Department of Chemistry						
Academic Calender and Academic Plan						
1st Semester Honours Course (July 2018 - Dec 2018) CCH 01						
Name of the paper	**Module or Unit No**	**Topic : Basics of Organic Chemistry Bonding and Physical Properties (Paper1B) & INORGANIC CHEMISTRY-1(Paper 1A)**	**Name of the teacher**	**To be Completed during**	**No of PPT classes**	**Continuous Internal Assesment Schedule (write yes or no)**
CCH 01	Module I	Valence Bond Theory	KT	July	0	Yes
CCH 01	Module II	Electronic displacements	KT	Aug	0	Yes
CCH 01	Module III	MO theory	SC	July-Aug	1	Yes
CCH 01	Module IV	Physical Properties	KT	Sept	0	Yes
CCH 01	Module V	General Treatment of Reaction Mechanism I	KT	Nov	1	Yes
CCH 01	Module VI	ORGANIC CHEMISTRY: O (1A) LAB :Separation based upon solubility	KT	July-Nov	0	No

CCH 01	Module VII	Extra nuclear Structure of Atom	K.B	July	NIL	Yes
CCH 01	Module VIII	Acid -Base reactions	K.B	Aug	1	Yes
CCH 01	Module IX	Redox Reactions. Ion electron method of balancing of redox reactions Disproportionation and Comproportionreactions	K.B	Sep	Nil	Yes
CCH 01	Module X	Electro analytical methods	K.B	Nov	Nil	Yes
CCH 01	Module XI	Solubility and solubility effect	K.B	Nov	Nil	Yes
CCH 01	Module XII	General Treatment of Reaction Mechanism	K.B	Dec	Nil	Yes
CCH 01	Module XIII	Inorganic Chemistry lab -Acid and Base Titrations	K.B	July-Aug	Nil	NO
CCH 01	Module XIV	Oxidations - Reduction Titrations	K.B	Sept,Nov,Dec	NIL	No

Course Outcome	The students will learn the Bonding and Physical Properties by understanding CO 1. The Valence bond theory for hybridization, shapes, resonance, orbital picture etc CO 2. Various Electronic displacements effects CO 3. Molecular Orbital Theory for HOMO, LUMO and SOMO CO 4. Aromaticity, Antiaromaticity, Homoaromaticity and Non aromaticity CO 5. Several Physical properties e.g., BDE and bond energy; bond distances, bond angles, bond angle strain, polarity, Heat of Hydrogenation and heat of combustion etc. Basics of Organic Chemistry (General Treatment of Reaction Mechanism I) be understood by explaining CO 1. Definition of Reaction mechanism and Mechanistic classification e.g, ionic, radical and pericyclic mechanism CO 2. Explanation of ionic mechanism with examples CO 3. Explanation of pericyclic mechanism with examples e.g., Chelotropic, Electrocyclic, Cycloadditionreaction, Sigmatropic reactions CO 4. Examples and reason of homolytic and heterolytic bond cleavage CO 5. Examples and reason of homogenic and heterogenic bond formation CO 6. Representation of mechanistic steps using arrow formalism CO 7. Basic idea of electrophiles and nucleophiles ORGANIC CHEMISTRY: O (1A) LAB The students will be able to distinguish different organic compounds from the given mixture by CO 1. Separation based upon solubility, by using common laboratory reagents like water (cold,hot), ,dil. HCl, dil. NaOH,dil. NaHCO3 CO 2. Purification based on crystallization using solvents , Hot water, Ethyl alcohol, Light petrol CO 3. Determination of its melting point by using Conc. H2SO4 Bath, Metal bath Enable the students to i) explain the extra nuclear structure of atoms and associated theories thereof.ii) Describe different concepts of classifying acids and bases.iii) Do balancing of redox reactions iv) Use redox/ formal potential values and explain the effects of precipitation ,complex formation and change of pH on their values. V)Calculate pKa values of reactants by some important electroanalytical methods . vi) Explain the concepts of solubility products and common ion effects and their roles in prcipitation and separation of common metalic ions from their different salts. vii) Explain general treatments of various reaction mechanisms. viii) Estimate in laboratory carbonates,bicarbonates , hydroxides present in mixtures by acid-base titration and also Fe(II), Fe(III),Mn(II) Cu(II) in mixtures by oxidation-reduction titration.

1st Semester Honours Course (July 2018 - Dec 2018) CCH 02

Name of the paper	Module or Unit No	Topic: Topic : Stereochemistry I (Paer 2)& PHYSICAL CHEMISTRY-1 (Paper 2A)and Practicals for both papers	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)

CCH 02	Module I	Bonding geometries of carbon compounds and representation of molecules:	KT	July	1	Yes
CCH 02	Module II	Concept of chirality and symmetry	KT	Aug	1	Yes
CCH 02	Module III	Relative and Absolute Configuration	KT	Sept	1	Yes
CCH 02	Module IV	Optical activity of Chiral Compounds	KT	Sept-Nov	1	Yes
CCH 02	Module V	General Treatment of Reaction Mechanism II :Reactive intermediates	KT	Dec		Yes
CCH 02	Module VI	ORGANIC CHEMISTRY: O (1B) LAB Determination of boiling point of common organic liquid compounds	KT	Sept-Nov		No
CCH 02	Module VII	Kinetic Theory and Gaseous state	SB	July	0	Yes
CCH 02	Module VIII	Transport processes Diffusion, Viscosity	SB	Aug-Sept	0	yes
CCH 02	Module IX	Chemical kinetics	SB	Nov	0	yes

CCH 02	Module X	Practicals	SB	July-Nov	0	No
Course Outcome	Paper 2: Stereochemistry I Students will gather knowledge about the three dimensional structure of any Sp3 hybridised chiral organic compound by explaining CO 1. Bonding geometries of carbon compounds and representation of molecules by classification of Isomerism, Projection Formulae, Representation,CO 2. Concept of chirality and Symmetry elements, optical isomers , Concept of Stereogenicity and Chirotopicity CO 3. Definition and rules of writing Configuration and also their Assignments, Examples of threo/erythro, syn/anti, cis/trans , E/Z CO 4. Optical activity of chiral compounds by optical rotation, specific rotation, optical purity, racemic modification, racemisation and resolution. invertomerism of trialkylamines General Treatment of Reaction Mechanism II Reactive intermediates: The 2nd part of Reaction Mechanism will be explained by CO 1. Structures, Types and Applications of Reactive intermediates carbocations , carbanions, carbon radicals, carbenes and their stabilities, CO 2. Electrophilic behavior of Carbocations & Nucleophilic behavior of Carbanions, CO 3. Electrophilic / Nucleophilic behavior of Carbon Radicals CO 4. Elementary idea of generation and fate of the all intermediates ORGANIC CHEMISTRY: O (1B) LAB CO 1. The students will be able to determine the boiling points of common organic liquid compounds by using boiling point bath. Paper 2A: Students will be able CO 1. To understand kinetic theory of gases,CO 2. To get an introduction to the basic concepts of pressure, temperature and velocity of ideal gases, CO 3. To get a picture about the probability of finding a molecule with a speed falling in a particular range, CO 4. To explain the key concepts of degree of freedom, equipartition of energy and specific heat, CO 5. To get a concept of collision among molecules and with the wall CO 6. To understand deviation of real gas from ideal behavior, CO 7. To understand critical constant and vanderwall's constant, CO 8. To learn about the different intermolecular forces, CO 9. To be able to derive rate equations from mechanistic data , CO 10. To make use of simple models for predictive understanding of physical phenomena associated to kinetics, CO 11. To study the dependence of the rate of chemical reactions on properties like pressure, temperature, presence of catalyst , CO 12. To understand transport properties, CO 13. To have a hands on experience about the different concepts of kinetics theory, flow properties and solubility					
2nd Semester Honours Course (Jan 2019 - June 2019) CCH 03						

Name of the paper	Module or Unit No	Topic : Stereochemistry II, General Treatment of Reaction Mechanism III and Substitution and Elimination Reactions	Name of the teacher	To be Completed during	No of PPT Classes	Continuous Internal Assesment Schedule (write yes or no)
CCH 03	Module I	Chirality arising out of stereoaxis	KT	January	0	Yes
CCH 03	Module II	Concept of Prostereoisomerism	KT	January	0	Yes
CCH 03	Module III	Conformation	KT	February	0	Yes
CCH 03	Module IV	Reaction Thermodynamics	KT	February	0	Yes
CCH 03	Module V	Concept of Organic Acids and Bases	KT	March	0	Yes
CCH 03	Module VI	Tautomerism	KT	March	0	Yes
CCH 03	Module VII	Reaction Kinetics	KT	April	0	Yes
CCH 03	Module VIII	Free-radical Substitution Reaction	SC	January	0	Yes

CCH 03	Module IX	Nucleophilic Substitution Reactions	SC	February	0	Yes
CCH 03	Module X	Elimination Reactions	SC	March	0	Yes
CCH 03	Module XI	Organic Preparations	KT	January-April	0	No

Course Outcome	Paper 2: StereochemistryII :The 2nd part of Stereochemistry deals with CO 1. Chirality arising out of stereoaxis e.g., allenes and biphenyls ,Atropisomerism, Assignment of R/S descriptor in allenes and biphenyls CO 2. Concept of prostereoisomerism, prochirality, prostereogenicity, Topicity of ligands and faces, Pseudoasymmetry, Pro-R and Pro-S designation of enantiotopic groups and propseudoasymmetric centre, Re /Si designation designation of enantiotopic nd diastereotopic faces CO 3. Conformational nomenclature, Determination of conformational analysis and Potential Energy diagram of various hydrocarbons, halohydrocarbons glycols depending on relative stability of conformers on the basis of steric effect, dipole-dipole interaction, H-bonding etc The 3rd part of reaction mechanism consisting CO 1 . Reaction thermodynamics i.e., basic idea about free energy, Equilibrium, enthalpy, entropy, by Explaining intermolecular & intramolecular reactions with examples CO 2. Concept of organic acids and bases,their structure, effect of substituent, solvent on acidity and basicity CO 3. Definition and types of tautomerism with examples CO 4. Concept of Reaction kinetics with Free energy profiles for one and multi step reactions with rate constant and free energy of activation , Free energy profiles for catalysed reactions (electrophilic and nucleophilic catalysed reactions), Kinetic control and thermodynamic control of reactions, Primary kinetic isotopic effect (kH/kD), Hammond postulate Substitution and Elimination Reactions: After studying this topic students will gain the knowledge of two unique types of reactions i.e., substitution and eliminations by learning the followings CO 1. Concept, Types (SN1, SN2, SNi) and Mechanisms of Sustitution Reaction at sp3 centre , Role of leaving group SN1, SN2 and SNi reaction CO 2. Concept, Types and Mechanisms of elimination reactions.(E1, E2 and E1cB), Reactivity of different substrates on elimination reactions, Orientation (Saytzeff/ Hofmann rules) CO 3. Substitution vs elimination Organic Preparations: The students will develop the skill of CO 1. Synthesis of some organic compounds given in the syllabus by several methods CO 2. Purification of the crude product based on crystallization using solvents e.g., Hot water, Ethyl alcohol, Light petrol or by sublimation if applicable CO 3. Determination of melting point of the Crystals by using • Conc. H2SO4 Bath • Metal bath • CO 4. Calculation of % of Yield.

2nd Semester Honours Course (Jan 2019 - June 2019) CCH 04

Name of the paper	Module or Unit No	Topic :	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)

CCH 04	Module I	Chemical Bonding-1 Ionic Bonding	K.B	Jan	1	yes
CCH 04	Module II	Covalent Bond	K.B	Feb	1	yes
CCH 04	Module III	Molecular orbital Concept of bonding, MO diagram of homo nuclear diatomic molecules	K.B	March	Nil	yes
CCH 04	Module IV	MO Diagram of Hetero nuclear diatomic molecules . Metallic bond.Weak Chemical forcec	K.B	April	Nil	yes
CCH 04	Module V	Radioactivity,Nuclear Stability Nuclear Reactions , Principles of determination of age of rocks and minerals , radio carbon dating and safety measures .	K.B	May	Nil	yes
CCH 04	Module VI	Artificial Radioavtiviy , transmutations of elements , fission , fussion and Spallation . Nuclear Energy and power generation	K.B	May- June	Nil	YES
CCH 04	Module VII	Iodo/ Iodiometric Titrations of Vit.C, Arsenite and Antimony, Avaiable chlorine in bleaching powder.	K.B	Jan-Feb	Nil	Yes
CCH 04	Module VIII	Estimation of Cu in brass, Cr and Mn in Steel and estimation of Fe in cement	K.B	March, April, May	Nil	Yes

Course Outcome	Enable the students to i) explain characteristics of different types of bondings in chemicals and underlying theories,derivations and associated parameters thereof ii) Explain solubility, energetics of dissolution process, importance of Born-Haber cycle iii) Discuss various features of covalent bonds e,g directional character, hybridization, Bent's Rule. iii) Explain Valence Bond theory,VSEPR theory and shapes of molecules containing lone pairs and bond pairs, multiple bonding .iv) Discuss MO diagram of Homo nuclear and Hetero nuclear compounds, metallic bond and weak chemical forces..v) Explain various aspects of nuclear stability,nuclear forces, nuclear reactions ,radio chemical methods. VI)Estimate in laboratory condition quantity of Vit.c,arsenite, antimony,and aiso Cu in brass,Cr,Mn in steel and Fe in cement samples.

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 05

Name of the paper	Module or Unit No	Topic: Chemical Thermodynamics I & II, Applications of Thermodynamics – I, Electrochemistry, Electromotive Force	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
CCH 05	Module I	Chemical Thermodynamics I	SB	Aug	0	Yes
CCH 05	Module II	Chemical Thermodynamics II	SB	Sept	0	Yes
CCH 05	Module III	Systems of Variable Composition	SB	Sept	0	Yes
CCH 05	Module IV	Applications of Thermodynamics – I Chemical Equilibrium	SB	Nov	0	Yes
CCH 05	Module V	ELECTROCHEMISTRY: (i) Conductance and transport number	AK	Sept	0	Yes

CCH 05	Module VI	ELECTROCHEMISTRY: (ii) Ionic equilibrium	AK	Nov	0	Yes
CCH 05	Module VII	Practical	SB	Aug-Nov	0	No

Course Outcome	Students will be able CO 01. To provide an insight into some of the fundamental concepts and principles that are very essential in the study of chemistry. CO 02. To understand the principle of conservation of energy and how this principle can be used to assess the energy changes that accompany physical and chemical processes, CO 03. To examine the means by which a system can exchange energy with its surroundings in terms of the work it may do or the heat it may produce, CO 04. To understand the thermodynamic description of mixtures state function, exact, inexact differential, CO 05. To understand the statements of 1st and 2nd laws of thermodynamics, CO 06. To learn the thermodynamic aspects of various processes and reactions, CO 07. To understand the concept of thermochemistry enthalpy change of different processes, CO 08. To get the concept of Entropy (S) from Carnot cycle and the significance of Helmholtz free energy(A) & Gibb's free energy (G), CO 09. To explain the criteria of spontaneity in terms of S,A and G, CO 10. To be able to derive important thermodynamic relations, CO 11. To learn the basic concept of equilibrium, CO 12. To develop an understanding of electrochemistry and the methods used to study the response of an electrolyte through current of potential, CO 13. To understand the difference between voltaic/galvanic and electrolytic electrochemical cells. CO 14. To understand why standard reduction potentials are used and how they are determined, CO 15. To know how the standard states used for E° and ΔG° are defined for gases solids liquids and solutes, CO 16. To be able to write balanced half reactions determine overall cell reactions, calculate the standard reduction potential and predict the direction of electron anion and cation flow based on a sketch of an electrochemical cell or the description of an electrochemical cell given in shorthand notation, CO 17. To understand the relationship between chemical energy (Gibbs free energy change for a redox reaction) and electrical energy (electromotive force or cell potential) in an electrochemical cell. CO 18. To be prepared to use standard reduction potentials to calculate the standard cell potential E° for an electrochemical cell. CO 19. To explain the various terms such as specific conductance, equivalent conductance and molar conductance, CO 20. To Explain the method of determination of equivalent conductance understand the factors affecting the conductance of electrolytic solution, CO 21. To Explain the effect of dilution on specific conductance, equivalent conductance and molar conductance, CO 22. To understand the ionic mobility of different ions,methods of determination of ionic mobility of ions, CO 23. To understand Kohlrausch's law and its applications, CO 24. To understand the basic concepts of Arrhenius theory of electrolytic dissociation, evidences in support of Arrhenius theory of electrolytic dissociation and its limitation,CO 25. To understand Ostwald's dilution law and its application in determination of Dissociation constant of weak electrolyte CO 26. To understand the need of another theory for strong electrolyte, CO 27. To understand the term- Electrophoretic and Asymmetric effect CO 28. To understand Debye-Huckel theory of strong electrolyte and its mathematical equation, CO 29. To define -Transport number or transference number of ions, CO 30. To understand the various methods of determination of transport number of ions CO 31. To Appreciate the importance of conductometric measurement, CO 32. To differentiate between various types of conductometric titrations, CO 33. To explain the nature of various acid-base titration curves as well as acid mixture versus base graph,

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 06

Name of the paper	Module or Unit No	Topic: Chemical periodicity, Chemistry of s and p Block Elements, Noble Gases, Inorganic Polymers & Coordination Chemistry-I	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
CCH 06	Module I	Chemical Periodicity	K.B	July	Nil	Yes
CCH 06	Module II	Chemistry of s and p block elements	K.B	Aug	1	Yes
CCH 06	Module III	Chemistry of s and p block elements	K.B	Sept	Nil	yes
CCH 06	Module IV	Noble gases	K.B	Nov	Nil	Yes
CCH 06	Module V	Inorganic polymers	K.B	Nov	Nil	Yes
CCH 06	Module VI	Coordination Chemistry -1	K,B	Dec	Nil	yes
CCH 06	Module VII	Complexometric titration	K,B	July, Aug,Sept	Nil	Yes

CCH 06	Module VIII	Chromatography of metal ions. Gravimetry	K.B	Nov, Dec	Nil	Yes
Course Outcome	Enable the students to i) Discuss various aspects of modernIUPAC periodic table including secondary periodicity of elrments.ii) Discuss periodicity of the features of s-,p-d- block elements in the light of their atomic radii,covalent radii,ionisation potential,electron affinity,electronegativity. iii) Explain the chemistry of s and p block elements in respect of their relative stability of different oxidation states,digonal relationship,allotropy and catenation.iv) Discuss the structure,bonding,preparation,and also properties and uses of Beriyllium hydrides and halides,Boric acid and borates,boron nitrides,borohydrides.v) Discuss about ,graphitic compounds,silens and oxides and oxoacids of N,P,S,Cl and also peroxoacids of S v) Narrate the properties of S-N compounds,interhalogens,polyhalides,pseudohalogens and flurocarbons. vi) Discuss preparation and properties and nature of bonding of some noble gas compounds of Xe-F, Xe-o. vii) Explain molecular shape of noble gas compound in the light of VSEPR theory.vii) Discuss with examples of inorganic polymers, their structural aspects,synthesis and comparison with organic polymers and also applications of a few inorganic polymers. like silicones and siloxanes. viii) Explain the structural aspects,nature of bonding, ligands,isomerism and nomenclature of co ordination complexes and associated theory. ix) Undertake Complexometric titration in laboratory for Zn(II), mixtures of Zn(II) withCu(II), Ca(II) inCa(II) withMg(II),Al(III) in Al(III) with Fe(III), Hardness of water. x) Undertake Chromatographic separation of some selected mixtures of metals, Gravimetric estimation of specific metals and chloride in laboratiory.					

3rd Semester Honours Course (July 2019 - Dec 2019) CCH 07

Name of the paper	**Module or Unit No**	**Topic: Chemistry of Alkenes and Alkynes, Aromatic Substitution, Carbonyl and Related Compounds & Organometallics**	**Name of the teacher**	**To be Completed during**	**No of PPT classes**	**Continuous Internal Assesment Schedule (write yes or no)**
CCH 07	Module I	Addition to C=C	KT	August	0	Yes
CCH 07	Module II	Addition to C≡C (in comparison to C=C)	KT	August	0	Yes
CCH 07	Module III	Electrophilic Aromatic Substitution	KT	August	0	Yes

CCH 07	Module IV	Nucleophilic Aromatic Substitution	KT	September	0	Yes
CCH 07	Module V	Addition to C=O	KT	September	0	Yes
CCH 07	Module VI	Exploitation of acidity of α-H of C=O	KT	November	0	Yes
CCH 07	Module VII	Nucleophilic addition to α,β-unsaturated carbonyl system	KT	November	0	Yes
CCH 07	Module VIII	Substitution at sp2 carbon (C=O system):	KT	December	0	Yes
CCH 07	Module IX	Grignard Reagents	KT	December	0	Yes
CCH 07	Module X	Practical: Identification of Liquid Compounds	KT	Aug-Nov	0	No
CCH 07	Module XI	Practical: Identification of Solid Compounds	KT	Aug-Nov	0	No
CCH 07	Module XII	Practical.:Quantitative Estimations	KT	Aug-Nov	0	No

Course Outcome	Chemistry of alkenes and alkynes : The students will develop the knowledge of Addition reaction by learning 1) The Mechanism, Reactivity of Electrophilic Addition to C=C bond with different electrophiles abiding Markonikoff's rule and anti—markonikoff's rule, Difference between regioselectivity, stereoselectivity, Ozonolysis reactions with mechanism, allylic and benzylic bromination, use of NBS for bromination to C=C with mechanism, Birch reduction of benzenoid aromatics, interconversion of E- and Z- alkenes; contra-thermodynamic isomerization of internal alkenes, electrophiilic addition to conjugated diene, allenes, 2) Mechanism and Reactivity of Electrophilic Addition to C≡C (in comparison to C=C) in the above way, 3) The acidities of the terminal alkynes can be proved by substituting them with Na/ Ag/ Cu, 4) Interconversion of terminal and non-terminal alkynes i.e. interconversion of 1-butyne can be converted to 2-butyne Aromatic Substitution: This part is Comprising of 1) General Mechanism, Orientation, Reactivity of different Electrophilic aromatic substitution, 2) Mechanism of Nucleophilic aromatic substitution Carbonyl and Related Compounds : Students will achieve the knowledge on 1) Mechanism and Reactivity of Nucleophilic addition to Carbonyl and Related Compounds with different nucleophiles, 2) Mechanism of some condensation, reduction and oxidation reaction of carbonyls, 3) Exploitation of acidity of α-H of C=O by alkylation, halogenations, aldol condensationetc rection, 4) Some named rearrangements with mechamism, 5) Alkylation of active methylene compounds (diethyl malonate and ethyl acetoacetate)with mechamism, 6) Mechanism of Nucleophilic addition to α,β-unsaturated carbonyl system, 7) Substitution at sp2 carbon (C=O system) by esterification and Hydrolysis (BAC2, AAC2, AAC1, AAL1), amide, Anhydrides, Acyl halides formation and their corresponding hydrolysed products. Organometallics: Students be knowledgable about 1) The General Idea, Structure and Types of Organometallic compounds. Few examples, 2) Preparation of Grignard reagent and organo lithium with mechanism 3) Mechanism of the addition reactions of Grignard reagents, organo lithium and Gilman cuprates to different electrophilic sites, 4) Mechanism of Reformatsky reaction, Blaise reaction by using organozinc compound, 5) Some abnormal behaviours of Grignard reagents , 6) comparison of reactivity among Grignard, organolithiums and organocopper reagents, 7)Reversal of polarity. i.e., Umpolung: How an electrophilic C=O group can be used as a nucleophile using organo-Li Identification of a Pure Organic Compound: The students will be able to identify a single compound 1) Single organic compounds can be identified by checking its Physical state (Solid and Liquid), 2. Then Identification of some solid and liquid compounds are done primarily by using litmus paper, Solubility test, Action of heat,$FeCl_3$ test, Silver mirror test,Fluorescence test, Fehling's test etc, 3) After having the idea about the probable name and nature of the compound it is identified correctly by doing a single test for each solid and liquid compounds, 4) Developing the skill for estimating different organic compound solutions quantitatively.

Name of the paper	Module or Unit No	Topic: Analytical Clinical Biochemistry	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
SEC	Module I	Carbohydrates	SC	August	1	Yes
SEC	Module II	Proteins	SC	August	1	Yes
SEC	Module III	Enzyme	SC	September	1	Yes
SEC	Module IV	Lipids	SC	September	0	Yes
SEC	Module V	Lipoproteins	SC	November	0	Yes
SEC	Module VI	Biochemistry of disease: Blood Urine	SC	November	0	No

Course Outcome	Explain the structure carbohydrates and amino acids, their physical and chemical properties and their function in living organisms. Describe the function of enzyme as a catalyst in maximum biological reaction and learn about the function of enzyme, and also see how they are related to things they come across in daily life. Understand the effect of cholesterol and triglycerides in human body Know about steroid hormone which regulates carbohydrate metabolism and has an anti-inflammatory effect on the body. It helps maintain blood pressure and regulate the salt and water balance in our body. . understand some of the types of disease that might be treatable by gene therapy

4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 08

Name of the paper	Module or Unit No	Topic: Nitrogen compounds, Rearrangements, The Logic of Organic Synthesis Retrosynthetic analysis and Organic Spectroscopy	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
CCH 08	Module I	Amines: Aliphatic & Aromatic	SC	February	0	Yes
CCH 08	Module II	Nitro compounds (aliphatic and aromatic)	SC	February	0	Yes
CCH 08	Module III	Alkylnitrile and isonitrile	SC	March	0	Yes
CCH 08	Module IV	Diazonium salts and their related compounds	SC	April	0	Yes
CCH 08	Module V	Rearrangements(1): Rearrangement to electron-deficient carbon	KT	February	0	Yes

CCH 08	Module VI	Rearrangements(2): Rearrangement to electron-deficient Nitrogen	KT	March	0	Yes
CCH 08	Module VII	Rearrangements(3): Rearrangement to electron-deficient Oxygen	KT	March	0	Yes
CCH 08	Module VIII	Rearrangements(4): Migration from Oxygen to Ring Carbon	KT	March	0	Yes
CCH 08	Module IX	Rearrangements(5): Migration from Nitrogen to Ring Carbon	KT	March	0	Yes
CCH 08	Module X	The Logic of Organic Synthesis (1) Retrosynthetic analysis Disconnections; synthons, donor and acceptor synthonsetc	KT	April	0	Yes
CCH 08	Module XI	The Logic of Organic Synthesis (2) Retrosynthetic analysis: C-C disconnections and synthesis	KT	April	0	Yes
CCH 08	Module XII	Strategy of Ring Synthesis	KT	April	0	Yes
CCH 08	Module XIII	Asymmetric synthesis	KT	April	0	Yes
CCH 08	Module XIV	Organic Spectroscopy(1) : UV Spectroscopy	KT	May	0	Yes

CCH 08	Module XV	Organic Spectroscopy(2) : IR Spectroscopy	KT	May	0	Yes
CCH 08	Module XVI	Organic Spectroscopy(3) : NMR Spectroscopy	KT	May	0	Yes
CCH 08	Module XVII	Organic Spectroscopy(4) : Application of UV, IR and NMR Spectroscopy	KT	May	0	Yes
CCH 08	Module XVIII	Experiment: Qualitative Analysis of Single Solid Organic Compounds	KT	Feb-May	0	No

Course Outcome	Nitrogen compounds:The students will have an preliminary idea about CO 1. The structural differences of Amines: Aliphatic & Aromatic, Preparation, Separation and Basicity of aliphatic and aromatic amines, Identification of primary, secondary and tertiary amines several reactions of amines with mechanism, CO 2. The preparation of Nitro compounds (aliphatic and aromatic), reduced products of nitro compounds on acidic, neutral and alkaline condition,CO 3. The various methods for preparing Alkylnitrile and isonitrile, CO 4. Preparation of aromatic Diazonium salts and their related compounds, to replace the N≡N group by different groups, coupling products Rearrangements : The students will be learnt different types of rearrangements including CO 1. Rearrangement to electron deficient carbon, CO 2. Rearrangement to electron deficient oxygen, CO 3. Rearrangement to electron deficient nitrogen CO 4. Migrating the group from oxygen to ring carbon, CO 5. Migrating the group from nitrogen to ring carbon The Logic of Organic Synthesis Retrosynthetic analysis after studying this module. Students have to go through the following CO 1. Definition of Disconnection, Synthon, Synthetic Equivlent, Umpolung Synthesis Illogical Electrophile & Nucleophiless, Functional Group Interconversion (FGI), Functional Group Addition (FGA) CO 2.How to do One-Group, Two-Group C-C disconnections and then synthesize, Concept of Reconnection and Protection-deprotection strategy of alcohol, amine, carbonyl, acid will also be taught in this module. CO 3. Strategy of ring synthesis:Medium and large rings may be synthesized by high dilution principle. CO 4. Asymmetric synthesis: Streoselective Reactions, Stereospecific Reactions, Diastereoselectivity, Enantiosectivity, CO 5. Diastereoselective synthesis may be carried out by applying Cram's rule using Felkin-Anh model for addition of nucleophiles to C=O adjacent to a stereogenic centre. Organic Spectroscopy:The student will be taught about Spectroscopy, the classification of it. e.g., CO 1. Emission Spectroscopy,CO 2. Absorption Spectroscopy. It is again divided into the following heads CO 3. UV Spectroscopy : CO 4. IR Spectroscopy, CO 5. NMR Spectroscopy Application of UV, IR and NMR :CO 1. The basic fundamental knowledge which are acquired in the previous modules (MXIII, MXIV and MXV) for identification of simple organic molecules Qualitative Analysis of Single Solid Organic Compounds After completing this module students will be able to analyse the given single solid organic compound by CO 1. Detection of special element by Lassaigne's test, CO 2. Solubility and classification (solvents: H_2O, 5% HCl, 5% NaOH and 5% $NaHCO_3$), CO 3. Identification of nitrogeneous and non-nitrogeneous functional groups, CO 4. The structure of the given compound may be achieved by corresponding suitable derivative preparation and, CO 5. Melting point determination of both the given sample as well as the derivative prepared.

Name of the paper	Module or Unit No	Topic: Application of Thermodynamics – II, Foundation of Quantum Mechanics, Crystal Structureand Practical	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
CCH 09	Module I	Application of Thermodynamics – II Colligative properties	AK	Feb	0	Yes
CCH 09	Module II	Application of Thermodynamics – II Phase Equilibrium	AK	Feb	0	Yes
CCH 09	Module III	Application of Thermodynamics – II Binary solutions	AK	Feb	0	Yes
CCH 09	Module IV	Foundation of Quantum Mechanics Beginning of Quantum Mechanics	AK	March	0	Yes
CCH 09	Module V	Foundation of Quantum Mechanics Wave function	AK	March	0	Yes
CCH 09	Module VI	Foundation of Quantum Mechanics Concept of Operators	AK	March	0	Yes
CCH 09	Module VII	Foundation of Quantum Mechanics Particle in a box	AK	April	0	Yes

CCH 09	Module VIII	Crystal Structure Bravais Lattice and Laws of Crystallography	AK	April	0	Yes
CCH 09	Module IX	Crystal Structure Crystal planes	AK	May	0	Yes
CCH 09	Module X	Crystal Structure Specific heat of solid	AK	May	0	Yes
CCH 09	Module XI	Practicals	SB	Feb-May	0	No

Course Outcome	Students will be able CO 01. To understand Raoult's law, CO 02. To compare Henry's law and Raoult's law to explain ideal solutions, CO 03. To describe ideal liquid mixtures, CO 04. To discuss P-C and T-C diagrams and the usefulness , CO 05. To explain non-ideal liquid-vapour systems, CO 06. To state and explain azeotropic mixtures, CO 07. To explain partially miscible and immiscibele liquid systems by taking appropriate examples, CO 08. To describe how a solute distribute itself in two immiscible liquids,CO 09. To state and explain Nernst's distribution law, CO 10., CO 11. To apply and derive an expression for modified Nernst distribution law for a special case in which solute associate or dissociate in one of the solvent ,CO 12. To classify systems as heterogeneous and homogeneous systems, CO 13. To define equilibrium and metastable equilibrium, CO 14. To appreciate the importance of phase rule equation in dealing with heterogeneous equilibrium of different types, CO 15. To define Phase rule and understand the concepts number of components, degrees of freedom, CO 16. To know conditions of equilibrium between two and three phases, CO 17. To explain the changes expected in the system if we vary temperature or pressure keeping the other variable constant, CO 18. To understand why normal boiling point and of water normal melting point of ice are 100°C and 0°C respectively CO 19. To get an idea how to use the phase diagram in developing practical applications, CO 20. To understand Clausius-Clapeyron equation and its applications, CO 21. To understand and explain miscibility in the solid-state, CO 22. To gain an understanding of the limitations of classical mechanics at molecular length scales the differences between classical and quantum mechanics the connection of quantum mechanical operators to observables, CO 23. To see how operator algebra can be used to solve simple eigenvalue problems, CO 24. To understand the concepts of probabilities, amplitudes, averages, expectation values, and observables CO 25. To get an overview about the structure and properties of solid crystals, CO 26. To know the characterisation of crystals using X-Ray diffraction, CO 27. To get hands-on experience of phase diagram, partition coeffiecient, buffer, pH etc

4th Semester Honours Course (Jan 2020 - Jun 2020) CCH 10

Name of the paper	Module or Unit No	Topic: Inorganic Chemistry 4	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
CCH 10	Module I	Coordination Chemistry 11	K.B	Jan,Feb, March,April	Nil	YES

CCH 10	Module II	Chemistry of d and f block elements. Transition elements	K.B	May	Nil	Yes
CCH 10	Module III	Lanthanhoids and Actinoids	K.B	May	1	Yes
CCH 10	Module IV	Reaction Kineticks and Mechanism.Substitution reactions in square planner complexes.Trans effect and its application in complex synthesis	K.B	June	Nil	Yes
CCH 10	Module V	Mechanism of Nucleophilic substitution in square planar complexes. Thermodynamic and Kinetic stability	K.B	June	Nil	Yes
CCH 10	Module VI	Inorganic Chemistry lab - Preparation of some complexes	K.B	Jan. Feb, March, April	Nil	Yes
CCH 10	Module VII	Inorganic Chemistry lab- Preparation of some complexes	K.B	May	Nil	Yes
CCH 10	Module VIII	Inorganic Chemistry lab-Measurement of 10 Dq by spectrophotometric method.Determination of λmax of [Mn(acac)3] and [Fe(acac)3] complexes	K.B	June	Nil	Yes

Course Outcome	Enable the students to i) explain the elementary concepts of Crystal field theory , CFSE in weak and strong fields, Jahn-Tellar distortion theory,types of metal ligand bonding, electronic configurations and their roles in determining the magnetic properties and colour of the complexes , Orgeal diagram, Racah parameter, Selection rule for electronic transition, Charge transfer spectra. ii) Compare 3d,4d and 5d elements in terms of oxidation state,redox properties and co-ordination chemistry. iii) Compare electronic configurations,oxidation states, colour,spectral and magnetic properties ,contraction of various lanthanide members and ion-exchange method for separation of lanthinides. iv) explain various aspects of inorganic reaction kinetics and mechanism. v) undertake preparation of some selected inorganic complexes , measurement of 10Dq of selected complexes by spectrophotometric method and determination of λ max of[Mn(acac)3] and[Fe(acac)3]complexes in laboratory.

4th Semester Honours Course (Jan 2020 - Jun 2020) SEC

Name of the paper	Module or Unit No	Topic: PHARMACEUTICALS CHEMISTRY	Name of the teacher	To be Completed during	No of PPT classes	Continuous Internal Assesment Schedule (write yes or no)
SEC	Module I	Drugs & Pharmaceuticals	KT	February-April	0	No
SEC	Module II	Fermentation	SC	February-April	0	No
Course Outcome	The students will develop knowledge about CO 1. The drug designing CO2.The synthesis of several drugs e.g., Analgesics Agents, Antipyretic Agents, Anti-inflammatory Agents, Antibiotics Agents, Antifungal Agents, Antiviral Agents, and HIV-AIDS related drugs by adopting the general established method. CO 3.Aerobic and anaerobic fermentation CO 4. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.					