M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC 301 **COURSE TYPE: CCC**

COURSE TITLE:

APPLICATIONS OF SPECTROSCOPY-INORGANIC CHEMISTRY

CREDIT:		**HOURS:**	
THEORY:	**PRACTICAL:**	**THEORY:**	**PRACTICAL:**
6		**90**	**00**
MARKS:		**MARKS**	
THEORY:	**PRACTICAL:**	**THEORY:**	**PRACTICAL:**
70+30			

OBJECTIVE: To learn about application of Spectroscopy in various field of In organic Chemistry.

UNIT-1/ 16 Hours	Applications of Atomic Absorption Spectroscopy, Atomic Emission Spectroscopy, Plasma Emission Spectroscopy, Flame Emission Spectroscopy and raman spectroscopy in inorganic chemistry.
UNIT-2/ 18 Hours	Vibrational Spectroscopy Symmetry and shapes of AB2, AB3, AB4, AB5 and AB6, mode of bonding of ambidentate ligands, ethylenediamine and diketonato complexes, application of resonance Raman spectroscopy particularly for the study of active sites of metalloproteins.
UNIT-3/ 20 Hours	Electron Spin Resonance Spectroscopy Hyperfine coupling, spin polarization for atoms and transition metal ions, spinorbit coupling and significance of g-tensors, application to transition metal complexes (having one unpaired electron) including biological systems and to inorganic free radicals such as PH4, F2 and [BH3].
UNIT-4/ 17 Hours	Nuclear Magnetic Resonance of Paramagnetic Substances in Solution The contact and pseudo contact shifts, factors affecting nuclear relaxation, some applications including biochemical systems, an overview of NMR of metal nuclides with emphasis on 195 Pt and 199Sn NMR
UNIT-5/ 19 Hours	Mossbauer Spectroscopy Basic principles, spectral parameters and spectrum display. Application of the technique to the studies of (1) bonding and structures of Fe+2 and Fe+3 compounds including those of intermediate spin, (2) Sn+2 and Sn+4 compounds – nature of ML bond, coordination number, structure and (3) detection of oxidation state and inequivalent MB atoms.

RECOMENDE READINGS:	1. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Cradock, ELBS. 2. Infrared and Raman Spectra: Inorganic and Coordination Compounds, K. Nakamoto, Wiley. 3. Progress in Inorganic Chemistry vol., 8 ed., F.A. Cotton, vol., 15, ed. S.J. Lippard, Wiley. 4. Inorganic Electronic Spectroscopy., A.P.B. Lever, Elsevier. 5. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, R.V. Parish, Ellis Horwood. 6. Practical NMR Spectroscopy, M.L. Martin, J.J. Delpeuch and G.J. Martin, Heyden.

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC 302 **COURSE TYPE: CCC**

COURSE TITLE:

APPLICATIONS OF SPECTROSCOPY-ORGANIC CHEMISTRY

CREDIT:		**HOURS:**	
THEORY:	**PRACTICAL:**	**THEORY:**	**PRACTICAL:**
6		**90**	**00**
MARKS:		**MARKS**	
THEORY:	**PRACTICAL:**	**THEORY:**	**PRACTICAL:**
70+30			

OBJECTIVE: To learn about application of Spectroscopy in various field of Organic Chemistry.

UNIT-1/ 20 Hours	Ultraviolet and Visible Spectroscopy Various electronic transitions (185-800 nm), Beer-Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fieser-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls. Mass Spectrometry Introduction, ion production – EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral framentation of organic compounds, common functional groups, molecular ion peak, metastable peak, McLafferty rearrangement. Nitrogen rule. High resolution mass spectrometery. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.
UNIT-2/ 19 Hours	**OXIDATIONS AND REDUCTIONS** Mechanism - study of the following oxidation reactions - oxidation of alcohols - use of DMSO in combination with DCC or acetic anhydride in oxidising alcohols - oxidation of methylene to carbonyl, oxidation of aryl methenes - allylic oxidation of olefins. Ozonolysis - oxidation ofOlefinicdoublebonds and unsaturated carbonyl compounds-oxidative cleavage of C-C bond. Reduction: Selectivity in reduction of 4-t-butylcyclohexanone using selecterides.Hydridereductions - reduction with LiAlH4, NaBH4, tritertiarybutyloxyaluminium hydride, sodium Cyanoborohydride, trialkyltin hydride, hydrazines.

UNIT-3/ 18 Hours	20 Infrared Spectroscopy Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lalctams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance. FT IR. IR of gaseous, solids and polymeric materials. Optical Rotatory Dispersion (ORD) and Circular Dichroism (CD) Definition, deduction of absolute configuration, octant rule for ketones.
UNIT-4/ 17 Hours	Nuclear Magnetic Resonance Spectroscopy General introduction and definition, chemical shift, spin-spin interaction, shielding mechanism, mechanism of measurement, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides &mercapto), chemical exchange, effect of deuteration, complex spin-spin interaction between two, three, four and five nuclei (first order spectra), virtual coupling. Stereochemistry, hindered rotation, Karplus curve-variation of coupling constant with dihedral angle.
UNIT-5/ 16 Hours	Simplification of complex spectra-nuclear magnetic double resonance, contact shift reagents, solvent effects. Fourier transform technique, nuclear Overhauser effect (NOE). Resonance of other nuclei-F, P. Carbon-13 NMR Spectroscopy General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimension NMR spectroscopy – COSY, NOESY, DEPT, INEPT, APT and INADEQUATE techniques.
RECOMENDE READINGS:	1. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Bassler and T.C. Morrill, John Wiley. 2. Introduction to NMR Spectyroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley. 21 3. Application of Spectroscopy of Organic Compounds, J.R. dyer, Prentice Hall. 4. Spectroscopic Methods in Organic Chemistry, D.H. Williams, I. Fleming, Tata McGraw-Hill.

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC 303	**COURSE TYPE: CCC**
COURSE TITLE: **PHOTOCHEMISTRY**	
CREDIT: **THEORY:** **PRACTICAL:** **6**	**HOURS:** **THEORY:** **PRACTICAL:** **90** **00**
MARKS: **THEORY:** **PRACTICAL:** **70+30**	**MARKS** **THEORY:** **PRACTICAL:**

OBJECTIVE: To learn about principle and application of Photochemistry in various fields.

UNIT-1/ 19 Hours	**BASICS OF PHOTOCHEMISTRY** Absorption, excitation, photochemical laws, quantum yield, electronically excited states- life times-measurements of the times. Flash photolysis, stopped flow techniques. Energy dissipation by radiative and non-radiative processes, absorption spectra, Franck-Condon principle, photochemical stages- primary and secondary processes Nature of changes on electronic excitation, Potential energy diagram, Emission Spectra, Environmental effects on absorption and emissionproperties, Excited state dipole moment, Redox potential and acidity constants of aromatic acids.
UNIT-2/ 18 Hours	**PHOTOPHYSICAL PROCESSES IN EXCITED STATE** Types of photophysical pathways, Radiation less transitions, Fluorescence emission, Triplet state and phosphorescence emission, Fluorescence quenching, Stern-Volmer equation, Concentration quenching and excimer formation, Quenching by foreign substrates, Exciplex formation.

UNIT-3/ 17 Hours	**II PROPERTIES OF EXCITED STATES**: Structure, dipole moment, acid-base strengths, reactivity. Photochemical calculation of rates of radiative processes. Bimolecular deactivation - quenching kinetics- Ill EXCITED STATES OF METAL COMPLEXES: Excited states of metal complexes: comparison with organic compounds, electronically excited states of metal complexes, charge-transfer spectra, charge transfer excitations, methods for obtaining charge-transfer spectra.
UNIT-4/ 16 Hours	**LIGAND FIELD PHOTOCHEMISTRY** Photosubstitution, photooxidation and photoreduction, lability and selectivity, zero vibrational levels of ground state and excited state, energy content of excited state, zero- zero spectroscopic energy, development of the equations for redox potentials of the excited states.
UNIT-5/ 20 Hours	**REDOX REACTIONS BY EXCITED METAL COMPLEXES** Energy transfer under conditions of weak interaction and strong interaction-exciplex formation; conditions of the excited states to be useful as redox reactants, excited electron transfer, metal complexes as attractive candidates (2,2'-bipyridine and 1,10- phenonthroline complexes), illustration of reducing and oxidising character of Ruthenium2+(bipyridal complex, comparision with Fe(bipy)s; role of spin-orbit coupling-life time of these complexes. Application of redox processes of electronically excited states for catalytic purposes, transformation of low energy reactants into high energy products, chemical energy into light *Applications of Photochemistry* Importance of photochemistry, origin of life, photosynthesis and mechanism of vision.
RECOMENDE READINGS:	1. C. E. Wayne & R. P. Wayne, *Photochemistry*, OUP (1996). 2. N. J. Turro. *Modern Molecular Photochemistry*, University Science Books (1991).

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC 311 **COURSE TYPE: CCC**

COURSE TITLE:

ORGANIC CHEMISTRY LAB

CREDIT: **THEORY:** **PRACTICAL:06**	**HOURS:** **THEORY:** **PRACTICAL:135**
MARKS: **THEORY:** **PRACTICAL:**	**MARKS** **THEORY:** **PRACTICAL:**

OBJECTIVE:

To gain practical knowledge of Organic preparations, Purifications and Chromatography.

1. Purification Techniques of organic compounds and their spectroscopic identifications.

a) Purification of binary mixtures by Thin Layer Chromatography (TLC) and Column chromatography (CC).

b) Purification of tertiary mixtures of amino acids by Paper Chromatography.

2. Extraction of Natural Products: Any one of the following – solasodine, caffeine, nicotine, piperine, rosine, carotenoids.

3. Organic Preparations: At least eight preparations (involving two or more than two steps)involving the following representative reactions.

a. Esterification and saponification

b. Oxidation (peracid, chromic acid, Mn(Vll)

c. Hydride reduction or hydrogenation

d. Nucleophilic substitution

e. Cycloaddition reaction

f. Grignard reaction

	g. Condensation reaction h. Preparation of dyes i. Aromatic electrophilic substitution j. Heterocyclic synthesis 4. Qualitative Analysis of Binary Mixtures (only two)
Recommended Reading:	**Text Books** 1. R. K. Bansal. *Laboratory Manual of Organic Chemistry* (3rd edn.), Wiley-Eastern (1994). 2. R. G. Brewster & W.E. Mcwedn. *Unitized Experimental Organic Chemistry* (4th edn.), East-West Press (1977). 3. A. I. Vogel. *Practical Organic Chemistry* (3rd edn.), Longman Group Ltd. (1973).

M.Sc. CHEMISTRY THIRD SEMESTER	
COURSE CODE: MSCC01	**COURSE TYPE : ECC/CB**
COURSE TITLE: TRIBAL STUDIES	
CREDIT: 06 **THEORY: 06**	**HOURS : 90** **THEORY: 90**
MARKS : 100 **THEORY: 70 CCA : 30**	

OBJECTIVE:

- Understands the concept and place of research in concerned subject
- Gets acquainted with various resources for research
- Becomes familiar with various tools of research
- Gets conversant with sampling techniques, methods of research and techniques of analysis of data
- Achieves skills in various research writings
- Gets acquainted with computer Fundamentals and Office Software Package .

UNIT - 1 12 Hrs	**Tribal Studies :** Meaning, Nature, Scope, Need & importance of tribal studies. Meaning, Definition & characteristics of Tribe, Caste & Race.
UNIT - 2 24 Hrs	**Scheduled Tribe in India :** Population Composition of tribal, classification of Indian Tribe – Racial, Lingual, Geographical, Cultural. **Some Major Tribes in India :** Santhal, Khasi, Munda, Bhils. **Some Major Tribes in Central India :** Gond, Baiga, Bharia, Korkus.
UNIT - 3 10 H rs	**Iliteracy :**Poverty, Indebness, Unemployment, migration & Exploitation Environmental & Degradation. **Problem of Health and sanitation :** Prostitution, Culture Decay due to assimilation. Replacement & Rehabilitation of Tribal population.
UNIT - 4 24 Hrs	**Welfare-Concept, Characteristics:** Tribal Welfare in post independence period. Constitutional provision & safe guard after independence, Legislation & Reservation Policy.
UNIT - 5 20 Hrs	**Tribal Development Programs for Scheduled Tribes :** Medical, Education, Economy, Employment & Agriculture Evaluation of Programs **Tribal Welfare & Advisory Agencies in India :** Role of NGO's in tribal development, Role of Christian missionaries in tribal welfare & development. Tribal Welfare Administration.
SUGGESTED READINGS	1. *Tribal Development In India (Orissa)* by Dr. Taradutt 2. *Books on Tribal studies* by PK Bhowmik 3. *Books on 'Tribal Studies'* by W.G. Archer

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC C02	**COURSE TYPE: ECC/CB**
COURSE TITLE: **GREEN CHEMISTRY**	

CREDIT: **THEORY: PRACTICAL:** **6**	**HOURS:** **THEORY: PRACTICAL:** **90 00**
MARKS: **THEORY: PRACTICAL:** **70+30**	**MARKS** **THEORY: PRACTICAL:**

OBJECTIVE:

To know eco-friendly methods of synthesis. This helps in planning the synthesis of any type of organic compounds with the revolution of Green Chemistry.

UNIT-1/ 18 Hours	**PRINCIPLES & CONCEPT OF GREEN CHEMISTRY** Introduction –Concept and Principles-development of Green Chemistry- Atom economy reactions –rearrangement reactions , addition reactions- atom uneconomic-sublimation-elimination-Wittig reactions-toxicity measures- Need of Green Chemistry in our day to day life.
UNIT-2/ 18 Hours	**MEASURING AND CONTROLLING ENVIRONMENTAL PERFORMANCE** Importance of measurement – lactic acid production-safer Gasoline – introduction to life cycle assessment-four stages of Life Cycle Assessment (LCA) –Carbon foot printing-green process Matrics-eco labels -Integrated Pollution and Prevention and Control(IPPC)-REACH (Registration, Evaluation, Authorization of Chemicals)

UNIT-3/ 18 Hours	**EMERGING GREEN TECHNOLOGY AND ALTERNATIVE ENERGY SOURCES** Design for Energy efficiency-Photochemical reactions- Advantages-Challenge faced by photochemical process. Microwave technology on Chemistry- Microwave heating –Microwave assisted reactions-Sono chemistry and Green Chemistry –Electrochemical Synthesis-Examples of Electrochemical synthesis.
UNIT-4/ 18 Hours	**RENEWABLE RESOURCES** Biomass –Renewable energy – Fossil fuels-Energy from Biomass-Solar Power- Other forms of renewable energy-Fuel Cells-Alternative economics-Syngas economy- hydrogen economy-Bio refinery chemicals from fatty acids-Polymer from Renewable Resources –Some other natural chemical resources
UNIT-5/ 18 Hours	**INDUSTRIAL CASE STUDIES** Methyl Methacrylate (MMA)-Greening of Acetic acid manufacture-Vitamin C-Leather manufacture –Types of Leather –Difference between Hide and Skin-Tanning –Reverse tanning –Vegetable tanning –Chrome tanning-Fat liquoring –Dyeing –Application-Polyethylene- Ziegler Natta Catalysis-Metallocene Catalysis-Eco friendly Pesticides-Insecticides.
RECOMENDE READINGS:	1. Mike Lancaster , Green Chemistry and Introductory text, II Edition 2. P.T.Anastas and J.C Warner,Green Chemistry theory and Practice, Oxford University press, Oxford (1988). 3. P.Tundoet. al., Green Chemistry, Wiley –Blackwell, London (2007). 4. ProttiD.Dondiet.al.,Green Chemistry 5. T.E Graedel, Streamlined Life cycle Assessment, Prentice Hall, NewJersey (1998). 6. V.K. Ahluwalia,Methods and Reagents of Green Chemistry: An Introduction by Green Chemistry. 7. www.clri.org

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC C03 **COURSE TYPE: ECC/CB**

COURSE TITLE:

ORGANIC SYNTHESIS II

CREDIT: **THEORY:** **PRACTICAL:** **6**	**HOURS:** **THEORY:** **PRACTICAL:** **90** **00**
MARKS: **THEORY:** **PRACTICAL:** **70+30**	**MARKS** **THEORY:** **PRACTICAL:**

OBJECTIVE:

To gain the knowledge in the preparation, properties, characterization and Uses of polymers.

UNIT-1/ 20 Hours	Disconnection Approach An introduction to synthons and synthetic equivalents, disconnection approach, functional group inter-conversions, the importance of the order of events in organic synthesis, one group C-X and two group C-X disconnections, ch_emoselectivity, reversal of polarity, cyclisation reactions, amine synthesis
UNIT-2/ 19 Hours	Protecting Groups Principle of protection of alcohol, amine, carbonyl and carboxyl groups. one Group C-C Disconnections Alcohols and carbonyl compounds, regioselectiviity. Alkene synthesis, use of acetylenes and aliphatic nitro compounds in organic synthesis
UNIT-3/ 18 Hours	Two Group C-C Disconnections Diels-Aider reaction, 1,3-difunctionalised compounds, cx,j3-unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalised compounds. Micheal addition and Robinson annelation.

UNIT-4/ 16 Hours	Ring Synthesis Saturated heterocycles, synthesis of 3-, 4-, 5- and 6-membered rings, aromatic heterocycles in organic synthesis.
UNIT-5/ 17 Hours	Synthesis of Some Complex Molecules Application of the above in the synthesis of following compounds: Camphor, Longifoline, Cortisone, Reserpine, Vitamin 0, Juvabione, Aphidicolin and Fredericamycin A.
RECOMENDE READINGS:	1.DesigningOrganicSynthesis,S.Warren,Wiley. 2.OrganicSynthesis·Concept,Methods andStartingMaterials,J.FuhrhopandG.Penzillin,VerlageVCH. 3.SomeModernMethodsofOrganicSynthesis.W.Carruthers,CambridgeUniv.Press. 4.ModernSyntheticReactions,H.O.House,W.A.Benjamin, 5.AdvancedOrganicCht!1nistry:Reactions,MechanismsandStructure,J.March,Wiley. 6.PrinciplesofOrganicSynthesis,R.NormanandJ.M.Coxon,BlackieAcademic&Professional. 7.AdvancedOrganicChemistryPartB,F.A.CareyandR.J.Sundberg,PlenumPress.

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE: MSC C04	**COURSE TYPE: ECC/CB**
COURSE TITLE: **HETEROCYCLICCHEMISTRY**	
CREDIT: **THEORY:** **PRACTICAL:** **6**	**HOURS:** **THEORY:** **PRACTICAL:** **90** **00**
MARKS: **THEORY:** **PRACTICAL:** **70+30**	**MARKS** **THEORY:** **PRACTICAL:**

OBJECTIVE:

To study of Nomenclature, Preparations, Characteristics and Structure of Heterocycles.

UNIT-1/ 20 Hours	NOMENCLATURE OF HETEROCYCLES Replacement and systematic nomenclature (Hantzsch-Widman system) for monocyclic fused and bridged heterocycles.Aromatic Heterocycles General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond lengths, ring current and chemical shifts in 1H NMR-spectra. Empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltations).Heteroaromatic reactivity and tautomerism in aromatic heterocycles.
UNIT-2/ 18 Hours	NON-AROMATIC HETEROCYCLES Strain-bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six-membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversino and 1,3-diaxial interaction. Stereo-electronic effects anomeric and related effects, Attractive interactions-hydrogen bonding and intermolecular nucleophilic, ectrophilic interactions. Heterocyclic Synthesis. Principles of heterocyclic synthesis involing cyclization reactions and cycloaddition reactions.
UNIT-3/ 18 Hours	SMALL RING HETEROCYCLES Three-membered and four-membered heterocycles-synthesis and reactions of azirodines, oxiranes, thiranes, azetidines, oxetanes and thietanes.Benzo-Fused Five-Membered HeterocyclesSynthesis and reactions including medicinal applications of benzopyrroles, bezofurans and benzothiophenes.

UNIT-4/ 18 Hours	MESO-IONIC HETEROCYCLES General classification, chemistry of some important meso-ionic heterocycles of type-A and B and their applications. Six-membered Heterocycles with one Heteroatom. Synthesis and reactions of pyrylium salts and pyrones and their comparison with pyridinium&thiopyrylium salts and phridones. Synthesis and reactions of quionlizinium and benzopyrylium salts, coumarins and chromones.
UNIT-5/ 16 Hours	HIGHER HETEROCYCLES Six membered Heterocycles with two or more Heteroatoms. Synthesis and reactions of diazones, triazines, tetrazines and thiazines. Seven-and Large-membered Heterocycles. Synthesis and reactions of azepines, oxepines, thiepines, diazepinesthiazepines, azocines, diazocines, dioxocines and dithiocines.
RECOMENDE READINGS:	1. Heterocyclic Chemistry Vol. 1-3, R.R. Gupta, M. Kumar and V.Gupta, Springer Verlag. 2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme. 3. Heterocyclic chemistry J.A. Joule, K. Mills and g.F. Smith, Chapman and Hall. 4. Heterocyclic Chemistry, T.L. Gilchrist, Longman ScietificTechinal. 5. Contemporary Hetrocyclic Chemistry, G,.R. Newkome and W.W. Paudler, Wiley-Inter Science. 6. An Introductiion to the Heterocyclic Compounds, R.M. Acheson, Johnwiely. 7. Comprehensive Heterocyclic Chemistry, A.R. Katrizky and C.W. Rees, eds. Pergamon Press

M.Sc. CHEMISTRY THIRD SEMESTER

COURSE CODE : MSCS02 **COURSE TYPE : OSC**

COURSE TITLE: INTELLECTUAL PROPERTY RIGHTS, HUMAN RIGHTS & ENVIRONMENT: BASICS

CREDIT: 06	**HOURS : 90**
THEORY: 06	**THEORY: 90**

MARKS : 100

THEORY: 70 CCA : 30

OBJECTIVE:

- Understands the concept and place of research in concerned subject
- Gets acquainted with various resources for research
- Becomes familiar with various tools of research
- Gets conversant with sampling techniques, methods of research and techniques of analysis of data.

UNIT - 1 12 Hrs	• Patents :- Introduction & concepts, Historical Overview. • Subject matter of patent. • Kinds of Patents. • Development of Law of Patents through international treaties and conventions including TRIPS Agreement. • Procedure for grant of patents & term of Patent. • Surrender, revocation and restoration of patent. • Rights and obligations of Patentee • Grant of compulsory licenses • Infringement of Patent and legal remedies • Offences and penalties • Discussion on leading cases.
UNIT - 2 24 Hrs	• Meaning of Copyright, Historical Evolution, • Subject matter of copyright. • Literary works • Dramatic Works & Musical Works • Computer Programme • Cinematographic films • Registration of Copyrights • Term of Copyright and Ownership of Copyrights • Neighboring Rights • Rights of Performers & Broadcasters • Assignment of Copyright. • Author's Special Rights (Moral Rights) • Infringement of Copyrights and defenses • Remedies against infringement (Jurisdiction of Courts and penalties) • International Conventions including TRIPS Agreement WIPO, UCC, Paris Union, Berne Convention, UNESCO. • Discussion on leading cases.
UNIT - 3 10 H rs	• Rights: Meaning • Human Rights- Meaning & Essentials • Human Rights Kinds • Rights related to Life, Liberty, Equals & Disable
UNIT - 4 24 Hrs	• National Human Rights Commission • State Human Rights Commission • High Court • Regional Court • Procedure & Functions of High & Regional Court.
UNIT - 5 20 Hrs	• Right to Environment as Human Right • International Humanitarian Law and Environment • Environment and Conflict Management • Nature and Origin of International Environmental Organisations (IEOs) • Introduction to Sustainable Development and Environment • Sustainable Development and Environmental Governance

SUGGESTED READINGS

1. G.B.Reddy, *Intellectual Property Rights and Law,* Gogia Law Agency, Hyderabad.
2. S.R.Myneni, *Intellectual Property Law*, Eastern Law House, Calcutta
3. P Narayanan *Intellectual Property Rights and Law (1999)*, Eastern Law House, Calcutta, India
4. Vikas Vashistha, *Law and Practice of Intellectual Property*,(1999) Bharat Law House, New Delhi.
5. Comish W.R *Intellectual Property,3rd ed, (1996),* Sweet and Maxwell
6. P.S. Sangal and Kishor Singh, *Indian Patent System and Paris Convention,*
7. Comish W.R *Intellectual Property, Patents, Copyrights and Allied Rights, (2005)*
8. Bibeck Debroy, *Intellectual Property Rights, (1998),* Rajiv Gandhi Foundation.