TGTWR DEGREE COLLEGE (GIRLS), DAMMAPETA,
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DEPARTMENT OF CHEMISTRY

B.Sc IYr
CHEMISTRY
SEMESTERWIS
ESYLLABUS
SEMESTER II

Unit-I(InorganicChemistry)

.15h(1hr/ week)

S2-I-1p-blockElements-II 7

Oxides:Typesofoxides(a)Normal-acidic,basicamphotericandneutral{b)Mixed (c)suboxided)peroxidee)superoxide. Structure-0foxidesofC,N,P,SandCl-reactivity, thermal stability, hydrolysis.

Oxyacids:StructureandacidicnatureofoxyacidsofB,C,N,P,S,ClandI.Redoxproperties of oxyacids of Nitrogen: HN02 (reaction with FeS04, K.Mn04, K2Cr201), HN03(reaction with- H_2S,Cu),HN04(re<lction with KBr, Aniline), H2N202(reaction with K.Mn04).Redox properties of oxyacids of Phosphorus: H3P02(reaction with HgClz), H3P03(reaction with AgN03, CuS04). Redoxpropertiesofoxyacids.ofSulphur:H2S01(reactionwithK.MnO.,K2Cr201),H2 S04(reaction with Zn, Fe, Cu), H_2S20J (reaction with Cu, Au), H2SOs (reaction with KI, FeS04), H_2S20s (reactionwith FeS04, KI).Redoxproperties of oxy acids of Chlorine.

Interhalogens-Classification-generalpreparation-structuresofAB,AB3,AB_5andAB_7typeand reactivity.

Polyhalides-Definitionandstructureof/*Cl2*,/Ct;and/3.

Pseudohalogens:Comparisionwithhalogens.

S2-I-2:ChemistryofZerogroupelements

Isolationofnoblegases,Structure, bondingandreactivityofXenoncompounds-Oxides, Halides and Oxy-halides. Clatherate compoundsandAnomalousbehaviorof He (II)

S2-I-3:Chemistryof d-blockelements

Charaeteristics of d-block elements with special reference to electronic configuration, variable• valence,abilitytoformcomplexes,magneticproperties&catalyticproperties.Stability of various oxidation states and standard reduction potentials. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu traids. Titanium triad - electronicconfigurationandreactivityof+3 and+4 states -oxides andhalides.Chromiumtriad -reactivityof+3and+6states.Coppertriad-reactivityof+1,+2and+3states.

lSh(lhr/week)

4 hrs

Unit- II**(Organic Chemistry)**

S2-0-1: Halogen compounds

Classification:alkyl(primary,secondary,tertiary),aryl,aralkyl,ally!,vinyl,benzyl.
Chemical reactivity - r duction, formation of RMgX, Nucleophilic substitution reactions - classification into SNI and SN2. Mechanism and energy profile diagrams of SN1 and SN2 reactions. Stereochemistry ofSN2 (Walden Inversion) 2-bromobutane,SNI (Racemisation) l-bromo-1-phenylpropane Structure and reactivity -Ease of hydrolysis - comparison of alkyl, vinyl, ally!, aryl, and benzyl halides.

26/06/19 26/06/19 26/6/19 26/6

Unit - IV (GeneralChemistry) lSh(lhr/week)

Sl-G-1. General Principles of Inorganic Qualitative Analysis 6h

Anionanalysis:Theoryofsodiumcarbonateextract,classificationandreactionsofanions-*coi-, Cl-,Br-,*soJ-,*Pof-,BOi-,CH₃Coo-,NO*3.Interferingions.CationAnalysis:Principles involved-Solubilityproduct,commonioneffect,generaldiscussionfortheseparationand identificationofgroupIindividualcations*(Hg?+·,Ag+,Pb²+)*withflowchartandchemical equations. Principleinvolvedin separationof groupII&IVcations.Generaldiscussionforthe separationandidentificationofgroupII*(Hg²+,Pb²+,Bi³+,Cd²+,sb3+),*III*(Al3+,Fe3+),*.IV(Mn2+,Zn²+)indi vidualcationswith flow chartandchemicalequations.Generaldiscussion forthe separationandidentification ofgroup Vindividualcations *(Ba²+,*Sr²+, Ca²+)withflow chartandchemicalequations.Theoryofflametest.IdentificationofGroupVIcations*(Mg2+,NHt).*

Sl-G-2.Isomerism Sh

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional· isomers: chain, functional·and positional isomers. Stereoisomers: enantiomers and diastereomers -definitions and examples. Repres_entation of stereoisomers -Wedge, Fischer projection, Sawhorse, Newmann formulae.

Conformational analysis :Classification of stereoisomers based on energy. Definition and examples Conformational and configurational isomers. Conformational analysis of ethane, n-butane, 1,2- dichloroethane,2-chloroethanol .Cyclic compounds: Baeyer's strain theory, Conformational analysis of cyclohexane

Cis-transisomerism:E-Z-Nomenclature

Sl-G-3:SolidstateChemistry 4h

Laws of Crystallography: (i) Law of Constancy of interfacial angles (ii) Law of Symmetry-Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-ray diffraction by crystals; Derivation of Bragg's equation. Determinationof structure of NaCl, KCl and CsCl (Bragg'smethod and Powder me hod).

References

Generalreference:B.ScIYearChemistry:SemesterI,TeluguAcademypublication,Hyd

Unit-I

I.Principlesof InorganicChemistrybyPuri,SharmaandKaliaVishalPublications1996.

2.ConciseInorganicChemistryby J.D.Lee3rdedn.

3.Basic Inorganic Chemistry by F.A.Cotton, G.Willdnson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem.

anti addition- peracids (via epoxidation), hydroboi-ation, ozonolysis -location of double bond. Dienes -Types of dienes, reactions of conjugated dienes -1,2 and 1,4 addition of HBr to 1,3 -butadiene and Diels -Alder reaction.

Alkynes-Preparationbydehydrohalogenationofvicinaldihalides,dehalogenationof tetrahalides. Physical Properties: Chemical reactivity - electrophilic addition of X2, HX, H20 (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation).

AromaticHydrocarbons **4h**

Introduction to aromaticity: Huckel's rule -Benzene, Naphthalene and Anthracene. Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation and halogenation, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definitionofortho,para,andmetadirectinggroups.Ringactivatinganddeactivatinggroups with examples. Orientation - (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivatinggroups - nitro, nitrile, carbonyl, carboxylic acid, sulphonicacid andhalo groups.

Unit-III(PhysicalChemistry) lSh(lhr/week)

Sl-P-1:Atomicstructureandelementaryquantummechanics **3h**

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton effect, de Broglie's hypothesis. Heisenberg's uncertainty principle.

Sl-P-2:GaseousState **Sh**

Deviationofrealgasesfromidealbehavior.vanderWaalsequationofstate.Critical

phenomenon.PVisothermsof real gases,continuityof state. Andrew'sisothermsof CO2. The vanderWaal's equationandcriticalstate.Derivationof relationshipbetweencriticalconstants and varr der Waal's constants. The law of corresponding states, reduced equation of states. Joule Thomsoneffectandinversiontemperatureofagas.Liquifactionofgases:i)Linde'smethod .basedonJouleThomsoneffectii)Claude'smethodbasedonadiabaticexpansionofagas.

Sl-P-3:LiquidStateandSolutions **4h**

LiquidState

Intermolecular forces,structureofliquids(qualitativedescription). Structural "differences between solids, liquids·and gases. Surface tension and its determination using stalagmometer. Viscosityof a liquid and determinationof coefficientof viscosityusing Ostwaldviscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

Solutions **3h**

Liquid-liquidmixtures,idealliquidmixtures,Raoult'sandHenry'slaws.Nonidealsystems.

Azeotropes:HCl-H20andC2H50H-H20systems. Fractionaldistillation.Partiallymiscible liquids: Phenol-Water,Trimethylamine-Waterand Nicotine-Watersxtems.

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S2-0-2:Hydroxycompoundsandethers **6hrs**

Alcohols: Preaparation:1°,2°and3°alcoholsusingGriganardreagent,ReductionofCarbonyl compounds,carboxylic •acidsandesters.Physicalproperties:H-bonding,Boilingpointand Solubility.ReactionswithSodium,HX/ZnCli (Lucasreagent),esterification,oxidationwith PCC,alk.K.Mn04,acidicdichromates,cone.HN03 andOppenaueroxidation(Mechanism).

Phenols: Preapartion:(i)fromdiazoniumsaltsofanilines,(ii)frombenzenesulphonicacidsand (iii)Cumenehydroperoxide.

Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution;halogenations, Riemer Tiemann reaction (Mechanism), Kolbe reaction (Me'chanism),Gattermann-Koch reaction, Azo-coupling reaction, Schotton-Boumannraction, Houben-Hoesch condensation,.

Ethers : Nomenclature,preparationby (a) Williamson'ssynthesis(b) fromalkenesbythe action• ofcone.H_2S04.Physicalproperties-AbsenceofHydrogenbonding,insolubleinwater,low boiling point. Chemicalproperties -inert nature, action of cone. H2S04 and HI.

S2-0-3Carbonylcomp_ounds **Sh**

Preparation of aldehydes & ketones from acid chloride,1,3-dithianes,nitriles and from carboxylic acids.Specialmethodsofpreparingaromaticaldehydesandketonesby(a)Oxidationofarenes (b) HydrolysisofbenzalhalidesPhysicalproperties -absenceof Hydrogenbonding.Reactivity ofthecarbonylgroupsinaldehydesandketones.Chemicalreactivity:Additionof(a)NaHS03 (b)HCN(c)RMgX(d)NH_3(e)RNH2_(f)NH20H(g)PhNHNH2(h)2,4-DNP(Schiffbases). AdditionofH20toformhydrate,chloralhydrate(stable),additionofalcohols-hemiacetaland acetalformation.Cannizaroreaction.Oxidationreactions-K.Mn04oxidationandauto oxidation, reduction -catalytic hydrogenation, mechanism of Clemmenson's reduction; Wolf-kishnerreduction,MeerweinPondoffVerlyreduction.ReductionwithLAH, NaB.

Unit..III (PhysicalChemistry) 15h(lhr/week)

S2-P-1:Electrochemistry **15h**

Electricaltransport-conductioninmetalsandinelectrolytesolutions,specificconductance and equivalent conductance, measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kholrausch's law, Arrheniustheoryofelectrolytedissociationanditslimitations,weakandstrongelectrolytes,

Ostwald's dilutionlaw - itsusesandlimitations.Debye-Huckel-Onsagar'sequationfor strong electrolytes(elementarytreatment only).Transportnumber, definition and determination by Hittorfs method for attackable electr<;>des. Applications. ofcon4uctivitymeasurements: Determinationofdegreeofdissociation,determinationofKa ofacids,determinationof solubility product of a sparingly soluble salt, conductometric titrations.

Electrolytic and Galvanic cells -reversible and irreversible cells, conventional representation of electrochemical cells. Electro motive force (EMF) of a cell and its measurement. Computation of EMF.Typesofreversibleelectrodes-thegaselectrode,metal-metalion,metal-insoluble.

salt. and redoxelectrodes.Electrode reactions,Nemst equation,cell EMF nndSingle· electrodepotential,StandardHydrogenelectrode-referenceelectrodes(calomelelectrode) -standardelectrode potential, sign conventions, electrochemical series and its significance. Applications of EMF measurements.Calculation of thermodynamic qu.antitiesof cell reactions(Gibbsfree·energyG,HelmholtzfreeenergyandEquilibriumconstantK). DeterminationofpHusinghydrogenelectrode,glasselectrodeandquinhydroneelectrode. Solubility product of AgCl.Potentiometric titrations.

Unit-IV(GeneralChemistry) 15h(1hr/week)

S2-G-1: Theory of Quantitative Analysis 6 hours

VolµmetricAnalysis:Introduction,standardsolutions,indicators,endpoint,titrationcurves, Typesoftitrations:i)neutralizationtitration-principle,theoryofacidbaseindicators,titration curvesandselectionofindicators-strong acid- strongbase, strongacid -weakbase,weakacid-strongbaseandweakacid-weakbase.Theoryof redoxtitrations -intemal(KMn04)and . externalindicators-useofdiphenylamineandferroinindicators.Theoryofcomplexometric titrations- useofEBT,Mur&ideandFastsulphoneblackindicators.RoleofpHin complexometric titrations. Precipft'ation titrations -theory of adsorption indicators.

Gravimetricanalysis- .Introduction, nucleation,precipitation, growthof precipitate,filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination ofNi^{2+}

S2-G-2:Stereoisomerism Sh

Opticalactivity: Definition,wavenatureoflight,planepolarisedlight,opticalrotationand specificrotation,chiralcenters.Chiralmolecules:definitionandcriteria-absenceofplane, centerandSnaxis*o{*symmetry-asymmetricanddissymmetricmolecules.Examplesof asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and disymmetric molecules (trans- 1,2-dichlorocyclopropane). Molecules with constitutionally symmetricalchiral carbons (Tartaric acid) Moleculeswith constitutionally unsymmetricalchiralcarbons(2,3dibromopentane).D, L • configuration- examples.R,S-configuration:Cahn-Ingold-Prelogrules,examplesfor asymmetric and disymmetric molecules.

S2-G-3:DiluteSolutions&ColligativeProperties 4h

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecul weight and elevation in boiling point and depression infreezingpoint.

;p. r =rence:B.ScIYearChemistry:SemesterII,TeluguAcademypublication,Hyd

1.PrinciplesofInorganicChemistrybyPuri,SharmaandKaliaVishalPublications1996.
2.ConciseInorganicChemistrybyJ.D.Lee3rdedn.
3.BasicInorganicChemistrybyF.A.Cotton,G.WilkinsonandPaul.L.Gaus3rdedn WileyPublishers2001.
4.ChemistryoftheelementsbyN.N.GreenwoodandA.EarnshawPergamonPress1989.
5.InorganicChemistrybyShriverandAtkins3rdednOxfordPressI999.
6. InorganicChemistryPrinciplesofstructureandreactivitybyJamesE.Huhey, E.A.KeiterandR.L.Keiter4thEdn.
7. TextbookofinorganicchemistrybyRGopalan.

UnitII

1. QrganicChemistrybyMorrisonandBoyd.
2. OrganicChemistrybyGrahamSolomons.
3. OrganicChemistrybyBruiceYuranisPowla.
4. OrganicChemistrybyL.G.WadeJr.
5. OrganicChemistrybyM.Jones,Jr
6. OrganicChemistrybyJohnMcMurry.
7. OrganicChemistrybySoni.
8. GeneralOrganicchemistrybySachinKumarGhosh.
9. OrganicChemistryby'CN pillai

UnitIII

1. PhysicalchemistrybyPWAtkins
2.PrinciplesofphysicalchemistrybyPruttonandMarron.
3. TextBookofPhysicalChemistrybySoniandDharmahara.
4. TextBookofPhysicalChemistrybyPuriandSharma
5. TextBookofPhysicalChemistryby K.L.Kapoor
6. Phy?icalChemistrythroughproblemsbyS.K.Dogra.
7. ElementsofPhysical"ChemistrybyLewisandGlasstone.
8. MaterialsciencebyKakani&Kakani

UnitIV

1. Vogel's Text Book of Quantitative Analysis by G.H.Jeffery, J.Bassett,J.Mendhamand R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. QuantitativeAnalysisbyDayandUnderwoodPrenticeHall(India)VIEdn..
3. Nano: TheEssentialsby T.Pradeep,McGraw-HillEducation.
4. Chemistryofnanomaterials:Synthesis,PropertiesandapplicationsbyCNRRaoet.al.
5. NanostructuredMaterialsandNanotechnology,editedbyHariSinghNalwa,AcademicPress
6. PracticalchemistrybyVKAhluwalia,SunithaDhingraandAdarshGulati.

LaboratoryCourse — 45hrs (3h/week)

PaperII-Quantitative Analysis Acid

- Base titrations

1. EstimationofCarbonateinWashingSoda.
2. EstimationofBicarbonateinBakingSoda.
3. EstimationofCarbonateandBicarbonateintheMixture.

KAKATIYAUNIVERSITY-WARANGAL-TELANGANA

UnderGraduateCourses(UnderCBCS2019-2022)

B.Sc.CHEMISTRYII Year

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Paper-III

Chemistry-m

Unit-I(InorganicChemistry) 15h (1hr/week)

S3-1-1:Chemistryoff-blockelements: 5h

ChemistryofLanthanides:Positioniriperiodictable,Electronicstructure,oxidationstate, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanjdes-complexation- type of donor ligands preferred. Magnetic properties- paramagnetism. Colour and spectt:a, f-f transitions -occurrence and separation- ion exchange method, solvent extraction.

Chemistry of actinides- general features-electronic configuration,oxidation state, actinidecontraction,colourandcomplexfonnation.Comparisonwithlanthanides.

S3-1-2:CoordinationCompounds-I 6h

Simpleinorganicmoleculesandcoordinationcomplexes.Nomenclature-IUPACrules, I.Coordinationnumber,coordinationgeometriesofmetalions,typesofligands.2.Briefreview of Werner's theory,Sidgwick's electronic interpretation and EAN rule and their limitations. (Valencebondtheory(VBT)-postulatesandapplicationto(a)tetrahedralcomplexes $[Ni(NH3)4)^{2+}$,$[NiCl4]^{2-}$and$[Ni(C0)4]$(b)Squareplanarcomplexes$[Ni(CN)4J^{2-}$,$[Cu(NH3)4]^{2+}$, $[PtCl4]^{2-}$(c)Octahedralcomplexes$[Fe(CN)6]^{4-}$,$[Fe(CN)6]^{3-}$,$[FeF6]^{4-}$,$[Co(NHJ)6]^{3+}$,$[CoF6]^{3-}$ LimitationsofVBT. 3.Isomerismincoordinationcompounds,stereoisomerism- (a)geometrical isomerism in (i)square planar meta Icomplexes of the type[MA2B2],[MA2BC], [M(AB)2],[MABCD].(ii)Octahedralmetalcomplexesofthetype[MA4B2],[M(AA)2B2], [MA3B3)usingsuitableexamples,(b)Opticalisomerismin(i).tetrahedralcomplexes [MABCD],(ii).Octahedralcomplexes[M(AA)2B2],[M(AA)J]usingsuitableexamples. Structuralisomerism:ionization_,linkage,coordinationligand.isomerismusingsuitable examples.

S3-1-3:MetalcarbonylsandOrganometallicChemistry ***4*h**

Metalcarbonyls:Preparationand propertiesofNi(C0)4.StructuralfeaturesofNi(C0)4, Fe(CO)s,Fe2(C0)9, Fe3(C0)12 and Cr(C0)6-18 valence electron rule. Definition,nomenclatureandclassificationoforganometalliccompounds.Methodsof preparation,propertiesandapplica_tionsofalkylandarylcompoundsofLi,Mg&Al.

Unit-II(OrganicChemistry) **15h(lhr/week)**

S3-0-1:Carboxylicacidsandderivatives **Sh**

Preparation:a) Hydrolysis ofNitrites,amidesand esters.b)Carbonation ofGrignard reagents. Special methodsofpreparationofAromaticAcids-OxidationofArenes.Physical properties-hydrogen bonding,dimericassociation,.Chemicalproperties -Reactions involvingH,OHand COOH groups-saltformation, anhydride formation, Acidhalideformation, Esterification (mechanism)& Amideformation.Reductionofacidtothecorrespondingprimaryalcohol- via esteror acid chloride. Degradation of carboxylic acidsby HunsDiecker reaction, Schmidt reaction (Decarboxylation). Arndt - Eistert synthesis, Halogenation by Hell -Yolhard-Zelenskyreaction.CarboxylicacidDerivatives -Hydrolysis nand Amonolysis ofacid halides, Acid anhydrides and esters (mechanism ofester hydrolysisby base and acid).Hydrolysis and dehydration of amides.

S3-0-2:Nitrohydrocarbons **3h**

Preparation ofNitroalk es.Reactivity- halogenation, reaction with HN02(Nitrousacid),Nef reaction,reduction.AromaticNitrohydrocarbons:PreparationofNitrobenzenebyNitration. Physicalproperties,chemicalreactivity-ReductionofNitrobenzenesindifferentmedia.

S3-0-3:Amines,CyanidesandIsocyanides **7h**

Amines:classificationintoI,2,3AminesandQuarternaryammoniumcompounds. Preparativemethods-Ammonolysisofalkylhalides,Gabrielsynthesis,Hoffman'sbromamide reaction(mechanism).Reductionof AmidesandSchmidt reaction. Physical properties. Useof aminesaltsasphasetransfercatalysts.ChemicalProperties:a)Alkylationb)Acylationc) Carbylaminereactiond)Hinsbergseparation.ReactionwithNitrousacidof1,2,3(Aliphatic andaromaticamines).ElectophilicsubstitutionsofAromaticamines-Brominationand Nitration,oxidationofaryland3Amines,diazotisation.Diazoniumsalts:Preparationwith mechanism.Synthetic importance -a) Replacement of diazonium group by -OH, X (Cl)-SandmeyerandGatterrnan reaction, byfluorine(Schiemann's reaction), byiodine,CN,N02,H andarylgroups.CouplingReaction-ofdiazoniumsalts.i)withphenolsii)withanilines. Reductiontophenylhydrazines.

Cyanides andisocyanides: Structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halidesandAmines. PropertiesofcyanidesandisocyanidesA)hydrolysisb)additionofGrignardreagentiii)

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reductioniv)oxidation.

UnitIll(PhysicalChemistry) 15h(1 hr/week)

S3-P-l:Thermodynamics-I **10h**

A brief review of - Energy, work and heat units, mechanical equivalent of heat, definition of system, surroundings. First law of thermodynamics statement- various forms mathematical expression.Tlu!rmodynamic quantities- extensive properties and intensive properties, state function andpath functions. Energy as a statefunctionand exact differential. Workof expansion and heat absorbed as path function.

Expressionforworkofexpansion,signconventionproblemsonfirstlaw.Heatchangesat constantpressure andheat changesat constantvolume.Enthalpy.Heat capacities atconstant pressureandconstantvolume.Derivation- ofCp-Cv=R.Isothermaladiabaticprocesses. Reversibleandirreversibleprocesses.Reversible changeand maximumwork.Derivationof expressionformaximumworkforisothermalreversible process.Problems.Internalenergyof anideal gas.Joulesexperiment.Joule-Thompsoncoefficient. Adiabatic changes inideal gas, derivationofequation,PV'=constant.P-Vcurvesforisothermalandadiabaticprocesses. Heatofareactionatconstant volume andatcon tantpressure,relation betweent:,.Hand*t:*,.V. Variationofheatof reaction with temperature.Kirchhoffsequationandproblems. Limitationsof firstlawandneedforsecond.law.Statementofsecondlawofthermodynamics.Cyclicprocess. Heatengine,Carnot'stheorem, Carnot'scycle. Derivationofefficiencyofheatengine. Problems.Thermodynamic scale oftemperature.

S3-P-2:Thermodynamics-II **5h**

Entropy: Definition from Carnot's cycle. Entropy as a state function. Entropy as a measure of disorder.Signofentropychangeforspontaneousandnon-spontaneousprocesses &equilibriumprocesses.Entropy changes in i).Reversible isothermal process, ii). Reversible adiabatic process, iii). Phase change, iv). Reversible change of state of aii'ideal gas. Problems. EntrOP3/of mixingof ideal gases.Free energy Gibb'sfunction (G) and Helmholtz'sfunction(A) as thermodynamic quantities.Concept of maximum work and network *t:,.G* asCriteria for spontaneity. Derivation of equation *t:,.G* =/::,.H -T6S.Significance of the equation. Gibbs equations and Maxwellrelations. Variation ofG with P, V and T.

Unit-IV(GeneralChemistry) **15h(1hr/week)**

S3-G-lEvaluationofanalyticaldata **4h**

Significant figures, accuracy and precision. Errors-classificationof errors- determinate and indeterminateerrors,absolute and relativeerrors. Problems based on mean, median, range, standard deviation

S3-G-2:Carbanions-1 **Sh**

Introduction, acidic nature of a-hydrogens and tautomerismincarbonylcompounds,nitro hydrocarbons, ethyl acetoacetate, diethyl malonate.Terminal alkynes.Stabiltyof carbanions Reactions : Aldol reaction, Perkin reaction, Benzoin condensation, halofonnreaction, conversion ofsmaller alkynes to higher alkynes.

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S3-G-3:**Phase Rule** **6h**

Statementandmeaningoftheterms-Phase,ComponentandDegreesoffreedom,Gibb'sPhase rule, phase equilibria of one component system -water system.Phaseequilibria of two- component system-Solid-Liquid equilibria,simpleeutectic-Pb-Agsystem,desilverisationof lead.Solidsolutions-compoundwithcongruentmeltingpoint-Mg-Znsystemandincongruent meltingpoint-NaCI-H2Osystem.

References

Generalreference:B.ScIIYearChemistry:SemesterIII,TeluguAcademypublication,Hyd

Unit-I

1. Analytical chemistry byG.L.David Krupadanam, D. Vijaya Prasad,K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar

2. PrinciplesofInorganicChemistrybyPuri,Shannaand KaliaVishalPublications(1996).
3. ConciseInorganicChemistrybyJ.D.Lee3rdednVanNostrandReinholdCompany(l977)
4. BasicInorganic Chemistry byF.A.Cotton, G.Wilkinson and Paul.L. Gaus3rdedn Wiley Publishers (2001).
5. InorganicChemistryPrinciplesofstructureandreactivitybyJamesE.Huhey, E.A. KeiterandR.L.Keiter4thedn.(2006)
6. ChemistryoftheelementsbyN.N.GreenwoodandA.EarnshawPergamonPress(l989).
7. Inorganic ChemistrybyShriverandAtkins3rdednOxfordPress(1999).
8. TextbookofInorganicChemistrybyRGopalan(UniversitiesPress(2012)
9. College Practical chemistry by VK Ahluwalia, Sunitha Dhingra and Adarsh Gulati Universities Press (India) Limited(20I2)

Unit-II

1. Textbookoforganicchemistrybysoni.SultanChand&Sons;TwentyNinlhedition(2012)
2. GeneralOrganicchemistrybySachinKumarGhosh.NewAgePublisher.sPvtLtd(2008).
3. Textbookoforganic chemistrybyMorrisonandBoyd.Person(2009)
4. TextbookoforganicchemistrybyGrahamSolomons.Wiley(2015)
5. TextbookoforganicchemistrybyBruiceYuranisPowla.(2012)
6. TextbookoforganicchemistrybyCNpillaiCRC Press(2012)
7. OrganicChemistrybyL.G.WadeJr.
8. OrganicChemistrybyM.Jones,Jr
9. OrganicChemistrybyJohnMcMurry.

UnitIII

I.PrinciplesofphysicalchemistrybyPruttonandMarron.TheMacmillanCompany;**4**th Edn.(1970)

2. TextBookofPhysicalChemistrybySoniandDhannahara.SulthanChandandSons.(2011)
3. TextBookofPhysicalChemistrybyPuriandSharma.S.NaginchandandCo.(2017)
4. TextBookofPhysicalChemistrybyK.L.Kapoor.(2012)
5. Colloidaland surfacechemistry,-M.Satake,Y.Hayashi,Y.Mido,S.A.Iqbaland
6. M.S.sethi,DiscoveryPublishingPvt.Ltd(2014)
7. MaterialsciencebyKakani &Kakani,NewAgelntemational(2016)
8. PhysicalChemistrybyIraLevine(Author) McGraw-HillEpucation;6edition(May9,2008)

UnitIV

1. Textbookoforganic chemistrybyMorrisonandBoyd,Person(2009)

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2. Textbookoforganicchemistrybygrahamsolomons,Wiley(2015)
3. TextbookoforganicchemistrybySony,SultanChand&Sons;29th edition(2012)
4. TextbookoforganicchemistrybyBruiceyuranisPowla,(2012)
5. GeneralOrganicchemistrybySachinkumarGhosh,NewAgePublishersPvtLtd(2008)

LaboratoryCourse

Paperill**(OrganicSynthesis)** **45h(Jh/week)**

1. **SynthesisofOrganiccompounds:**

   Acetylation:Acetylationofsalicylicacid,BenzoylationofAniline.

   Aromaticelectrophilicsubstitution: Nitration: Preparationof nitrobenzeneand m-dinitro benzene.

   Halogenation: Preparation of p-bromo acetanilide, Preparation of 2,4,6-tribromophenol

   Oxidation: Preparation of benzoic acjd from benzyl chloride.

   Esterification:Preparationof n-butyl acetate from acetic acid.

   Methylation:Preparationof -naphtbylmethylether.

   Condensation:Preparation of benzilidineaniline and Benzaldehydeand aniline.

   Diazotisation: Azocoupling of-Naphthol.

2. Micro,raveassistedsynthesisofAsprin-DEMO(demonstrationonly)

11/09/2020 01/09/2020 01/09/2020

B.Sc; . IIIYEAR
CHEMISTRYSEMESTER-VI
DSC-3F: CHEMISTRYPAPER-VI·.
(04Credits)·60Hrs(04Hrs/week)·

UNIT-I:SEPARATIONTECHNIQUES **15 Hrs**

SolventExtraction-Principle,Methodsofextraction:Batchexaction,continuousextractionand counter currentextraction. Application-D.eterminationofIron (III).•

Chromatography: Classificationofchromatographicmethods,principlesofdifferentialmigration, adsorption phenomenon$_1$ nature of adsorbents, solvent systems.

ThinlayerChromatography•(TLC):Advtages,preparationofplates,developmentofthe chromatogram,Detectionofthespots,factorseffectingR,valuesandappHcations.

PaperChromatograp.hy: Principle;choiceofpaperandsolventsystems,developmntofchromatogram -ascending,descending,radiaiandtwodimensionalchromatographyandapplications.

Column Chromatography .Principle, Types·of stationary phases, Column·packing -Wet packing technique, Dry packing technique.Selection criteria of mobile phase solvents for eluting polar,non-:polarcompoundsanditsapplications.

GasChromatography: Theoryandinst.rumentation(Blockdiagram), ·Typesofstationary phasesandcarrierges(niobilphase).

UNIT-II:DRUGSANDGREENCHEMISTRY **15Hrs**

a) Drugs:Introduction: Drug,Disease(definition),Historicalevolution-,',Sources-plant,animal synthetic, Biotechnology and human gene therapy.

Terminology: Pharmacy, Phannacolgy.Pharmacophore,Phamiacodynamics,Pharmacokinetics (ADME,Receptors-brieftreatment) Metabolites and Antimetabolites.

Nomenclature:Chemicalniune,Genericnamehmdtradenameswithexamples.

Classification:Classificationbasedonstructuresandtherapeuticactivitywithoneexampleeach.

Synthesis: Synthesis and therapeutic activity ofthefollowingdrugs- L-Dopa,Chloroquin, Omeprazole, Albuterol and Ciprofloxacin.

b) GreenChemistry:**Introduction:**Definitionofgreenchemistry,needofgreenchemistry,basic principles of green chemistry.

Greensynthesis:Evaluationofthetypeofthereaction(i)Rearrangements(100%atomeconomic),(ii) Additionreaction(100% atomeconomic),Pericyclicreac;tions(noby-product)

Selection of solvent: Aqueousph ereactions, Reactions in ioni liquids;Solid supported synthesis and solvent free reactions (solid phase reactions)**Green Catalysts:**Phase transfer catalysts (PTC), Biocatalysts.

01/09/2020 01/09/2020 01/09/2020

UNIT-III:ELECTROANALYTICALMETHODS 1SHrs

Potentiometry: Principle, ElectrochemicalceU, Electrodes.- (i)lndicator and (ii) Reference electrodes-NonnalHydrogenElectrode,QuinhydroneElectrode,SaturatedCalomelElectrode.NwnericalProblems.

Application ofPotentiometry -Assay ofSulphanilamide

Conductometry: Conductivity.Cell, Specific Conductivity, Equivalent Conductivity. Numerical Problems.ApplicationsofConductometry.EstimationofCl·usingJ\.gN01..DeterminationofAspirin withKOH.

Colorimetry:Generalfeaturesofabsorption-spectroscopy,transmittance,absorbance,andmolar absorptivity.Beer -Lru:nbert'slawd itslimi_!ations:Verificationof Beer'slaw;Estimation ofironin water samples by thiocyanatemethod. Estimationof (i) Chromium.and(ii) Manganesein steel.

Spectrophotometry:Instruments:...SingleandDoublebeam**UV**VisibleSpectrophotometers,IR-Spectrophotometer- Principle, . Sources of radiations,· Sampling, Block diagram of FT-IR Spectrophotometer.

UNIT-IV:Mo'LECULARSPECTROSCOPY

Introductiontoelectromagneticradiation,interaction.of electromagnetic.rationswithmolecules,various types of molecular spectra.

Electronicspectroscopy:Bondingandanti-bondingmo.lecularorbitals,electronicenergylevelsof molecules(cr,1t,n),typesofelectronictransitions:*a-a•*,n-a•,n-1t•,1t-1t•withsuitableexamples.

Selectionrules,Terminologyofchromophore,auxochrome,bathochromicandhypsochromicshifts.

Absorptionofcharacteristicsofchroinophones:•diene,enoneandaromaticchro.mophorei;.Representation ofUV-Visibl¢ spectra.

Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination offorceconstant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and enlf&Ylevels, Modes of vibr tions in polyatomic molecules. Characteristic absorptionbands of various functional groups. FiJ:iger print nature of infrared spectrum.

ProtonMagneticResonanceSpectroscopy(1H-NMR):Principlesofnuclearmagneticresonance, equivalentandnon-equivalentprotons,positionofsignals..Chemical shift,NMRsplittingofsignals- spin-spin coupling, representation of proton NMR spectrum ..., Integrations. ^{1}H NMR spectrum of-ethyl bromide, acetaldehyde, 1, 1, 2- tri bromo ethane; ethyl acetate and acetophenone.

MassSpectrometry:ElectronImpactMass:Basicprinciples,Nitrogenrule,typesofions:Molecular ion,fragmentionandisotopicions,representation ofsspectrum,·types ofpeaks(molecularion, fragmentandisotopicionpeaks).Determinationofmolecularweight;Massspectrwnofethylchloride, ethylbromideandacetophenone.

01/09/2020

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01/09/2020

REFERENCES:

Unit-I

l.AnalyticalChemistrybyDavidKrupadanam,UniversitiesPress(India)Limited.

2. D. A. Skoog, D:M;West, F.J.Holler, Fwidamentals ofAnalytical Chemistry 6[111]Edn. Saunders College Publishing, Fort worth (1992).

3. M.NSastry,SeparationMethods,Paperback(2004),HimalayaPuqlications..

4. UsharaniAnalyticalChemistryPaperback(2000)NarosaPublications.

5.Analytical Chemistry_7[111]editionby.GaryD.Cl}ristian(2004).

Unit-II:

l.DrugsbyG.L.DavidKrupadanam;D.VijayaPrasad,K.VaraprasadRao,K.L.N.Reddy C.Sudhakar,UniversitiesPress(India)Limited2007.

2. An Introduction tM dicinal Chemistryby GrahamL.Patrick;OxfordUniversity Press, New York.1995.•

3. David William and Thomas I,,emke, Foye's Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, 2008.

4. AshutoshKarMedicinalChemistry;NewAgeInternational,2005.

5. O.D.Tyagi& M.YadavSyntheticDrugsby,AnmolPublications,1998.

6. MedicinalChemistrybyAllcaL.Gupta,Pragati Prakasban.

7. Ahluwalia,V.K.&K.idwai,M.R.NewTrendsinGreenChemistry,Anama_laya Publishers(2005).

8. Anastas, P.T,& Warner, J.K.: Green Chemistry - Theory andPractical, Oxford University Press (1998).

9. Matlack,A.S.lntro.ductiontoGreenChemistry,MarcelDekker(2001)Cann,M.C.&.Connely, M.E. Real-Worldcases in Green Chemistry, American Chemical Society,Washington (2000).

Unit-III:

1. Robinson, J.W. UndergraduateInstrumental Analysis 5th Ed., MarcelDekker, Inc,New York (1995).

2. B.K.Sharma,IndustrialChemistry(inludingChemic!Engineering).Ecln.(1997).

3. Willard, H.I-i.,Merritt,L,L:,,Dean, J.&Settoe, F.A:InstrumentalMethods ofAnalysis. 7[111]Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA, 1988.•

4. Harris,D.C.QuantitativeChemicaiAnalysis,W.H.Freeman.2007.•

Unit-IV:

l.Organicspectroscopy,WilliamKemp

01/09/2020

1/9/2020

01/09/2020

2. Skoog,p.A.HollerF.J. &Nieman, T.A.PrinciplesofInstrumentalAnalysis,Cengage Learning India Ed.

3. Willard, H.H.,Merritt,L.L.,Dean,i.&Settoe,F.A.InstrumentalMethodsofAnalysis, 7thEd.WadsworthPublishingCompanyLtd,, Belmont,California,USA,1988.

4. C.N;Banwell:FundamentalsofMolecularSpectroscopy.

LABORATORYCOURSE

CHEMISTfl¥'LABPAPER-VI

.(QualitativeanalysisofOrganicC ompounds)

(03Hrsperweek,01Credit)•45Hrs

I. **QualitativeanalysisofOrganicCompounds:**

1. Identification of an organic compoundthrough the functionalgroup analysis: Determinationof melting pointandpreparationof suitablderivativesofthefollowing:Carboxylicacids,Phenols,amines,urea, .thiourea,carbohydrates,aldehydes;ktones,amides,nitrohydrocarbons,esterandnaphthalene.

2. Spectral&Chromatographyanalysis:

1. Spectralanalysisoforganiccompoundswithdifferentfunctionalgroupsusing UV,IR, [1]HNMRandMassspectroscopy.(Eg:-Ethanol,AcetophenoneandAniline)•

2. Thiplayerchromatography(TLC):DeterminationofR,valuesandidentificatinoforganic compounds: preparation and separation of 2,4-dinitrophenyl hydrazones of acetone and 2 butanone using toluene and light petroleum(40:60)•

B.Sc.ChemistryIIIYcar...
Scn1ester VI, Paper-VI
DitclplincSpecific Elective-.A(4Credits) **60Hrs**
M_cdicinalChembtry.

Unit-I:Introductio naridTrm_inology. eair-borne;water-!;s
S6-E-A-I:Diseases:Commondiseases,mfectived1seases-,-.,.msectom.
andhereditarydiseases; alIn edient(API)
Tcrminoloipi•InMedicinal-
Chemistry: Drug, _Active.Pharmaceu! Pacokinetics'Pharmaceuticals,
Pharmacology,.Phannacophore, Phannacodynanu,
metabolites,antimetabolitesandtherapeuti_cindex.
Drugs:Noinenc)ature•:chemicalname,•.Genericnamean;dTre es withC>(aIJlples;
Classification:Classification basedonstrucf!Ji"esandtherapeutic activityw1.ex8.I1:)ples,

ADM:ET: a) Absorption: Definition, absorption of drugs ltcross the meinbrane -active and passive absorption,routes of administration ofdrugs. b) Distribution: de :nition and effect of plasmaprotein binding. c) Metabolism: dei.rnition, phase Iand phaseII reactions.•
d)Elimination:definitionand enalelimination.Toxicity.

Unit-II: EnzymesandReceptors. **lSHrs**
S6-E-A'."II:.Enzymes:•Intr;-oduction. Mechanismand:factorsaffectingenzymeaction, Specificity *of*.enzyme action (including stereo specificity), Enzyme irihibitors •and their importance. Types of inhibition - reversible, irreversible and theirsubtypes *with* examples.

Receptors:Introduction,Druga tiori-receptortheory,Mechanismofdrugactior1,conceptof agonistsandantagonists withexamples.Drugreceptorinteractionsinvolved41drugreceptor complex.bindingroeof-OHgroup-NH2group,quaternary arnmoniwn saltsanddouble bond. Structure -activity relationships ofdrug molecules, explanation.with sulfonamides.

Unit-III:**SynthesisandTherapeuticActivityofDrugs** 15Hrs
S6--A-111: Introduction,**synthesis** andtherapeuticactivityof
Chemotherapeutics: Sulphanilamide,dapsone,Pencillin-G (semisynthesis),Chloroquin, Isoniazid, Cisplatin and AZT.

Drugs totreat -:nctbolicdisorders: ti diabeti - To!bu.tarnide;Antiinflamrnatory •Ibuprofen; Cardiovascular-Glyceryl tn ate;Anttpyrehc (paracetamol, aspirin) and Antacid- Omeprazole.

Drugactgon. ?ervoussystem:Anesth7tics-definition,Classification-localandgeneral. Volat1le-N1trousox1de,chloroformusesand_disadvantages.Localanaesthetics-benzocaine.

Unit- IV: Molccul.ar Messengers, Vitamins nn_d Micronutrients 15Hrs
S6-E-A-IV:M lccu nrMcssng rs:Introduction_ to hormonesd neurotransmitters, Thyroid. hormons,AntJthyro1ddugy.arb1mol. Arennme:Adrenerg1cdrugs-salbutamol.atenel.oi .Serotonin:SSRls-fluoxetme.Dopamine:Anhparkmsondnig-Levodopa.

01/09/2020 01/09/2020 01/09/2020

Vitumln$,,ml Mlc1·onu.t.1·cntiwJntrodlicUon;itruni**so.urce!l,:Dficienc.ydisorders**q **remedy**
ofVitaminsA,B.C,0,EK.nn(.Imicro:nutrle11ts-NafK,Ca,Cu;Znarid*l:*

RccmmcndcdTextDQolunndltcrcrcnccbooks.

1. lntroductio11toMedicinnlChemistry,Q;L,Patrick,.OxfordUniyersityPressNe:wYork•. 2013.
2. MedicinalChemistry,ThomnsNogrady,OxfordUniv.Press.NewYor.2005.:
3. Foye'sPrinciplesofMedicinalthcrnistry,.Oa:vidWillia.mnndThomasLerrlke,. LippincottWilHams&Wilkii1s,2008.
4. Medicinnl-Chemistcy,As!n11oshKnr,NewAgeInternational,200S'.
5. SyntheticDmgs,O.D.Tyngi&M.Ya<lav,AnmolPublications,.1998•.
6;Medicinal Chcmislry AlkaL.Gupta, PragntlPrakoshrut•
7. Drugs,G.L.DavidKrupdanruu,D,VijnyaPrasad,K.VaraprasadRao,K.L.N.Rddy, C.Sudhakar;UniversitiesPress(India)Ltd•;2012.

01/09/2020

...B.Sc.Chemistry III¥earSeme
ster-VI,Papcr,.VI
DisciplineSpecificElcctive.;.B(4Credits)
,,·AgriculturalandFuelChemistey. 60Hrs

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T1.5 Hrs S6E-B-I:IntroductiollDefinition, .classification ofpesticidsba.sc,d,onuse (tge9. 'OXlClty andchemical,structurewithexamples.Adverse.effectsofpestlc1desanditsimpacton environmentalpollution,•

Syrithesis,.manufacture and uses of representative pesticicles: Organochlorines (Cypennethrin); Organophosphates(Parathion); Carbarriates (Carbary!); Quinones(Chloranil),Anilides(Alachlor)•

Pesticideformulations: Dusts,Granules,Wettablepowders,EmulsionsaJ1dAerosols..

Biopcstcic}:es :IntroductionPotentialpesticidalplants of India, Roleof Neemm ;plant protection-constituents, Azadirachtin and hsrole in pest cqntrol. Structt1re and mod ofaction.of Pyrethrins(pyrethrin l)and Pyrethroids.(p.ennethrin) and nicotjnoids (Imidacloprid).·

UnitII:-Fertilizers lSJirs

S6-E-B-11:lntrouction:·(heedoffertilizers),functionsofessentialplantnutrients(N,P,K), •Classificationformulaaridusesoffertilirs:

Nitrogenousfertilizers: Ammoniumnitrate; Urea, Calch1mCyanamide,CalciumAmmonium Nitrate, Sodium Nitrate, AmmoniumChlori.de i!.iid:their uses•.

Phosphate fertilizers: Norinalsuper phosphate,Triple SuperPhosphate, AmmoniumPhosphate. and their uses.

Potassium•fertilizers:.Potassiumchloride,potassium ·nitrate,potassiumsulphateanduses. Complexfertilizers:DiammoniumPhosphateandmixedfertilizerstheiruses.Manufactureof ureaandSuperphosphateoflimeandtheirreactions inthesoil•.

Biofertilizers-Introduction definition, classification, Rhizobium, Azatobactor, Azospirillium, Azolla, Blue GreenAlgae, Vermicompostingand uses.

Organic farming;·Theprincipal methods,croprotation,greenmanuresand compost, biological pest control, and mechanical cultivation and uses.

Un1t Ill: EnergySo.urces and Coal lSHrs.**S6-E-B-111:**Review.oLenergy sources (renewable and non-renewable). Classirl-cation of fuels and their calorific value.

Coal: Usesofcoal(fuelandnonfuel)invariousindustries,itscomposition,carbonizationof coal.Coalgas,producergasandwaterps-compositionandllses;Fractionation ofcoaltaruses ofcoaltarbasedchemical_s;requisitesofagoodmetallurgicalcoke,Coalgasification(Hydro gasification and C talytic g ification),oal liquefaction and Solvent Refining.

Unit IV:Petroleumand Usproducts; pctrocbc01icals andnonpetroleumfuels S6-B-IV: **lSHrs.**

Pctroicumanditsproducts

•.Petroleum:Orgin:Composit!onofcrudepetrolumandclassification•.Properties-flashpoint anditsdetermmahon, .Knocldngandantiknockmgcompoundsoctanenumber.andCetane num er. Distjllation of c d¢petroleum, Frac_tion;Distil ation - Principle and process, refining, Fractions and uses. Cracking -Them1al and catalytic cracking, Refonning•

1/9/2020 01/09/2020

01/09/2020. 1/9/2020

B.Sc.,IIIYEARCHEMISTRY

SEMESTER-V

DSE-A:ChemistryPaper-V

(Spectroscopy&C!,romatograpl,y)

***(04*credits)** **60Hrs*(04*Hrs/week)**

UNIT-I:MolecularSpectroscopy(15Hrs}

SS-A-E-1:Introduction toelectromagneticradiation, interactionof electromagnetic radiations with molecules,various types of molecularspectra.

Rotationalspectroscopy(Microwavespectroscopy)

Rotationalaxis,moment of inertia,classification ofmolecules(based onmomentofinertia),rotational energies, selectionrules, determinationof bondlengthof rigid diatomic moleculeseg. HCI.

Infraredspectroscopy

Energylevels ofsimpleharmonic oscillator, molecularvibration spectrum,selectionrules. Determination of force constant(Problems). Qualitativerelation offorce constantto bondenergies.Anharmonicmotion of realmoleculesand energylevels.Modes of vibrationsin polyatomic molecules. Characteristic absorptionbands of various functional groups. Fingerprintnature of infrared spectrum

.Electronicspectroscopy

Bonding andanti-bondingmolecular orbitals,electronic energylevelsofmolecules(o,rr,n),types of electronictransitions:o-o*,n-o*,n-rr*,rr-rr* with suitable examples. Selectionrules,Terminology of chromophore,auxochrome,bathochromicandhypsochromicshifts.Absorption of characteristics of chromophones:diene, enone and aromatic chromophores.Representation of UV-Visible spectra. General featuresofabsorption-spectroscopytransmittance,absorbance,andmolarabsorptivity.Beer-Lambert's law and its limitations.

UNIT-II:NMR&MassSpectroscopy(15 Hrs)

***S5-A-E-JJ:*ProtonMagneticResonanceSpectroscopy**

Principlesofnuclear magneticresonance,equivalent andnon-equivalentprotons,positionof signals. Chemicalshift,factors affecting chemical shifts,NMRsplitting of signals-spin-spin coupling, representation ofprotonNMR spectrum-ntegrations.^{1}HNMRspectrum of-ethylbromide, acetaldehyde,l, l,2-tribromo ethane,ethyl acetate and acetophenone.

MassSpectrometry

ElectronImpactMass:Basicprinciples,Nitrogenrule,types ofions: Molecular ion,fragmentionand isotopic ions,representation ofmassspectrum,types of peaks (molecularion, fragment andisotopicion peaks). Determination of molecular formula.Mass spectrum of ethyl chloride,ethyl bromide and acetophenone.

UNIT-III:Separationtechniques-I(15Hrs}

***S5-A-E-/ll:*Solvent.Extraction**-Principle,Methodsofextraction:Batchextraction,continuous extraction and counter current extraction.Application- Determinationof Iron ([11).

Chromatography: Classification of chromatographicmethods,principlesofdifferential migration, adsorptionphenomenon, nature of adsorbents, solvent systems.

r--)

ThinlayerChromatography (TLC): Advantages,preparationofplates, solidphaseand mobile phase usedin TLC,eluotopic series, developmentof the chromatogram, Detectionof the spots, factors effecting Rr values and applicationsof TLC.

PaperChromatography: Principle,choiceofpaperandsolventsystems,developmentofchromatogram -ascending,descending,radial andtwo dimensionalchromatography, detection ofspots, and applications of paper chromatography.

UNIT-JV: Separationtechniques-II(15Hrs)

***S5-A-E-IV:*ColumnChromatography**-Principle, Types of stationaryphases, Column packing-Wet packingtechnique, Dry packingtechnique. Selectioncriteria ofmobile phase solvents for elutingpolar, non-polarcompounds andits applications.

Jon exchangechromatography: Principle,cation and anion exchange resins, its applicationin separation of ions, de-ionized water.

GasChromatography: Principle,theory andinstrumentation(BlockDiagram),Typesof stationary phases and carrier gases (mobile phase), application ofGC.

High performanceliquid chromatography: Principle, theory and instrumentation,stationary phases and mobile phases. Applications of HPLC, analysis of Paracetamol.

RecommendedTextBooksandReferenceBooks:

l. FundamentalsofMolecularSpectroscopy,C.N. Banwell&McCash.
2. Organicspectroscopy,WilliamKemp,PalgraveMacmillan;2nd Revisededition.
3. Spectroscopy,BKSharmaKrishnaPrakashanMedia,1981.
4. ElementsofOrganicspectroscopy,YRSharma.
5. Applicationsof AbsorptionspectroscopyofOrganiccompounds(Englishpaperback,DyerR.John)
6. Organicchemistry,MorrisonandBoyd,PearsonPublications.
7. Introduction toSpectroscopyby Donald Pavia,Gary Lampman and GeorgeKriz. Saunders College Division, 200I.
8. ChemistrytextbookforB.Sc.,publishedbyTeluguacademy,Govt.ofTelangana.
9. AnalyticalChemistrybyDavidKrupadanam,UniversitiesPress(India)Limited.
10. Principles of InstrumentalAnalysis,D.A.Skoog,F.J.Holler&T.A. Nieman, Cengage Learning IndiaEd.
11. Fundamentalsof AnalyticalChemistry 6 1hf_dn, D.A.Skoog, D.M. West, F.J.Holler,Saunders College Publishing, Fort worth (1992).
12. InstrumentalMethods of Analysis, 7th Ed. Willard, H.H., Merritt, L.L., Dean, J. & Settle,F.A. WordsworthPublishing Co.Ltd., Belmont, California, USA, 1988.
13. ATextBookofQuantitativeInorganicAnalysis7 1hEd.,Vogel,A.1.PrenticeHall.
14. AnalyticalChemistry7thEditionbyGaryD.Christian(2004)
15. SeparationMethods,M.NSastry,HimalayaPublication(2004)

B.Sc.,IIIYEARCHEMISTRYS

EMESTER-V

DSE-B:ChemistryPaper-V

(Metallurgy,DyesandCatalysis)

***(04*credits)** **60Hrs*(04*Hrs/week)**

Unitl:GeneralPrinciplesofMetallurgyandProductionofNonFerrousMetals{15Hrs)

***S5-E-B-I:*Pyrometallurgy:** Drying and calcination, roasting, smelting, products of smelting,
Hydrometallurgy: Leachingmethods, leaching agents, leaching of metals, oxides and sulphides.
Separation of liquid and solidphases and processing of aqueous solutions
Electrometallurgy: Electrolysis,Refiningelectrolysis,electrolysisfromaqueoussolutions,fused-salt electrolysis
Refiningprocesses: Chemicalandphysicalrefiningprocesses
Productionofselectednon-ferrousmetals(Copper,Nickel,Zinc): Properties,rawmaterials, production (flow chartspresentations and chemicalreactionsinvolved) anduses.

UnitII:Naturaland SyntheticDyes*(15*Hrs)

S5-E-B-II:DefinitionandClassificationofdyes-Naturaldyes,Syntheticdyes:basedonchemical constitutionof dyes; Chemicalnature of dyes; Applicationof dyes.
StructuresofNaturaldyes: Indigo,Tyrianpurple,Alizarine,lndigotin.
StructuresofSyntheticdyes: Nitro dyes,Nitroso dyes,Azo dyes (Monoazo dye,Bisazo dyes)Diary! methane dyes, Triarylmethane dyes, Xanthenesdyes, Phenolphthalein, Fluoroseine,Acridine dyes.
Synthesisofdyes: Monoazo dye,Bisazodyes(Congored),Auromine0,MalachiteGreen,Crystal Violet,Rhodamine B,AcridineYellow,Indigotin. Bindingofdyestofabric.Applicationsofdyes.

UnitHI:Catalysis-I(15Hrs)

***S5-E-B-Ill:*Homogeneous and heterogeneous catalysis-** Definitionof a catalyst and catalysis. Comparisonof homogeneousandheterogeneouscatalysiswith specificexamples.Generalcharacteristics of catalytic reactions.
Acid-base catalysis- Examples of acid and bascatalysedreactions,hydrolysis of esters.Kinetics of acid catalysed reactions. Specific acid and general acid catalysis, Kinetics of base catalysedreactions. Specific base and general base catalysis. Examples- Aldo! condensation and decompositionofnitramide,base catalysedconversionof acetone to di acetone alcohol, Mutarotationof Glucose. Effect ofpH onreaction rate of acid and base catalysedreactions.
Phasetransfercatalysis: Principleofphasetransfercatalysis,classificationofphasetransfercatalysts. Factorsinfluencingtherateof PTCreactions.

UnitIV:Catalysis-II(15 Hrs)

***S5-E-B-IV:*Enzymecatalysis-**Characteristics ofenzymecatalysis,Examples:(i)lnvertaseininversion ofcanesugar(ii)Maltaseinconversionofmaltosetoglucose(iii)Ureaseindecompositionofurea (iv)Zymaseinconversionof glucosetoethanol(v)workingofcarbonicanhydraseand(vi)Mechanism of oxidationetha_nol by alcohol dehydrogenase. Factors affecting enzyme catalysis.Effect of temperature, pH, concentration and effect of inhibitor on enzyme catalysedreactions, Catalytic efficiency.

Kinetics ofenzyme catalysed reactions:Michaelis-MentonEquation.Mechanismof enzyme catalysed reactions.SignificanceofMichaelisconstant(Km)andmaximumvelocity(Vmax),Lineweaver-Burk plot. Types of enzyme inhibitors.

RecommendedTextBooksandReferenceBooks:

I. lndustrialChemistryB.K.Sharma
2. EngineeringChemistry,JainandJain
3. [ndustrialChemistry,E.Stocchi,Vol-I,EllisHorwoodLtd.UK.
4. HandbookofIndustrialChemistry,J.A.Kent:Riegel's,CBSPublishers,NewDelhi.
5. Theoryofproductionofnon-ferrousmetalsandalloysStudy.KaterinaSkotnicova,Monika Losertova, MiroslavKursa.
6. TheChemistryofSyntheticDyes,Volume4,K.Venkataraman,Elsevier.
7. OrganicChemistryVol-IbyI.L.Finar.
8. OrganicChemistrybyJennice, GorzinskiSmith.
9. NaturalDyes:Sources,Chemistry,ApplicationandSustainabilityIssuesbySujataSaxenaandA.S. M. Raja.
10. PhysicalChemistrybyAtkinsandDePaula,8thEdn.
11. PhysicalChemistrybyPuri,SharmaandPattania, 2017.
12. KineticsandmechanismofchemicaltransformationsbyRajarajmandKuriacose,Publishedby MacmillanIndia Ltd.
13. TextbookofPhysicalChemistrybyK.L.KapoorMacmillan,1999.
14. CatalysisbyJ.C.Kuriacose,MacmillanPublishersIndiaLimited,1980.
15. PhaseTransferCatalysis,Fundamentals,ApplicationsandIndustrialperspectives,C.M.Stark, C.Liotta &M.Halpern, AcademicPress.
16. Phase TransferCatalysis,E.V.Dehmlow&S.S.Dehmlow,VerlagChemie,Weinheim.

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B.Sc.,IIIYEARCHEMISTRYS

EMESTER-VLABORATORY

COURSE

Paper-V:*Experime11tsi11 PhysicalChemistry-I*

(01Credit) **45Hrs(03 Hrs/week)**

I. Distributionlaw

a) Determinationof molecuJar statusandpartitioncoefficient of benzoicacid in Toluene and water.

b) Determinationofdistributioncoefficientofaceticacidbetweenn-butanolandwater.

2. Electrochemistry

a) Determinationofcellconstantofconductivitycell.

b) Verification ofOstwald's dilutionlaw- Determinationofdissociation constant (Ka)of acetic acidby conductivitymeasurements.

3. Colorimetry

a) VerificationofBeer's-LambertslawforKMnO$_4$

b) DeterminationoftheconcentrationofthegivenKMnO$_4$solution.

4. Adsorption

a) Adsorptionof acetic acid on animal charcoal- VerificationofFreundlich adsorption isotherm.

5. Physicalconstants

a) Surfacetensionandb)Viscosityofliquids.(DemonstrationExperiment)

Referencebooks:

t

I. SeniorPracticalPhysicalChemistry,B.DKhosla,V.C.Garg,AdarshGulatiPublishedby R.Chand&Co.

2. PracticalPhysicalChemistry,B.VishwanathanandP.S.Raghavan.VivaBooks.

3. Practicals inPhysicalChemistryby P.S.SindhuISBN-IO:l-4039-2916-5/1403929165 ISBN-13: 978-1-4039-29 I 6-7/9781403929167.

B.Sc.,IIIYEARCHEMISTRY

SEMESTER-VI

DSE-A:ChemistryPaper-VI

(MedicinalChemistry)

***(04*credits)** **60Hrs(04Hrs/week)**

Unit-I:IntroductionandTerminology(15Hrs)

***S6-E-A-I:*Diseases:**Common diseases,infectivediseases-insect borne, air-borne, ,vater-borneand hereditary diseases.

Terminology inMedicinal Chemistry: Drug,Active PharmaceuticalIngredient(ADI), Pharmaceuticals,Pharmacology,Pharmacophore,Pharmacodynamics, Pharmacokinetics, metabolites, antimetabolitesand therapeuticindex.

Drugs: Nomenclature:Chemicalname,Genericnameand Tradenameswith examples; Classification:Classificationbasedon structures and therapeutic activity with examples.

ADMET:a) Absorption: Definition,absorption of drugs acrossthe membrane-active andpassive absorption, routesof administration ofdrugs. b)Distribution:definitionand effectof plasmaprotein binding.c)Metabolism:definition,phaseIandphaseJIreactions.d)Elimination: definition and renal elimination. Toxicity.

Unit-II:Enzymesand Receptors(15Hrs)

***S6-E-A-II:*Enzymes: Introduction,**Mechanismand factors affecting enzyme action, Specificity of enzymeaction(includingstereospecificity),Enzymeinhibitorsandtheirimportance.Typesof inhibition-reversible,irreversibleandtheir subtypeswithexamples.

Receptors: Introduction,Drugaction-receptorfheory,Mechanismofdrugaction,conceptofagonists andantagonistswith examples. Drug receptorinteractions involved indrugreceptorcomplex. Bindingroleof-OHgroup,-NH2group,quaternaryammoniumsaltsanddoublebond.Structure -activityrelationshipsofdrugmolecules,explanationwithsulfonamides.

Unit-III:Synthesisand TherapeuticActivityofDrugs(15Hrs)

***S6-E-A-III:*Introduction,synthesisandtherapeuticactivityof:

Chemotherapeutics: Sulphanilamide,dapsone, Penicillin-G(semisynthesis), Chloroquin, Jsoniazid, Cisplatin and AZT.

Drugstotreatmtabolic disorders:Anti diabetic-Tolbutamide;Anti-inflammatory-Ibuprofen; Cardiovascular- Glyceryltrinitrate; Antipyretic (paracetamol, aspirin) andAntacid- Omeprazole.

Drugsactingonnervoussystem: Anesthetics-definition,Classification-localandgeneral.Volatile-Nitrous oxide,chloroformuses and disadvantages.Local anesthetics -benzocaine.

Unit-IV:Molecular MessengersandVitaminsandMicronutrients(15Hrs)

S6-E-A-IV: **MolecularMessengers:** Introduction to hormonesandneurotransmitters,Thyroid hormones,Antithyroid drug-Carbimazol. Adrenaline:Adrenergic drugs-salbutamol,atenelol. Serotonin: SSRis- tluoxetine. Dopamine: Antiparkinsondrug- Levodopa.

Vitamins andMicronutrients: Introduction, Vitamin sources, Deficiencydisorders andremedyof VitaminsA,B, C,D,E,Kandmicronutrients -Na,K, Ca,Cu,ZnandT.

RecommendedTextBooksandReferenceBooks:

1. IntroductiontoMedicinalChemistry,G.L.Patrick,OxfordUniversityPress,NewYork.2013.
2. MedicinalChemistry,ThomasNogrady,OxfordUniv.Press,NewYork.2005.
3. Faye'sPrinciples of Medicinal Chemistry,DavidWilliamand Thomas Lemke,Lippincott Williams &Wilkins, 2008.
4. MedicinalChemist1y,AshutoshKar,NewAgeInternational,2005.
5. SyntheticDrugs,O.D.Tyagi&M.Yadav,AnmolPublications,1998.
6. MedicinalChemist1y,AlkaL.Gupta,PragatiPrakashan.
7. Drugs,G.L. David Krupadanam,D.Vijaya Prasad, K.VaraprasadRao,K. L.N.Reddy, C. Sudhakar, Universities Press (India) Ltd. 2012.

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B.Sc.,IIIYEARCHEMISTRY

SEMESTER-VI

DSE-B:ChemishyPaper-VI

(Agricultural&FuelChemistry)

***(04*credits)** **60Hrs*(04* Hrs/week)**

UnitI:Pesticides(15Hrs)

***S6-E-B-I:*Introduction,**Definition,classification ofpesticides based on use(target).Toxicity and chemical structure with examples. Adverse effects of pesticides and its impact on environmental pollution.

Synthesis,manufacture and uses of representative pesticides: Organochlorines (Cypermethrin); Organophosphates (Parathion); Carbamates (carbaryl); Quinones (Chloranil), Anilides (Alachlor).

Pesticideformulations: Dusts,Granules,WettablepowdersEmulsionsandAerosols.

Biopestcides:Introduction: Potential pesticidal plants of India, Role of Neem in plant protection-constituents,Azadirachtin and its role in pest control,Structure and mode of action of Pyrethrins (pyrethrin-1)andPyrethroids(permethrin)andnicotinoids(Tmidacloprid).

UnitII:Fertilizers(15Hrs)

***S6-E-B-ll:*Introduction:**(needoffertilizers),functionsofessentialplantnutrients(N,P,K), Classification formula and uses of fertilizers:

Nitrogenousfertilizers: Ammoniumnitrate,Urea,CalciumCyanamide,CalciumAmmonium Nitrate, Sodium Nitrate, AmmoniumChloride and their uses.

Phosphate fertilizers: Normal super phosphate,TripleSuperPhosphate,AmmoniumPhosphate and their uses.

Potassiumfertilizers: Potassiumchloride,potassiumnitrate,potassiumsulphateanduses.

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Complexfertilizers: DiaammoniumPhosphateandmixedfertilizerstheiruses.Manufactureofurea andSuperphosphateoflimeandtheirreactionsinthesoil.

Biofertilizers: Introduction,definition,classification,Rhizobium,Azatobactor,Azospirillium, Azolla, Blue GreenAlgae, Vermicomposting and uses.

Organic farming: Theprincipalmethods, crop rotation, greenmanures and compost, biologicalpest control, andmechanicalcultivationanduses.

UnitIII:Enen:ySourcesandCoal(15Hrs)

***S6-E-B-III:*Reviewof energysources (renewableandnon-renewable). Classificationof fuels and their calorific value.

Coal: Uses ofcoal (fuelandnonfuel) invariousindustries, its composition,carbonization of coal. Coalgas, producer gas andwater gas-compositionanduses. Fractionationof coaltar, uses of coal tar based chemicals,requisitesof a goodmetallurgical coke, Coal gasification (Hydro gasification andCatalytic gasification),Coalliquefactionand Solvent Refining.

UnitIV:Petroleumanditsproducts,Petrochemicalsandnonpetroleumfuels (15Hrs)

***S6-E-B-IV:*Petroleumanditsproducts**

Petroleum: Origin,Composition ofcrude petroleumand classification.Properties-flash pointandits determination,Knocking and anti-knocking compounds; Octanenumberand Cetanenumber. Distillationofcrude petroleum,FractionalDistillation -Principle andprocess,refining,fractionsand uses. Cracking -Thermalandcatalytic cracking, Reforming.

Petroleumproducts-Petrol,Diesel,LPG,Kerosene,Tarandtheirapplications.

Petrochemicals-Vinylacetate,Propyleneoxide,Isopreneandtheiruses.

Lubricants: Classification oflubricants-Solid, semi solidand liquids; Properties (viscosity, flash point,firepoint,cloudpoint,pourpoint)andtheirdetermination.FunctionsofLubricants,Mechanism of lubrication.

Non-Petroleumfuels: NaturalGas- CNG,LNG,clean Fuels- H2gas,ethanol,Fuelfrom waste- bio gas, Fuel frombio mass-Bio ethanol, biodiesel, and Synthetic fuels- syngas based.

RecommendedTextBooksandReferenceBooks:

1. Chemistryofpesticides,N.N.Melnikov,Springer-Verlag-Technology&Engineering(2012).
2. PesticideSynthesis,ThomasA.Unger,Elsevier,(2000).
3. Pesticides,R.Cremlyn,JohnWiley,1980.
4. ManuresandFertilisers,K.Kolay,PublishdbyAtlantic(2007).
5. Sharma,B.K.&Gaur,H.IndustrialChemistry,GoelPublishingHouse,Meerut(1996).
6. ATextBookofEngineeringChemistryPaperback-2017byShashiChawla.
7. IndustrialChemistry,Vol-I,Stocchi.E,EllisHorwoodLtd.UK(1990).
8. Jain,P.C.&Jain,M.EngineeringChemistry,DhanpatRai&Sons,Delhi.
9. EngineeringChemistrybyShashiChawla,DhanpatRai&Sons,Delhi.

B.Sc.,IIIYEARCHEMISTRY

SEMESTER-

VILABORATORYCOUR

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Paper-V:*ExperimentsinPhysicalChemistry-II*

(01Credit) **45Hrs(03 Hrs/week)**

1. **Kinetics**
   a) Determinationofspecificreactionrateofthehydrolysis ofmethyl acetatecatalyzedby hydrogenion at roomtemperature.
   b) DeterminationrateofdecompositionofhydrogenperoxidecatalyzedbyFeCb
2. **Electrnchemistry**

A. Potentiometry:

a) Determinationofredox potentialofFe^{2+}-$Fe^{3+}$by potentiometrictitration offerrous ammoniumsulphate vs potassiumdichromate.

b) PrecipitationtitrationofKCIvsAgN03-Determinationofgivenconcentrationofsilver nitrate.

B. pHmetry:

a) pH metric titrationofstrongacid (HCI) vsstrong base-Determination of theconcentration of given acid.

b) pH metric titrationofstrongacid (aceticacid)with strong base(NaOH)-Determinationof aciddissociationconstant (Ka) of weak acid.

3. **Conductometry:**
   a) Determinationofoverall order:Saponificationofethyl acetatewith NaOH byconductance measurement

Referencebooks:

I. Seniorpracticalphysicalchemistry,B.D.Khosla,V.C.Garg,AdarshGuati.
2. AdvancedPracticalPhysicalchemistry,J.B.Yadav.
3. PracticalPhysicalchemistry,B.VishvanathanandP.S.Raghavan.
4. PracticalPhysicalchemistry,P.S.Sindhu.