetin) | |
| **5** | **I** | Synthesis of Flavones (Chryosin) and Flavanol (Querecetin) | |
| **6** | **I** | Porphyrin: Structure, Spectral Properties, Biological Importance | |
| **7** | **I** | Porphyrin: Structure, Spectral Properties, Biological Importance | |
| **8** | **I** | Synthesis of Haemoglobin | |
| **9** | **I** | Synthesis of Chlorophyll-A | |
| **10** | **I** | Synthesis of Chlorophyll-A | |
| **11** | **II** | General Method of Structure Elucidation of Alkaloids | |
| **12** | **II** | General Method of Structure Elucidation of Alkaloids | |
| **13** | **II** | Structure Elucidation of Quinine | |
| **14** | **II** | Structure Elucidation of Quinine | |
| **15** | **II** | Biological Importance and Synthesis of Morphine | |
| **16** | **II** | *Vitamins:* Introduction | |
| **17** | **II** | Synthesis and Biochemical Importance of Vitamin $B_1$ (Thiamine), Vitamin H (Biotin) | |
| **18** | **II** | Synthesis and Biochemical Importance of Vitamin $B_1$ (Thiamine), Vitamin H (Biotin) | |
| **19** | **II** | Synthesis and Biochemical Importance of α-Tocopherol (Vitamin | |

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| | | E), and Vitamin C | |
| **20** | **II** | Synthesis and Biochemical Importance of α-Tocopherol (Vitamin E), and Vitamin C | |
| 21 | **III** | Introduction and Stereochemistry of Steroids | |
| 22 | **III** | Structure Elucidation of Cholesterol | |
| 23 | **III** | Structure Elucidation of Cholesterol | |
| 24 | **III** | Structure Elucidation of Cholesterol | |
| 25 | **III** | Structure Elucidation of Cholesterol | |
| 26 | **III** | Biological Importance of Bile Acid | |
| 27 | **III** | Biological Importance of Androgens | |
| 28 | **III** | Biological Importance of Oestrogens, Gestrogens | |
| 29 | **III** | Biological Importance of Adrenocortical Hormones | |
| 30 | **III** | Biological Importance of Cortisone | |
| 31 | **IV** | *Terpenoids:* Classification | |
| 32 | **IV** | Nomenclature | |
| 33 | **IV** | General Methods of Structure Determination | |
| 34 | **IV** | General Methods of Structure Determination | |
| 35 | **IV** | Structure Elucidation of Abietic Acid | |
| 36 | **IV** | Structure Elucidation of Abietic Acid | |
| 37 | **IV** | Structure Elucidation of Abietic Acid | |
| 38 | **IV** | Synthesis and Biological Importance of Farnesol | |
| 39 | **IV** | Synthesis and Biological Importance of Zingeberine | |
| **40** | **IV** | Synthesis and Biological Importance of Squalene | |

**Signature of Faculty Member:**

**ate:** **Counter Signature of H.O.D.**

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

Semester: **Sixth** **LESSON PLAN** Subject: **Principles of Inorganic Chemistry (CH-323)**

Session: Even **2016–2017** **Theory**/Sessional

Branch/Course: **Int. M. Sc.** Name of the Faculty Member: **Dr. Biswa Nath Ghosh**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| 1-2 | **I** | Theory of Acid-Bases: Arrhenius Theory, Solvent-System Definition, Brönsted-Lowry Theory: Conjugate Acid-Base Pairs | |
| 3-4 | **I** | Lewis Theory, Usanovich Concept, Lux-Flood Concept. | |
| 5-6 | **I** | Acid-base Equilibrium, Strength of Brönsted Acids and Bases: Gas-Phase Proton Affinity | |
| 7-8 | **I** | Acid and Bases in Water, Levelling Effect of Water. Lewis Acid and Bases: Properties | |
| 9-10 | **I** | Hard and Soft Acids and Bases (Pearson's Classification, HSAB Principle), Symbiosis Effect, Strength of Lewis Acids and Bases. | |
| 11-12 | **I** | Super Acids: Hammet-Acidity Function. | |
| 13-14 | **II** | Basic Concepts, Redox Reactions and Electromotive Force, Electrochemical Cells | |
| 15-16 | **II** | Type of Electrodes, Electrode Potential: Standard Electrode Potential, Formal Potential. | |
| 17-18 | **II** | Factors Influencing Electrode Potential: Effect of Concentration, pH, Precipitation, Complex Formation. | |
| 19-20 | **II** | Application of Electrode Potential: Electrochemical Series, Redox Stability in Water | |
| 21-22 | **II** | Redox Potential Diagram: Latimer Diagram (Disproportionation Reaction: Chlorine, Manganese System, Copper System, Oxidation by Atmospheric Oxygen) | |
| 23-24 | **II** | Redox Potential Diagram: Frost Diagram (Manganese), Redox Indicator | |
| 25-26 | **II** | Redox Titration: Titration of Fe(II) by $KMnO_4$, Titration of Fe(II) by $K_2Cr_2O_7$. | |
| 27-28 | **III** | Electron Deficient, Electron Precise, and Electron Rich Compounds, Gillespie and Nyholm Rules for Predicting Structures | |
| 29-30 | **III** | Homocyclic Rings of S, Se and Te, S, SN and SeN Compounds- Neutral Sulfur Rings | |

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| 31-32 | **III** | Cyclic Sulfur Imides, Sulfur-Nitrogen Rings and Chains ($SN_x$) | |
| 33-34 | **III** | atenation and Heterocatenation, Heteropoly and Isopoly Anions, | |
| 35-36 | **III** | Electron Counting Rules for Clusters: Wade-Mingos-Lauher Rules and Extended 18 Electron Rules (mno rules), Boranes: Boron Cage Compounds- Closo, Nido, Arachno, | |
| 37-38 | **III** | Heteroboranes, Carboranes, Metalloboranes and Metallocarboranes | |
| 39-40 | **III** | Cage Compounds of S and P, Carbonyl and Carbide Clusters | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

## LESSON PLAN

Semester: **6th** Subject: **Biomolecules (CH-325)**
Session: Even **2016–2017** **Theory**/Sessional
Branch/Course:**Int. MSc** Name of the Faculty Member: **Dr. Ramakrishna D.S.**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| 1 | I | Introduction, Functions of Carbohydrates, Classification of carbohydrate | |
| 2 | I | D&L-Isomers, Epimers | |
| 3 | I | Structure of Glucose (open chain structure) | |
| 4 | I | Cyclic structure of Glucose, Drawbacks of open chain structure | |
| 5 | I | Structure of Fructose ( both open chain& ring structure) | |
| 6 | I | Mutarotation &its Mechanism | |
| 7 | I | Reaction of Glucose ,Osazone formation | |
| 8 | I | Reaction of Fructose, Conversion of Aldose to Ketose & vice versa, Epimerization | |
| 9 | I | Chain lengthening &chain Shorting of Aldose, Anomers, Chemistry of Disaccharides | |
| 10 | I | Sucrose &Lactose ( Structure and Properties) | |
| 11 | II | Amino acids: (Introduction) | |
| 12 | II | structural features, | |
| 13 | II | Physical properties of amino acids, | |
| 14 | II | optical activity and isoelectic point, | |
| 15 | II | essential amino acids, | |
| 16 | II | non-essential amino acids | |
| 17 | II | Synthesis of alpha amino acids. | |
| 18 | II | Chemical properties of alpha amino acids. | |

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| **19** | **II** | Chemical properties of alpha amino acids. | |
| **20** | **II** | Overall view on module II | |
| **21** | **III** | Proteins: | |
| **22** | **III** | Peptides | |
| **23** | **III** | Structure determination. Polypeptides or proteins: | |
| **24** | **III** | Classification | |
| **25** | **III** | primary structure of proteins | |
| **26** | **III** | Secondary and tertiary structure of proteins | |
| **27** | **III** | quaternary structure of proteins | |
| **28** | **III** | glycoproteins, denaturation | |
| **29** | **III** | Folding enzymes. | |
| **30** | **III** | Overall view on module III | |
| **31** | IV | Introduction , Chemistry of Nucleic Acid , Assignments | |
| **32** | IV | Structure of Nucleotides ,Nucleosides ,RNA, DNA | |
| **33** | IV | Nitrogenous bases, pentose Sugar, binding of Nucleotide components | |
| **34** | IV | Structure of DNA | |
| **35** | IV | Structure of RNA ,Types of RNA | |
| **36** | IV | m-RNA , t-RNA | |
| **37** | IV | Transcription & Translation | |
| **38** | IV | Post Transcription Modification , Genetic Code | |
| **39** | IV | Central dogma of life , Replication of DNA | |
| **40** | IV | Protein Biosynthesis ,genetic error ,Wobblehypothesis | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

## LESSON PLAN

Semester: **1st & 7th** Subject: **Group Theory and Wave Mechanics (CH-411)**
Session: Odd **2016–2017** **Theory**/Sessional
Branch/Course: **M.Sc. (IC) and Int. M.Sc. (Chemistry)**
Name of the Faculty Member: **Dr. Aruna Kumar Barick**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **41** | **I** | Symmetry Elements and Symmetry Operations, Matrix Representation of Symmetry Operation, Classes of Operations | |
| **42** | **I** | Point Groups ($C_{n,}$ $C_{nv}$, $C_{nh,}$ $S_n$, $D_n$, $D_{nd}$, and $D_{nh}$) | |
| **43** | **I** | Point Groups ($T_d$, $O_h$, $D_{\infty a}$, $C_{\infty v}$, and $D_{\infty h}$) | |
| **44** | **I** | Properties of Point Groups, | |
| **45** | **I** | Irreducible and Reducible Representation, Bases of Representation | |
| **46** | **I** | Character of a Representation, Reduction Formula | |
| **47** | **I** | The Great Orthogonality Theorem (Without Proof) and Its Explanation | |
| **48** | **I** | Construction of Character Tables for $C_{2v}$ and $C_{3v}$ | |
| **49** | **I** | Construction of Character Tables for $T$ (Cubic), $C_4$ (Cyclic) and $D_\infty$ Groups | |
| **50** | **I** | Projection Operator and Direct Product | |
| **51** | **II** | Postulates of Quantum Mechanics, Quantum Mechanical Operators | |
| **52** | **II** | Application of Schrodinger Wave Equation to Particle in a Box | |
| **53** | **II** | Harmonic Oscillator | |
| **54** | **II** | Rigid Rotator | |
| **55** | **II** | Hydrogen Atom, Transformation of Co-ordinates | |
| **56** | **II** | Separations of Variables | |
| **57** | **II** | $\phi$, $\theta$ and $R$ Equations, Spherical Harmonics | |
| **58** | **II** | Shapes of *s*, *p* and *d* Orbital | |
| **59** | **II** | Probability Density in 1s Orbital, Physical Interpretation of Hydrogen Orbitals | |

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|---|---|---|---|
| **60** | **II** | Radial Distribution Function and Curves | |
| **61** | **III** | Definition | |
| **62** | **III** | Generalized Angular Momentum | |
| **63** | **III** | Eigen Functions and Eigen Values of Angular Momentum | |
| **64** | **III** | Operator using Ladder Operators | |
| **65** | **III** | Addition of Angular Moments | |
| **66** | **III** | Mutual Interaction of Electron Orbitals and Resultant Vectors | |
| **67** | **III** | Russel–Saunder's Coupling | |
| **68** | **III** | j–j Coupling | |
| **69** | **III** | Ground State Term Symbols and Hund's Rule | |
| **70** | **III** | Micro States and Derivation of Russel–Saunder's Term for $P^2$, $d^2$ and pd Configuration | |
| **71** | **IV** | Variation Theorem and its Application to Hydrogen atom in Derivation of its Ground State Energy | |
| **72** | **IV** | Perturbation Theory (First Order and Non-degenerate) | |
| **73** | **IV** | Secular Equations | |
| **74** | **IV** | Linear Combination of Atomic Orbitals (LCAO) Approximation (Molecular Orbital Theory) | |
| **75** | **IV** | Application to Hydrogen Molecule Ion | |
| **76** | **IV** | Huckel Theory of Conjugated Systems | |
| **77** | **IV** | Bond Order and Charge Density Calculations | |
| **78** | **IV** | Applications to Ethylene, Butadiene | |
| **79** | **IV** | Applications to Cyclopropenyl Radical, Cyclobutadiene, etc. | |
| **80** | **IV** | Spin and Anti-symmetric Nature of Wave Function (Pauli's Exclusion Principle) | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

# LESSON PLAN

**Semester: 1st & 7th** **Subject: Structure and Reactivity (CH-413)**

Session: Odd **2016–2017** **Theory**/Sessional

Branch/Course: **M.Sc. (IC) and Int. M.Sc. (Chemistry)**

Name of the Faculty Member: **Dr. Sukalyan Dash**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Delocalized Chemical Bonding, Conjugation | |
| **2** | **I** | Cross Conjugation | |
| **3** | **I** | Resonance | |
| **4** | **I** | Hyperconjugation, Bonding in Fullerenes, Tautomerism. | |
| **5** | **I** | Aromaticity in Benzenoid and Non-benzenoid Compounds, Alternant and Non-alternant Hydrocarbons | |
| **6** | **I** | Huckel's Rule, Energy Levels of π-molecular Orbitals of Simple Systems, Annulenes, Anti-aromaticity, Homo-aromaticity | |
| **7** | **I** | Bonds Weaker than Covalent (Addition compounds) | |
| **8** | **I** | Crown Ether Complexes and Cryptands | |
| **9** | **I** | Inclusion Compounds, Cyclodextrins | |
| **10** | **I** | Catenanes and Rotaxanes | |
| **11** | **II** | Types of Mechanisms, Types of Reactions | |
| **12** | **II** | Thermodynamic and Kinetic Requirements | |
| **13** | **II** | Kinetic and Thermodynamic Control | |
| **14** | **II** | Hammond's Postulate, Curtin-Hammett Principle | |
| **15** | **II** | Potential Energy Diagrams, Transition States and Intermediates | |
| **16** | **II** | Methods of Determining Mechanisms | |
| **17** | **II** | Methods of Determining Mechanisms | |
| **18** | **II** | Hard and Soft Acids and Bases | |

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| **19** | **II** | Hammett Equation and Linear Free Energy Relationship | |
| **20** | **II** | Substituent and Reaction Constants. Taft Equation | |
| **21** | **III** | Non-classical Carbocations | |
| **22** | **III** | Generation and Structure of Free Radicals | |
| **23** | **III** | Generation and Structure of Carbenes | |
| **24** | **III** | Generation and Structure of Nitrenes | |
| **25** | **III** | Generation and Structure of Arynes | |
| **26** | **III** | General Discussion on Isotope Effect | |
| **27** | **III** | General Discussion on Isotope Effect | |
| **28** | **III** | Stereoselective, Regioselective Reactions | |
| **29** | **III** | Stereospecific and Regiospecific Reactions | |
| **30** | **III** | Stereospecific and Regiospecific Reactions | |
| **31** | **IV** | $S_N^2$, $S_N^1$ Mechanisms | |
| **32** | **IV** | Mixed $S_N^1$ and $S_N^2$ Mechanism | |
| **33** | **IV** | SET Mechanisms. The Neighboring Group Mechanism | |
| **34** | **IV** | Neighboring Group Participations by Sigma and Pi Bonds | |
| **35** | **IV** | Classical and Non-classical Carbocations, Phenonium Ions, Norbornyl System | |
| **36** | **IV** | Nucleophilic Substitution at Allylic, Carbon | |
| **37** | **IV** | Nucleophilic Substitution at Aliphatic Trigonal and Vinylic Carbon | |
| **38** | **IV** | Effects of Substrate Structure, Attacking Nucleophile | |
| **39** | **IV** | Effects of Leaving Group and Reaction Medium | |
| **40** | **IV** | Phase Transfer Catalysis, Ambident Nucleophile, Regioselectivity | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

Semester -7th &1st M.Sc M.Sc

**LESSON PLAN**

Subject: Thermodynamics &Chemical dynamics (CH-414)

Session: 2016 **Theory**

Branch/Course: Integrated M.Sc &M.Sc Name of the Faculty Member: **Dr Trinath Biswal**

| Period | Module /Number | Topic to be covered | |
|---|---|---|---|
| 1 | I | Laws of Thermodynamics | |
| 2 | I | Free Energy | |
| 3 | I | Partial Molar Properties & Chemical Potential | |
| 4 | I | Third Law of Thermodynamics & Determination of Entropy | |
| 5 | I | Entropy & Probability | |
| 6 | I | Boltzmann-Planck equation | |
| 7 | I | Partial free energy ,molar volume ,molar heat content | |
| 8 | I | Problems | |
| 9 | I | Fugacity &its Determination | |
| 10 | I | Determination of fugacity by Graphical Method | |
| 11 | I | Determination of fugacity by Approximate & General Method | |
| 12 | II | Probability Distribution, Ensemble averaging &its types | |
| 13 | II | Postulates of Ensemble averaging ,Canonical , Grand Canonical& Microcanonical | |
| 14 | II | Corresponding Distribution Law | |
| 15 | II | Translational & Rotational Partition Function | |
| 16 | II | Vibrational Partition Function, Electronic Partition Function | |
| 17 | II | Calculation of thermodynamic properties of Partition Function | |
| 18 | II | Applications of Partition Function | |
| 19 | II | Behavior of solids , Fermi- Dirac Statistics | |
| 20 | II | Chemical equilibria & equilibrium constant in terms of Partition function | |
| 21 | II | Bose-Einstein Statistics , Distribution Law & application to He | |
| 22 | II | Phosphate group transfer & ATP , Biological oxidation& reduction Reaction | |
| 23 | III | Interionic attraction Theory & Debye- Huckel Treatment | |
| 24 | III | Onsagar Limiting law its Verification & Modification | |
| 25 | III | Activity& Activity coefficient | |
| 26 | III | Debye- Huckel – Bronsted Equation , Salt effect | |
| 27 | III | Primary salt effect & secondary salt effect | |
| 28 | III | Determination of activity coefficient by solubility Method ,Ion Association | |
| 29 | III | Determination of thermodynamic dissociation constant of weak electrolytes by Shedlovsky Method & EMF Method | |

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| 30 | III | Amino acids ,Hydrogen ion concentration | |
| 31 | III | Ampholytes Isoelectronic points | |
| 32 | IV | Introduction ,collision theory of Reaction Rate | |
| 33 | IV | Theory of Absolute Reaction rate of both unimolecular & Bimolecular Reaction | |
| 34 | IV | Lindeman Mechanism | |
| 35 | IV | Arrehenious theory & Activated complex | |
| 36 | IV | Reaction between ions | |
| 37 | IV | Stedy-State Kinetics &its Problems , Examples | |
| 38 | IV | Dynamic chain reactions of Hydrogen & Bromine | |
| 39 | IV | Pyrolysis of Acetaldehyde ,Ethane | |
| 40 | IV | Fast reaction &its study by Relaxation Method | |
| 41 | IV | Flash photolysis & NMR Technique | |

Signature of Faculty member:
Date: Counter Signature of H.O.D

# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester -1st &7th **LESSON PLAN** Subject: Polymer Chemistry (CH-415)

Session: 2016 **Theory**/ Sessional

Branch/Course: M.Sc &Integrated M.Sc Name of the Faculty Member: **Dr Trinath Biswal**

| Period | Module /Number | Topic to be covered | |
|---|---|---|---|
| 1 | I | Introduction, classification of polymer, DP, Tacticity, | |
| 2 | I | Functionality, crystallinity , Degree of crystallinity | |
| 3 | I | Glass Transition temperature &its application | |
| 4 | I | Inorganic polymer & Elemento -Organic polymer ,Crystallisability | |
| 5 | I | Chain-growth polymerization ,its mechanism , Kinetics of Chain –growth polymerization | |
| 6 | I | Polyaddition polymerization , Step-growth polymerization ,its mechanism , Kinetics of step – growth polymerization | |
| 7 | I | Distinction between Step-growth & Chain-growth polymerization , Molecular weight control &Molecular weight distribution of linear polymer | |
| 8 | I | Polyfunctional step polymerization, Newer type of step polymerization | |
| 9 | I | Radical chain polymerization ,Molecular weight , chain transfer, Inhabitation &Retardation | |
| 10 | I | Determination of absolute rate constant, Auto acceleration | |
| 11 | II | Emulsion Polymerization ,Qualitative aspect , Mechanism | |
| 12 | II | CMC , Salient features, Application, Advantages | |
| 13 | II | Ionic chain polymerization ,comparison of radical & ionic chain polymerization | |
| 14 | II | Kinetics of cationic chain polymerization ,Carother equation | |
| 15 | II | Kinetics of anionic chain polymerization ,features of cationic &anionic chain polymerization | |

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| 16 | II | Cationic polymerization & Anionic polymerization of carbon-carbon double bond | |
| 17 | II | Block copolymer ,types synthesis ,properties & Application | |
| 18 | III | Chain copolymerization ,classification properties , application | |
| 19 | III | Radical chain co-polymerization &its kinetic study | |
| 20 | III | Ionic chain co-polymerization &its kinetic study | |
| 21 | III | Ring opening polymerization , Examples & Mechanism | |
| 22 | III | General characteristic Ring opening polymerization of cyclic ethers & cyclic amides | |
| 23 | III | Stereoisomerism ,types of stereoisomerism in polymers | |
| 24 | III | .Properties of Stereo- regular polymers | |
| 25 | III | Forces of Stereo -regulation in alkene polymerization | |
| 26 | III | Ziegler-Natta polymerization ,Types ,Mechanism & kinetic study | |
| 27 | III | Crystalline melting point, Glass transition temperature | |
| 28 | III | .Relationship of $T_g$ with molecular weight , plasticizer ,n copolymer | |
| 29 | III | Properties involving Large deformation | |
| 30 | IV | Properties involving small deformation | |
| 31 | IV | Ideal ,Azeotropic , Alternating Copolymerization | |
| 32 | IV | Property requirement & Utilization of polymers | |
| 33 | IV | Fracture & Deformation of polymer | |
| 34 | IV | ,Fracture Mechanism , Types of Fracture | |
| 35 | IV | Crack growth & its Mechanism | |
| 36 | IV | Cyclic deformation &its Molecular aspects | |
| 37 | IV | Healing of polymer. Adhesives | |
| 38 | IV | Conducting polymer , characteristics & Examples | |
| 39 | IV | Different types of Molecular weight | |
| 40 | IV | Molecular weight Determination | |
| 41 | IV | Molecular weight Determination & Short questions | |

Signature of Faculty member:

Date: Counter Signature of H.O.D

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: **2nd, 8th** **LESSON PLAN** Subject: **Stereochemistry (CH-422)**
Session: Even **2016–2017** **Theory**/Sessional
Branch/Course: **M.Sc and Int. MSc** Name of the Faculty Member: **Dr. Ramakrishna D.S.**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Chirality, Fischer projection and R and S notations, | |
| **2** | **I** | Threo and erythro nomenclature, E and Znomenclature, | |
| **3** | **I** | Optical isomerism in biphenyls | |
| **4** | **I** | Allenes, | |
| **5** | **I** | Concept of Prostereoisomerism | |
| **6** | **I** | Assymetric synthesis | |
| **7** | **I** | Assymetric synthesis (enzymatic) | |
| **8** | **I** | catalytic nexus | |
| **9** | **I** | Conformation of a few acyclic molecules (5memb) | |
| **10** | **I** | Conformation of a few acyclic molecules (6memb) | |
| **11** | **II** | Conformation of a few acyclic molecules (hetero) | |
| **12** | **II** | Conformation of cyclic systems having one sp2 carbon atoms | |
| **13** | **II** | two sp2 carbon atoms | |
| **14** | **II** | Dynamic stereochemistry | |
| **15** | **II** | Conformation and reactivity, Selection of substrates | |
| **16** | **II** | Quantitative correlation between conformation and reactivity | |
| **17** | **II** | Weinstein-Eliel equations and Curtin-Hammett principles | |
| **18** | **II** | Conformational effects on stability and reactivity in acyclic compounds | |
| **19** | **II** | Ionic elimination | |
| **20** | **II** | Intramolecular rearrangements | |
| **21** | **II** | **Neighbouring group participation** | |

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| **22** | **II** | cyclic systems | |
| **23** | **II** | Nucleophilic substitution reaction at ring carbon | |
| **24** | **II** | Formation and Cleavage of epoxide rings | |
| **25** | **II** | Addition reactions to double bonds | |
| **26** | **II** | Elimination reactions | |
| **27** | **III** | Molecular dissymmetry | |
| **28** | **III** | chiroptical properties | |
| **29** | **III** | linearly and circularly polarised lights | |
| **30** | **III** | circular birefringence and circular dicroism | |
| **31** | **IV** | ORD, Plane curves, Cotton effect | |
| **32** | **IV** | Rotatory Dispersion of ketones | |
| **33** | **IV** | the Axial Haloketone rule | |
| **34** | **IV** | the Octane rule | |
| **35** | **IV** | Helicity rule | |
| **36** | **IV** | Lowe's rule | |
| **37** | **IV** | Emperical rule | |
| **38** | **IV** | Benzene chromophore. | |
| **39** | **IV** | **Problems** | |
| **40** | **IV** | **Overall view** | |

**Signature of Faculty:**

**Date:** **Counter Signature of H.O.D.**

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

## LESSON PLAN

Semester: **2nd & 8th** Subject: **Spectroscopy-I (CH-423)**
Session: **Even 2016–2017** **Theory**/Sessional
Branch/Course: **M.Sc. (IC) and Int. M.Sc. (Chemistry)**
Name of the Faculty Member: **Dr. Aruna Kumar Barick**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | **Atomic Spectroscopy:** Introduction | |
| **2** | **I** | Electromagnetic Spectrum | |
| **3** | **I** | General Discussion on Various Molecular Excitation Processes | |
| **4** | **I** | Spectra of Hydrogen and Hydrogen Like Atoms | |
| **5** | **I** | Alkali Metals Spectra | |

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| **6** | **I** | L-S Coupling, Term Symbols, | |
| **7** | **I** | Space Quantization | |
| **8** | **I** | Zeeman Effect and Stark Effect | |
| **9** | **I** | Paschen-Bach Effect | |
| **10** | **I** | Problem Solve | |
| **11** | **II** | ***Rotational and Vibrational Spectroscopy:*** Introduction | |
| **12** | **II** | Rotation of Molecules and Classification of Molecules | |
| **13** | **II** | Molecular Spectra of Diatomic Gases | |
| **14** | **II** | Rotational Spectra of Diatomic Molecules | |
| **15** | **II** | Rotational Spectra of Polyatomic Molecules | |
| **16** | **II** | Vibrational Spectra of Diatomic Molecules | |
| **17** | **II** | Intensity of Spectral Lines | |
| **18** | **II** | Vibrational-Rotational Spectra | |
| **19** | **II** | P, Q, and R Branches | |
| **20** | **II** | Problem Solve | |
| **21** | **III** | ***Raman Spectroscopy:*** Introduction | |
| **22** | **III** | Quantum Theory of Raman Effect | |
| **23** | **III** | Classical Theory of Raman Effect | |
| **24** | **III** | Pure Rotational Raman Spectra | |
| **25** | **III** | Vibrational Raman Spectra | |
| **26** | **III** | Polarization of Light and the Raman Effect | |
| **27** | **III** | Rotational-Vibrational Raman Spectra | |
| **28** | **III** | Comparison with IR spectra | |
| **29** | **III** | Structure Determination from Raman and IR Spectra | |
| **30** | **III** | Problem Solve | |
| **31** | **IV** | ***Photoelectron Spectroscopy:*** Basic Principles | |
| **32** | **IV** | Photoelectric effect, Ionization Process, Koopman's | |

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| | | Theorem | |
| **33** | **IV** | Photoelectron Spectra of Simple Molecules | |
| **34** | **IV** | ESCA, Chemical Information from ESCA | |
| **35** | **IV** | Auger Electron Spectroscopy – Basic Idea | |
| **36** | **IV** | ***Mössbauer Spectroscopy:*** Introduction | |
| **37** | **IV** | Principles of Mossbauer Spectroscopy | |
| **38** | **IV** | Experimental Methods, Theoretical Aspects | |
| **39** | **IV** | Quadrupole Splitting, Magnetic Hyperfine Interaction | |
| **40** | **IV** | Problem Solve | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

## LESSON PLAN

Semester: **2nd & 8th** Subject: **Organic Reaction Mechanism (CH-424)**

Session: **Even 2016–2017** **Theory**/Sessional

Branch/Course: **M.Sc. (IC) and Int. M.Sc. (Chemistry)**

Name of the Faculty Member: **Dr. Sukalyan Dash**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | $S_E^1$, $S_E^2$ and $S_E^i$ Mechanisms | |
| **2** | **I** | Effect of Substrate, Leaving Group and Solvent | |
| **3** | **I** | Reactions Hydrogen Exchange, Migration of Double Bonds, Keto-Enol Tautomerism | |
| **4** | **I** | Halogenation, Aliphatic Diazonium Coupling, Stork-Enamine Reaction | |
| **5** | **I** | Structure Reactivity, Relationship in Mono-substituted Benzene | |
| **6** | **I** | Orientation in Benzene Ring with More than One Substituent, Vilsmeier-Haack Reaction, Pechmann Reaction | |
| **7** | **I** | Introduction, Mechanisms of Aromatic Nucleophilic Substitutions ($S_NAr$, $S_N^1$, Aryne) | |

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| **8** | **I** | Effect of Substrates, Leaving Groups, and Nucleophile | |
| **9** | **I** | Reactions: Nucleophilic Displacement in Areno-diazonium Salts by Different Nucleophiles, Chichibabin Reaction | |
| **10** | **I** | Reactions: Nucleophilic Displacement in Areno-diazonium Salts by Different Nucleophiles, Chichibabin Reaction | |
| **11** | **II** | Electrophilic Addition | |
| **12** | **II** | Nucleophilic Addition | |
| **13** | **II** | Free Radical Addition | |
| **14** | **II** | Orientation and Reactivity, Addition to Cyclopropanes | |
| **15** | **II** | Hydroboration, Michael Reaction, Sharpless Asymmetric Epoxidation | |
| **16** | **II** | Mechanism and Reactivity | |
| **17** | **II** | Mannich Reaction, $LiAlH_4$ Reduction of Carbonyl Compounds, Acids, Esters, Nitriles | |
| **18** | **II** | Addition of Grignard Reagents, Reformatsky Reaction, Aldol Condensation | |
| **19** | **II** | Knoevenagel Condensation, Perkin Reaction, Tollens Reaction | |
| **20** | **II** | Wittig Reaction, Prins Reaction, Benzoin Condensation | |
| **21** | **III** | $E^2$ Mechanism | |
| **22** | **III** | $E^1$ Mechanism | |
| **23** | **III** | $E^1_{CB}$ Mechanism | |
| **24** | **III** | Orientation, Effect of Substrate | |
| **25** | **III** | Effect of Base, Leaving Group | |
| **26** | **III** | Effect of Medium, Orientation of Double Bond | |
| **27** | **III** | Saytzeff and Hoffman Rules, Pyrolytic Elimination Reaction | |
| **28** | **III** | Oxidative Elimination (Oxidation of Alcohol by Chromium, Moffatt Oxidation) | |
| **29** | **III** | Cleavage of Quaternary Ammonium Hydroxides | |

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| **30** | **III** | Chugaev Reaction, Shapiro Reaction | |
| **31** | **IV** | Nature of Migration | |
| **32** | **IV** | Migratory Aptitude | |
| **33** | **IV** | Memory Effects | |
| **34** | **IV** | Wagner-Meerwein Rearrangement | |
| **35** | **IV** | Favorskii Rearrangement | |
| **36** | **IV** | Arndt-Eistert Synthesis | |
| **37** | **IV** | Neber Rearrangement | |
| **38** | **IV** | Hofmann Rearrangement | |
| **39** | **IV** | Baeyer-Villiger Rearrangement | |
| **40** | **IV** | Sommelet-Hauser Rearrangement | |

**Signature of Faculty Member:**

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## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

## LESSON PLAN

Semester: **2nd and 8th** Subject: **SCNC**

Session: **Even 2016–2017** **Theory**/Sessional

Branch/Course: **M.Sc. (IC) and Int. M.Sc. (Chemistry)** Name of the Faculty Member: **Dr. Monalisa Mohapatra**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Derivation of phase rule, Brief concept on one and two component system | |
| **2** | **I** | Water, Sulphur system | |
| **3** | **I** | Application of phase rule to three component systems of solids | |
| **4** | **I** | Application of phase rule to three component systems of liquids | |
| **5** | **I** | Kinetics of Catalytic Reactions | |
| **6** | **I** | Acid-base Catalysis, Enzyme Catalysis | |
| **7** | **I** | Heterogeneous Catalysis | |
| **8** | **II** | Surface tension | |
| **9** | **II** | Capillary action | |

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| **10** | **II** | Adsorption, types of adsorption | |
| **11** | **II** | Gibbs adsorption isotherm | |
| **12** | **II** | Freundlich's adsorption isother | |
| **13** | **II** | Langmuir's adsorption isotherm and its limitations | |
| **14** | **II** | BET adsorption isotherm and its applications | |
| **15** | **II** | Heat of adsorption | |
| **16** | **II** | Estimation of surface areas of solids from solution adsorption studies | |
| **17** | **II** | Brief concepts on micelle | |
| **18** | **II** | Reversed micelle | |
| **19** | **II** | Microemulsions | |
| **20** | **III** | Polymer-definition, Types of polymer | |
| **21** | **III** | Number average and weight average macromolecules | |
| **22** | **III** | Determination of molecular weights of macromolecules | |
| **23** | **III** | Osmometry | |
| **24** | **III** | Viscometry | |
| **25** | **III** | Diffusion and Light scattering method | |
| **26** | **III** | Kinetics of polymerization | |
| **27** | **III** | Donnan Effect | |
| **28** | **III** | Stereochemistry of polymerization | |
| **29** | **IV** | Classification of nuclides, nuclear stability, binding energy | |
| **30** | **IV** | Nuclear models, Characteristics of radioactive decay | |
| **31** | **IV** | Decay kinetics, parent-daughter decay growth relationships | |
| **32** | **IV** | Detection and measurement of radioactivity, advances in the solid and liquid scintillation counting techniques | |
| **33** | **IV** | Methods for the determination of half life period of single and mixed radionuclides | |
| **34** | **IV** | Nuclear fission, nuclear fuels and nuclear reactors, nuclear fuel reprocessing | |
| **35** | **IV** | Fast breeder reactors, radiological safety aspects and radioactive waste managements | |
| **36** | **IV** | Interaction of radiation with matter, effect of ionizing/ non-ionizing radiations on water | |
| **37** | **IV** | Aqueous solutions and on organic compounds, radiation dosimetry | |
| **38** | **IV** | Preparation and separation of radioactive isotopes | |
| **39** | **IV** | Application of radioisotopes and radiations in various fields | |
| **40** | **IV** | Isotopic dilution techniques, neutron activation analysis and its applications | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

# LESSON PLAN

Semester: **3rd and 9th** Subject: **ENVIRONMENTAL Chemistry**

Session: Odd **2016–2017** **Theory**/Sessional

Branch/Course: **M. Sc. And Int. M.SC.** Name of the Faculty Member: **Prof. R. B. Panda**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| 1-2 | **I** | Air Pollutants, Air Quality Standards, Production, Fate, Effects and Control of Gaseous Pollutants | |
| 3-4 | **I** | Oxides of Carbon, Nitrogen and Sulphur, Organic Air Pollutants, Photochemical Reaction | |
| 5-6 | **I** | Photochemical Smog, Greenhouse Effect, Climate Change, Global warming, Acid Rain and Ozone Depletion. | |
| 7-8 | **I** | Water World, Source of Water**,** Water Quality, Water Pollutants (Inorganic and Organic), Sources, Fate, Effects and Controlling Measures, Chemical Speciation, Pollution by Radionuclides | |
| 9-10 | **I** | Biochemical Oxygen Demand, Chemical Oxygen Demand, Eutrophication, Biodegradation of Pollutants | |
| 11-12 | **II** | Treatment of Water for Drinking, Electro-dialysis, Ion Exchange, Reverse Osmosis | |
| 13-14 | **II** | Desalination Processes, Removal of Iron, Manganese, Phosphorous, Calcium and Nitrogen and Treatment of Water for Industrial Purposes | |
| 15-16 | **II** | Sedimentation, Coagulation, Flocculation, Filtration, Adsorption, Disinfection of Water | |
| 17-18 | **II** | Sewage Treatment (Physical and Chemical Methods), Health Effects of Drinking Water Treatment Technologies | |
| 19-20 | **II** | Impact of Detergents, Pesticides and Other Additives | |

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| | | on Sewage Treatment | |
| 21-22 | **III** | Sources of Oil Pollution, Chemistry and Fate of Hydrocarbons Oil in Run Off and Ground Water | |
| 23-24 | **III** | Biodegradation, Effect on Aquatic Organisms and Communities | |
| 25-26 | **III** | Treatment and Disposal Technology | |
| 27-28 | **III** | Soil Pollutants (Inorganic, Organic, Pesticides, Radionuclides) | |
| 29-30 | **III** | Sources and Effects on Nature and Properties of Soil, Crops, Plants and Terrestrial Animals. | |
| 31-32 | **IV** | Nature and Sources of Hazardous Wastes, Classification, Characteristics and Constituents, | |
| 33-34 | **IV** | ransport and Effects, Treatment by Physical and Chemical Methods, Thermal Treatment Methods | |
| 35-36 | **IV** | Biodegradation of Wastes, Disposal of Hazardous Wastes. Waste Management and Industrial by Products, Natural Hazards and Management | |
| 37-38 | **IV** | Control of Subsurface Migration of Hazardous Waste, Biomedical Waste Management | |
| 39-40 | **IV** | Environmental Management and Sustainable Development | |

**Signature of Faculty Member:**

**Date:** **Counter Signature of H.O.D.**

## VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

## LESSON PLAN

Semester: **4th and 10th** Subject: **Chemistry of Materials**

Session: **Even 2016–2017** **Theory**/Sessional

Branch/Course: **M.Sc. (IC) and Int MSc**

Name of the Faculty Member: **Dr. Sukalyan Dash**

| Period | Module/ Number | Topics to be Covered | Remarks/Sign. of Faculty Member |
|---|---|---|---|
| **1** | **I** | Glassy State, Glass Formers | |
| **2** | **I** | Glass Modifiers, Applications | |

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| **3** | **I** | Ceramic Structures | |
| **4** | **I** | Mechanical Properties | |
| **5** | **I** | Clay Products. Refractories | |
| **6** | **I** | Characterizations, Properties and Applications | |
| **7** | **I** | Macroscopic Composites, Dispersion-Strengthened and Particle-Reinforced, Fibre-Reinforced Composites | |
| **8** | **I** | Nanocrystalline Phase, Preparation | |
| **9** | **I** | Procedures, Special Properties | |
| **10** | **I** | Applications | |
| **11** | **II** | Types of Ionic Conductors | |
| **12** | **II** | Mechanism of Ionic Conduction | |
| **13** | **II** | | |
| **14** | **II** | Interstitial Jumps (Frenkel), Vacancy Mechanism | |
| **15** | **II** | Diffusion Superionic Conductors | |
| **16** | **II** | Phase Transition and Mechanism of Conduction in Superionic Conductors | |
| **17** | **II** | Phase Transition and Mechanism of Conduction in Superionic Conductors | |
| **18** | **II** | Phase Transition and Mechanism of Conduction in Superionic Conductors | |
| **19** | **II** | Examples and Applications of Ionic Conductors | |
| **20** | **II** | Examples and Applications of Ionic Conductors | |
| **21** | **III** | Conducting Organics, Organic Superconductors | |
| **22** | **III** | Magnetism in Organic Materials | |
| **23** | **III** | Fullerenes-Doped, Fullerenes as Superconductors | |
| **24** | **III** | Molecular Rectifiers | |
| **25** | **III** | Molecular Transistors | |
| **26** | **III** | Artificial Photosynthetic Devices | |

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| **27** | **III** | Optical Storage Memory and Switches-Sensors | |
| **28** | **III** | Nonlinear Optical Effects, Second and Third Order, Molecular Hyperpolarisability | |
| **29** | **III** | Second Order Electric Susceptibility | |
| **30** | **III** | Materials for Second and Third Harmonic Generation | |
| **31** | **IV** | Introduction to ***Thin Films and Langmuir-Blodgett Films*** | |
| **32** | **IV** | Preparation Techniques: Evaporation/Sputtering | |
| **33** | **IV** | Chemical Processes, Sol-Gel Method | |
| **34** | **IV** | Growth Techniques of Langmuir-Blodgett (LB) Film | |
| **35** | **IV** | Photolithography | |
| **36** | **IV** | Properties and Application of Thin and LB Films | |
| **37** | **IV** | Molecular Shape, Structure and Configuration of Polymeric materials | |
| **38** | **IV** | Crystallinity, Stress-Strain Behaviour | |
| **39** | **IV** | Polymer Types and Their Applications | |
| **40** | **IV** | Conducting and Ferroelectric Polymers | |

**Signature of Faculty Member:**
**Date:** **Counter Signature of H.O.D.**