To,

The Principal Secretary,
Raj Bhavan, Bihar,
Patna

Sub:-**Regarding submission of proposed course structure and uniform syllabus of Chemistry for 1st and 2nd Semester of 4-Year undergraduate Course.**

Reference:- Letter No.-BSU (UGC) -02/2023- 871/ GS(I) dated 09.06.2023 and P.U. Letter No. 014/PSVC.

Sir,

In Compliance with your letter no.BSU(UGC)- 02/2023-792/ GS(I) dated-30.05.2023 followed by above mentioned letter no, we are submitting the proposed course structure and syllabus of Chemistry for 1st and 2nd semester system as per UGC regulations.

Enclosed:-as above.

Your faithfully

1. 14.06.2023

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2. K Shahi 14.6.23

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Course Structure

Chemistry

(A)Major Core Courses

Sl. No.	Sem.	Type of Course	Name of Course	Credits	Marks
1.	I	MJC-1 (T)	Inorganic Chemistry : Atomic Structure & Chemical Bonding Organic Chemistry : Fundamental of Organic Chemistry, stereochemistry & aliphatic hydrocarbons	4	100
		MJC-1 (P)	Inorganic Chemistry Lab: Volumetric analysis. Organic Chemistry Lab : Detection, Purification, Separation of organic Compouds.	2	100
2.	II	MJC-2 (T)	Physical Chemistry : States of matter and ionic equilibria.	4	100
		MJC-2 (P)	Physical Chemistry Lab: Determination of Physical Properties of liquids and pH- metry.	2	100
3.	III	MJC-3	Organic Chemistry : Basics and Hydrocarbons	5	100
4.	III	MJC-4 (T)	Physical Chemistry II: Chemical Thermodynamics and its Applications (T)	3	100
		MJC-4 (P)	Physical Chemistry II: Chemical Thermodynamics and its Applications (P)	1	100
5.	IV	MJC-5 (T)	Inorganic Chemistry II: s- and p Block Elements (T)	3	100
		MJC-5 (P)	Inorganic Chemistry II: s- and p Block Elements (P)	2	100
6.	IV	MJC-6 (T)	Organic Chemistry II: Oxygen Containing Functional Groups (T)	3	100
		MJC-6 (P)	Organic Chemistry II: Oxygen Containing Functional Groups (P)	2	100
7.	IV	MJC-7	Physical Chemistry III: Phase Equilibria and Electrochemical Cells	5	100
8.	V	MJC-8 (T)	Inorganic Chemistry III: Coordination Chemistry (T)	3	100
		MJC-8 (P)	Inorganic Chemistry III: Coordination Chemistry (P)	2	100
9.	V	MJC-9	Organic Chemistry III: Heterocyclic Chemistry	5	100
10.	VI	MJC-10 (T)	Physical Chemistry IV: Conductance & Chemical Kinetics (T)	3	100
		MJC-10 (P)	Physical Chemistry IV: Conductance & Chemical Kinetics (P)	1	100
11.	VI	MJC-11 (T)	Organic Chemistry IV: Biomolecules (T)	3	100
		MJC-11 (P)	Organic Chemistry IV: Biomolecules (P)	2	100
12.	VI	MJC-12	Physical Chemistry V: Quantum Chemistry & Spectroscopy	5	100
13.	VII	MJC-13	Inorganic Chemistry IV: Organometallic Chemistry	5	100
14.	VII	MJC-14	Research Methodology	5	100
15.	VII	MJC-15	Organic Chemistry V: Spectroscopy	6	100
16.	VIII	MJC-16	Analytical Methods in Chemistry (T)	4	100

Sub Total = 80

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Course Structure

Chemistry

(B) Minor Courses to be offered by the Department for students of other Departments of Science

Sl. No.	Sem	Type of Course	Name of Course	Credits	Marks
1.	I	MIC-1 (T)	Inorganic Chemistry : Atomic Structure & Chemical Bonding. Organic Chemistry : Fundamentals of Organic Chemistry, stereochemistry & aliphatic hydrocarbons.	2	100
		MIC-1 (P)	Inorganic Chemistry Lab : Volumetric analysis Organic Chemistry Lab : Detection, Purification & Separation of Organic Compounds.	1	100
2.	II	MIC-2 (T)	Physical Chemistry : States of Matter & Ionic Equilibrium	2	100
		MIC-2 (P)	Physical Chemistry Lab : Determination of S.T. Viscosity & Molecular weight.	1	100
3.	III	MIC-3	Organic Chemistry I: Basics and Hydrocarbons	3	100
4.	IV	MIC-4	Physical Chemistry II: Chemical Thermodynamics and its Applications	3	100
5.	V	MIC-5	Inorganic Chemistry II: s- and pBlock Elements	3	100
6.	V	MIC-6	Organic Chemistry II: Oxygen Containing Functional Groups	3	100
7.	VI	MIC-7	Physical Chemistry III: Phase Equilibria and Electrochemical Cells	3	100
8.	VI	MIC-8	Inorganic Chemistry III: Coordination Chemistry	3	100
9.	VII	MIC-9	Organic Chemistry III: Heterocyclic Chemistry	4	100
10.	VIII	MIC-10	Physical Chemistry IV: Conductance & Chemical Kinetics	4	100

Sub Total = 32

Note: The Department may reduce the syllabus of the Minor Courses as per the credit distribution. The Department concerned may also decide practical courses.

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Chemistry
SEMESTER – I
MJC-1(T) : Inorganic Chemistry: Atomic Structure, Chemical Bonding and fundamentals of organic Chemistry

Course Objective

The Objective of CBCS based four year undergraduate Programme (FYUGP) in Chemistry Hons for Semester I & II, Specially for Major & Minor course is to provide the clear conception and understanding about theory and practical course mentioned in the syllabus.

Course Outcomes

After the completion of the course, the students will be able to understand the following:
: the model of an atom including the related various principles.
: the principles of bonding as well as shapes and structure of covalent molecules.
: Intial step of research in Organic Chemistry viz-Detectionl, Seperation and Purfication of Organic Compounds.

MJC-1(T)

(Theory: 4 credits)

Inorganic Chemistry : Atomic Structure and Chemical Bonding		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Atomic Structure :** Bohr's Theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrodinger's wave equation, significance of wave function. Quantum Numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams. Pauli's Exclusions Principle, Hund's Rule of maximum multiplicity, Aufbau's principle and its limitations, Variations of orbital energy with atomic number.	10
2	**Chemical Bonding:** (i) Ionic bond: General characteristics, types of ions size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy. Madelung constant, Born-Haber cycle and its application, Solvation energy. (ii) Covalent bond: Lewis structure, Valence Bond Theory (Heitler-London approach). Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Bent's rule, Resonance and resonance energy, Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2,C_2, B_2, F_2 & CO, NO and their ions; hydrogen chloride, berrylium fluoride, carbon dioxide, (idea of s-p mixing and orbital interaction to be given). Formal charge, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, multiple bonding (sigma and pi bond approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polaizability. Fajan's rule and consequences of polarization. Ionic character in covalent compounds: Bond moment, dipole moment and electronegativity difference. (iii) Metallic bond: Qualitative idea of valence bond and band theories. Semiconductors and insulators, defects in solids. (iv) Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen Bonding (theories of hydrogen bonding, valence bond treatment) Effects of chemical force, melting and boiling points, solubility energetics of dissolution process.	10

Organic Chemistry:-Fundamentals, Sterochemistry and hydrocarbons.		
3	**Fundamentals of Organic Chemistry:** Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules, Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.	05
4	**Stereochemistry** Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; *cis - trans* nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).	05
5	**Aliphatic Hydrocarbons** Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. **Alkanes:** (Upto 5 Carbons). *Preparation:* Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation. **Alkenes:** (Upto 5 Carbons) *Preparation:* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). *Reactions:* cis-addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation. **Alkynes**: (Upto 5 Carbons) *Preparation:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. *Reactions:* formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alk. $KMnO_4$.	10
	TOTAL	40

Suggested Readings :

1. Advanced Inorganic Chemistry, F.A. Cotton, G. Wilkinson.
2. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science, 2001.
3. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.I. Keiter, Pearson Education Asia, 2000.
4. Inorganic Chemistry, ELBS 2nd Edition, D.F. Shriver, P.W. Atkins and C.H. Langford. Oxford University Press 2002.
5. Principles of Inorganic Chemistry. B.R. Puri, L.R. Sharma, Jauhar S.P., S.N. Chand & Co.
6. Inorganic Chemistry, 3rd Edition (ISE) A.G. Sharpe Addison Wesley.
7. Organic Chemisry - Graham Solomons
8. Sterochemistry – Conformation and Mechanism : P.S Kalsi
9. Organic Chemistry - Morrison & Boyd

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MJC -1 (P) : 2 Credits

Inorganic and Organic Chemistry Practical

Course Outcomes

After finishing this Practical Course, Studens will be skilled in-

1. Understanding and preparing solution of different strengths.
2. Calculating the neutral point in different titrations.
3. Initial research steps involved in Organic Chemistry.

Practical- 1. Inorganic Chemisry Practical

a. Acidimetry and Alkalimetry
b. Preparation and dilution of standard solutions.
c. Permangnatometry / dichromatry
d. Iodometry / iodimetry

Practical- 2.Organic Chemistry Practical

Detection of elements, separation and purification of Organic Compounds and Hydrolysis of ester.

Suggested Readings :

1. Practical inorganic chemistry : Shikha Gulati and J. L . Sharma
2. Practical Chemistry : Dr O .P. Pandey , D.N. Bajpayi & Giri.
3. Quantitative Chemical analaysis: A.I. Vogel, Prentice Hall Publication.
4. Text book of practical Organic Chemistry: A.I. Vogal, Prentice Hall Publication.
5. Practical Organic Chemistry, F.G. Mann & B.C. Saunders,Orient long man.

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Chemistry

SEMESTER – II

MJC-2(T) : Physical Chemistry: States of matter and Ionic Equilibrium

Course Outcomes

After the completion of this course, the student will have sound knowledge and understanding about:

: The mathematical expressions for different Properties of gas, liquid and solid and understand their physical significance.

: The Crystal structure, and may calculate related properties of different crystal systems.

: The concept of ionization of electrolytes with emphasis on weak acid and base and hydrolysis of salt.

: The concepts of pH, pK_a, pK_b, pK_w Buffer Solutions, Solubility Product etc. and their applications in day to daylife.

MJC-2(T)

(Theory: 4 credits)

Physical Chemistry : States of matter and Ionic Equilibrium		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Gaseous state:** Kinetic molecular model of a gas postulates and concept of an Ideal gas, Derivation of the kinetic gas equation and various gas laws; Maxwell's Distribution of Molecular velocities and its use in evaluating different types of molecular velocities – Most Probable Velocity, Average (Mean) Velocity, Root Mean Square (RMS) Velocity, and Average kinetic energy; Relationship between various molecular velocities; Law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Viscosity of gases, co-efficient of viscosity and its dependence on temperature and pressure; Collision frequency, Collision diameter and Mean free path; Relationship between mean free path (λ) and co-efficient of viscosity (η), Calculation of collision diameter (σ) from co-efficient of viscosity (η). Behaviour of real gases: Deviations form ideal gas behavior, compressibility factor Z, and its variation with pressure for different gases; Causes of deviation from ideal behaviour. Equation of states for real gases; Van der Waals equation of state, its derivation and application in explaining real gas behaviour, Virial coefficients, calculation of Boyle temperature; Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state & critical constants, relation between critical constants and van der Waals constants, law of corresponding states.	12
2	**Liquid state:** Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases.	08
3	**Solid state:** Nature of the solid state, law of constancy of interfacial angles, law of rational indices, miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravaislattices;x-ray diffraction, Bragg'slaw, a simple account of rotating crystal method and powder pattern method; Analysis of powder diffraction patterns of NaCl, CsCl and KCl.	08

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4	**Ionic equilibria**: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases,dissociation constants of mono and diprotic acids; pH and pOH, pH scale; common ion effect; Salt hydrolysis, calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Bufffer solutions; derivation of Henderson equation and its applications; Solubility product of sparingly soluble salts, applications of solubility product principle; Qualitative treatment of acid- base titration curves (calculation of pH at various stages). Theory of acid-base indicators; selection of indicators and their limitations.	12
	TOTAL	40

Suggested Readings :

1. Atkins, P.W.; Paula, J.de.; Atkin's Physical Chemistry; Oxford UniversityPress.
2. Ball, D.W.; Physical Chemistry; Cengage Learning,India.
3. Castellan, G.W; Physical Chemistry;Narosa.
4. Kapoor, K.L.; A Textbook of Physical Chemistry, Vol 1, 6Th Edition; McGraw Hill Education.
5. Puri, Sharma, Pathania; Principles of Physical Chemistry; Vishal PublishingCo.
6. Pahari, S.; Physical Chemistry Vol I & II; New Central Book Agency (P)Ltd.
7. Moore, W.J.; Physical Chemistry, 5th Edition, Longmans Green & Co.Ltd.
8. Glasstone, S.; Textbook of Physical Chemistry; D. Van Nostrand company, New York.

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MJC-2(P): Physical Chemistry Lab

Course Outcomes

When the students will finish this practical course , they will be skilled in :-

:determination of coefficient of viscosity of various types of solutions and also in the determination of the surface tension of the various type of liquids.

:molecular weight determination by victor mayer method.

: preparation of buffer solution, pH determination of various types of buffer solutions.

MJC-2(P) :Physical Chemistry **(Practical: 2 credits)**
Practical : **Surface tension measurements using Stalagmometer** Determine the surface tension of aqueous solutions by (a) drop number, (b) drop weight method. **Viscosity measurementusing Ostwald's viscometer.** 1. Determination of co-efficient of viscosity of an unknown aqueous solution. 2. Study of variation of viscosity with different concentration of sugar solutions. **Molecular weight of a volatile compound** Determination of molecular weight of a volatile compound using Victor Meyer's method. **pH- metry:** 1. Study the effect of addition of HCl/ NaOH on pH to the solutions of acetic acid, sodium acetate and their mixtures. 2. Preparation of buffer solutions of different pH values (a) Sodium acetate- acetic acid (b) Ammonium chloride-ammonium hydroxide 3. pH metric titration of (a) strong acid with strong base, (b) weak acid with strong base and determination of dissociation constant of a weak acid.

Suggested Readings :

1. Khosla, B.D.; Garg, V.C. & Gulati, A.; Senior Practical Physical Chemistry; R. Chand & Co, NewDelhi.
2. Garland, C.W.; Nibler, J.W.; Shoemaker, D.P.; Experiments in physicalChemistry, 8th Edition, McGraw-Hill, New York.
3. Yadav, J. B.; Advanced Practical Physical Chemistry, 32nd Ed; Goel Publishing House.

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SEMESTER – I

MIC-1 (T) : Inorganic Chemistry Atomic Structure and Chemical Bonding and Fundamentals of organic Chemistry

Course Objective

The Objective of CBCS based four year undergraduate Programme (FYUGP) in Chemistry Hons for Semester I & II, Specially for Major & Minor course is to provide the clear conception and understanding about theory and practical course mentioned in the syllabus.

MIC-1 (T) : Inorganic Chemistry Atomic Structure and Chemical Bonding (Theory: 2 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Atomic Structure:** *Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.* Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (m_s). Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configuration, Hund's, Pauli's and Aufbau's principle.	06
2	**Chemical Bonding and Molecular Structure** *Ionic Bonding:* General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character. *Covalent bonding:* VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds.	06
	***Section B: Organic Chemistry-1* (30 Periods)**	
3	**Fundamentals of Organic Chemistry** Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.	04
4	**Stereochemistry** Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; *cis - trans* nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).	04
	TOTAL	20

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Suggested Readings :

1. Advanced Inorganic Chemistry, F.A. Cotton, G. Wilkinson.
2. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science, 2001.
3. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.I. Keiter, Pearson Education Asia, 2000.
4. Inorganic Chemistry, ELBS 2nd Edition, D.F. Shriver, P.W. Atkins and C.H. Langford. Oxford University Press 2002.
5. Principles of Inorganic Chemistry. B.R. Puri, L.R. Sharma, Jauhar S.P., S.N. Chand & Co.
6. Inorganic Chemistry, 3rd Edition (ISE) A.G. Sharpe Addison Wesley.

Reference Books:

7. □ J. D. Lee: *A new Concise Inorganic Chemistry*, E L. B. S.
8. □ F. A. Cotton & G. Wilkinson: *Basic Inorganic Chemistry*, John Wiley.
9. □ Douglas, McDaniel and Alexader: *Concepts and Models in Inorganic Chemistry*,
10. John Wiley.
11. □ James E. Huheey, *Ellen Keiter and Richard Keiter: Inorganic Chemistry: Principles*
12. *of Structure and Reactivity*, Pearson Publication.
13. □ T. W. Graham Solomon: *Organic Chemistry, John Wiley and Sons.*
14. □ Peter Sykes: *A Guide Book to Mechanism in Organic Chemistry,* Orient Longman.
15. □ E. L. Eliel: *Stereochemistry of Carbon Compounds*, Tata McGraw Hill.
16. □ I. L. Finar: *Organic Chemistry* (Vol. I & II), E. L. B. S.
17. □ R. T. Morrison & R. N. Boyd: *Organic Chemistry*, Prentice Hall.
18. □ Arun Bahl and B. S. Bahl: *Advanced Organic Chemistry,* S. Chand

MIC-1(P): Inorganic and Organic Chemistry Lab

(Practical : 1 Credit)

Practical- 1. Inorganic Chemisry Practical

a. Preparation and standardization of solutions.
b. Permangnatometry / dichromatry.
c. Acidimetry / Alkalimetry.

Practical- 2. Organic Chemisry Practical

Organic Practical : Detection of elements, separation and purification of Organic Compounds.

Suggested Readings :

1. Practical inorganic chemistry : Shikha Gulati and J. L . Sharma
2. Practical Chemistry : Dr O .P. Pandey , D.N. Bajpayi& ,Giri.
3. Quantitative Chemical analaysis: A.I. Vogel, Prentice Hall Publication.
4. Text book of practical Organic Chemistry: A.I. Vogal, Prentice Hall Publication.
5. Practical Organic Chemistry, F.G. Mann & B.C. Saunders,Orient long man.

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SEMESTER – II

MIC-2 (T) : Inorganic Chemistry Atomic Structure, Chemical Bonding and Fundamental of organic Chemistry

Course Objective

The Objective of CBCS based four year undergraduate Programme (FYUGP) in Chemistry Hons for Semester I & II, Specially for Major & Minor course is to provide the clear conception and understanding about theory and practical course mentioned in the syllabus.

MIC-2 : Inorganic Chemistry I Atomic Structure and Chemical Bonding

(Theory: 2 credits)

Unit	Topics to be covered	No. of Lectures
1	**Atomic Structure:** What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ_2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wavefunctions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals.	04
2	**Chemical Bonding and Molecular Structure** MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1^{st} and 2^{nd} periods (including idea of *s-p* mixing) and heteronuclear diatomic molecules such as CO, NO and NO^+. Comparison of VB and MO approaches.	04
	Organic Chemistry	
3	**Aliphatic Hydrocarbons** Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. **Alkanes:** (Upto 5 Carbons). *Preparation:* Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation. **Alkenes:** (Upto 5 Carbons) *Preparation-* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). *Reactions:* cis-addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymercuration-demercuration, Hydroboration-oxidation. **Alkynes**: (Upto 5 Carbons) *Preparation:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. *Reactions:* formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alk. $KMnO_4$	06

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4	**Gaseous state:** Kinetic molecular model of a gas postulates and concept of an Ideal gas, Derivation of the kinetic gas equation and various gas laws; Maxwell's Distribution of Molecular velocities and its use in evaluating different types of molecular velocities – Most Probable Velocity, Average (Mean) Velocity, Root Mean Square (RMS) Velocity, and Average kinetic energy; Relationship between various molecular velocities; Law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Viscosity of gases, co-efficient of viscosity and its dependence on temperature and pressure; Collision frequency, Collision diameter and Mean free path; Relationship between mean free path (λ) and co-efficient of viscosity (η), Calculation of collision diameter (σ) from co-efficient of viscosity (η). Behaviour of real gases: Deviations form ideal gas behavior, compressibility factor Z, and its variation with pressure for different gases; Causes of deviation from ideal behaviour. Equation of states for real gases; Van der Waals equation of state, its derivation and application in explaining real gas behaviour, Virial coefficients, calculation of Boyle temperature; Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state & critical constants, relation between critical constants and van der Waals constants, law of corresponding states.	06
	TOTAL	20

Suggested Readings :

1. Advanced Inorganic Chemistry, F.A. Cotton, G. Wilkinson.
2. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science, 2001.
3. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.I. Keiter, Pearson Education Asia, 2000.
4. Inorganic Chemistry, ELBS 2nd Edition, D.F. Shriver, P.W. Atkins and C.H. Langford. Oxford University Press 2002.
5. Principles of Inorganic Chemistry. B.R. Puri, L.R. Sharma, Jauhar S.P., S.N. Chand & Co.
6. Inorganic Chemistry, 3rd Edition (ISE) A.G. Sharpe Addison Wesley.

Reference Books:

7. □ J. D. Lee: *A new Concise Inorganic Chemistry*, E L. B. S.
8. □ F. A. Cotton & G. Wilkinson: *Basic Inorganic Chemistry*, John Wiley.
9. □ Douglas, McDaniel and Alexader: *Concepts and Models in Inorganic Chemistry*,
10. John Wiley.
11. □ James E. Huheey, *Ellen Keiter and Richard Keiter: Inorganic Chemistry: Principles*
12. *of Structure and Reactivity*, Pearson Publication.
13. □ T. W. Graham Solomon: *Organic Chemistry, John Wiley and Sons.*
14. □ Peter Sykes: *A Guide Book to Mechanism in Organic Chemistry,* Orient Longman.
15. □ E. L. Eliel: *Stereochemistry of Carbon Compounds*, Tata McGraw Hill.
16. □ I. L. Finar: *Organic Chemistry* (Vol. I & II), E. L. B. S.
17. □ R. T. Morrison & R. N. Boyd: *Organic Chemistry*, Prentice Hall.
18. □ Arun Bahl and B. S. Bahl: *Advanced Organic Chemistry,* S. Chand

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MIC-2(P): Physical Chemistry Lab.

When the students will finish this practical course , they will be skilled in:-

- **: determination of coefficient of viscosity of various types of liquids and also in the determination of the surface tension of the various types of liquids.**
- **: molecular weight determination by victor Meyer Method.**
- **: pH dermination of various types of buffer solutions.**

MIC-2(P) :Physical Chemistry Lab.

(Practical: 1 credit)

Practical :

Surface tension measurements using Stalagmometer

Determine the surface tension of aqueous solutions by (a) drop number, (b) drop weight method.

Viscosity measurement using Ostwald's viscometer.

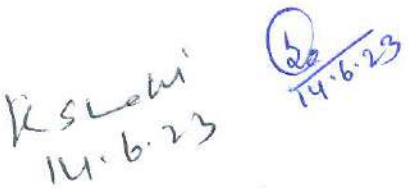
1. Determination of co-efficient of viscosity of an unknown aqueous solution.
2. Study of variation of viscosity with different concentration of sugar solutions.

Molecular weight of a volatile compound

Determination of molecular weight of a volatile compound using Victor Meyer's method.

Suggested Readings :

1. Khosla, B.D.; Garg, V.C. & Gulati, A.; Senior Practical Physical Chemistry; R. Chand & Co, NewDelhi.
2. Garland, C.W.; Nibler, J.W.; Shoemaker, D.P.; Experiments in physicalChemistry, 8th Edition, McGraw-Hill, New York.
3. Yadav, J. B.; Advanced Practical Physical Chemistry, 32nd Ed; Goel Publishing House.



SEMESTER – I

MDC-1 (T) : Inorganic Chemistry Atomic Structure and Chemical Bonding and Fundamentals of organic Chemistry

Course Objective

The Objective of CBCS based four year undergraduate Programme (FYUGP) in Chemistry Hons for Semester I & II, Specially for Major & Minor course is to provide the clear conception and understanding about theory and practical course mentioned in the syllabus.

MDC-1 (T) : Inorganic Chemistry Atomic Structure and Chemical Bonding (Theory: 2 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Atomic Structure:** *Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.* Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (m_s). Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configuration, Hund's, Pauli's and Aufbau's principle.	06
2	**Chemical Bonding and Molecular Structure** *Ionic Bonding:* General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character. *Covalent bonding:* VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds.	06
	Section B: Organic Chemistry-1	
3	**Fundamentals of Organic Chemistry** Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.	04
4	**Stereochemistry** Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; *cis - trans* nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).	04
	TOTAL	20

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Suggested Readings :

19. Advanced Inorganic Chemistry, F.A. Cotton, G. Wilkinson.
20. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science, 2001.
21. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.I. Keiter, Pearson Education Asia, 2000.
22. Inorganic Chemistry, ELBS 2nd Edition, D.F. Shriver, P.W. Atkins and C.H. Langford. Oxford University Press 2002.
23. Principles of Inorganic Chemistry. B.R. Puri, L.R. Sharma, Jauhar S.P., S.N. Chand & Co.
24. Inorganic Chemistry, 3rd Edition (ISE) A.G. Sharpe Addison Wesley.

Reference Books:

25. □ J. D. Lee: *A new Concise Inorganic Chemistry*, E L. B. S.
26. □ F. A. Cotton & G. Wilkinson: *Basic Inorganic Chemistry*, John Wiley.
27. □ Douglas, McDaniel and Alexader: *Concepts and Models in Inorganic Chemistry*,
28. John Wiley.
29. □ James E. Huheey, *Ellen Keiter and Richard Keiter: Inorganic Chemistry: Principles*
30. *of Structure and Reactivity*, Pearson Publication.
31. □ T. W. Graham Solomon: *Organic Chemistry, John Wiley and Sons.*
32. □ Peter Sykes: *A Guide Book to Mechanism in Organic Chemistry,* Orient Longman.
33. □ E. L. Eliel: *Stereochemistry of Carbon Compounds*, Tata McGraw Hill.
34. □ I. L. Finar: *Organic Chemistry* (Vol. I & II), E. L. B. S.
35. □ R. T. Morrison & R. N. Boyd: *Organic Chemistry*, Prentice Hall.
36. □ Arun Bahl and B. S. Bahl: *Advanced Organic Chemistry,* S. Chand

MDC-1(P): Inorganic and Organic Chemistry Lab

(Practical : 1 Credit)

Practical- 1. Inorganic Chemisry Practical

b. Preparation and standardization of solutions.
d. Permangnatometry / dichromatry.
e. Acidimetry / Alkalimetry.

Practical- 2. Organic Chemisry Practical

Organic Practical : Detection of elements, separation and purification of Organic Compounds.

Suggested Readings :

6. Practical inorganic chemistry : Shikha Gulati and J. L . Sharma
7. Practical Chemistry : Dr O .P. Pandey , D.N. Bajpayi& ,Giri.
8. Quantitative Chemical analaysis: A.I. Vogel, Prentice Hall Publication.
9. Text book of practical Organic Chemistry: A.I. Vogal, Prentice Hall Publication.
10. Practical Organic Chemistry, F.G. Mann & B.C. Saunders,Orient long man.

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SEMESTER – II

MDC-2 (T) : Inorganic Chemistry: Atomic Structure, Chemical Bonding and Fundamental of organic Chemistry

Course Objective

The Objective of CBCS based four year undergraduate Programme (FYUGP) in Chemistry Hons for Semester I & II, Specially for Major & Minor course is to provide the clear conception and understanding about theory and practical course mentioned in the syllabus.

MDC-2 : Inorganic Chemistry I Atomic Structure and Chemical Bonding

(Theory: 2 credits)

Unit	Topics to be covered	No. of Lectures
1	**Atomic Structure:** What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ_2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wavefunctions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals.	04
2	**Chemical Bonding and Molecular Structure** MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1^{st} and 2^{nd} periods (including idea of *s-p* mixing) and heteronuclear diatomic molecules such as CO, NO and NO^+. Comparison of VB and MO approaches.	04
	Organic Chemistry	
3	**Aliphatic Hydrocarbons** Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. **Alkanes:** (Upto 5 Carbons). *Preparation:* Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation. **Alkenes:** (Upto 5 Carbons) *Preparation-* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). *Reactions:* cis-addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymercuration-demercuration, Hydroboration-oxidation. **Alkynes**: (Upto 5 Carbons) *Preparation:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. *Reactions:* formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alk. $KMnO_4$.	06

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4	**Gaseous state:** Kinetic molecular model of a gas postulates and concept of an Ideal gas, Derivation of the kinetic gas equation and various gas laws; Maxwell's Distribution of Molecular velocities and its use in evaluating different types of molecular velocities – Most Probable Velocity, Average (Mean) Velocity, Root Mean Square (RMS) Velocity, and Average kinetic energy; Relationship between various molecular velocities; Law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Viscosity of gases, co-efficient of viscosity and its dependence on temperature and pressure; Collision frequency, Collision diameter and Mean free path; Relationship between mean free path (λ) and co-efficient of viscosity (η), Calculation of collision diameter (σ) from co-efficient of viscosity (η). Behaviour of real gases: Deviations form ideal gas behavior, compressibility factor Z, and its variation with pressure for different gases; Causes of deviation from ideal behaviour. Equation of states for real gases; Van der Waals equation of state, its derivation and application in explaining real gas behaviour, Virial coefficients, calculation of Boyle temperature; Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state & critical constants, relation between critical constants and van der Waals constants, law of corresponding states.	06
	TOTAL	20

Suggested Readings :

19. Advanced Inorganic Chemistry, F.A. Cotton, G. Wilkinson.
20. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science, 2001.
21. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.I. Keiter, Pearson Education Asia, 2000.
22. Inorganic Chemistry, ELBS 2nd Edition, D.F. Shriver, P.W. Atkins and C.H. Langford. Oxford University Press 2002.
23. Principles of Inorganic Chemistry. B.R. Puri, L.R. Sharma, Jauhar S.P., S.N. Chand & Co.
24. Inorganic Chemistry, 3rd Edition (ISE) A.G. Sharpe Addison Wesley.

Reference Books:

25. J. D. Lee: *A new Concise Inorganic Chemistry*, E L. B. S.
26. F. A. Cotton & G. Wilkinson: *Basic Inorganic Chemistry*, John Wiley.
27. Douglas, McDaniel and Alexader: *Concepts and Models in Inorganic Chemistry*,
28. John Wiley.
29. James E. Huheey, *Ellen Keiter and Richard Keiter: Inorganic Chemistry: Principles*
30. *of Structure and Reactivity*, Pearson Publication.
31. T. W. Graham Solomon: *Organic Chemistry, John Wiley and Sons.*
32. Peter Sykes: *A Guide Book to Mechanism in Organic Chemistry,* Orient Longman.
33. E. L. Eliel: *Stereochemistry of Carbon Compounds*, Tata McGraw Hill.
34. I. L. Finar: *Organic Chemistry* (Vol. I & II), E. L. B. S.
35. R. T. Morrison & R. N. Boyd: *Organic Chemistry*, Prentice Hall.
36. Arun Bahl and B. S. Bahl: *Advanced Organic Chemistry,* S. Chand

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MDC-2(P): Physical Chemistry Lab.

When the students will finish this practical course , they will be skilled in:-

- **: determination of coefficient of viscosity of various types of liquids and also in the determination of the surface tension of the various types of liquids.**
- **: molecular weight determination by victor Meyer Method.**
- **: pH dermination of various types of buffer solutions.**

MDC-2(P) :Physical Chemistry Lab.

(Practical: 1 credit)

Practical :

Surface tension measurements using Stalagmometer

Determine the surface tension of aqueous solutions by (a) drop number, (b) drop weight method.

Viscosity measurement using Ostwald's viscometer.

3. Determination of co-efficient of viscosity of an unknown aqueous solution.
4. Study of variation of viscosity with different concentration of sugar solutions.

Molecular weight of a volatile compound

Determination of molecular weight of a volatile compound using Victor Meyer's method.

Suggested Readings :

4. Khosla, B.D.; Garg, V.C. & Gulati, A.; Senior Practical Physical Chemistry; R. Chand & Co, NewDelhi.
5. Garland, C.W.; Nibler, J.W.; Shoemaker, D.P.; Experiments in physicalChemistry, 8th Edition, McGraw-Hill, New York.
6. Yadav, J. B.; Advanced Practical Physical Chemistry, 32nd Ed; Goel Publishing House.

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CHEMISTRY

The Question paper pattern of B.SC for 1st and 2nd Semester of 4 Year Course under CBCS.

The question papers ESE shall be set as per following pattern:-

Semester-I

Course	CIA	ESE	Total Marks
MJC-1 (T)	30	70	100
MJC-1 (P)	30	70	100
MIC-1 (T)	30	70	100
MIC-1 (P)	30	70	100
MDC-1 (T)	30	70	100
MDC-1 (P)	30	70	100
Semester-II			
MJC-2 (T)	30	70	100
MJC-2 (P)	30	70	100
MIC-2 (T)	30	70	100
MIC-2 (P)	30	70	100
MDC-2 (T)	30	70	100
MDC-2 (P)	30	70	100

The marks distribution for ESE of theory paper carrying 70 marks will consist of three parts :-

Part –(A) – Compulsory- consisting of Ten objective / multiple choice questions each carrying two marks.

(10x2=20 marks)

Part –(B) – Short answer type- Four questions to be answered out of six questions carrying five marks each.

(04x05=20 marks)

Part –(B) – Long answer type- Three questions to be answered out of five questions carrying ten marks each.

(03x10=30 marks)

Total = 70 Marks

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Proposed Course Structure for 4 Year Undergraduate Programme under CBCS System

Skill Enhancement Course (SEC)

Semester – I (SEC- 1)

Science	Social Science/Arts	Commerce
• Advance Spreadsheet Tools • Basic IT Tolls • Creative Writing • Communication in Everyday life	• Advance Spreadsheet Tools • Public Speaking in English Language & Leadership • Creative Writing • Communication in Everyday life	• Advance Spreadsheet Tools • Digital Marketing • Creative Writing • Communication in Everyday life

Semester – II (SEC- 2)

Science	Social Science/Arts	Commerce
• Big Data Analysis • Beginners Course to Calligraphy • Introduction to Cloud Computing (AWS) • Personality Development & Communication	• Big Data Analysis • Beginners Course to Calligraphy • Personality Development & Communication • पटकथा लेखन	• Big Data Analysis • Beginners Course to Calligraphy • Business Communication • Personality Development & Communication

Semester – III (SEC- 3)

Science	Social Science/Arts	Commerce
• Prospecting E-waste for sustainability • Visual Communication & Photography • Graphic Design & Animation • Statistical Software Package • Communication in Professional Life	• Personal Financial Planning • Visual Communication & Photography • Statistical Software Package • Communication in Professional Life • रचानात्मक लेखन • रंगमंच	• Prospecting E-waste for sustainability • Sustainable Ecotourism & Entrepreneurship • Visual Communication & Photography • Statistical Software Package • Communication in Professional Life

LIST OF SKILL ENHANCEMENT COURSES (SEC)

SL. NO.	Course Title	LTP Distribution of the Course			Total Credits:	Total Marks = 100
		L	T	P		
1	Advance Spreadsheet Tools	1	0	3	3	End -Term Appraisal : 70 Marks Internal Assessment: 30 Marks
2	Basic IT Tolls	1	0	3	3	
3	Beginners Course to Calligraphy	1	0	3	3	
4	Big Data Analysis	1	0	3	3	
5	Business Communication	1	0	3	3	
6	Communication in Everyday life	1	0	3	3	
7	Communication in Professional Life	1	0	3	3	
8	Creative Writing	1	0	3	3	
9	Digital Marketing	1	0	3	3	
10	Graphic Design & Animation	1	0	3	3	
11	Introduction to Cloud Computing (AWS)	1	0	3	3	
12	Personal Financial Planning	1	0	3	3	
13	Personality Development & Communication	1	0	3	3	
14	Prospecting E-waste for sustainability	1	0	3	3	
15	Public Speaking in English Language & Leadership	1	0	3	3	
16	Statistical Software Package	1	0	3	3	
17	Sustainable Ecotourism & Entrepreneurship	1	0	3	3	
18	Visual Communication & Photography	1	0	3	3	
19	पटकथा लेखन	1	0	3	3	
20	रंगमंच	1	0	3	3	
21	रचानात्मक लेखन	1	0	3	3	

Skill Enhancement Course (SEC)

- ***Course Title - Advance Spreadsheet Tools***

Learning Objectives

The Learning Objectives of this course are as follows:

- To enable the students to use Excel for advanced data analysis
- To equip the students to with automation skills on excel
- To enable the students to use excel for informed decision making.

Learning outcomes

The Learning Outcomes of this course are as follows:

- By studying this course, students will be able to make meaningful representations of data in the form of charts and pivot tables.
- By studying this course, students will be able to draw analysis on data using spreadsheets and use interpretation to make decisions.
- By studying this course, students will be able to generate word documents with appropriate formatting, layout, proofing.
- By studying this course, students will be able to manage data for generating queries, forms and reports in a database.

SYLLABUS

Unit 1: Excel Advanced Techniques

Templates, Efficiency, and Risk (Standard Deviation, Variance, and Coefficient of Variation), Data Validation; *Functions and Power functions, Array Formulae (Frequency Distribution, mode.mult, mode.sngl), Tables, Advanced Range Names, What-if-analysis: Goal-seek, Data tables, and Scenario Manager; Data analysis ToolPak: Descriptive Statistics, Moving averages, Histogram, Covariance, correlation, and Regression analysis (only for projection); solver add in. Problem Solving using Solver (optimal product mix, workforce scheduling, transportation, capital budgeting, financial planning), Integrating excel with other tools: MS word, outlook, PowerPoint, Access, Power BI.

Unit 2: Excel Interactivity and Automation

Index and Match, Offset, Dynamic Charting, Database functions, Text functions, and Error functions: IfError, IsError, Aggregate, Circular Reference, Formula Auditing, Floating-Point Errors, Form Controls (Button, Combo, Check box, Spinner, List, Option), Visual Basic (only basic). Recording Macros, Absolute and relative macros, editing macros, Use of spinner buttons and command buttons; Sub Procedure, Function Procedure (creating New Functions); Working with Loops: Do_while loop, For_Next loop; Creating User Forms: Message Box, Input Box; If_Then_Else.

Unit 3: Introduction to VBA

Conditional Formatting, Charts that Inspire (Waterfall, Column, Line, Combo, Thermometer, Scatter, Histogram) Sheers, Sparklines, Graphics Tricks and Techniques, Worksheet Automation using Macros: Absolute and relative macros, editing macros, Creating new functions using macros, Use of spinner buttons and command buttons.

Unit 4: Data Analysis and Decision-Making

Working with External Data, Advanced Uses of PivotTables, PowerPivot, Reporting with PowerPivot, Power query, Dashboard, Creating a spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll Accounting; Capital Budgeting (NPV & IRR), Portfolio Management, Breakeven analysis, and Sensitivity analysis; Operations Management: Constraint, Forecasting & Trend Analysis optimization, Assignment Problems; Depreciation Accounting (Single Method); Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression Analysis

Essential/recommended readings

- Excel 2016 Power Programming with VBA, Michael Alexander, Dick Kusleika, Wiley.
- Financial Analysis and Modelling Using Excel and VBA, Chandan Sengupta, Second Edition, Wiley Student Edition.
- MS Excel 2016, Data Analysis & Business Modelling, Wayne Winston, PHI.

Suggestive readings

- Microsoft Excel 2016 - Data Analysis and Business Modelling Paperback - 1 May
- 2017 Wayne L. Winston, Microsoft Press.
- Microsoft Excel Practical Formulae: From Basic Data Analysis to Advanced
- Formulae
- Manipulation Diane Griffiths.

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- ***Course Title – Basic IT Tools***

Learning Objectives

The Learning Objectives of this course are as follows:

- To enable students develop IT skills that are a pre-requisite in today's work environment.
- To equip them with basic computing skills that will enhance their employability in general.
- To enable the student to analyse and present information in a meaningful manner.

Learning outcomes

The Learning Outcomes of this course are as follows:

- By studying this course, students will be able to use word-processor to generate documents with appropriate formatting, layout, review and referencing.
- By studying this course, students will be able to manage data in worksheets and workbooks and analyze it using spreadsheet functions and inbuilt formulas.
- By studying this course, students will be able to draw analysis on data using spreadsheets to make decisions.
- By studying this course, students will be able to make meaningful representations of data in the form of charts and pivot tables.
- By studying this course, students will be able to manage data in database tables and use the same for generating queries, forms and reports.

SYLLABUS

Course Contents:

Unit 1: Introduction to Spreadsheets

Spreadsheets: Concept of worksheets and workbooks, creating, opening, closing and saving workbooks, moving, copying, inserting, deleting and renaming worksheets, working with multiple worksheets and multiple workbooks, controlling worksheet views, naming cells using name box, name create and name define; Exchanging data using clipboard, object linking and embedding; Printing and Protecting worksheets: Adjusting margins, creating headers and footers, setting page breaks, changing orientation, creating portable documents and printing data and formulae; Implementing file level security and protecting data within the worksheet; Understanding absolute, relative and mixed referencing in formulas, referencing cells in other worksheets and workbooks, correcting common formula errors, working with inbuilt function categories like mathematical, statistical, text, lookup, information, logical, database, date and time and basic financial functions.

Unit 2: Data Analysis in Spreadsheets

Consolidating worksheets and workbooks using formulae and data consolidate command; Choosing a chart type, understanding data points and data series, editing and formatting chart elements, and creating sparkline graphics, Analysing data using pivot tables: Creating, formatting and modifying a pivot table, sorting, filtering and grouping items, creating calculated field and calculated item, creating pivot table charts, producing a report with pivot tables. Introduction to recording and execution of macros.

Unit 3: Word Processing

Introduction: Creating and saving your document, displaying different views, working with styles and character formatting, working with paragraph formatting techniques using indents, tabs, alignment, spacing, bullets and numbering and creating borders; Page setup and sections: Setting page margins, orientation, headers and footers, end notes and foot notes, creating section breaks and page borders; Working with tables: Creating tables, modifying table layout and design, sorting, inserting graphics in a table, table math, converting text to table and vice versa; Create newspaper columns, indexes and table of contents, Spell check your document using inbuilt and custom dictionaries, checking grammar and style , using thesaurus and finding and replacing text; Create bookmarks, captions and cross referencing, adding hyperlinks, adding sources and compiling and bibliography; Mail merge: Creating and editing your main document and data source, sorting and filtering merged documents and using merge instructions like ask, fill-in and if-then-else; Linking and embedding to keep things together.

Unit 4: Databases

Introduction to Database Development: Database Terminology, Objects, Creating Tables, working with fields, understanding Data types, Changing table design, Assigning Field Properties, Setting Primary Keys, using field validation and record validation rules, Indexing, working with multiple tables, Relationships & Integrity Rules, Join Properties, Record manipulation, Sorting & Filtering; Select data with queries: Creating Query by design & by wizard (Select, Make Table, Append, Delete, Cross Tab, Update, Parameterized Query, Find Duplicate and Find Unmatched), Creating multi table queries, creating & working with table joins. Using operators & expressions: Creating simple & advance criteria; Working with forms: Creating Basic forms, working with bound, unbound and calculated controls, understanding property sheet, Working with Data on Forms: Changing Layout, creating Sub Forms, creating list box, combo box and option groups; Working with Reports: Creating Basic Reports, Creating Header & Footer, Placing Controls on reports, sorting & grouping, Creating Sub reports.

Essential/recommended readings

- Swinford, E., Dodge, M., Couch, A., Melton, B. A. (2013). Microsoft Office Professional 2013. United States: O'Reilly Media.
- Wang, W. (2018). Office 2019 For Dummies. United States: Wiley. Microsoft
  Lambert, J. (2019). Microsoft Word 2019 Step by Step. United States: Pearson Education.

Suggestive readings

- Jelen, B. (2013). Excel 2013 Charts and Graphs. United Kingdom: Que.
- Alexander, M., Jelen, B. (2013). Excel 2013 Pivot Table Data Crunching. United Kingdom: Pearson Education.
- Alexander, M., Kusleika, R. (2018). Access 2019 Bible. United Kingdom: Wiley.

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- ***Course Title*** **– Beginners Course to Calligraphy**

Learning Objectives

The Learning Objectives of this course are as follows:

- To teach students the art of Calligraphy.
- To make students better at handwriting and embellish the scripts.
- To help the students communicate with creativity.

Learning outcomes

The Learning Outcomes of this course are as follows:

- Students will be skilled in calligraphy scripts.
- Learning flourishing will help to develop good writing.
- Practice sessions will further a project at the end of semester.
- Will induce skills to set up a business, too.

SYLLABUS

Unit 1: Introduction to Calligraphy

- Definition, History of calligraphy, Calligraphy at the Global level, Types of Calligraphy:Classical Calligraphy & Modern Calligraphy
- Practice Sessions: Introducing students to Calligraphy and its types through images,videos and animations.

Unit 2: Introduction to the Writing tools

- Tool Kit, Different Types of Pens, Different Types of Nibs, Different Types of Brushes, Different Types of Inks
- Practice Sessions: Display of Writing items, Discussion on the usage of different types of pens, nibs and brushes through hands-on activities

Unit 3: Foundation to Calligraphy

- How to write letters?, Majuscules, Miniscules, Numbers, Learning Strokes, Sans SerifB- point, Celtic, Italian Script, Roman Script, Gothic Script
- Practice Sessions: Learning and practicing strokes- Upstroke, Downstroke, Overturn, Underturn, Compound curve, Oval, Ascending loop
- Hands-on activities and Assessment on Sans Serif B-point, Celtic, Italian Script,Roman Script, Gothic Script, Flourishing

Essential/recommended readings

- Suepsuan, P. A. (2021). Start Calligraphy The Right way to write: Learn Calligraphy The Complete Book - Modern Calligraphy Pen For Beginners, Learning Resources Step By Step Number Line, Mastering Modern Calligraphy. Independently published.
- C., & Co., T. P. (2020). Modern Calligraphy Set for Beginners: A Creative Craft Kit for Adults featuring Hand Lettering 101 Book, Brush Pens, Calligraphy Pens, and More. Paige Tate & Co.

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• Course Title – Big Data Analytics

Learning Objectives

The Learning Objectives of this course are as follows:

- To Understand the Big Data Platform and its Uses
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS.
- Provide hands on Hadoop Eco System
- To understand spark framework

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to identify Big Data and its Business Implications.
- After studying this course, students will be able to list the components of Hadoop and Hadoop Eco-System.
- After studying this course, students will be able to access and process data on distributed file system,
- After studying this course, students will be able to manage job execution in Hadoop environment.
- After studying this course, students will be able to develop Big Data Solutions using Hadoop Eco System.

SYLLABUS

Unit 1: Fundamentals of Big Data Analysis

Data Storage and Analysis, Characteristics of Big Data, Big Data Analytics, Typical Analytical Architecture, Requirement for new analytical architecture, Challenges in Big Data Analytics - Need of big data frameworks

Unit 2: Hadoop Framework

Hadoop, Requirement of Hadoop Framework, Design principle of Hadoop -Comparison with other system, Hadoop Components - Hadoop 1 vs Hadoop 2, Hadoop Daemon's - HDFSCommands, Map Reduce Programming: I/O formats, Map side join, Reduce Side Join, Secondary sorting, Pipelining Map Reduce jobs

Unit 3: HDFS (Hadoop Distributed File System)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

Unit 4: Spark Framework and Data Analysis with Spark Shell

Introduction to GPU Computing, CUDA Programming Model, CUDA API, Simple Matrix, Multiplication in CUDA, CUDA Memory Model, Shared Memory Matrix Multiplication, Additional CUDA API Features. Writing Spark Application - Spark Programming in Scala, Python, R, Java - Application Execution.

Practical Exercises

- Downloading and installing Hadoop.
- Understanding different Hadoop modes. Startup scripts, Configuration files.
- Hadoop Implementation of file management tasks, such as Adding files and directories, retrieving files and Deleting files.
- Run a basic word count Map reduce program to understand map reduce paradigm: To count words in a given file, to view the output file, and to calculate the execution time.
- Map Reduce Program to analyse time-temperature statistics and generate report with max/min temperature.
- Implement of Matrix Multiplication with Hadoop Map Reduce.
- Implementation of K-means clustering using Map Reduce.
- To study and implement basic functions and commands in R programming.
- To build Word cloud, a text mining method using R for easy to understand and visualization than a table data.
- To implement clustering program using R programming

Essential/recommended readings

- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
- Mike Frampton, "Mastering Apache Spark", Packt Publishing, 2015.
- Tom White,"Hadoop:TheDefinitiveGuide",O'Reilly,4thEdition,2015.
- Nick Pentreath, Machine Learning with Spark, PacktPublishing,2015.
- Mohammed Guller, Big Data Analytics with Spark, Apress,2015.
- Donald Miner, Adam Shook, "Map Reduce Design Pattern", O'Reilly, 2012

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- ***Course Title*** **– Business Communication**

Learning Objectives

The Learning Objectives of this course are as follows:

- To train students to enhance written as well as oral communication in the corporate world.
- To help students in understanding the principles and techniques of business communication.
- To understand the use of electronic media for communication.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to explain the need for communication in management.
- After studying this course, students will be able to appreciate the need of effective writing for communication.
- After studying this course, students will be able to demonstrate the skill of effective report writing and summarizing annual reports.
- After studying this course, students will be able to analyse business correspondence and e-correspondence.
- After studying this course, students will be able to appreciate oral presentations.

SYLLABUS

Unit 1: Introduction to the essentials of Business Communication
Meaning, process and functions. Need and importance. Medium: verbal & non-verbal communication. Channels: formal & informal. Levels of communication. Direction of communication: downward, upward, lateral, & diagonal. Effective communication: difficulties/barriers and solutions. Interactive and non-interactive techniques of communication. Listening as a tool of communication, Guidelines for effective listening.

Unit 2: Effective Writing
Guidelines for clear writing. References, bibliographical research tools. Citing methods, footnotes, discussion footnotes. Use of library and internet for collection, classification and interpretation of data and information.

Unit 3: Report Writing
Types of reports. Formal report: components and purpose. Organising information: outlining & numbering sections, section headings, sub-headings, & presentation. Writing reports on field work/visits to industries, business concerns. Summarising annual reports of companies: purpose, structure and principles. Drafting minutes.

Unit 4: Business Correspondence and E-Correspondence
Need and importance of business letters. Office memorandum, office circulars, notices and orders. Technology for communication. Effective IT communication tools. Electronic mail: advantages, safety and smartness in email. E-mail etiquettes.

Unit 5: Spoken English and Oral Presentation
Effective negotiation: elements, process and general guidelines. Telephonic conversation. Conducting & facing interviews. Conducting & participating in group decisions. Making presentations: content and organising. Features of a good presentation. Delivering a presentation.

Practical Exercises:

The learners are required to:

- learn how to summarise annual reports of companies.
- prepare presentations using power-point.
- participate in Group discussions and mock interviews.
- smartly draft business emails.

Essential/recommended readings

- C.B.Gupta (2019). Essentials of Business Communication, Sultan Chand & Sons.
- Kaul, A. Effective Business Communication, 2nd ed. PHI learning
- Lesikar, R.V. & Flatley, M.E. (2001). Basic Business Communication Skills for Empowering the Internet Generation, Tata McGraw Hill Publishing Company Ltd. New Delhi.
- Ludlow, R. & Panton, F.(1992). The Essence of Effective Communications, Prentice Hall of India Pvt. Ltd., New Delhi.
- Meyer C,Dev(2021). Communicating for Results,Oxford University Press
- Quintanilla, Kelly M, (2021), Business and Professional Communication, 4e, Sage Textbook
- R. C. Bhatia (2008), Business Communication, Ane Books Pvt Ltd, New Delhi.
- Raman and Singh(2012). Business Communication. Oxford University Press
- Scot, O., Contemporary Business Communication. Biztantra, New Delhi.

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- ***Course Title*** **– Communication in Everyday Life**

Learning Objectives

The Learning Objectives of this course are as follows:

- To lay down a basic foundation for basic communication that is a part of a student'severyday life.
- To inculcate the fundamentals of communication with the aim to enhance listening,speaking and writing skills.
- To hone practical skills that can be used in day-to-day affairs.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to improve mediation skills.
- After studying this course, students will be able to building human relationships.
- After studying this course, students will be able to foster societal understanding
- &develop an independent perspective.
- After studying this course, students will be able to enhance social Communication skills of students.

SYLLABUS

UNIT 1
Theory of Communication

- Meaning, Features, Uses, Cycle, Feedback, Advantages
- Barriers
- 7 C's of Communication

UNIT 2
Listening Skills

- Netiquettes
- Audio-book Listening & Discussions
- Note-taking

UNIT 3
Speaking Skills

- Oral Presentation- Audio-Visual aids, Audience & Feedback, Delivery ofPresentation, Handling Questions
- Group Discussion- Culture & History, Current Affairs, Society-related
- Public Speaking- Public Speech, Extempore
- Interview- Personal, Conversational, Public

UNIT 4
Reading Skills

- Close Reading
- Skimming
- Scanning

UNIT 5
Writing Skills

- Summarising
- Paraphrasing
- Note-making
- Essays- Expository Essay, Descriptive Essay, Narrative Essay
- Letter Writing- Formal Letter, Informal Letter

- Reports- Incidence, Newspaper, Organisational Report
- Analysis & Interpretation- Textual
- Intra & Inter-personal Skills - Monologue, Dialogue

Suggested Readings

- Chaudhary, Shoma. "Understanding Interviews, Billy Elliot is my Story, Only LessHappy". Tehelka: The People's Paper, 18 February 2006.
- Kumar, Dinesh. "Understanding Values, Our Muddled Generation". The Hindu, 26March 2006.
- Learning to Write I, "Free Writing". In Fluency in English II, ed. Varma, Pramodiniand Mukti Sanyal, pp. 1-5, Oxford, New Delhi, 2015.
- Learning to Write II, "Editing". In Fluency in English II, ed. Varma, Pramodini andMukti Sanyal, pp. 25-27, Oxford, New Delhi, 2015.
- Learning to Write III, "What makes Good Writing Good". In Fluency in English II, ed. Varma, Pramodini and Mukti Sanyal, pp. 48-51, Oxford, New Delhi, 2015.

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Course Title – Communication in Professional Life

Learning Objectives

The Learning Objectives of this course are as follows:

- To prepare the students for their upcoming professional fields.
- To inculcate the fundamentals of professional and business communication.
- To learn aspects of global communication.
- To enhance employability skills of the learners by enabling them to write effective resumes and face interviews with confidence

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to improve presentation skills to be learnt by effective use of verbal and non-verbal communication for the professional field.
- After studying this course, students will be able to acquire practical employability skills to be disseminated through focused sessions on practical employable knowledge.
- After studying this course, students will be able to enhance professional communication.
- After studying this course, students will be able to improve persuasion and negotiation skills which will be useful for the professional field.

UNIT 1

- Theory of Business Communication
- Introduction
- What is Business Communication?
- Language of Business Communication
- Cultural Components - Cross-Cultural Communication, Cultural Shock, Stereotyping, Ethnocentrism
- Miscommunication & Effective Communication

UNIT 2
Listening Skills

- Netiquettes
- Audio-book Listening & Discussions
- Note-taking

UNIT 3
Speaking Skills

- Presentation Skills- Oral Presentation, Ppt. Preparation, Ppt. Presentation
- Group Discussion
- Talks- Domain-specific, Ted-Talks, Business Meets, Motivational Talks
- Telephonic Skills
- Persuasion Skills
- Meeting & Negotiation
- Interview- Promotion Interview, Job Interview, Business Interview
- Functions and activities of PR

UNIT 4

Writing Skills

- Summarising & Paraphrasing
- Job-Oriented Skills- CV, Resume & Bio- Data, Job Application Letter
- Documentation
- Advertisements & Invitation
- Letter Writing- Applications, Business Letters
- Report- Analytical Report, Project Report
- Digital Communication in Social Space- Social Media Posts (Twitter, Facebook), Blog Writing, Review Writing
- Advertisement/Invitation/Poster Designing- Canva/MS Word/Coral
- Memo, Office Order, Minutes
- Making Online Academic/Work Profile- LinkedIn

Suggested Readings

- Kaushik, J.C. and K.K. Sinha eds., English for Students of Commerce, OxfordUniversity Press, New Delhi.
- Sethi, Anjana & Bhavana Adhikari, Business Communication, Tata McGraw Hill.
- Anjana Neira Dev, et.al, eds. Business English, Department of English, Universityof Delhi, 2011, Pearson Publications, New Delhi.

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Course Title – Communication in Professional Life

Learning Objectives

The Learning Objectives of this course are as follows:

- To build creative writing skills of students in the main inodes of creative writing vizpoetry, fiction (novel, short stories), non-fiction (life narratives, autobiographies andbiographies) and drama.
- To inculcate practical skills in students by mapping their creative talent which bebeneficial for employability too.
- To perform hands-on-activities to students to develop their creative skills throughpractical sessions.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to be sensitive to the texture ofliterary language.
- After studying this course, students will be able to develop craft in creative writing.
- After studying this course, students will be able to develop sense of expressingthemselves through poetry/short story/biography.
- After studying this course, students will be able to induce an understanding of therelationship between an individual and society.
- After studying this course, students will be able to get into different fields andpursue versatile career opportunities.
- After studying this course, students will be able to develop an understanding of theatre and performance through drama will also help them to develop observatoryand behavioural skills.
- After studying this course, students will be able to develop a critical thought processand a knack in putting it in words. Students may also utilise the learnings of proofreading and editing for their academic and professional growth.
- After studying this course, students will be able to go for publishing their own work.
- After studying this course, students will be able to write a book and submit.

SYLLABUS

UNIT 1

- Introduction to Creative Writing- Meaning, Importance
- Imagination & Writing- Peer-interaction, Activities on Imagination
- Tropes, Motifs and Figures- Learning tropes, motifs and figures through videos, Discussion on the findings
- Craft of Writing- Figure of Speech, Word Play, Character Creation
- Character Creation- Dialogue Enaction, Learning Characters through discussion on famous writings, Character Analysis, Writing activities on creating different types ofcharacters (gender/social background/ethnicity etc.)

UNIT 2

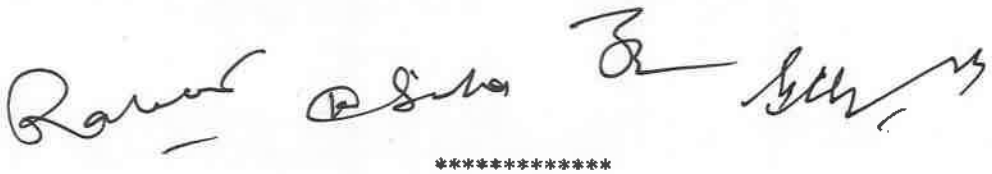
- Close Reading
- Analysis and Interpretation- Reading different works in Literature, Discussionin small groups, Practice Writing Session
- Proofreading & Editing- Practice sessions on Proofreading & Editing of different types of writing

UNIT 3

- Steps of Creative Writing- Pre-Writing, Writing, Post-Writing/Final Draft
- Types of Creative Writing- Poetry, Fiction, Non-Fiction (Life Narratives), Drama
- Creative Writing & Media- Film Review, Book Review, Other Writings in Media, Submission, Publication
- Learning to write Poetry- Reading & understanding Poetry; Practising tone, rhyme, metre, verses; Writing sessions
- Learning to write Fiction- Reading & understanding Fiction; Practicing different elements of fiction (Short story, Novella, Novel); Writing sessions
- Learning to write Non-Fiction- Reading & understanding Non-Fiction (Biographies & Autobiographies); Practicing different elements of non-fiction; Writing sessions
- Learning to write Drama- Reading & understanding Drama; Practicing different elements (plot, character, climax, verbal & non-verbal cues) of Drama; Writing sessions
- Submission & Publication (in Print & Digital) - Discussions over how & where to submit and publish (online/offline), Hands-on activities

Suggested Readings

- *Creative Writing: A Beginners ' Manual* by AnjanaNeira Dev et al. for The Departmentof English, University of Delhi (New Delhi: Pearson, 2008).



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Course Title – Digital Marketing

Learning Objectives

The Learning Objectives of this course are as follows:

- To acquaint the students with the knowledge of growing integration between the traditional and digital marketing concepts and practices in the digital era.
- To familiarize the students with the tools and techniques used by the digital marketers for driving the marketing decisions to attain marketing objectives.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to understand the concept of digital marketing and its integration with traditional marketing.
- After studying this course, students will be able to understand customer value journey in digital context and behaviour of online consumers.
- After studying this course, students will be able to understand email, content and social media marketing and apply the learnings to create digital media campaigns.
- After studying this course, students will be able to examine various tactics for enhancing a website's position and ranking with search engines.
- After studying this course, students will be able to leverage the digital strategies to gain competitive advantage for business and career.

SYLLABUS

Unit 1: Marketing in the Digital World

Digital marketing: Concept, Features, Difference between traditional and digital marketing, Moving from traditional to digital Marketing; c

Digital Marketing Channels: Intent Based- SEO, Search Advertising; Brand Based-Display Advertising; Community Based-Social Media Marketing; Others-Affiliate, Email, Content, Mobile.

Customer Value Journey: 5As Framework; The Ozone 03 Concept Key; Traits of online consumer

Unit 2: Content and Email Marketing

Content Marketing: Step-by-step Content Marketing Developing a content marketing strategy Email Marketing: Types of Emails in email marketing, Email Marketing best practices

Unit 3: Social Media Marketing and Display Marketing

Social Media Marketing: Building Successful Social Media strategy; Social Media MarketingChannels; Facebook, LinkedIn, YouTube (Concepts and strategies)

Display Advertising: Working of Display Advertising; Benefits and challenges; Overview of Display ad Process.; Define- Customer, Publisher, Objectives; Format-Budget, Media, Ad Formats, Ad Copy.

Unit 4 Search Engine Marketing

Introduction of SEM: Working of Search Engine; SERP Positioning; online search behaviour, DMI's 5P Customer Search Insights Model.
Search Engine Optimization: Overview of SEO Process; Goal Setting-Types.
On-Page Optimization: Keyword Research, SEO Process -Site Structure, Content, Technical Mechanics, Headings, Image & Alt text, Social Sharing, Sitemaps, Technical Aspects- Compatibility, Structured Data Markup.
Off Page Optimisation: Link Formats, Link Building, Content Marketing, Social Sharing; Black and White Hat Techniques
Search Advertising: Overview of PPC Process; Benefits of Paid Search; Basis of Ranking; Goal Setting-Objectives; Account Setting-Creation of Google Ads, Campaign architecture, Campaign setup, Targeting, Bid Strategy, Delivery, Ad Scheduling, Ad Rotation, Keyword Selection; Ad Copy composition, Ad Extension

Essential/recommended readings

- Dodson, I. (2016). The art of digital marketing: the definitive guide to creating strategic, targeted, and measurable online campaigns. John Wiley & Sons.
- Kartajaya, H., Kotler, P., & Setiawan, I. (2016). Marketing 4.0: moving from traditional to digital. John Wiley & Sons.
- Ryan, Damien: Understanding Digital Marketing - Marketing Strategies for Engaging the Digital Generation. Kogan Page Limited.

Suggested Readings

- Moutusy Maity: Internet Marketing: A practical approach in the Indian Context:
- Oxford Publishing
- Seema Gupta: Digital Marketing: Mcgraw Hill
- Ultimate guide to digital Marketing by Digital Marketer

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Course Title – Graphic Design and Animation

Learning Objectives

The Learning Objectives of this course are as follows:

- To introduce the students to the skill of animation.
- To learn about the application of 2D and 3D animation.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to understand the importance of animation and graphics design
- After studying this course, students will be able to learn graphics design in 2D and 3D animation.
- After studying this course, students will be able to learn the application of graphics design in 2D and 3D animation in advertising and other areas.

SYLLABUS

Unit 1:2D Animation

Introduction to 2D Animation: Introduction to 2D Animation, Drawing concept, Colour theory & basics, Incorporating sound into 2D animation

Layout & Designing: Basic of sketching, still life and assignment of basic drawing, Composition of basic elements, Work in different media, such as drawing, collage, and painting, Explore the relationship between elements and principal, Pixel and resolution: Vector and Bitmap Graphics.**Graphics and advertising (Practical)**

- Creating Digital Layout
- Professional image editing (PHOTOSHOP)
- Advertising and relevant case , Graphics and illustration (Corel Draw, Paint)
- Vector Composition , 2D animation (Macromedia Flash)

Broadcast Design (Practical)

- Working with visual images
- Story Boarding
- Titles and Credit Making
- Stop motion animation

Production / Post-Production (Practical)

- Paint & animate (scanning, tracing, ink & Paint)
- Understanding Background composition
- Basic Understanding of 2D animation and technique
- Animation with flash, Portfolio Making

Unit 2: 3D Animation

3D Modeling: Introduction to 3D space in Blender, Introduction to Modeling Techniques, In-organic Modeling, Organic Modeling

3D Shading: Use of Materials & Shader, Shader and Texture Editing, Shading Organic Model, Shading In-Organic Models

3D Animation and Rigging (Practical)

- Introduction to 3D Animation
- Create, Edit and working with Animation Graph, Rigging using Blender
- Setting up controllers for joints
- Simple Skeleton structure with proper joint orientation

3D Lighting and Rendering (Practical)

- Understanding Lighting in Cycles
- Direct and Indirect Lighting
- Light Linking, Final Composition
- Creating composition and Light with the Shaded Models

3D Dynamics (Practical)

Introduction to Dynamics, Active and Passive Bodies
Creating basic Simulation and collusion using Rigid body
Cloth Simulation, Simulation of Brick wall collusion
Introduction to Fluid Effects, Creating fluid simulation

Project

(Digital Imaging)

- Design Print advertisement for Service
- Design Print advertisement for Product
- Design Print advertisement an Event
- Design Print advertisement on Social Awareness
- Design a collage with a social message

2D Animation

- Drawing fundamentals using lines
- Sketching of cartoon characters
- 2D Logo designing
- Storyboarding of a 30 seconds film
- Portfolio making of an organization

3D Animation

- Exploring the Interface of 3D application & Basic Modeling
- Create different types of Materials and create a Shading
- Create a simple walk cycle using the character rigs
- Create a composition and Light set up
- Create a Fluid simulation & rendering

Suggested Readings:

- The Illusion of Life: Disney Animation, Ollie Johnston and Frank Thomas, Disney Editions.
- Blender Production Creating Short Animations from Start to Finish, Roland Hess, Routledge.
- Animating with Blender: Creating Short Animations from Start to Finish, Roland

Hess, Focal Press

- Simplified Drawing for Planning Animation, Wayne Gilbert, Anamie Entertainment Ltd.
- Getting Started in 3D with Maya, Adam Watkins, Routledge,
- Creating Characters with Personality: For Film, TV, Animation, Video Games, and Graphic Novels, Tom Bancroft, Watson-Guptill
- Force: Dynamic Life Drawing for Animators, Mike Mattesi, Focal Press

Note: Learners are advised to use the latest edition of readings.

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Course Title – Introduction to Cloud Computing (AWS)

Learning Objectives

The Learning Objectives of this course are as follows:

- To learn about cloud computing through Amazon Web Services (AWS) platform.
- To learn about AWS cloud concepts, services, security and architecture to build an application.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to Understanding cloud computing platform
- After studying this course, students will be able to differentiate between on-premises, hybrid-cloud, and all-in cloud
- After studying this course, students will be able to describe the basic global infrastructure of the AWS Cloud
- After studying this course, students will be able to understanding the core AWS services, including compute, network, databases, and storage.

SYLLABUS

Unit 1

Introduction to cloud computing, Creating AWS account, AWS Management Console, AWS Documentation overview, Availability Zones, AWS Global Infrastructure.

Unit 2

Compute in the Cloud Amazon EC2, instance types.

Unit 3

Storage and Databases: - Amazon Simple Storage Service (Amazon S3),Amazon Relational Database Service (Amazon RDS), Amazon DynamoDB.

Project

Create an AWS account and implement AWS cloud for deploying any application.

Suggested Sources

- Any free platform can be used, for example Amazon, Google, Azure etc.

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Course Title – Personal Financial Planning

Learning Objectives

The Learning Objectives of this course are as follows:

- To familiarize students with different aspects of personal financial planning like savings, investment, taxation, insurance, and retirement planning
- To develop the necessary knowledge and skills for effective financial planning.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to understand the meaning and appreciate the relevance of financial planning.
- After studying this course, students will be able to understand the concept of investment planning and its methods.
- After studying this course, students will be able to examine the scope and ways of personal tax planning.
- After studying this course, students will be able to analyse insurance planning andits relevance.
- After studying this course, students will be able to develop insight into retirement planning and its relevance.

SYLLABUS

Unit 1: Introduction to Financial Planning:
Financial goals, steps in financial planning, budgeting incomes and payments, time value of money. Introduction to savings, benefits of savings, management of spending & financial discipline, Setting alerts and maintaining sufficient funds for fixed commitments.

Unit 2: Investment Planning:
Process and objectives of investment, concept and measurement of return & risk for various asset classes, measurement of portfolio risk and return, diversification & portfolio formation. Gold bond; Real estate; Investment in greenfield and brownfield Projects; Investment in fixed income instruments, financial derivatives & commodity market in India. Mutual fund schemes; International investment avenues. Currency derivatives and digital currency.

Unit 3: Personal Tax Planning:
Tax structure in India for personal taxation, Scope of personal tax planning, exemptions and deductions available to individuals under different heads of income and gross total income. Comparison of benefits - Special provision u/s 115 BAC vis-a-vis General provisions of the Income-tax Act, 1961, tax avoidance versus tax evasion.

Unit 4: Insurance Planning:
Need for insurance. Life insurance, health insurance, property insurance, credit life insurance and professional liability insurance.

Unit 5: Retirement Benefits Planning:

Retirement planning goals, process of retirement planning, Pension plans available in India, Reverse mortgage, Estate planning.

Practical Exercises:

The learners are required to:

- Perform electronic fund transfers through net banking and UPI.
- Identify certain recent Ponzi schemes in the market.
- Prepare tax planning for a hypothetical individual.

Suggested Readings:

- Halan, M. "Let's Talk Money: You've Worked Hard for It, Now Make It Work for You" Harper Collins Publishers, New York.
- Indian Institute of Banking & Finance. "Introduction to Financial Planning" Taxmann Publication, New Delhi.
- Keown A.J. "Personal Finance" Pearson, New York.
- Madura, J. "Personal Finance", Pearson
- Pandit, A. "The Only Financial Planning Book that You Will Ever Need" Network 18 Publications Ltd., Mumbai.
- Sinha, M. "Financial Planning: A Ready Reckoner" McGraw Hill Education, New York.
- Tripathi, V. "Fundamentals of Investment" Taxmann Publication, New Delhi.

Note: Learners are advised to use the latest edition of readings.

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Course Title – Personality Development and Communication

Learning Objectives

The Learning Objectives of this course are as follows:

- To develop inter personal and effective communication skills.
- To develop problem solving skills and understand its influence on behaviour and attitudes of individuals.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to understand the importance of oral and written communication in day-to-day working of the organisation.
- After studying this course, students will be able to develop inter personal skills and problem-solving skills.
- After studying this course, students will be able to understand the role of body language in effective communication.

SYLLABUS

Unit 1

Introduction, need for Communication, Process of Communication, Written and Verbal Communication, Visual communication, Signs, Signals and Symbols, Silence as a Mode of Communication, Inter-cultural, Intra-cultural, Cross-cultural and International communication, Communication through Questionnaires, Business Letter Writing, Electronic Communication.

Unit 2

Business Cases and Presentations, Letters within the Organizations, Letters from Top Management, Circulars and Memos, Business Presentations to Customers and other stakeholders, presenting a Positive Image through Verbal and Non-verbal Cues, Preparing andDelivering the Presentations, Use of Audio-visual Aids, Report Writing.

Unit 3

Barriers to Communication, Improving Communication Skills, Preparation of Promotional Material, Non-verbal communication, Body language, Postures and gestures, Value of time, Organizational body language, Importance of Listening, Emotional Intelligence. Working individually and in a team, Leadership skills, Leadership Lessons, Team work and Team building, Feedback, Feed forward Interpersonal skills - Delegation, Humour, Trust, Expectations, Values, Status, Compatibility and their role inbuilding team - work Conflict Management - Types of conflicts, how to cope with conflict.

Unit 4

Negotiation Skills, Types of Negotiation, Negotiation Strategies, Selling skills - Selling to customers, Selling to Superiors Selling to peer groups, team mates and subordinates, Conceptual selling, Strategic selling, Selling skills - Body language.

Essential/recommended readings

- Kushal Jin - Business Communication, VK India.
- Krishnamacharyulu, C. S. G, Ramakrishnan Lalitha - Personality Development, Interpersonal Skills and Career Management, Himalaya Publishing.
- Corvette Budjac - Conflict Management: A Practical Guide to Developing NegotiationStrategies, Pearson.

Suggestive Readings

- Mitra, B. K., Personality Development and Soft Skills, Oxford University Press.
- Kumar Sanjay and Pushplata, Communication Skills, Oxford University Press.
- Mandal S. K., Effective Communication and Public Speaking, Jaico Publishing.

Note: Latest edition of the readings may be used

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Course Title – Prospecting E-waste for Sustainability

Learning Objectives

The Learning Objectives of this course are as follows:

- To provide in-depth knowledge on the effective mechanisms to regulate the generation, collection, and storage of e-waste
- To gain insights into the internationally/nationally acceptable methods of transport, import, and export of e-waste within and between countries
- To develop a holistic view on recycling, treatment, and disposal of e-waste and related legislative rules.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to holistically analyze the environmental impacts of e-waste
- After studying this course, students will be able to apply the skills and various concepts for sustainable management of e-waste
- After studying this course, students will be able to decipher the role of various national and international regulations for e-waste management
- After studying this course, students will be able to provide specific recommendations for improved methods for handling e-waste at different stages such as generation, collection, storage, transport, and recycling.

SYLLABUS

Practical/Hands-on Exercises

- Identification of e-waste and its types
- Composition of e-waste and segregation- from the material provided
- Dismantling of e-waste and handling process
- Visit a nearby e-waste handling facility

- Environmental protection laws and producer's responsibility for e-wastemanagement Build an understanding of how regulatory mechanisms can be utilized in the management of e-waste in educational institutions.
- Discussion on plausible ways and implementation of e-waste reduction at the source Evaluation of the status of e-waste handling at your institution. Suggest potential solutions as per the existing norms of E-Waste (Management) Rules, 2016 and beyond.
- Estimate how recycling of e-waste in metro cities will go in sync with the circular economy
- Develop an understanding and itinerary of the process for procuring e-waste import permissions.
- Inventory of the e-waste disposal mechanisms.
- Study the evolution of e-waste management rules and its implementation- Hazardous Waste Rules, 2008, E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2016
- Study the international laws on e-waste management- the international legislations:The Basel Convention; The Bamako Convention; The Rotterdam Convention;
- Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union; Restrictions of Hazardous Substances (RoHS) Directive

Teaching and learning interface for practical skills:

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c)customized exercises based on available data; (d) survey analyses; and (e) developing case studies; (f) demonstration and critical analyses; and (h) experiential learning individually and collectively.

Prospective sector(s):

© Electric and electronic industries,
® E-waste Recycling Unites,
® Private entrepreneurs,
• Environmental consultancies,
© Pollution Boards, and
© Environmental NGOs

Suggested Readings:

- Hester, R.E. and Harrison, R.M., 2009. Electronic Waste Management:
- Design. Analysis and Application. Royal Society of Chemistry Publishing.
- Cambridge, UK.
- Fowler, B.A., 2017. Electronic Waste: Toxicology and Public Health Issues.Academic Press.
- Gaidajis, G., Angelakoglou, K. and Aktsoglou, D., 2010. E-waste:environmental
- problems and current management. Journal of Engineering Science and
- TechnologyReview, 3(1), pp. 193-199.
- Janyasuthiwong, S., 2020. Metal Removal and Recovery from Mining
- Wastewaterand E-waste Leachate. CRC Press.

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Course Title – Public Speaking in English Language and Leadership

Learning Objectives

The Learning Objectives of this course are as follows:

- To impart leadership skills to students along with adequate communication skills tocurate strong leaders in the emerging social, political and corporate world.
- To create leaders with ethics and resilience in industry-based fields as well as social
- fields.

® To allow students to realise their leadership skills and curate them through a hand-on practical approach which will be helpful in generating employable skills for them.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to learn effective communication through Public Speaking will instill leadership development among students.
- After studying this course, students will be able to lead in different fields at the undergraduate level, be responsible citizens and employ leadership skills in their future endeavours, too.
- After studying this course, students will be able to strengthen their critical mindset, help them being assertive and put forward constructive viewpoints employing the skills learnt in the practice sessions.

SYLLABUS

UNIT 1

© Introduction to Effective Communication- Features, Advantages & Disadvantages

- Importance of Listening
- Oral communication- Meaning, Features & Importance
- Reading Public Speech- Reading documented speeches delivered in the past; Understanding the art of word play, vocabulary and putting thoughts into words

UNIT 2

- Public Speaking-
  - V What is Speech?, Overcoming Fear of Public Speaking, Language of Public Speech
  - V Drafting a Public Speech (Reading, research, writing, Fact check, Re-writing, Delivery)
  - Y' 3P's of Public Speaking (Preparation, Practice, Performance)
  - *S* Rhetoric Skills, Art of Informative & Persuasive speaking, Concluding Speech with Power
- Types of Public Speaking-
  - *S* Physical & Online
  - *S* Political, Organisational, Educational & Motivational
  - *S* Ted Talks, Public Speaking in Media
- Listening in groups and Discussion- Listening famous speeches (from history & everyday life); Analysis of its elements & classroom discussion
- Writing Public speech- Classroom Practice Sessions

UNIT 3

- Leadership Skills- (2 hrs.)
  - S Meaning, Features & Importance
  - S Historical Overview
  - S Leadership in Academic Life, Corporate Space, Public Life, Social Leadership and Political Leadership
- Leadership & Innovations- (2 hrs.)
  - S Audience analysis
  - S Audience Engagement & Leadership
  - S Influencing through Leadership
- Execution & Delivery of Public Speech- Learning rhetorics through speeches in the form of Audio/ Video; Learning Body Language & Paralanguage through ICT
- Developing leadership competence through Public Speaking- Intra-class Speech Competitions; Extempore; Group Discussion

UNIT 4

- Importance of Public Speaking in developing Leadership Skills
- Ethics in Public Speaking & Leadership
- Mock Parliament/MUNs
- Workshop

Suggested Readings:

S Beebe, S. A., & Beebe, S. J. (2012). Public speaking: An audience-centredapproach. (8th ed.). Boston: Pearson.

S Cardon, P. (2014). Business communication: Developing leaders for a networkedworld. (international ed.). New York: McGraw-Hill.

S Jaffe, C. I. (2013). Public speaking: Concepts & skills for a diverse society. (7thed.). Boston: Cengage Learning.

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Course Title – Statiscal Software Package

Learning Objectives

The Learning Objectives of this course are as follows:

- To familiarize students with data analysis using a statistical software package like SPSS or any other equivalent.
- To provide skills for research analysis and increase employability.
- To lay a foundation for advance data analysis work and higher education.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to understand basic functions of statistical software package for managing variables and generate descriptive statistics to describe the data and analyze data through graphs and charts.
- After studying this course, students will be able to test differences in sample means.
- After studying this course, students will be able to identify relationships between variables and develop models for predicting dependent variables on the basis of independent variables.
- After studying this course, students will be able to understand data structures and identify clusters in data.
- After studying this course, students will be able to identify principal components that are relevant from a host of variables.

SYLLABUS

Unit 1: Getting started with the Software

Introduction: Data Entry, Storing and Retrieving Files, Generating New Variables; Managing Data - Listing cases, replacing missing values, computing new variables, recoding variables, selecting cases, sorting cases, merging files, Graphs - Creating and editing graphs and charts; Descriptive Statistics Procedures: Frequencies, Descriptive,Explore, Cross Tabulation.

Unit 2: Hypothesis Testing for Means

T-tests: One sample test, Independent samples and paired samples t-test; ANOVA - One- way analysis of variance with post hoc analysis, Two-way analysis of variance.

Unit 3: Testing for Association between Variables

Chi-square Test of Independence; Bivariate Correlation Analysis: Simple Scatter Plot; Correlation Coefficient: Pearson, Spearman Rho and Kendall Tau Coefficient. Factor analysis.

Unit 4: Regression Analysis

Linear Regression: Simple Linear Regression, Multiple regression analysis with matrix scatterplot. Multiple Regression: Standard (Enter) and Stepwise Method. Binary Logistic Regression.

Essential/recommended readings

- Performing Data Analysis using IBM SPSS, Lawrence S. Meyers, Glenn C. Gainst, J. Guarino, Wiley Publication
- SPSS for Windows Step by Step A Simple Guide and Reference, Darren George andPaul Malley
- SPSS in Simple Steps, Kiran Pandya, Smruti Bulsari, Sanjay Sinha, Dreamtech Press

Suggestive Readings

- Using SPSS in Research, Dr. Radha Mohan, Neelkamal.

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Corse Title – Sustainable Ecotourism and Enterpreneurship

Learning Objectives

The Learning Objectives of this course are as follows:

- To train students in concepts and principles of sustainable ecotourism leading to a new generation of entrepreneurs
- To inculcate field-based practical skills in translating ecological systems into wealth generation while conserving natural resources
- To transform local biological wealth into a hub of global attraction and generate a scientific basis of Indian traditional knowledge

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to develop next-generation ecological entrepreneurs
- After studying this course, students will be able to evolve eco-literate society by integrating market-based instruments with eco-cultural knowledge of traditional societies
- After studying this course, students will be able to practice ecological knowledge for wealth generation, environmental conservation, and popularization of Indian traditional knowledge

SYLLABUS

Practical/Hands-on Exercise

- Assess the current state of ecotourism in little-known/explored areas and examine ecotourism potential
- Field surveys to identify the existing locations having ecological, wildlife, scenic, and ethnic potential for ecotourism and analyze existing prevalent eco-practices having the potential to integrate with ecotourism programme
- Identify ten plant species having ecological, economic, and cultural significance as ecotourist attraction
- Develop stories on the selected wild habitats to attract ecotourists from within and outside the country
- Identify suitable track and prepare a checklist of birds and animals with their stories for a diverse group of ecotourists
- Examine the current state of natural resources and develop suitable messages and appropriate media for educating different target groups
- Survey and identify the target group for ecotourism based on their age, education, economic and other criteria and evaluate their psychological barriers to ecotourism
- Conduct inventory of facility and analyze a preliminary competitive advantage over ecological attractions in the nearby area
- Analyze tourist spending patterns and track preferences for ecotourism attractions in nearby areas and add value to ecological, wildlife, and cultural attractions
- Survey attitude and perception of residents regarding ecotourism plan and analyze costs and benefitsof the sustainable ecotourism development programme using a demand-driven marketing approach
- Develop messages, stories, and pictures to attract tourists and promote ecotourism in the target area
- Analyze basic elements of ecotourism, the special needs of ecotourists, develop trips and travel packages offering an array of experiences and predict the market trends
- Develop ecotourist activities for individuals, families, and groups and craft social media campaigns for the proposed ecotourism business
- Develop a plan for strategic alliances and partnerships with other projects/groups /organizations for public- private partnership in the proposed ecotourism programme.

Teaching and learning interface for practical skills:

To impart training on technical and analytical skills related to the course objectives, a wide range of learningmethods will be used, including

(a) laboratory practical;

(b) field-work exercises;

(c) customized exercises based on available data;

(d) survey analyses;

(e) developing case studies;

(f) demonstration and critical analyses;

(h) experiential learning individually and collectivelyrospective sector(s):

- Forest Departments
- Tourism industry .
- World Bank
- UNDP
- WWF
- Environmental NGOs

Suggested Reading:

- Ballantyne, R. and Packer, J., 2013. International Handbook on Ecotourism. Edward Elgar Publishing Limited, UK
- Blumstein, D.T., Geffroy, B., Samia, D.S. and Bessa, E., 2017. Ecotourism's promise and
- Peril. A Biological Evaluation. Springer Int. Publ. (Chapters 10-11)
- Fennell, D.A., 2014. Ecotourism. An Introduciton. Routledge, London, UK.
- Fletcher, R., 2014. Romancing the wild. In Romancing the Wild. Duke University Press.
- Tanguay, G.A., and Rajaonson, J., (2015). Evaluating Sustainable Tourism Using Indicators:
- Problems and Solutions. In: Brophy, S.C., (Ed), Ecotourism: Practices, Benefits and o Environmental Impacts. Nova Science Publishers, pp. 119 - 134.
- Wearing, S. and Schweinsberg, S., 2019. Ecotourism: Transitioning to the 22nd century. Routledge

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Course Title – Visual Communication and Photography

Learning Objectives

The Learning Objectives of this course are as follows:

- To synthesize a comprehensive view of principles involved in Visual Communication.
- To appreciate and express the cultural significance of photography as visual art and understand its evolution and purposes.
- To develop an awareness of compositional and organizational strategies for the effective deployment of formal elements of visual art.
- To read visual texts with a deep knowledge of visual history and theory.
- To create an ability of situating the content and form of the visual representation of thematic context.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to acquire knowledge of the
- culturaland historical importance of the visual medium.
- After studying this course, students will be able to explore the
- fundamentals andunderlying theories of Visual Communication.
- After studying this course, students will be able to develop a thorough
- knowledge ofconcepts, and skills in creating photographs.
- After studying this course, students will be able to learn to identify and
- analyzesemiotics in photographs.
- After studying this course, students will be able to develop a craftsmanship in
- creating aesthetically pleasing photographs.

SYLLABUS

Unit 1: Historical Background and Basics of Visual Communication

Unit Description: The Unit I will give a brief history of the visual arts from the caveman to modern man. Skills of artistic schools of thought and Intertextuality in art in relation to culture.

Topics- Concept and History of Visual Communication, Human Eye and Visual Process, Visual culture and Information Education Communication, Theories of visual communication - Gestalt Theory of visual communication, Perceptual theory of Visual communication, Semiotics and cognitive approach in visuals

Unit II: Theories of Visual Communication

Unit Description: This unit will put emphasis on theories, semiotics and the study of signs. Through semiotic theories improve critical thinking skills, and learn to use semiotics to think logically and to analyze visual media in context of culture.

Topics: Fundamentals of Design: Definition. Approaches to Design, Centrality of Design, Elements of Design, Principles of Visual and other Sensory Perceptions. Colour psychology and theory (some aspects), Definition, Optical / Visual Illusions, etc., Various stages of design process, Learning skills to read signs and signifier in visuals for social messaging

Unit III: Photography as Visual Communication

Unit Description: This unit will provide skills to learn camera and lighting techniques.

Topics: Introduction to photography, Camera - structure and function of camera ,

Characteristics of light, Sources of Light-Nature, Artificial and Available, Lighting techniques-three-point lighting, Exposure - focusing, aperture, shutter speed, Depth of field.
, Kinds of light indoor and outdoor - Electronic flash and artificial lights, Light meters

Unit IV: Camera Compositions and Accessories

Unit Description: This unit will provide skills about camera accessories and designing aesthetically rich compositions.

Topics: Camera lenses and accessories, Basic shots, angle, and view, Composition, Role of photographic image in visual communication, Basics of photojournalism, photo-features, photo - essays, writing captions, visual storytelling.

Essential Readings

- Barnes, Susan B. An Introduction to Visual Communication: From Cave Art to Second Life, Peter Lang Pub, 2011.
- Berger, Arthur Asa, Seeing is Believing: An Introduction to Visual Communication, McGraw-Hill Education, 2012.
- Lester, Paul Martin, Visual Communication: Images with Messages (6ed), Cengage Learning, 2013.
- Photography: A Critical Introduction - edited by Liz Wells London, Routledge, Oxon, 2015.
- Farrell, I. Complete Guide to Digital Photography, Quercus Publishing, UK, 2014.

Suggested Readings

- Mandav, Pradeep, Visual Media Communication, Authors Press, 2001.
- Williams, Rich, Visual Communication: Integrating Media, Art, and Science, Routledge, 2007

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Course Title - पटकथा लेखन

Course Objective

- पटकथा लेखन का परिचय कराना।
- विद्यार्थी की लेखन–क्षमता और भाषा–कौशल को बढ़ावा देना।
- विद्यार्थी की लेखन में रोजगार सम्बन्धी क्षेत्रों के लिए तैयार करना।

Course Learning Outcomes:

- पटकथा लेखन तथा उसके तकनीकी शब्दों से विद्यार्थी अवगत हो सकेगा।
- पटकथा लेखन की जानकारी मिलने के उपरान्त विद्यार्थी के लिए रोजगार की संभावनाएँ बनेंगी।
- विद्यार्थी भाषायी सम्प्रेषण को समझते हुए लेखन से सम्बन्धित विभिन्न पक्षों से अवगत हो सकेगा।
- विद्यार्थी में अभिव्यक्ति कौशल का विकास हो सकेगा।

SYLLABUS

यूनिट 1

- पटकथा लेखनः परिचय
- पटकथा के तत्व
- पटकथा के प्रकार
- पटकथा की शब्दावली

यूनिट 2

- पटकथा लेखन में शोध का महत्व
- चरित्र की निर्मिति और विकास
- एक दृश्य का लिखा जाना
- तीन अंक (थ्री एक्ट) और पाँच अंक (फाइव एक्ट) को समझना

यूनिट 3

- वेबसीरीज के लिए पटकथा लेखन
- लघु फिल्म के लिए पटकथा लेखन
- वृत्तचित्र के लिए पटकथा लेखन
- विज्ञापन फिल्म के लिए पटकथा लेखन

यूनिट 4

- पटकथा का पाठ और विश्लेषण
- किसी आईडिया को स्क्रीन प्ले के तौर पर विकसित करना

सन्दर्भ पुस्तकें:

- पटकथा कैसे लिखें: राजेद्र पांडेय – वाणी प्रकाशन, दिल्ली, संस्करण 2015
- पटकथा लेखन : एक परिचय – मनोहर श्याम जोशी– राजकतल प्रकाशन, दिल्ली संस्करण 2000
- कथा–पटकथा : मन्नू भंडारी – वाणी प्रकाशन, दिल्ली , संस्करण 2014
- व्यावहरिक निर्देशिका: पटकथा लेखनः असगर वजाहत – राजकमल प्रकाशन, दिल्ली, संस्करण 2011
- आईडिया से परदे तकः रामकुमार सिंह–राजकमल प्रकाशन, दिल्ली, संस्करण 2021

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Course Title - रंगमंच

Course Objective

- हिन्दी रंगमंच का परिचय कराना।
- नाट्य–प्रस्तुति की प्रकिया की जानकारी देना।
- अभिनय के विभिन्न पक्षों से अवगत करना।
- रंगमंच के खेलों और गतिविधियों से अवगत कराना।

Course Learning Outcomes:

- नाट्य–प्रस्तुति की प्रकिया से विद्यार्थी अवगत हो सकेगा।
- रंगमंच की जानकारी मिलने के उपरान्त इस क्षेत्र में विद्यार्थी के लिए रोजगार की संभावनाएँ बनेंगी।
- रंगमंचीय गतिविधियों से विद्यार्थी के व्यक्तित्व का विकास हो सकेगा।
- विद्यार्थी में अभिव्यक्ति कौशल का विकास हो सकेगा।

SYLLABUS

यूनिट 1

- भरत मुनि कृत नाट्यशास्त्र (संक्षिप्त परिचय)
- हिन्दी का पारंपरिक रंगमंच (संक्षिप्त परिचय)

यूनिट 2

प्रस्तुति–प्रकियाः आलेख का चयन, अभिनेताओं का चयन,दृश्य–परिकल्पना (ध्वकन–संगीत–नृत्य–प्रकाश), पूर्वाभ्यास

यूनिट 3

अभिनय की तैयारीः वाचिक, आंगिक, आहार्य, सात्विक

यूनिट 4

आशु अभिनय, थिएटर गेम्स, संवाद–वाचन, शारीरिक अभ्यास, सीन वर्क

यूनिट 5

मंच प्रबंधनः सेट, रंग–सामग्री, प्रचार–प्रसार, ब्रोशर–निर्माण

सन्दर्भ पुस्तकें:

- संक्षिप्त नाट्यशास्त्रम् – राधावल्लभ त्रिपाठी, वाणी प्रकाशन, दिल्ली, 2009
- रंग स्थापत्यः कुछ टिप्पणियाँ – एच0 वी0 शर्मा राष्ट्रीय नाट्य विद्यालय प्रकाशन, दिल्ली संस्करण 2004
- पारंपरिक भारतीय : रंगमंच अनंतधाराएँ – कपिला वात्स्यायन, अनुवाद–बदी उजम्मा, नेशनल बुल ट्रस्ट, दिल्ली, 1995
- हिंदी रंगमंच का लोकपक्ष, सं प्रो0 रमेश गौतम, स्वराज प्रकाशन, दिल्ली 2020
- मंच आलोकन – जी0 एन0 दासगुप्ता, अनुवाद – अजय मलकानी, नेशनल बुक ट्रस्ट, दिल्ली 2006
- रंगमंच के सिद्धांत –सं महेश आनंद, देवेन्द्र राज अंकुर, राजकमल प्रकाशन, दिल्ली 2008

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Course Title- रचनात्मक लेखन

Learning Objectives

- विद्यार्थीयों के मौखिक और लिखित अभिव्यक्ति कौशल को विकसित करना।
- उनमें कल्पनाशीलता और रचनात्मकता का विकास करना।
- साहित्य की विविध विधाओं और उनकी रचनात्मक शैली का परिचय कराते हुए लेखन की ओर प्रेरित करना।
- प्रिंट एवं इलेक्ट्रानिक माध्यमों के लिए लेखन की प्रवृति को विकसित करना।

Learning outcomes

The Learning Outcomes of this course of this course are as follows:

इस पाठ्यकम के अध्ययन के पश्चात् विद्यार्थीयों में :

- मौखिक और लिखित अभिव्यक्ति कौशल को विकसित होने में मदद मिलगी।
- उसमें कल्पनाशीलता और रचनात्मकता का विकास हो सकेगा।
- साहित्य की विधि विधाओं और उनकी रचनात्मकता शैली का परिचय होगाा जिससे वे स्वयं भी विधाओं में लेखन की अग्रसर हो सकेगे।
- प्रिंट एवं इलेक्ट्रानिक माध्यमों के लिए लेखन की ओर भी ये अग्रसर होंगे।

SYLLABUS

यूनिट 1

रचनात्मक लेखकः अवधारणाः स्वरूप आधार एवं विश्लेषण

- भाव एवं विचार की रचना में अभिव्यक्ति की प्रकिया
- अभिव्यक्ति के विविध क्षेत्रः साहित्य पत्रकारिता विज्ञापन भाषण

- लेखन के विविध रूपः मौखिक–लिखित गद्य–पद्य कथात्मक–कथेतर
- अर्थ निर्मित के आधारः शब्द और अर्थ की मीमांसा शब्द के पुराने–नए प्रयोग, शब्द की व्याकरणिक कोटि

यूनिट 2

भाषा भंगिमा और साहित्य लेखन

- भाषा भंगिमाएँः औपचारिक–अनौपचारिक, मौखिक–लिखित, मानक भाषिक संदर्भः क्षेत्रीय, वर्ग–सापेक्ष, समूह–सापेक्ष
- रचना–सौष्ठवः शब्दशक्ति, प्रतीक, बिम्ब, अलंकारवक्रता
- कविताः संवेदना भाषिक सौष्ठव, छंदबद्ध–छंदमुक्त, लय, गति, तुक
- कथा–साहित्यः वस्तु, पात्र, परिवेश, कथ्य और भाषा

यूनिट 3

विविध विधाओं एवं सूचना माध्यमों के लिए लेखन

- नाट्य–साहित्यः वस्तु, पात्र, परिवेश, कथ्य, रंगमंच और नाट्य–भाषा
- विविध गद्य विधाएँः निबंध, संस्मरण, आत्मकथा, व्यंग्य,रिपोर्ताज, यात्रा–वृत्तांत
- प्रिंट माध्यम के लिए लेखनः फीचर, यात्रा–वृत्तांत, साक्षात्कार, विज्ञापन
- इलेक्ट्रानिक माध्यम के लिए लेखनः विज्ञापन, पटकथा, संवाद

Practical Exercises if any:

नोटः उपर्युक्त का परिचय देते हुए इनका अभ्यास भी करवाया जाए।

References and suggested readings

1. साहित्य चिंतनः रचनात्मक आयामः रघुवंश
2. शैलीः रामचंद्र मिश्र
3. रचनात्मक लेखकः सं0 रमेश गौतम
4. कविता क्या हैः विश्वनाथ प्रसाद तिवारी
5. कथा–पटकथाः मन्नू भंडारी
6. पटकथा लेखनः मनोहर श्याम जोशी
7. कला की जरूरतः अर्नेस्ट फिशरः अनुवादकः रमेश उपाध्याय
8. साहित्य का सौंदर्यशास्त्रः रवींद्रनाथ श्रीवास्तव
9. कविताः रचना–प्रकियाः कुमार विमल

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Proposed Course Structure for 4 Year Undergraduate Programme under CBCS System

Value Added Course (VAC)

Semester – I (VAC- 1)

Science	Social Science/Arts	Commerce
• Ayurveda & Nutrition • Financial Literacy • Ethic & Culture • Art of Being Happy • Swach Bharat • Fit India • Panchakosha: Holistic Development of Personality • Culture & Communication	• Gandhi & Education • Sports for life • Ethic & Culture • Art of Being Happy • Swach Bharat • Fit India • Panchakosha: Holistic Development of Personality • भारतीय भक्ति परम्परा और मानव मूल्य	• Digital Empowerment • Sports for life • Ethic & Culture • Art of Being Happy • Swach Bharat • Fit India • Panchakosha: Holistic Development of Personality • Culture & Communication

Semester – II (VAC- 2)

Science	Social Science/Arts	Commerce
• Vedic Mathematics • Emotional Intelligence • Yoga Philosophy & Practice • Ethics & Values in Ancient Indian Tradition • Constitutional Values & Fundamental Duties • Social & Emotional Learning • Ecology & Literature	• Vedic Mathematics • Emotional Intelligence • Yoga Philosophy & Practice • Ethics & Values in Ancient Indian Tradition • Constitutional Values & Fundamental Duties • Social & Emotional Learning • सृजनात्मक लेखन के आयाम	• Vedic Mathematics • Emotional Intelligence • Yoga Philosophy & Practice • Ethics & Values in Ancient Indian Tradition • Constitutional Values & Fundamental Duties • Social & Emotional Learning • Ecology & Literature

List of Value-Added Course (VAC)

SL. No.	Course Title	LTP Distribution of the Course			Total Credits:	Total Marks = 100
		L	T	P		
1	Art of Being Happy	1	0	3	3	End -Term Appraisal : 70 Marks Internal Assessment: 30 Marks
2	Ayurveda & Nutrition	1	0	3	3	
3	Constitutional Values & Fundamental Duties	1	0	3	3	
4	Culture & Communication	1	0	3	3	
5	Digital Empowerment	1	0	3	3	
6	Ecology & Literature	1	0	3	3	
7	Emotional Intelligence	1	0	3	3	
8	Ethics and Culture	1	0	3	3	
9	Ethics & Values in Ancient Indian Tradition	1	0	3	3	
10	Financial Literacy	1	0	3	3	
11	Fit India	1	0	3	3	
12	Gandhi & Education	1	0	3	3	
13	Panchakosha: Holistic Development of Personality	1	0	3	3	
14	Social & Emotional Learning	1	0	3	3	
15	Sports for life	1	0	3	3	
16	Swach Bharat	1	0	3	3	
17	Vedic Mathematics	1	0	3	3	
18	Yoga Philosophy & Practice	1	0	3	3	
19	भारतीय भक्ति परम्परा और मानव मूल्य	1	0	3	3	
20	सृजनात्मक लेखन के आयाम	1	0	3	3	

Value Added Courses (VAC)

Course Title – Arts of Being Happy

Course Objectives

- To synthesize the insights developed by Human Development experts, Psychologists, Anthropologists on one hand, and the intellectual traditions of Vedantic Philosophy and Indology on the other towards the experience of happiness.
- To illustrate various factors that determine the subjective experience of happiness in a cross cultural context.

Learning Outcomes

- The students shall be able to evaluate the factors contributing to the phenomenon of happiness in the personal, familial and community life of an individual in different cultures in the Indian context.
- They will be able to develop healthy interpersonal relationships and wellbeing, cherishing the values of Indian culture and philosophy.
- They will be able to relate to the global phenomenon of sustainable development and become sensitive to the needs of the planet.
- They will be able to apply the experience of *Aananda* at a personal level.

Syllabus of *The Art of Being Happy*

Unit 1:Human Ecology and Happiness
• Definitions/Factors of Happiness: Environmental and Social • Physical, emotional and psychological well-being for happiness • Physiological and hormonal basis of happiness • Coping with Stress: A life saving skill
Unit 2:Indological Theories of Happiness
• *Panch Kosh* Theory & Idea of Well Being • Idea of Self and other • Hierarchy and stages of happiness 13

Unit 3 : Happiness: Cross-cultural Contexts
• Culture and Happiness • Interpersonal Relationship: Comparative Perspective • Towards Self-Actualization
Unit 4:Local and Global Perspective of Happiness
• Measuring happiness: Key indicators • Happiness Index • India in Global Happiness Indices

Practical/ Practice Component

The course will be based on students' identification and operationalization of the concept of happiness and well-being. Students will explore the indicators and actualization of these concepts in everyday life.

- Community surveys on the facilities promoting positive mental health practices such as Yoga and Meditation Centres, Recreation clubs, and Parks for youth and senior citizens shall be carried out by the students.
- Extending help and social service by visiting old age homes/ hospitals/slum areas or any other disadvantaged groups.
- Students can undertake a field work / project independently or work as an Intern with NGOs working in the area of happiness and well-being.
- Critical appreciation of a documentary/ film based on Happiness and Well-being can be undertaken by the students.
- Workshops/ Sessions for the actualization of innate creative potential- (Music, Drawing, Calligraphy, Dramatics)
- Hands-on Happiness: Gardening, Cleaning, Washing, Cooking, etc.
- If required, students can share their experiences in the form of a Project Report.
- Students may share their experiences in the form of Audio-video presentations of 15-20 minutes.
- Any other Practical/Practice as decided from time to time

Essential Readings

- Ramavathy, Vinayachandra & Choudry, Anuradha. (2013). Understanding Happiness: A Vedantic Perspective. Psychological Studies. 59. 141-152. 10.1007/s12646-013-0230-x.
- Leontiev, Dmitry. (2012). Anthropology of Happiness: the state of Well-Being and the way of Joy,In SocialScience,sVol43 No 2 P93-104
- Snyder .C.R. S.J. Lopez & J.T. Pedrotti. (2015). Positive Psychology (The Scientific and Practical Explorations of Human Strengths): Sage Publication. (Chapter 5: Subjective Well-being: The Science of Happiness and Life Satisfaction, Page 63 to 73)
- WorldDevelopmentIndicators2016. (2016).United States: World Bank Publications.
- Zelenski, John. (2019).

Suggested Readings

- Baumgardner,S&Crothers,M.(2014).Positive Psychology. New Delhi: Pearson Education, India.
- Goleman,D.(2007).Social Intelligence:The new science of human relationships, RHUK
- Mathews, Gordon and Carolina Izquierdo. (eds). (2010). Pursuits of Happiness: Well being in Anthropological Perspective. Berghan Books
- Seligman,M.(2002). Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment.NewYork:FreePress.
- Sri Aurobindo, The Synthesis of Yoga, Part Three: The Yoga of Divine Love, Chapter 7, The Ananda Brahman, pp. 569-570
- PositivePsychology:TheScienceofWell-Being,-CarletonUniversity,Ottawa, Canada, Sage Publications Chapter3:Happiness;page 77 to 110)

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Course Title – Ayurveda and Nutrition

COURSE OBJECTIVES:

- To introduce the basic principles of nutrition in Ayurveda
- To link the Ayurvedic nutrition with modern dietary practices for health
- To analyse basic tenets of traditional diets and health recipes
- To understand the contemporary food habits in everyday life

LEARNING OUTCOMES:

- Awareness of traditional food cultures of India
- Evaluate changing food patterns and lifestyle over the years
- Understand Indian Knowledge Systems (IKS) and key Vedic principles with respect to Food and Nutrition
- Apply basic tenets of traditional diets for health and disease
- Prepare selected healthy recipes based on Ayurvedic principles

Syllabus of *Ayurveda and Nutrition*

Unit 1: Introduction to Ayurvedic Nutrition
• Ayurveda and Indian food cultures • Nutrition and lifestyle transition over the years • Regional Food Traditions of India
Unit II: Basic principles of Food and Nutrition and Ayurveda
• Understanding rich sources of nutrients • Concept of *Doshas* & assessment • Ayurvedic Principles of food habits and factors determining quality of food *(Ahara vidhi visheshaayatana)* • FSSAI regulations on Ayurvedic Aahar
Unit III: Ayurvedic Diets
• Principles of Diet: *Aharavidhi vidhan, Sattvic, Rajasi, Tamasic* foods • Incompatible food (*Viruddha Ahara*), *Pathya; Apathya; Viprita Ahaar* • Lifestyle Management with *Dincharya* and *Ritucharya* • Application of Ayurvedic diets to stress linked food behaviour

Practical/ Practice Component

- Visit your local market and classify the available food items according to *Sattvic, Rajasi, Tamasic*foods
- Conduct a survey of 10-15 households in your locality:
  - To study food behaviour and analyse them in light of Ayurvedic dietary principles of *Sattvic, Rajasi, Tamasic*
  - To study the food consumption patterns and intake of incompatible food: *Viruddha Ahara, Pathya; Apathya; VipritaAhaar*
  - To know about their adopted lifestyle *Dincharya* and *Ritucharya*

Students are required to visit available e-resources of University of Delhi, Ministry of

- Ayushwith regard to Ayurvedaand Nutrition.
- If required, students can share their experiences in the form of a Project Report.
- The students may share their experiences in the form of audio-visual presentations of 15-30 minutes.
- Any other Practical/Practiceas decided from time to time

Essential Readings

- Rastogi S (2014) Ayurvedic Science of Food and Nutrition. ASIN: BOOHWMV094, Springer: ISBN-13:978-1461496274
- Rastogi S (2010) Building bridges between Ayurveda and modern science. Int J AyurvedaRes. 1(1):41-46.
- FSSAI regulations on Ayurveda Aahar Regulations 2022. Gazette of India CG-DL-E-07052022-235642. New Delhi, Friday, May 6, 2022/ Vaisakhal6, 1944.
- Frawley D (2012) Ayurvedichealing: A comprehensive guide. Lotus Press, India.
- https://iksindia.org/:Indian Knowledge Systems

Suggested Readings

- Charaka Samhita, Charaka (1998) In: Tripathi BN (ed) Sutra Stahan Maharashitiya Adhyay. Chaukhamba Orientelia, Varanasi.

- Kapoor Kapil & Singh AK Indian Knowledge Systems Volume– 1. Indian Institute of Advanced Study Shimla. Published by DK Printworld (P) Ltd, N.Delhi. https://www.lkouniv.ac.in

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Course Title – Constitutional Values And Fundamental Duties

COURSE OBJECTIVES:

- Enrich students with knowledge and relevance of the Constitution.
- Develop awareness about Duties and Values.
- Inculcate a sense of Constitutionalism in thought and action.

LEARNING OUTCOMES:

- Understand the Constitution and its relevance
- Appreciate the values and goals embedded in the Constitution.
- Recognise the importance of Fundamental Duties enshrined in the Constitution.
- Apply the spirit of fundamental values and duties in everyday national life.

Syllabus of *Constitutional Values and Fundamental Duties*

Unit I: **The Constitution of India – an Introduction**
• Federal Republic, Rule of Law, Separation of Powers • Sovereignty, Socialism, Democracy • Secularism and *Sarva Dharma Sama Bhava*
Unit II: Constitutional Values
• **Justice:** Social, Political, Economic • **Liberty**: Thought, Expression, Belief, Faith, Worship • **Equality** : Equality before law & equal application of laws • **Fraternity:** Dignity, Unity and Integrity
Unit III: Fundamental Duties
• Reflecting on the ancient Indian notions of righteousness and duty consciousness • Fundamental Duties- Article 51A [(a) – (k)] • Legal status of Fundamental Duties - Judicial approach

Practical/ Practice Component

- Reflections on some of the constitutional values/ fundamental duties and its contemporary relevance in day-to-day national life through group discussions and projects.
- Conduct workshops to spread awareness on the Fundamental Duties and Values.
- Students are required to conduct a survey (minimum 25 respondents) on assessing the awareness of the constitutional duties amongst the citizens.
- Students may share their experiences on Fundamental Duties and Values in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

ESSENTIAL READINGS

- *Preamble* to the Constitution of India, 1950.
- The Constitution of India, Articles - 14, 19, 21.
- The Constitution of India, Fundamental Duties [Ar. 51 A (a) – (k)].

SUGGESTED READINGS

- Durga Das Basu, *et al.*, *Introduction to the Constitution of India* (LexisNexis, 26th edn, 2022).
- Leila Seth, *We, the Children of India: The Preamble to Our Constitution* (New Delhi, Puffin Books, Penguin Books India, 2010).
- Mahendra Pal Singh, V.N. Shukla's Constitution of India, (Eastern Book Company, Lucknow, 13th revised edn. 2017)
- B.R. Ambedkar Selected Speeches, (Prasar Bharati, New Delhi, 2019) *available at:* https://prasarbharati.gov.in/whatsnew/whatsnew_653363.pdf.

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Course Title - CULTURE AND COMMUNICATION

Learning Objectives:

- To focus on traditional values disseminated from Indian cultural heritage.
- To understand the interconnections between the legacy of our past and needs of our contemporary society.
- To learn to adapt, interact and celebrate our diversity and pluralistic culture.
- To develop communication skills in speaking, listening, reading and writing and apply them in our quotidian life as young citizens of contemporary India.
- To integrate ethical values and life skills.

Course Outcomes:

- Students will be able to appreciate the relevance of ancient Indian wisdom and core ethical values in our contemporary life.
- Students will be able to engage in a dialogue between the past and the present and inculcate the best principles towards a meaningful life.
- Students will be encouraged to involve themselves in team work and group activities to address challenges faced in metropolitan cities.
- Students will be able to develop communication skills, that is, analytical reading, empathetic listening, considerate speaking as well as informed writing.
- Extension activities will equip the students, drawn from diverse backgrounds, with life skills and confidence to integrate with a multicultural environment and work towards an inclusive community.
- Students will be encouraged to envisage and work towards an ethically robust society and thereby strengthen the nation.

Unit I: Ethical Valuesfrom Indian Cultural Heritage • *VasudhaivaKutumbakam* • United WeStand, Divided WeFall • *Ek Bharat, ShreshtBharat*
Unit II: Developing Life Skills • Empathy • Adaptability • Conserving our natural resources • Sharing knowledge resources
Unit III: Effective Communication in Everyday Life • empathetic listening • considerate speaking • analytical reading • informed writing

Practical/ Practice Component

As hands-on experience is an essential component of the course, this section will focus on the practical aspects to correlate with the fundamental principles and learnings of the theory portion. Students will be encouraged to use the communicationtools learnt through Unit 3 and corroborate the continuitiesof core principles studied in Unit 1 and 2.

- Students will be asked to conduct surveys/interviews in their neighbourhood or commuting routes to assess the nature and quality of negotiating our cultural diversity and pluralist traditions.
- Students would be assigned visits to old-age homes, hospitals, cancer wards, etc. to interact and write about their experiences with old people, caregivers, patients, nursing staff, helpers, etc.

staff, helpers, etc.

- They will also be assigned visits to historically important places and monuments within the city and also converse with the tourists in order to trace a comprehensive view of the rich cultural history of India. They may create video documentaries, take and record tourists' interviews and/or write a journal entry of the visit using the communication skills learnt.

- Students shall make group presentations or individual reports on the activities undertaken. Discussions with classmates and the teacher shall be undertaken to evolve clarity of vision on the ethical values and effective communication skills learned through this course.

ESSENTIAL READINGS:

- Ramanujan, A.K. 'A Flowering Tree', *Cultural Diversity, Linguistic Plurality & Literary Traditions in India*. Department of English, OUP, 2015. pp 125-138
- Haksar, A. N. D. 'Chanakya Niti Shastra', *Chanakya Niti*. India, Penguin Random House India Private Limited, 2020.
- Dhanavel. S.P. *English and Soft Skills*. Orient Black Swan, 2010.
- Murthy, Sudha. 'The Nobel Prize', *Wise & Otherwise*. India, Penguin Random House India Private Limited, 2006.
- Murthy, Sudha. 'How to Beat the Boys', *Three Thousand Stitches: Ordinary People, Extraordinary Lives*'. Penguin Books, 2017.
- Soyinka, Wole. 'Telephone Conversations', *The Individual and Society*, Department of English, Pearson Education, 2006. pp 122-23
- Bansode, Hira. 'Bosom Friend', *The Individual and Society*, Department of English, Pearson Education, 2006. pp 49-50

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Course Title - Digital Empowerment

COURSE OBJECTIVES:

- Understand the digital world and need for digital empowerment
- Create awareness about Digital India.
- Explore, communicate and collaborate in cyberspace.
- Building awareness on cybersafety and security.

LEARNING OUTCOMES:

- Use ICT and digital services in daily life.
- Develop skills to communicate and collaborate in cyberspace using social platforms, teaching/learning tools.
- Understand the significance of security and privacy in the digital world.
- Evaluate ethical issues in the cyber world.

Syllabus of *Digital Empowerment*
Unit I: Digital inclusion and Digital Empowerment
• Needs and challenges • Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, e-Kranti (Electronic Delivery of Services), e-Health Campaigns • Public utility portals of Govt. of India such as RTI, Health, Finance, Income Tax filing, Education
Unit II: Communication and Collaboration in the Cyberspace
Syllabus of *Digital Empowerment*
Unit I: Digital inclusion and Digital Empowerment
• Needs and challenges • Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, e-Kranti (Electronic Delivery of Services), e-Health Campaigns • Public utility portals of Govt. of India such as RTI, Health, Finance, Income Tax filing, Education
Unit II: Communication and Collaboration in the Cyberspace

• Electronic Communication: electronic mail, blogs, social media • Collaborative Digital platforms • Tools/platforms for online learning • Collaboration using file sharing, messaging, video conferencing
Unit III:Towards Safe and Secure Cyberspace
• Online security and privacy • Threats in the digital world: Data breach and Cyber Attacks • Blockchain Technology • Security Initiatives by the Govt of India
Unit IV: Ethical Issues in Digital World
• Netiquettes • Ethics in digital communication • Ethics in Cyberspace

Practical/ Practice Component

The course should be conducted in an interactive mode through demonstration, using appropriate tools.

• Conduct workshops on e-services initiated under Digital India.

• Spread digital literacy/awareness amongst the vulnerable groups and marginalised sections of the society like street vendors, domestic help, security guards, senior citizens.

• Students will take up team activities/ projects exploring digital services in the areas such as education, health, planning, farming, security, cyber security, financial inclusion, and justice, e-Kranti.

• Any other Practical/Practice as decided from time to time

Essential Readings /Online Resources

1. Rodney Jones and Christoph Hafner. "Understanding digital literacies: A practical Introduction". Routledge Books, 2nd edition, 2021.

2. https://www.digitalindia.gov.in

3. https://www.digilocker.gov.in

4. https://www.cybercrime.gov.in

5. https://www.cybersafeindia.in

6. https://www.meity.gov.in/cyber-surakshit-bharat-programme

Suggested Readings:

1. David Sutton. "Cyber security: A practitioner's guide", BCS Learning & Development Limited, UK, 2017.
2. https://www.mha.gov.in/document/downloads/cyber-safety-handbook

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Course Title – Emotional Intelligence

COURSE OBJECTIVES

- Introduce the concept of emotional intelligence, its models and components.
- Understand the significance of emotional intelligence in self-growth and building effective relationships.
- Identify the measures of emotional intelligence.

LEARNING OUTCOMES

- Self-Awareness, Self-Management, Social Awareness & Relationship Management.
- Discover personal competence and techniques of building emotional intelligence.
- Gain insights into establishing positive relationships.

Syllabus of *Emotional Intelligence*

Unit I: Fundamentals of Emotional Intelligence
• Nature and Significance • Models of emotional intelligence: Ability, Trait and Mixed • Building blocks of emotional intelligence: self-awareness, self-management, social awareness, and relationship management
Unit II: Personal Competence
• Self Awareness: Observing and recognizing one's own feelings, Knowing one's strengths and areas of development. • Self Management: Managing emotions, anxiety, fear, and anger.
Unit III: Social Competence
• Social Awareness: Others' Perspectives, Empathy and Compassion • Relationship Management: Effective communication, Collaboration, Teamwork, and Conflict management
Unit IV: Emotional Intelligence: Measurement and Development
• Measures of emotional intelligence • Strategies to develop and enhance emotional intelligence

Practical/ Practice Component

Students will practice self-management techniques to regulate emotions such as

- Mindfulness
- Conditioned relaxation response
- Boundary setting
- Any other

Students will practice various techniques of relationship management such as engaging with:

- Display of empathy
- Effective communication

- Teamwork
- Conflict resolution
- Any other

- If required, students can share their experiences in the form of a Project Report.

Essential Readings

- Any other Practical/Practice as decided from time to time
- Bar-On, R., & Parker, J.D.A.(Eds.) (2000). The handbook of emotional intelligence. San Francisco, California: Jossey Bros.
- Goleman, D. (2005). Emotional Intelligence. New York: Bantam Book.
- Sternberg, R. J. (Ed.). (2000). *Handbook of intelligence.* Cambridge University Press.

Suggested Readings

- HBR's 10 Must Reads on Emotional Intelligence (2015)
- HBR's 10 Must Reads on Managing Yourself (2011)
- Self Discipline : Life Management, Kindle Edition, Daniel Johnson.

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Course Title - Ecology and Literature

Course Objectives:

- To raise awareness among students towards the urgent predicament of Environmental and Ecological crisis and the need for reducing our carbon footprint upon fast depleting, ravaged ecological reserves.
- To develop a heightened ecological consciousness among students, leading to more responsible ecological behavior.
- To view environmental concerns as raised through plays, stories and poems.

Learning Outcomes:

- The course will highlight the urgency of environmental crisis, making studentsconscious and aware of the role each one of us plays.
  into environmental sensitivity and responsible ecologicalbehavior.
- Students will be encouraged to respond to incidents of habitat destruction, deforestation, etc. and realize the need for our urgent intervention.

Syllabus of *Ecology and Literature*

Unit I: Negotiating environmental issues creatively 1. William Wordsworth: 'In April beneath the scented thorn' 2. Rabindranath Tagore: 'The Waterfall' 3. Gieve Patel: 'On Killing a Tree'
UNIT II. Ecocritical literary representations 1. Mary Oliver: 'Sleeping in the Forest' 2.AK Ramanujan: 'A Flowering Tree'
3.Mamang Dai: 'Small Townsand the River'
UNIT III: Empathetic exploration and imaginative re-enactments 1. Amitav Ghosh's 'Part I: Stories' from *The GreatDerangement: Climate Change and the Unthinkable.* 2. ThangjamIbopishak: 'Volcano,Youcannot erupt' from *Dancing Earth: An Anthology of Poetry from North-East India* 3. ThangjamIbopishak. 'Dali, Hussain, or Odour of Dream, Colour of Wind' from *Dancing Earth: An Anthology of Poetry from North-East India*

Practical/ Practice Component

• Students would undertake field visits to a school or a slum in the neighborhood or the play area of residential complexes to share, narrate stories, poems and articulate the ideas

engaged with in the classroom lectures.

- They shall apply imaginative and creative ways of presenting socially responsible ecological behavior through re-tellings of the texts they have studied in the class.
- Creative re-enactment of key ideas studied by students in the form of a play, to be done Individually and/or in a group to create awareness regarding environmental consciousness.
- They can also collectively organize a tree plantation drive in and around the college campus and adopt a sapling each in the college premises and in their neighborhood to take care of.
- Any other Practical/Practice as decided from time to time

SUGGESTED READINGS:

1. Akhter, Tawhida, and Ahmad Bhat, Tariq. Literature and Nature. United Kingdom, Cambridge Scholars Publishing, 2022.

2. Shiva, Vandana. 'Development, Ecology and Women', Staying Alive: Women Ecology and Development. India: Zed Books, 1988. pp 1-14

3. Carl, Safina. Prologue & Chapter 1, Beyond Words: What animals think and feel. Souvenir Press, 2015.

. Garrard, Greg. *Ecocriticism*. United Kingdom: Taylor & Francis, 2011.

5. Wohlleben, Peter. *The Hidden Life of Trees: What They Feel, How They Communicate—Discoveries from a Secret World*. India: Penguin Books Limited, 2016.

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Course Title - Ethics and Culture

Course Objectives

- The course aims to help students explore ethical and cultural dimensions of their lives.
- The course provides a forum for students to pause, revisit their assumptions and beliefs, and become mindful of their thoughts, emotions and actions.
- It gives the students an opportunity to express themselves and inquire into their decision making processes. This will enable them to cultivate ethical values and participate in the creation of a society based on acceptance, compassion, and justice.

Learning Outcomes

- Explore perspectives on ethics in thoughts, words and actions
- Evolve ethical decision making practises
- Understand the need for an ethical society and culture
- Introspect, become conscious of and assess one's stance in life
- Cultivate empathy, tolerance and compassion
- Apply the values learnt in the course to everyday life.

Syllabus of *Ethics and Culture*

Unit 1

Unit I: Introduction | The Basis of Ethics
• Getting to Know Each Other • What to Expect from the Course? • Recognition of Our Common Humanity • Empathy, Compassion and Justice
Unit II: The Role of Intelligence, Reason and Emotions
• Discernment: What Is The Right Thing To Do? • The Art of Conflict Resolution • Destructive and Constructive Emotions • The Need for Emotional Balance
Unit III: Cultivating Inner Values | Ethics in the World of Work and Play
• Training the Mind: Mindfulness and Kindness • Meditation • Discovering your Vocation and Interests • Self-discipline, Integrity, Commitment, Creativity • Work-Life Balance
Unit IV: Striving for a Better World | Outreach Activities
• Means and Ends • Debate and Dialogue • Culture as Shared Values • Creating and Sustaining Ethical Cultures: The Role of Philosophy, Religion, Literature, Theatre, Cinema, Music, Media

Practical/ Practice Component
Unit 1

1. The teacher may ask students to introduce themselves, sharing their regional and cultural roots. They may be asked to reflect on those aspects of their identities that reflect their cultural roots.
2. After a round of initial introduction, the teacher may ask students to list down a set of values that they think they have developed through their parents and grandparents. Are these values unique to their families, regional and/or ethnic backgrounds? Of these, which are the values they would like to sustain and which are the ones they would wish to modify?
3. The teacher may draw upon the values discussed by students in the previous lesson. Using these as the base, the teacher may ask students to think of ethical values that form the basis of their decisions.

4. The teacher may ask students to think of people who they think have lived an 'ethical life'. These may be people who they know from their personal lives or people known for upholding ethical values in the face of adversity.
5. Students are encouraged to identify what are common human values necessary to realise shared common humanity–the feeling of interconnectedness/interdependence.
6. Class to be divided in small groups to discuss how each would make an effort to cultivate new morals/ethical values for betterment of their local environment.
7. Celebrating 'Sharing and Caring' based on regional diversity can be encouraged.
8. Engage students to do activities of 'being in the shoes of others' (peers, parents, siblings, house help/support or in any local community grappling with problems) to understand the problems empathetically.
9. The students can be asked to make bookmarks/cards to remind them about virtues pertaining to empathy versus sympathy, need versus greed, just versus unjust or compassion versus insensitivity.
10. Compassion is about cultivation of it as a daily value so students can in small groups undertake compassion based activities of looking after animals, birds, needy, elderly, differently abled, non-privileged etc. and share their thoughts in the class.

Unit 2

1. Make the student think of a hard decision they have made. What made it hard? How did you make the decision? How do you assess it retrospectively?
2. Encourage students to think of judgements and decisions based on the dilemmas and challenges they faced? How do they go about making these decisions?
3. The teacher may introduce any well known story and ask the students to discuss the story from the point of view of the different characters.
4. Ask students how willing they are to deal with a conflict when it occurs. What strategies do they adopt to resolve the conflict?
5. The teacher may ask students to prepare posters with captions like "avoidance", "competition", "cooperation" and "adaptation" and then may ask students to identify with one of these styles which according to them best represents their style of dealing with conflict.
6. The students may be asked to discuss different such similar situations that they may have encountered and a discussion may be initiated on how they resolve those conflicts.
7. The students can be asked to write down certain destructive emotions that they are experiencing presently. How would they work to make them constructive? A classroom discussion could follow around this.
8. Ask the students to note down a list of constructive emotions experienced by them

recently. Were the constructive emotions less powerful as compared to the destructive ones experienced by them? Discussion in class can follow.

9. How do you (i) express, (ii) handle anger/ disgust/ distress/ fear (any destructive emotion can be taken up). A healthy discussion in the class can take place around this.
10. Students may be asked to practice a simple breathing exercise. They can sit straight with eyes opened or closed in a comfortable position to just observe their breathing. They can repeat this exercise six to eight times and share (if they like) their experience of silence.
11. To identify your interests and develop a meaningful hobby.
12. Have an open conversation in the class about happiness.

Unit 3

1. The students could observe various emotions that bottle-up in their minds and be asked to watch the flow of emotions non-judgmentally.
2. Students may be asked to recall their journey to the college that morning. Do they remember road signs, faces of people they crossed, the roads that they took, the people they interacted with, the sights and smells around them, or anything else?
3. Students could be asked to cultivate the habit of simple greeting as practice of gratitude and celebrate a day of joyful giving.
4. The students can close their eyes for 2-3 minutes and be asked to observe their thoughts, list them and categorise them into 'to be kept' or 'to let go'.
5. The teacher may ask students to close their eyes and imagine a situation in which they are truly happy. Students could wish for the well-being of two students in the same classroom in their meditative state.
6. Students could meditate on who has been their inspiration and the qualities of the person who has inspired them and then express gratitude to the person concerned.
7. The teacher may ask the students to think retrospectively about what they thought they would take up as a vocation when they were younger. How and why their choices were influenced and changed, if at all.
8. The teacher may ask the students to imagine and chart a journey and destination for themselves. They may also talk about the challenges they foresee.
9. The teacher may encourage the students to maintain a daily diary of their scheduling of time or a worklog and see how much time they effectively give to their work. The teacher may help the students identify the distractors and where one may be 'wasting' time and energy. The activity is designed to help students understand the value of effective time utilisation.
10. In this lesson, the teacher may ask the students to draw up a list of team ethics. They may build this based on their experiences of working with each other in groups.

11. The teacher may ask the students to share an incident each where they felt pressurised/bored to complete some work. How did they deal with their stress and monotony of work?

Unit 4

1. Students will be asked to work in pairs and develop situations that pose ethical dilemmas and how to resolve them.
2. Students may be asked to look at a film or at an advertisement and discuss what they think about the question/s posed in them. The teacher may ask them if they can think of an alternative ethical approach to the problem posed.
3. Students will be asked to think of situations in which they lost their temper. Have they ever felt that in a fit of emotion they said something that they regretted later? If they had paused to listen and then respond, what would the other person have said? How would the outcome of the situation have been different?
4. A debate on any relevant topic may be conducted in the class. After the first round the students may be asked to adopt and argue their opponents point of view. At the end of this exercise the students can have an open discussion on which position finally appealed to them.
5. The teacher may give a short story to the students and ask them to change the ending. They may be asked to observe how characters and their views may have undergone change in the process.
6. There can be a discussion around a topic such as, the idea of corporal punishment, euthanasia etc. Students can be given a sheet of paper and can be asked to write for or against the theme. The idea is to enable them to understand that the positions they have taken vis-a-vis the theme are a result of different value orientations.
7. Popular foods from many parts of India can be discussed. Their origins can be traced to chart a kind of food history.
8. The teacher on the basis of discussions with students can draw from Philosophy, Religion, Literature, Theatre, Cinema, and Media to highlight that the choices people/characters make are grounded in their culture.
9. The students can discuss classical/folkdances that are performed in their respective groups. Details can be drawn based on the number of dancers, music (live or recorded) and costumes. The role of oral traditions and literature in indicating the importance of ethics in our everyday lives can be discussed.

Suggested Activities for Outreach: Social/ Community Engagement and Service

In the weeks that follow, students will be expected to engage in outreach activities that shall enable them to put into practice some of the ethical considerations deliberated upon and imbibed in the previous modules. A list of suggested outreach activities is as follows:

- Adopt a village with the aim of cultural and ethical learning
- Discussing health and hygiene issues in a community
- Tutoring students Gender sensitization
- Working on environmental issues
- Working with Child Care Centre such as Anganwadis and Balwadis
- Working with differently abled students
- Preserving cultural and heritage sites
- Spending time with senior citizen including a Senior Citizens Home
- Extending care to animals in animal welfare shelters
- Addressing issues relating to Reproductive Health
- Spreading awareness about adolescent health
- Addressing issues relating to mental health
- Health and nutrition awareness
- Swacchata Abhiyaan
- Sensitisation towards disease awareness
- Vriksharopan

If required, students can share their experiences in the form of a Project Report

Any other Practical/Practice as decided from time to time

Suggested Readings:

- Aristotle. *Nichomachean Ethics*. London: Penguin Classics, 2004
- Swami Vivekananda. *The Complete Works of Swami Vivekananda*. Advaita Ashrama, 2016.

  ---https://www.ramakrishnavivekananda.info/vivekananda/complete_works.html
- Panch Parmeshwar in English translation as The Holy Panchayat by Munshi Premchand
- The Silas Marner by George Eliot
- We are Seven by Wordsworth
- The Chimney Sweeper by William Blake

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Coures Title - Ethics and Values in Ancient Indian Traditions

COURSE OBJECTIVES:

- To understand the rich cultural traditions relating to discourses on life and its purpose, instilling of values relating to ethical and moral propriety.
- To make students more engaged with the past traditions of the country.
- To introduce students to early epics: Puranic, Buddhist and other traditions.

LEARNING OUTCOMES:

- Students will develop an overview of indigenous philosophies.
- Understanding the richness of Indian heritage leading to greater sensitivity.
- Inspiration from history to deal with contemporary issues.
- Appreciate the traditions of diversity, discussions, debates and knowledge transmission.

Syllabus of *Ethics and Values in Ancient Indian Traditions*

Unit I The idea of India and Bharat
1. 'Jambudvipa'; 'Aryavrata'; 'Bharat' ; India 2. Early discourse on moral order- ṛta in Vedic traditions 3. Debates in the Upanishads and the Shramanic traditions
Unit II State, Society and Dharma
1. Kingship and Society: *Dharma, Neeti* and *Daṇḍa* 2. Rashtra, Sanskar and making of socio-cultural milieu
Unit III The 'Purpose of Life' in Texts
1. 'Right Conduct': Buddhist, Jaina and Shramanic Traditions 2. Puruṣārtha Chatushtaya*: Dharma, Artha, Kāma and Mokṣa* 3. Assimilation and Assertion: Ethical issues in Epics and Puranic traditions

Practical/ Practice Component

- Discuss in your locality, in 10-15 households with regard to Ethics and Values in Indian traditions:
  - Vedic traditions
  - Puruṣārtha Chatushtaya
  - Buddhist, Jaina and Shramanic Traditions
  - Jambudvipa; Aryavrata; Bharat; India
- Students are required to explore e-resources available with University of Delhi and other academic institutions.

- Students are required to watch documentaries and films on the subject-related topics.
- If required, students can share their experiences in the form of a Project Report.
- Students may share their experiences in the form of audio-visual presentations of 15-30 minutes.
- Any other Practical/Practice as decided from time to time

Essential Readings

Buietenen, J.A.B. Van, *The Bhagwadgita in the Mahabharata: Text and Translation.* Chicago: Chicago University Press, 1981. Bhagwadgita by Geeta Press Gorakhpur.

Bhasham, A.L, *Wonder that was India: A Survey of the Culture of the Indian Subcontinent Before the Coming of the Muslims.* London, Sidgwick and Jackson, 1954

Dasgupta, S. N. *History of Indian Philosophy*. Cambridge University Press, 1923, Vol. I-II.

Hiltebeital, Alf. *Rethinking the Mahabharata: A Reader's Guide to the Education of the Dharma King.* Chicago: Chicago University Press, 2001.

Kane, P.V. *History of Dharmashastra (Ancient and Medieval Religious and Civil Law),* vol. II, parts 1-2; vol. III 3rd ed. Pune: Bhandarkar Oriental Research Institute,[1941, 1946].

Olivelle, Patric. King, Governance, and Law in Ancient India: Kautilya's Arthashastra. Oxford: Oxford University Press, 2013.

Sharma, Arvind. 'On Hindu, Hindustan, Hinduism and Hindutva'. Numen, 49(1), 2002, p. 1-36.

Suggested Readings

Olivelle, Patric. (text and trans.) *Manu's Code of Law: A Critical Edition and Translation of the Manava-Dharmashastra.* New Delhi: Oxford University Press, 2006.

Rocher, Ludo. 'The Concept of Boundaries in Classical India', in Peter Gaefkke and David A. Utz (eds.), *The Countries of South Asia: Boundries, Extensions, and Interrelations*

Philadelphia: University of Pennsylvania, Department of South Asia Regional Studies (Proceedings of The South Asia Seminar, III, 1982-1983), 1988, p. 3-10.

Sukthankar, V.S., S.K. Belvalkar, and P.L. Vaidya(ed.). *The Mahabharata.* Poona: Bhandarkar Oriental Research Institute, 1933-66.

Tripathi, Radhavallabh, ed. *India's Intellectual Traditions: A Revealed Through Sanskrit Sources*. New Delhi: Sahitya Akademi, 2016.

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Coruse Title - Financial Literacy

Course Objectives

- Familiarity with different aspects of financial literacy such as savings, investment, taxation, and insurance
- Understand the relevance and process of financial planning
- Promote financial well-being Learning Outcomes
- Develop proficiency for personal and family financial planning
- Apply the concept of investment planning
- Ability to analyse banking and insurance products
- Personal tax planning

Syllabus of *Financial Literacy*
Unit I: Financial Planning and Financial products
• Introduction to Saving • Time value of money • Management of spending and financial discipline
Unit II: Banking and Digital Payment
• Banking products and services • Digitisation of financial transactions: Debit Cards (ATM Cards) and Credit Cards. Net banking and UPI, digital wallets • Security and precautions against Ponzi schemes and online frauds
Unit III: Investment Planning and Management
• Investment opportunity and financial products • Insurance Planning: Life and non-life including medical insurance schemes
Unit IV: Personal Tax
• Introduction to basic Tax Structure in India for personal taxation • Aspects of Personal tax planning • Exemptions and deductions for individuals • e-filing

Practical/ Practice Component

- Regular class activities to enhance students' understanding of topics and the application of concepts. The case study method may be followed as a teaching pedagogy.
- Numerical questions pertaining to each unit wherever applicable should be practiced.
- For the second unit, students may be assigned a project wherein they can log on to the website of various banks and conduct an in-depth analysis and comparison of various financial products offered.
- For Unit III, a Project related to building a dummy portfolio of stocks and tracking their returns may be given.

- An investment budget may be given to the students to select investment options that maximize the return and minimize the tax implications.
- For the last unit, students may also file a dummy IT return to get hands-on experience with e-filing.
- Students may conduct a financial literacy survey among at least 25 respondents to measure the level of financial literacy and share the findings in the awareness in the form of a report.
- Any other Practical/Practice as decided from time to time

References

- *Introduction to Financial Planning (4th Edition 2017)* – Indian Institute of Banking & Finance.
- Sinha, Madhu. *Financial Planning: A Ready Reckoner July 2017,* McGraw Hill.

Additional Resources

- Halan, Monika. *Lets Talk Money: You've Worked Hard for It, Now Make It Work for You* July 2018 Harper Business.
- Pandit, Amar *The Only Financial Planning Book that You Will Ever Need* , Network 18 Publications Ltd.

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Course Title - Fit India

Course Objectives:

- Encourage physical activity through engaging the students in sports and yoga.
- Understand the importance of a balanced diet .
- Build skills for self-discipline, self-confidence, cooperation and teamwork.
- Promote fitness as a joyful activity.

Learning Outcomes:

- Adopting a healthy lifestyle.
- Knowledge of nutrition, diet and psycho-physiological aspects of fitness.
- Develop Self-esteem, Self-confidence, Self-discipline and team spirit as indicators of fitness.

Syllabus of *Fit India*
Unit I: Participation in Physical Activity • Fit India Protocol • Physical Activity, Health and Fitness • Indicators of Fitness Practical/Practice • Aerobic Work Out / Physical Activity (Walking) • Yoga – Asanas (Lying, Sitting and Standing positions) and Pranayama • Cardiovascular Testing by 12min/9 min Cooper Run/Walk test
Unit II: Health Related Fitness and their Components • Muscular Strength and Endurance • Body Composition and Flexibility Practical/Practice • Flexibility Training: Back Saver Sit and Reach test • Muscular Strength Training: Curl Ups / Standing Broad Jump/ VerticalJump/ Plyometric • Endurance Training: 1 Mile RockPort Testor 12 /9 minute Cooper run/walk test. • Ideal Body Weight,Body Mass Index (BMI), Waist-Hip Ratio, Waist-Height Ratio (Data of at least 10 persons to be collected)

Unit III: Nutrition and Fitness

- Healthy Eating Plate
- Balanced Diet
- Caloric Content of Food

Practical/Practice

- Preparing Daily Diet and Calorie Chart
- Aerobic Work Out / Physical Activity (Walking)
- Assessment of Physical Activity with the Calorie intake.
- Asanas for :
  - digestive system
  - excretory system

Unit IV: Psycho-physiological aspects of Fitness

- Sports Physiology and Psychology
- Depression, Anxiety and Stress Scale (DASS)
- Rosenberg Self Esteem Scale

Practical/Practice

- Skills learning and Participation in sports
- Group Games / Relays/ Minor Games
- Meditative Asanas and Pranayama
- Fitness component testing (as per Fit India Protocol and Norms) and Analysis of Results
- Data of at least 10 persons to be collected on DASS and self-esteem scale

Note: Concepts are to be taken up during the practical/practice hours.

Essential Readings:

- Fit India Website: https://fitindia.gov.in
- Wener W.K. Hoeger, Sharon
- A. Hoeger - Fitness and Wellness-Cengage Learning (2014).

SUGGESTED READINGS:

- Charles B. Corbin, Gregory J Welk, William R Corbin, Karen A Welk Concepts of Fitness And Wellness_ A Comprehensive Lifestyle Approach-McGraw-Hill (2015)
- W.Larry Kenney, Jack H. Wilmore, Devid L.Costil(2015). Physiology of Sports and Exercise, Second Edition. USA. Human Kinetics.
- Websites of International Sports Federations
- Website of Ministry of Youth Affairs and Sports

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Course Title - GANDHI AND EDUCATION

Course Objectives

1. Seek inspiration from Gandhi's thoughts on education.
2. Analyse Gandhian education philosophy for moral and character development.
3. Understand Gandhi's Idea on Self-reliant education (Swavalambi Shiksha)
4. Relate Gandhi's educational thoughts to NEP 2020

Learning Outcomes

1. Value Gandhian perspective on education
2. Appreciate the significance of education in Indian languages
3. Evaluate the application of Gandhian thoughts in NEP 2020
4. Realise the principles of NEP 2020 in vocational and skill oriented education.

Unit I: Gandhi's Philosophy and education
• Gandhi's Philosophy on education • Education for character building and moral development • Education relating to health, hygiene, heritage, and handicraft
Unit II: Gandhi's Experiment in Education
• Gandhi's educational ideas on use of Indian Language as a medium of Instruction, TextBook and Teacher. • Gandhi's educational thought on Elementary and Adult Education. • Gandhi's vision on Higher Education
Unit III: Gandhi's Educational Thought on Skill and Vocational Education • Rural development through Skill and Local Need Based education • Skill education in NEP 2020 and Gandhi • Gandhi's Idea on Self-reliance (Swavalambi Shiksha) and its reflection in contemporary educational policy.

Practical/ Practice Component

- Regular visits to Gandhi Museum and library to gain insight on Gandhi
- Excursion to Gandhi Ashrams located in different places like Sewagram, Wardha, Sabarmati, Ahmedabad etc.
- Workshops/projects in collaboration with Gandhi Bhawan, Gandhi Smriti and Darshan, Gandhi Peace Center. Ashrams based on innovation in village & cottage industry, Khadi, handicrafts, organic farming etc.
- Adoption of one place for Swachhta Mission or Skill Education
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

ESSENTIAL READINGS

- महात्मा गांधी. (2014). बनिु यादी शिक्षा. वाराणसी : सर्वसेवा संघ प्रकाशन.
- गांधी, मो. क. (2010). मेरेसपनों का भारत. अहमदाबाद : नवजीवन प्रकाशन मंदिर. नवजीवन प्रकाशन मंदिर. (1960). शरीर-

श्रम. अहमदाबादः मो. क. गांधी. pp– 196-231

- प्रभ, ुआर. के. व राव, य. ूआर. (1994). महात्मा गांधी के विचार. इंडिया: नेशनल बकु ट्रस्ट.
- Anand T. Hingorani, ed.] Gandhi, M.K. Our Language Problem (Bombay:
- Bharatiya Vidya Bhavan,), pp. 53-55
- TOWARDS NEW EDUCATION written by M. K. Gandhi Edited by Bharatan Kumarappa

SUGGESTED READINGS:

- गांधी, मो·क· (2012). स य के योग अथवा आ मकथा (वेद , काशीनाथ,अनवु ादक) अहमदाबादः नवजीवन काशन मं दर·
- गांधी, मो·क· (2012). हदं वराज (नणावती, अमतलालृ ठाकोरदास, अनवु ादक)· अहमदाबाद·नवजीवन काशन मं दर
- Coomaraswamy, Anand K . (1910). Art and Swadeshi . Munshi Ram Manoharalal. Delhi

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Course Title - Panchakosha: Holistic Development of Personality

Course Objectives

- To introduce Five *Koshas* – five levels of mind-body complex – *Annamaya, Pranayama, Manomaya, Vigyanamaya* and *Anandamaya Kosha*; for a holistic development of personality.
- To generate awareness about physical and mental wellbeing through the Indian concept of *Panchkosha*.
- To develop a positive attitude towards self, family and society amongst students.
- To guide students build personalities based on the understanding of *Panchkosha*.

Learning Outcomes

- Enhanced physical and mental health.
- Coping with peer pressures and stress.
- Improved concentration leading to better overall performance.
- Manage life situations through a balanced and mature approach.

Syllabus of *Panchkosha: Holistic Development of Personality*

Unit I: Elements of Personality
• *PanchaKosha*: Introduction • Five aspects of Human Personality: *Annamaya Kosha* (Physical body), *Pranamaya Kosha* (Vital life force energy), *Manomaya Kosha* (Psychological wellness), *Vijnanamaya Kosha* (Intellect), *Anandamaya Kosha* (Happiness and Blissfulness) • Health: Mental and Physical
Unit II: *Annamaya Kosha* and *Pranamaya Kosha*
• Human Body and *Pancha Karmendriyas* • *Annamaya Kosha:* Balanced diet and exercise for healthy body • *Pranamaya Kosha:* Development of life force, *Pranayam* • *Charucharya:* Social Etiquettes
Unit III: *Manomaya Kosha* and *Vijnanamaya Kosha*
• *Antahkarana* and its functions • *Pancha Gyanendriyas* • *Manomaya Kosha* : Controlling the *Mana* (mind) • *Vijnanamaya Kosha*: Ability of discretion and decision making
Unit IV: *Anandamaya Kosha* and Beyond
• *Anandamaya Kosha:* Experience of happiness and bliss • Self-realisation, Nature of Consciousness: *Sat-Chit-Ananda*

Practical/ Practice Component

- Recitation of select verses from *Taitiriyopansid*
- *Asana*
- *Pranayama*
- Meditation
- Visit to a Yog shivir or meditation centres
- Students are required to watch documentaries and films on the subject-related topics.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

Essential Readings

- पंचकोश विवेक,स्वामी परमहंस योगनान्द, https://ndl.iitkgp.ac.in/पर उपलब्ध
- विवेक चड़ामू णि, आदि शंकराचार्यद्वारा लिखित, अरविन्द आनंद द्वारा अनदि त, चौखम्भा प्रकाशन, वाराणसी, 2015
- Vivek Chudamani, Adi Shankaracharya, Swami Turiyananda (Sanskrit and English), Sri Ramakrishna Math, Mylapore, 2019
- सभी के लिए योग,बी.के.एस. आयंगार, प्रभात प्रकाशन, 2018
- Yoga The Path to Holistic Health: The Definitive Step-by-step Guide, B.K.S. Iyengar, Dorling Kingsley, London, 2021
- The Sacred Science of Yoga & The Five Koshas, Christopher Sartain, CreateSpace Independent Pub, 2015 Suggested Readings
- PanchaKosha: The five sheaths of the human being, Swami Nishchalanand, Kindle edition.
- Upanisadvakya Mahakosa. (An Upanishadic Concordance, taken from 239 Upanishads, G. S. Sadhale (Compiled by). Chowkhamba Vidyabhawan, Varanasi, 2014
- The Pentagon of Creation: As Expounded in the Upanishads, Ajai Kumar Chhawchharia, CreateSpace Independent Pub, 2015

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Course Title - Social and Emotional Learning

Course Objectives

- This course aims to develop social and emotional awareness in students and initiate them towards better personal and social well-being.
- To create an awareness towards self, others, the environment and their harmonious coexistence.

Learning Outcomes

- Students will be able to become aware of oneself and the society.
- Make informed lifestyle choices and extend the self in the joy of giving.
- Develop empathy, compassion, connect with nature and evolve emotionally to create a more harmonious society.
- Cultivate sensitivity towards discriminatory practices and explore possible solutions.

Syllabus of *Social and Emotional Learning*
Unit I: **Introduction | Self-Awareness and Happiness**
• Getting to Know Each Other • What to Expect from this Course? • Getting to Know Oneself • What Makes One Happy/ Unhappy? Outer vs Inner Sources of Happiness, Joy of Giving
Unit II: Social Relationships | Mindfulness
• Sharing vs Power: Peers, Family and Society • Going Beyond Power Relationships Through Open Conversation • The Value of Silence and Reflection • Practice of Mindfulness
Unit III: **Identity, Self-Image, Status, Self-Worth | Digital Identity**
• Identity Construction and Expression: Individual and Collective • Accepting and Valuing Oneself • Understanding the Gendered World • Identifying and transcending stereotypes • Identity Formation and Validation in the Digital World • Discrimination and its Forms

Unit IV : **Lifestyle Choices | Stress and Its Management**
• What Choices Does One Get To Make? • Is Choice influenced? Relationships, Career Choices • Career Pressures, Examinations • Dealing with Disappointment, Coping Skills, Health and Fitness • Connect With Nature: Sensitivity Towards Other Sentient Beings

Practical/ Practice Component
Unit 1

Getting to Know Each Other

In this lecture, the teacher will facilitate social engagement and personal reflection through a round of introductions. This also provides an opportunity for the teacher and students to recognise the deeper meanings that lie underneath routine exercises of introduction. For example, the adjectives that people use to describe themselves are indicative of the image that they wish others to hold of them. But do they hold the same image about themselves?

Teachers may begin the class by introducing themselves. Any introductory exercise that serves as an ice breaker and creates the classroom space as one of vibrant and open discussions, may be used. Teachers should try and ensure participation of all students in this exercise.

Activities

1.Who is in your circle?

Students may be asked to draw three concentric circles on their notebooks. The central circle is for the topic, the second for 'Love', and third for 'Like'. The space outside the circles is for 'Don't like'. The class decides on one topic, such as food, movies, web series, books, music, interests, etc. Each topic is taken up in turn and students are asked to write what they love, like, and don't like in the circles and share it with others. The exercise helps students to identify with their peers in commonalities and differences. The teacher may use prompts such as 'Why do you like this show?', 'Why do you dislike this food?' etc.

2. I am...

Students are asked to complete the sentences. The teacher may take turns and ask random students to answer it or the teacher may write these on the board and ask every student to write the answer in their notebooks. Some suggested prompt sentences are:

I am excited about.....

I wish I could.....

I am wondering.....

I am feeling anxious about....

Students can choose to share some of the answers with the class. The purpose of the exercise is to bring most students to speak in class and share their honest feelings and thoughts.

3. Introduce Yourself... Know Yourself

In this exercise, the teacher asks all students to take turns to introduce themselves. It is likely that most students will talk about their names, previous qualifications and hobbies. At the end of the introductions, the teacher can identify commonalities such as previous courses undertaken, regional identities, age, or similar common factors. The teacher may then use the following prompts to facilitate discussion:

Do these define you? Are you something more?

Would you like to change any of these qualifiers?

Is there something about you that you would like to share with us? Do you ever wonder about your identity/ identities?

What to Expect from this Course?

In this class, the focus is on understanding the relevance of the course and providing a course overview. Students will be able to explore the various dimensions of their lives and develop insights about themselves and their relationships. By discussing the outline of the course and the suggested activities, the teacher shall bring to the fore the exploratory journey that the students will embark upon. The students' questions relating to the course contents will also be addressed in this lecture.

Activities

In this class, the teacher may undertake an overview of the course, discussing each week's themes briefly. The nature of assignments and evaluation can also be detailed out. The teacher may hold a discussion with students on the following:

1. Why is social and emotional learning important?
2. What can the teacher do to make the classroom a more welcoming and open space for you?
3. What would be some of the activities that you would like to undertake during the course? Such
   as watching movies, reading books, maintaining a reflective journal, engagement in the field, mindfulness exercises, etc.

Self Awareness and Happiness

The aim of this module is to help students develop awareness about themselves – who they are, what their strengths and limitations are, and how they can develop themselves. This will help them to learn interlinkages and distinctions between thoughts, emotions and behaviours. This module will make them aware of the difference between happiness and pleasure and help them ponder on sources of happiness.

Self Awareness

Self-awareness is the experience and understanding of one's own personality – how an individual understands his own feelings, motives, desires, and behaviour, and the triggers for the same. Hence, self-awareness can be considered to be vital for personal development.

Students would thereby become more grounded and confident. This lesson will focus on the student's intrapersonal and interpersonal awareness through discussions and activities.

Activities

1. Students are asked to make a timeline of important events in their life and how each one affected them at that time. Do they see it differently today?
2. SWOT Analysis can be done by each student – Strengths, Weaknesses, Opportunities and Threats.
3. How do they envision their ideal person – What does your ideal person look like? What characteristics do they possess? Identify the gap. How do they plan to fill/reduce the gap?

Happiness

The term 'happiness' includes pleasant and positive emotions which can range from deep satisfaction and contentment to pleasure and excitement. The focus of this session would be to discuss techniques to develop the long-lasting feelings of contentment rather than momentary and short-lived emotions of excitement and pleasure. This will encourage and foster feelings of wellbeing and life satisfaction. The teacher will use activities in order to inculcate the ways of developing and sustaining happiness.

Activities

Writing a gratitude Journal – include in it what you are grateful for.

Mindfulness exercises and developing a mindful way of doing things.

"As one door closes, another door opens". A discussion based on the three opportunities that they think they lost and consider what it was they gained in the process.

Unit 2

Social Relationships

In this module, students will be asked to turn their gaze towards the society in which they are located and where they form social relations. They will be asked to introspect and understand the ways in which they connect with their immediate and extended social surroundings. In this context, peers and family exercise a significant influence on the identities of adolescents and young adults. The students will be asked to assess the nature of their relationship with friends and family and explore these negotiations in the context of sharing versus power.
The teacher will help students broaden their understanding by extending the discussion to include other social relationships, beyond peers and family. They will be encouraged to think about how they are influenced and how they in turn influence the people around them. The class shall explore the importance of open conversation as a means to resolve conflicts and contradictions.

Sharing vs Power: Peers

Identity formation and development is significantly dependent on the peer group with which the individual interacts. During this class, the students may pose the following question to themselves and to each other- What is the nature of the relationships that they share with their peers? Adolescents and young adults like to conform to peer expectations. Students may

explore whether relationships between peers are equal. What forces mediate these relationships? By posing examples from real life, the teacher will encourage the students to closely examine their relationships with their friends and family.

Activities

Ask the students to describe their close friends with fictitious names. They should then be asked why they are close to them and what is the one quality about their friends that they appreciate.

Divide students into groups of 5 each. This can vary depending on the class size. Each group can discuss how they were influenced by their friends in decision making processes.

The class/ group can share a story from their life about how they made a decision based on peer pressure. They should also share the result. Were they happy or unhappy about it? The findings can be discussed in the class.

Sharing vs Power: Family

The family is often considered to be a given and stable construct in which one is born or placed. As the relationships of adolescents with people outside the home grow, their interactions with their families evolve and take on a new and sometimes difficult character. Discussions and activities in the class should help the students objectively analyse their family space and the way in which they negotiate with it at different points of time. Through examples from day to day life, the teacher will help the students understand such spaces and the role they play.

Activities

Describe the ideal family. The students can think about the nature of the ideal created by them. What is the role played by siblings in your personal development?

Role play can be used to perform the different roles in a family so as to understand the different points of view within it.

Sharing vs Power: Society

The individuals generally extend the nature of their relationships with the family to the larger social world. In their pursuit to seek autonomy and independence, they may form new kinds of relationships in the larger social context. These relationships may be characterised by imbalances in power. This lecture will try to help the students strike a balance between self and society and stress the role of dialogue, sharing and cooperation.

Activities

The teacher can ask the students to describe any one constructive social role performed by them. (Any way in which they helped people around them). They can draw, speak, share a photograph or write a creative piece about it.

In the years to come what kind of role do you see yourself performing in society?

Share any one story about a person that has really influenced you? It can be about a public figure or anyone around you.

Going Beyond Power Through Open Conversation

In the previous lectures, the discussion has been around family, peer groups and society. In this session, the focus will be on the ways to build a more egalitarian society—one that is more collaborative, inclusive and takes into account different points of view. Open Conversation is suggested as a way by which acceptance, active listening and empathy can be

encouraged.

Activities

The students can be asked to present a brief performance showing the way in which open conversation can help in conflict resolution.

Movies in line with classroom discussions held in the past few weeks can be shown to the students. Movie screening should be followed by a discussion.

A short story, poem or a play can be used to build on classroom discussions.

Mindfulness

This module focuses on the significance of silence, introspection and non- judgmental awareness of the present moment. These mental practices are for understanding and building humane connection with self and others. The students are sometimes unable to spare time for their inner growth. Mindfulness practices aim at self-awareness and self- acceptance for overall well being. Valuing and practicing silence helps in the process of deeper reflection and builds inner strength to face conflicts with calmness. It hones the ability to develop mental equanimity and equipoise.

The Value of Silence and Reflection

The students will learn to understand the value of silence in the noise around. The practice of silence helps in self-reflection and connecting the inner and outer worlds. It enables one to experience joy, contentment and peace. Silence is a way of understanding how to enjoy one's own company and not to confuse being alone with loneliness. The students will appreciate that silence and solitude are positive and constructive.

Activities

The students can be asked to maintain silence and watch the flow of thoughts and emotions. In the process of silence the students can identify what gives them happiness and what they can do to create happiness for others.

The students can visit natural spaces to understand how silence runs in the sounds of nature which can help them realise peace.

Practice of Mindfulness

Through this lesson, the students will understand the significance of mindfulness as a daily practice for understanding that happiness depends on the self-training of mind. The joy of living in the moment with full awareness and steadiness of mind are important for accepting and cherishing all experiences positively and non-judgmentally.

Suggested Activities

Mindful walk/trek in the garden/forest/mountains or at a monument. Mindful eating while enjoying all elements of tastes in different types of food can also be done.

The students can be engaged in groups for non-judgmental listening

The class can be divided to discuss what activities of the day they engage with full awareness and where the moments go unnoticed

Identity, Self-image, Status, Self-worth

The module is designed to help the learners revisit the constructs of identity, self and personhood. It builds on questions such as 'who am I', 'how do others and I see myself', 'does status and self-image affect my sense of self-worth'. Specifically, it deals with how one's identity takes shape and thereon begins to be an integral part of oneself. It encourages the students to think about what factors influence their self-worth, such as achievements and accumulations, wealth, career or popularity. The students learn to accept and appreciate self and others.

Identity Construction and Expression: Individual and Collective

This lesson is aimed to help the learners deconstruct their sense of identity and rechart the signifiers/ markers and processes which have played a pivotal role in constructing their sense of identity and self. Itunfoldshowprocessesofsocialisationwithinfamily,school,community and society at large have played a role in making students who they are. How do these processes shape our notions of self-concept, self-evaluation, and self-esteem? The students will be able to become aware of their individual and collective sense of identity and self.

Activities

The teacher may ask the students to imagine one's identity in different contexts that are significant for identity construction. For instance, what does identity of being someone's 'child' entail; likewise what kind of an identity does one expect of oneself as a sibling, student and as a friend.

The teacher may ask the students to read from biographies/autobiographies of people from other cultures and discuss excerpts from the books. The teacher may elaborate the qualities of these people.

The teacher may organise a field visit with the students to different places. Ask the students to survey people from those locales about their experiences.

Accepting and Valuing Oneself

This lesson builds on the previous lesson by unpacking how concerns revolving around self-image and status may affect one's sense of self. It aims to make one aware why a challenge to one's identity may lead to discomfort and conflict. Students will be encouraged to accept their physical appearance and identity and to value self-worth. This lesson invites them to undertake an inward journey.

Activities

The teacher may ask students to respond to different characters in a movie where challenges to their identity lead to different kinds of responses.

What will change after 10 years in terms of your identity and what according to you will not change?

The teacher may ask the students to identify an 'open space' and 'sit alone' and write a reflective essay on the theme, 'remember what makes you, you'.

Gender Roles

The objective of this module is to enable the students to differentiate between biological and psychological context of gender in order to understand how their gendered identities are socially constructed. Gender refers to the characteristics of men and women and includes norms, behaviour and roles associated with being man or woman, girl or boy. Further, this will enable the students to become aware that their destiny need not be determined by biology.

Understanding a Gendered World

The objective of this lecture is to enable the students to understand that gender roles are taught by the process of socialization, beginning with the family. Everyday things that we do like eating, speaking, walking, our gestures and even the professions that we think we choose are all often influenced by societal norms.

Activities

The teacher may ask the students to list things associated under the heading; men and women. Once listed, the headings can be interchanged and a discussion may follow.

Ask students to bring an artefact from home, it can be a childhood picture.On the basis of the picture students can share childhood experiences. Through the narrative of their oral history students can share experiences of how they acquired gender.

Identifying and Transcending Stereotypes

In the previous lecture, students have been made aware that gender stereotypes are socially constructed, that the ways in which we interact with others and with ourselves are shaped by gender. The objective of this lecture is to explain the importance of thinking beyond the stereotypes and to reinforce that biological differences between genders should not lead to social discrimination.

Activities

Movie viewing: Students and teachers can choose any movie for discussion.
Quiz cards: On the cards the following can be written and the student can be asked to identify which is socially constructed and which refers to biology.

Men are Breadwinners, Women are homemakers.

Males have XY chromosomes, Females have XX chromosomes.

Women give birth to babies, men don't.

Boys don't cry

Digital Identity

It may be constricting to identify exclusively with ideas like region, ethnicity, language, gender, nationality. For, in this increasingly interconnected world, students find themselves at the intersection of many ideas - evolving and fixed, dominant and marginalised. This rainbow of ideas provides an opportunity to appreciate the diversity in the constitution of an individual's identity. But what happens when one is given a chance to construct a digital identity for oneself? Digital platforms and social networking sites arguably provide an individual the choice to portray oneself the way one likes. Do we choose to present our authentic selves or do we prefer to present highly curated versions of ourselves? Do social media posts reflect self- respect and self-love?

Identity Formation and Validation in the Digital World

Through this session, students are expected to realise the ways in which they construct themselves digitally and how that construction is a manifestation of conformity, resistance and/or subversion, of the dominant ideologies. Students should be encouraged to reflect on what exactly they are seeking from engaging with social media. They need to think how the joy of sharing ideas may be different from the egoic need for compulsive validation.

Activities

Think of the digital filters that you use before sharing your photographs with others. Why do you think you need to do that?

We often feel happy about being validated in the form of 'likes' and positive comments on our social media posts. However, do you feel sad when that does not happen? What could be the possible reason for your mind to have this line of thought?

Digital Identities: Impact on the Self

The students will carry forward the learnings from the previous session and continue their inquiry in the realm of motivations for curating a digital self and its relation to self-esteem. They would be encouraged to engage in a non-judgemental conversation which would motivate them to inquire whether their digital activities are a result of anxiety which may be emanating from their self-image.

Activities

Do you think the use of digital filters is disrespectful to your self? Is not using them a source of anxiety for you? Can this have anything to do with your self-esteem?

Think of situations that make you feel sad on social media. Note them down. Do you think not exposing yourself to such a situation is a solution or do you think you also need to locate the issue within yourself?

Try spending a day without doing any activity on social media like posting anything or surfing other people's accounts for their activities. At the end of the day observe how you feel.

Unit IV

Lifestyle Choices

How we choose to live and behave influences our social and emotional wellbeing. In this module we analyse our lifestyle choices relating to material and cultural consumption, relationships and career. Students will be encouraged to inquire whether our everyday choices are based on a culture of passive consumption and conformism. We will seek to explore possibilities of alternative forms of living premised on ethical consumption, altruism, simple and sustainable living.

What Choices Does One Get to Make?

In this session, the attempt will be to explore the extent to which consumerism impacts our lifestyle choices and the repercussions of these on our natural and social environment. Today we live in an era of mass consumption and consumer culture fostered by advanced technologies and global production systems. Overt materialism, wasteful and conspicuous

consumption unmindful of the larger implications are key aspects of this phenomenon. In this lecture, we explore our lifestyle choices such as our physical image, attire, dietary choices, desire for dream homes and destination weddings. This would be the starting point for a re-imagination of a world based upon choices that would lead to simple and sustainable living.

Suggested Activities

Students may be asked to work through their consumption history right from their childhood. A discussion may then be initiated by asking the students to reflect on their consumption choices and their motives behind the same.

The teacher may identify a few products like tea, coffee, coca-cola, jeans etc and ask the students to trace product histories and geographies.

The students may be asked to discuss a strong desire to possess an object and then deconstruct that desire. Discussion may emphasise upon why they wanted it?

Is Choice Influenced? Relationships, Career Choices

In this lecture, we examine the extent to which lifestyle choices, regarding relationships and career, get influenced and by what factors. Do we really have a choice as regards the career that we intend to pursue? Often factors like family, gender, the need for security and stability influence our choices. Recognizing and mapping the space of freedom and unfreedom with respect to our choices is a necessary life skill that would enable a more self-aware and harmonious living.

Activities

Reflect on an instance where you may have inflicted pain on someone and also think of a moment when you felt someone was insensitive in their conduct of a relationship.

The teacher may divide the class into small groups and hold a discussion on what constitutes a successful career.

Reflect on the various career options available in your society and discuss what you would prefer to pursue and why?

Discrimination

The module is designed to help the learners understand the origin and nature of discrimination and the effects thereof. Discrimination can be on various grounds such as ethnicity, religion, caste, race, gender, disability, or place of birth. One's discriminatory actions can lead to social fragmentation. The module encourages the learners to introspect their actions and seeks to celebrate diversity.

Why and How? Forms of Discrimination

The objective of this lesson is to make learners aware of different forms of discrimination. On the one hand, an individual can be a victim of discrimination, and on the other, the same person

may harbour prejudice or discriminate against others. It is pertinent to understand our own biases and introspect our actions.

Activities

The teacher can ask students to count their friends who belong to different backgrounds. They can reflect on what they have learned by interacting with these friends.

Ask students to learn about their neighbourhood and document what groups live there, what has been the nature of their relationships.

An exercise on privilege using nothing but wadded up papers and a trash can. Students Learn A Powerful Lesson About Privilege. https://youtu.be/2KlmvmuxzYE

Stress and Its Management

This module is designed to give students an opportunity to articulate the pressures and challenges that one experiences in life. It gives students a chance to spell out how pressure to perform well can become a source of stress. The module is aimed to equip the learners with ways of dealing with disappointments with regard to the choice of career path and with performance related stress. It brings to fore skills of coping with stress and disappointments. It also highlights the role of physical well-being in keeping oneself mentally healthy.

Career Pressures, Examinations

This lesson is designed to help students have a relook at the challenges and pressures they have recently faced or are facing on account of career choices and examinations. It gives them a space to articulate what they might have faced while making these choices. This lesson also gives them an opportunity to highlight the uncertainties and challenges they foresee in their future lives.

Activities

The teacher may ask the students to organise themselves in groups of 4-6. Each of the groups have to do a role-play around the themes on career pressures.

Show images of different people and ask the students to quickly jot down impressions. The collective answers serve as a springboard for discussions. Students may learn about their own

biases through this activity.

The teacher may ask the students to identify movies where struggles related to career and performance pressure stand out.

The teacher may ask the students to share their experiences about the following:

- First few months into an academic programmes
- 2 months before examinations
- On the day of examination
- 15 days after examinations get over

Dealing with Disappointments, Coping Skills, Health and Fitness

This session aims to equip the learners with coping skills to manage stress and deal with disappointments. Furthermore, it makes them aware of the importance of health and fitness for maintaining mental health.

Activities

The teacher can ask the students to write how they come to know they are stressed and what they do when they are stressed? The teacher may engage them in a discussion on coping skills and channelize students' energies into positive ways of resolutions of conflict and stress.

The teacher may ask the students to discuss the lives of high achievers and low achievers and how performance pressures drive their lives. Can they draw similarities and differences in the sources of stresses and how they deal with these stresses?

Ask each of the students to share their daily regime to keep themselves physically fit. The students may also share how each one mentally 'feels/experiences' when one is engaged in physical exercises.

Connect with Nature

This module is designed to strengthen bonds with nature while understanding its intrinsic value as opposed to its instrumental value. Issues of global warming and environmental degradation are the consequences of a disconnect between humans and nature. The aim is to cultivate environmental awareness through virtues of altruistic responsibility, empathy, cohesiveness, and mutual sustainability between nature, flora-fauna, animals and humans. The students may be engaged in activities to build bridges between the inner environment (one's self) and external environment (nature). In this way, they can celebrate oneness with nature and perceive nature not as a means but an end in itself.

Sensitivity Towards Other Sentient Beings

The students, in this session, would participate in group based environmental activities as a way of building social responsibility towards all sentient beings. Any action against even a part of nature impacts the whole. Thus, it is the responsibility of all, to create a safe environment for all sentient beings to live in harmony.

Activities

Students can be encouraged for Nature walks, nature drives, treks and hikes, nature photography, adopting natural spaces in local areas, plantation drives, visiting biodiversity parks, adopting spaces for greening etc.

Visits to animal shelters can be organised to sensitise the students.

Films can be screened on environmental sustainability, environmental consciousness etc

- Any other Practical/Practice as decided from time to time

Suggested Readings

- Black,Donna Lord(2022). Essentials of Social and Emotional Learning (SEL). NJ : Wiley.
- Goleman,Damiel (2005). Emotional Intelligence.USA:Bantam.
- Swami Vivekanand. (2016).The complete works of Swami Vivekanand. Advaita Ashrama.(https://www.ramakrishnavivekanand.info/vivekanand/complete works.html)

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Course Title - Sports for Life

Course Objectives

- To imbibe the significance of sports to promote health, fitness and wellness in life.
- To understand the values of teamwork, tolerance, goal-setting and decision making.
- To learn the strategies and tactical moves while playing a sport.
- To understand the importance of physical activity in reference to 3S: strength, speed and suppleness.

Learning Outcomes

- Acquire values of cooperation, team spirit, determination, and endurance.
- Acquire good health and psychological well-being through sports participation.
- Apply the decision making-ability and goal-setting skills acquired through sports participation in everyday life.
- Acquire skills for engaging in moderate or vigorous physical activity and sports participation.
- Reduce exposure to screen time on electronic gadgets and channelising energy through sports participation.

Syllabus of *Sports for Life*

Unit I: Rules and Techniques
Concept • Rules of the Sport • Techniques / skills in the sport/ Aerobic Skills ***Practical*** • Marking of the court / field • Outdoor Adventure Activity • Skills learning in sports • Group Games / Relays • Participation in Intramural competitions

Unit II: Components of Fitness

Concepts

- Meaning and Development of Strength, Speed, Endurance, Flexibility and Coordinative Abilities.

Practical

- Skills learning and Participation in sports
- Group Games / Relays / Minor games
- Participation in Intramural competitions

Unit III: Benefits of sports and physical activity

Concepts

- Effect of exercise on the body
- Organizing of a sports competition
- Balanced Diet

Practical

- Skills learning and participation in sports
- Group Games, / Relays /Step Aerobics
- Participation in Intramural competitions

Unit IV: Sports in Contemporary Times

Concepts

- Honours and Awards associated with sports and sportspersons

Practical

- Skills learning and Participation in sports
- Participation in Intramural competitions

Note

- **The concepts are to be dealt with during the practical/practice classes.**

- The list of suggestive sports: Aerobics and Physical Activity, Athletics, Archery, Badminton, Basketball, Boxing, Chess, Carrom, Cricket, Football, Handball, Hockey, Kabaddi, Kho-Kho, Swimming, Shooting, Squash, Table-Tennis, Tennis, Taekwando, Volleyball, Wushu, Wrestling etc.

Suggested Readings

- James R Morrow Jr., Dale P. Mood, James G. Disch, Minsoo Kang - Measurement and Evaluation in Human Performance-Human Kinetics Publishers (2015)
- W.Larry Kenney, Jack H. Wilmore, Devid L.Costil.(2015). Physiology of Sports and Exercise, Second Edition. USA.Human Kinetics.
- Wener W.K. Hoeger, Sharon A. Hoeger - Fitness and Wellness-Cengage Learning (2014).
- Kansal DK (2012).A practical approach to Measurement Evaluation in Physical Education &Sports selection. Sports & Spiritual Science Publications, New Delhi.
- Websites of International Sports Federations, Ministry of Youth Affairs and Sports Govt. Of India.

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Coruse Title - Swachh Bharat

COURSE OBJECTIVES:

- To understand the developmental challenges with reference to sanitation infrastructure and practices.
- To build values of cleanliness, hygiene and waste management in diverse socio-economic contexts.
- To understand planning of social policy and programmes.
- To use waste management techniques at community level.
- To instill a sense of service towards society and the Nation. LEARNING OUTCOMES:
- Understanding the significance of the Swachh Bharat Abhiyan.
- Ability to analyse and predict the sanitation challenges of India
- Determine the link between sanitation and development.
- Contribute to the Swachh Bharat Abhiyan through real time projects/fieldwork

Syllabus of *Swachh Bharat*

Unit I: Introduction to Swachh Bharat Abhiyan
• Gandhian philosophy of Cleanliness • Swachh Bharat Abhiyan (SBA) • Hygiene, Sanitation & Sustainable Waste Management • Agencies and nodal Ministries for SBA • Different phases of the SBA and its evaluation • Citizens' Responsibilities: Role of *Swacchagrahi*
Unit II: Swachh Bharat: Rural and Urban Facets
• Indicators for Swachh Bharat • Rural ❖ Sanitation coverage across households (2014 vs. 2022) ❖ Open Defecation Free (ODF) Villages: Parameters ❖ ODF plus model: Key indicators • Urban ❖ Sustainable sanitation ❖ Waste/water and solid waste management ❖ Garbage Free Cities
Unit III: Prospects and Challenges
• Attitudes and Perceptions • Operational and Financial issues • Monitoring & Supervision • Community Mobilization

Practical/ Practice Component

Suggested Activities: List of activities to be undertaken:

- Identify plastic and e-waste in and around the institution and suggest innovative technologies to minimize wastage.
- Identify events/fests that generate maximum waste and ways to minimize it.
- Visit canteen/shops and track the lifecycle of wet/dry waste in and around the institution and document the findings in the form of a Project Report.
- Conduct interviews of stakeholders to understand the level of awareness.
- Conduct a Clean Audit of the Institution and identify areas for action.
- Conduct cleanliness drives.
- Organise Swachhata Pakhwada meetings, rallies, and mobilization camps within the identified
- communities.
- Students may participate in the Swachh Bharat Internship programme.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

Essential Readings

- "Swachh Bharat Mission - Gramin, Department of Drinking Water and Sanitation, Ministry of Jal Shakti"
- India 2021, Ministry of Information & Broadcasting
- http://swachhbharatmission.gov.in/SBMCMS/swachhta-pakhwada.htm
- https://swachhbharatmission.gov.in/SBMCMS/about-us.htm
- https://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/ODF_verification_checklist.pdf
- https://sbm.gov.in/phase2dashboard/PhaseII/NationDashboard.aspx
- https://www.niti.gov.in/sites/default/files/2019-08/Report%20of%20Sub-Group%20of%20Chief%20Ministers%20on%20Swachh%20%20Bharat%20Anhiyaan.pdf

Suggested Readings

- **https://swachhbharatmission.gov.in/SBMCMS/writereaddata/Portal/Images/pdf/brochure/Greywatermanagement.pdf**
- **https://swachhbharatmission.gov.in/SBMCMS/writereaddata/Portal/Images/pdf/brochure/PWMB5_28th_June.pdf**
- GoI (2020). Swachh Bharat Mission (Grameen) Phase 2: Operational guidelines. Department of Drinking Water and Sanitation, Ministry of Jalshakti.
- MoHUA (2017). Guidelines for Swachh Bharat Mission - Urban (PDF). Ministry of Housing and Urban Affairs, Government of India.

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Course Title - Vedic Mathematics

Course Objectives:

- Foster love for maths and remove its fear through Vedic Mathematics
- Enhance computation skills in students through Vedic Mathematics
- Develop logical and analytical thinking
- Promote joyful learning of mathematics
- Discuss the rich heritage of mathematical temper of Ancient India

Learning Outcomes:

- Overcome the fear of maths
- Improved critical thinking
- Familiarity with the mathematical underpinnings and techniques
- Ability to do basic maths faster and with ease.
- Appreciate the Mathematical advancements of Ancient India.

Syllabus of *Vedic Mathematics*

Unit I: Vedic Maths- **High Speed Addition and Subtraction**
• Vedic Maths: History of Vedic Maths and its Features • Vedic Maths formulae: *Sutras* and *Upsutras* • Addition in Vedic Maths: Without carrying, Dot Method • Subtraction in Vedic Maths: *Nikhilam Navatashcaramam Dashatah* (All from 9 last from 10) • Fraction –Addition and Subtraction
Unit II: Vedic Math - **Miracle Multiplication and Excellent Division**
• Multiplication in Vedic Maths: Base Method (any two numbers upto three digits) • Multiplication by *Urdhva Tiryak Sutra* • Miracle multiplication: Any three-digit number by series of 1's and 9's • Division by *Urdhva Tiryak Sutra* (Vinculum method)
Unit III: Vedic Maths-**Lightening Squares and Rapid Cubes**
• Squares of any two-digit numbers: Base method • Square of numbers ending in 5: *Ekadhikena Purvena Sutra* • Easy square roots: *Dwandwa Yoga* (duplex) *Sutra* • Square root of 2: *Baudhayana Shulbasutra* • Cubing: *Yavadunam Sutra*
Unit IV. Vedic Maths-**Enlighten Algebra and Geometry**

- Factoring Quadratic equation: *Anurupyena, Adyamadyenantyamantya Sutra*
- Concept of *Baudhayana* (Pythagoras) Theorem
- Circling a square: *Baudhayana Shulbasutra*
- Concept of pi: *Baudhayana Shulbasutra*
- Concept angle (θ) $0^{\circ}, 30^{\circ}, 45^{\circ}, 60^{\circ}$ and 90°: *Baudhayana* number

Note: **Some of the theoretical concepts would be dealt with during practice hours.**

Practical/ Practice Component

he students are expected to demonstrate the application of Vedic Maths: *Sutra* and *Upsutra*

- Conduct workshops under the supervision of the course teacher to spread awareness on the utility of Vedic Mathematics.
- Students are required to visit nearby retail shops/local vendors to purchase stationery/vegetables/bread and butter and use tricks of Vedic maths of addition and subtraction to calculate the amount to pay and receive the difference.
- Students may share their experience with the class teacher in the form of audio-video presentations of 15 minutes.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

Essential Readings

- The Essential of Vedic Mathematics, Rajesh Kumar Thakur, *Rupa Publications*, New Delhi 2019.
- Vedic Mathematics Made Easy, Dahaval Bathia, *Jaico Publishing*, New Delhi 2011
- Vedic Mathematics: Sixteen Simple Mathematical formulae from the Vedas, Jagadguru Swami Sri Bharati Krishna Trithaji, *Motilal Banarasidas*, New Delhi 2015.
- Learn Vedic Speed Mathematics Systematically, Chaitnaya A. Patil 2018.

Suggested Readings

- A Modern Introduction to Ancient Indian Mathematics, T S Bhanumurthy, Wiley Eastern Limited, New Delhi
- Enjoy Vedic Mathematics, S M Chauthaiwale, R Kollaru, The Art of Living, Bangalore
- Magical World of Mathematics, VG Unkalkar, Vandana publishers, Bangalore

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Course Title - Yoga: Philosophy and Practice

Course Objectives

- To learn the fundamentals of Yoga for harmonising the body, mind and emotions.
- To demonstrate the value and the practice of holistic living.
- To value the heritage of Yoga for self and society.

Learning Outcomes

- Understanding ways to harmonise the body and mind through Yoga.
- Disciplining the mind through practicing Yoga.
- Understanding of consciousness through practical training.

Syllabus of *Yoga: Philosophy and Practice*

Unit I: Yoga: *Asana, Prāṇāyāma* and *Dhyana*
• History of Yoga • Significance of Asana • Effect of Praṇayama • Importance of *Dhyana*
Unit II: Patanjali's *Yogasūtra* and *Chakra*
• Patanjali's Yogasūtra: a summary • First sutra • Second sutra • *Chakras* (psychic centres)
Unit III: Understanding *Asana* and *Pranayama*
• Asana: the basics • *SuryaNamaskara* • *Nadishodhana Praṇayama*

Practical/ Practice Component

- Surya Namaskar
- Selected Asana
- *Praṇayama*
- Relaxation exercises for the eyes (7 steps) neck (4 steps)
- Concentration on *Bhrumadhya*

- Project Work (effect of everyday concentration on breath for 15 minutes: reflections to be compiled in the form of a Project report.
- Any other Practical/Practice as decided from time to time

Essential Readings

- Āsanas, Prāṇāyāmaand Mudra Bandh , Swami SatyanandaSaraswati, Yoga Publications Trust, Munger, Bihar, India, 2004.
- Patanjali Yogasutras, Commentary by Swami Vivekanand, Rajyoga

Suggested Readings

- PatanjalYog Pradeep- Swami OmanandSaraswati, Gita Press, Gorakhpur, 2013.
- Science of Pranayama-Swami Sivananda, Edition by David De Angellis, 2019, All Rights Reserved.
- Udayveer Shastri Granthavali,4, Patanjal- Yoga Darshanam, Udayavir Shastri, Govindram Hasanand, Delhi 6.

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Course Title - भारतीय भक्ति परंपरा और मानव मूल्य

COURSE OBJECTIVES

- भारतीय भक्ति की महान परंपरा, प्राचीनता और इसके अखिल भारतीय स्वरूप सेछात्रों का परिचय कराना
- भारतीय भक्ति परंपरा के माध्यम सेछात्रों मेंमानव मूल्यों और गुणों को जगाकर उनका चारित्रिक विकास करना और एक अच्छे मनुष्य का निर्माण करना ।
- छात्रों को भारतीय नैतिक, सांस्कृतिक और सामाजिक मल्ूयों के प्रति जागरूक करना ।
- भारतीय भक्ति परंपरा के माध्यम सेराष्ट्रीयता और अखिल भारतीयता की भावना जागतृ करना।

LEARNING OUTCOMES

- भारतीय भक्ति परंपरा के माध्यम सेछात्रों मेंमानव मल्ूयों और गुणों को विकास होगा और वे एक अच्छेऔर चरित्रवान मनष्ुय बन सकेंगे।
- भारतीय भक्ति परंपरा के सांस्कृतिक और सामाजिक पक्षों की जानकारी हो सकेगी।
- भक्ति की प्राचीनता और अखिल भारतीय स्वरूप की जानकारी सेराष्ट्रीयता और अखिल भारतीयता की भावना जागतृ और मजबतू होगी।
- प्रमखु भक्त कवियों का परिचय और उनके विचारों की जानकारी हो सकेगी।

Unit I: भारतीय भक्ति परंपरा

भक्ति: अर्थऔर अवधारणा भक्ति के विभिन्न संप्रदाय और सिद्धांत भारत की सांस्कृतिक एकता और भक्ति भक्ति का अखिल भारतीय स्वरूप
Unit II: भारत के कुछ प्रमखु भक्त और उनके विचार
संत तिरुवल्लवर ु , आण्डाल, अक्कमहादेवी, ललयद , मीराबाई, तलसीदास ु , कबीरदास, रैदास, गरु ु नानक, सरदास ू , जायसी, तकाराम ु , नामदेव, नरसिंह मेहता, वेमना, कं चन ु , नम्बियार, चैतन्य महाप्रभ, ुचंडीदास, सारला दास, शंकरदेव
Unit III: मानव मल्ू य और भक
मानव मल्ू य का अर्थ चयनित भक्त कवियों की जीवन मल्ू यपरक कविताएँ

Practical/ Practice Component

• पाठ्यक्रम मेंउल्लिखित कवियों मेंसेकिसी एक कवि की रचनाओंमेंविभिन्न मानव मल्ूयों केआधार पर प्रोजेक्ट

• वर्तमान समय मेंभक्ति की प्रासंगिकता को समझना; सर्वे और साक्षात्कार पद्धति केआधार पर.

• जीवन मेंमानव मल्ूयों के प्रतिपालन पर सर्वे और साक्षात्कार केआधार पर एक रिपोर्टबनाना.

• उल्लिखित कवियों मेंसेकिसी एक कवि सेसंबंधित किसी मठ, आश्रम या मंदिर आदि, अथवा कोई फिल्म/ डॉक्यमु ेंट्री केआधार पर रिपोर्टबनाना.

• आवश्यक हो, तो छात्र प्रोजेक्ट रिपोर्ट के रूप में अपने अनभव साझा कर ु ें

• Any other Practical/Practice as decided from time to time

Essential Readings

• 'भक्ति का उद्भव और विकास तथा वैष्णव भक्ति के विविध रूप', भारतीय साहित्य का समेकित इतिहास, संपादक- डॉ नगेंद्र, हिंदी माध्यम कार्यान्वयन निदेशालय, दिल्ली विश्वविद्यालय, दिल्ली, पष्ृठ संख्या 215-250

• कुछ प्रमखु कवियों के चयनित पद

• 'भक्ति आंदोलन और भक्ति काव्य', शिव कुमार मिश्र, अभिव्यक्ति प्रकाशन, इलाहाबाद, 1994

• 'मानव मल्ूय और साहित्य', डॉ धर्मवीर भारती, भारतीय ज्ञानपीठ, नई दिल्ली,1999 Suggested Readings:

• 'भक्ति केआयाम', डॉ. पी. जयरामन, वाणी प्रकाशन, नई दिल्ली

• 'हिंदी साहित्य का इतिहास', आचार्यरामचंद्र शक्ु ल, लोक भारती प्रकाशन, इलाहाबाद

- 'मध्यकालीन हिंदी काव्य का स्त्री पक्ष', डॉ. पनमू कुमारी, अनामिका पब्लिशर्सएंड डिस्ट्रीब्यटुर्स, नई दिल्ली

- 'मध्यकालीन हिंदी भक्ति काव्य: पनु मूल्मूयांकन केआयाम', डॉ. पनमू कुमारी, अनामिका पब्लिशर्सएंड डिस्ट्रीब्यटुर्स , नई दिल्ली

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Course Title - सृजनात्मक लेखन के आयाम

पाठ्यक्रम का उद्देश्य (Course Objectives):

1. सृजनात्मक और भाषायी कौशल का संक्षिप्त परिचय कराना
2. विचारों का प्रभावी प्रस्तुति करण करना
3. सृजनात्मक चिंतन और लेखन क्षमता को विकसित करना
4. मीडिया लेखन की समझ विकसित करना पाठ्यक्रम अध्ययन के परिणाम

(Learning Outcomes):

1. सृजनात्मक चिंतन और लेखन क्षमता का विकास हो सके गा
2. लेखन और मौखिक अभिव्यक्ति की प्रभावी क्षमता विकसित हो सके गी
3. मीडिया लेखन की समझ विकसित होगी
4. विद्यार्थी में अपने परिवेश, समाज तथा राष्ट्र के प्रति संवेदनशीलता का विकास होगा

Syllabus: सृजनात्मक लेखन के आयाम

इकाई – 1 (Unit I): सृजनात्मक लेखन • सृजनात्मक लेखन: अर्थ, स्वरूप और बोध • सृजनात्मक लेखन और परिवेश • सृजनात्मक लेखन और व्यक्तित्व निर्माण
इकाई – 2 (Unit II): सृजनात्मक लेखन : भाषिक संदर्भ
• भाव और विचार का भाषा में रूपान्तरण • साहित्यिक भाषा की विभिन्न छवियाँ • प्रिंट तथा इलेक्ट्रोनिक माध्यमों की भाषा का अंतर
इकाई 3 (Unit III): सृजनात्मक लेखन – विविध आयाम

- कविता, गीत, लघु कथा
- हास्य - व्यंग्य लेखन,
- पल्लवन, संक्षेपण, अनूच्छेद

Practical/ Practice Component

- कक्षा में प्रत्येक विद्यार्थी द्वारा 'मेरी पहली रचना' शीर्षक से किसी भी विधा में लेखन
- किसी भी साहित्यिक रचना का भाषा की दृष्टि से विश्लेषण
- इकाई- 3 में उल्लिखित विधाओं में विद्यार्थियों द्वारा लेखन एवं सामहू िक चर्चा
- प्रत्येक इकाई से संबन्धित परियोजना कार्य: o समसामयिक विषयों पर किसी भी विधा में लेखन – बदलते जीवन मल्ू य, महामारी, राष्ट्र निर्माण में छात्र की भमि ू का, यवाओं के क ु र्तव्य, पर्यावरण संरक्षण, लोकतन्त्र में मीडिया की भमि ू का, ऑनलाइन शॉपिंग अथवा अन्य समसामयिक विषय o किसी उत्सव, मेला, प्रदर्शनी, संग्रहालय और किसी दर्शनीय स्थल का भ्रमण तथा उस पर परियोजना कार्य
- प्रिंट माध्यम के खेल, राजनीति, आर्थिक और फिल्म जगत आदि से जड़ी साम ु ग्री का भाषा की दृष्टि से विवेचन
- इलेक्ट्रोनिक माध्यम के समाचार, धारावाहिक, विज्ञापन आदि का भाषा की दृष्टि से विवेचन
- आवश्यक हो, तो छात्र प्रोजेक्ट रिपोर्ट के रूप में अपने अनभव साझा कर ु ेंं
- Any other Practical/Practice as decided from time to time अनिवार्य पाठ

(ESSENTIAL READINGS)

- लेखन एक प्रयास, हरीश चन्द्र काण्डपाल

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Proposed Course Structure for 4 Year Undergraduate Programme under CBCS System

Ability Enhancement Courses (AEC)

Semester – I (AEC- 1)

Science	Social Science/Arts	Commerce
• MIL	• MIL	• MIL

Semester – II (AEC- 2)

Science	Social	Commerce
• Environmental Science	• Environmental Science	• Environmental Science

Semester – III (AEC- 3)

Science	Social	Commerce
• Course on Disaster Risk Management	• Course on Disaster Risk Management	• Course on Disaster Risk Management

Semester – IV (AEC- 4)

Science	Social Science/Arts	Commerce
• Course on NCC/NSS/NGO's/Social Service/Scout & Guide/Sports	• Course on NCC/NSS/NGO's/Social Service/Scout & Guide/Sports	• Course on NCC/NSS/NGO's/ Social Service/Scout & Guide/Sports

List of Ability Enhancement Course (AEC)

SL. NO.	Course Title	LTP Distribution of the Course			Total Credits:	Total Marks = 100
		L	T	P		
1	MIL (Semester – I)	2	1	0	2	End -Term Appraisal : 70 Marks Internal Assessment: 30 Marks
2	Environmental Science (Semester – II)	2	1	0	2	
3	Course on Disaster Risk Management (Semester – III)	2	1	0	2	
4	Course on NCC/NSS/NGO's/Social Service/Scout & Guide/Sports (Semester – IV)	2	1	0	2	

Proposed Course Structure for 4 Year Undergraduate Programme under CBCS System

Ability Enhancement Course (AEC)

Semester – I (AEC- 1)

Science	Social Science/Arts	Commerce
• **MIL**	• **MIL**	• **MIL**

ENGLISH COMMUNICATION

Course Learning Objectives:

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. The present course hopes to address some of the aspects of effective communication skills through an interactive mode of teaching-learning process. The various dimensions of communication skills that will be focused in the course include language of communication, speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note taking etc.

Syllabus:

1. Introduction:
   - Theory of Communication
   - Types and modes of Communication
   - Effective Communication/ Mis- Communication
   - Barriers and Strategies
2. Language of Communication:
   - Verbal and Non-verbal (Spoken and Written)
   - Personal, Social and Business
   - Intra-personal, Inter-personal and Group communication
3. Speaking Skills
   - Dialogue
   - Group Discussion
   - Interview
   - Public Speech
   - Role Play/Extempore Presentations

4. Reading and Understanding

- Close Reading
- Comprehension, Analysis and Interpretation

- Summary ParaphrasingTranslation (from Indian language to English and vice-versa)

Literary/Knowledge Texts

5. Writing Skills

- Making notes
- Documenting
- Report Writing
- Writing Letters - job applications, CV and Resume
- Academic Writing
- Writing a Proposal

Readings:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. 4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

REMEDIAL ENGLISH

Learning Objectives:

English language skills – reading, writing, speaking and listening – are fundamental in constructing knowledge in all academic disciplines, succeeding in the world of work, and making sense of everyday life. The standards and benchmarks enlisted in this syllabus can help students adapt to the continually changing world of communication and develop a global outlook.

Through this course the students will be able to acquire the following set of literacy standards/ skills and implement them as working strategies: 1. Will engage in and gain basic proficiency in reading and comprehension 2. Will speak to a) inform b) describe c) explain d) persuade. The style and vocabulary will be at the beginners' level. 3. Make use of the grammar, syntax and tone of speech at the preliminary level. 4. Will read a variety of materials to facilitate comprehension. 5. Will understand the elements of grammar and its functions in a text. 6. Employ reading strategies such as scanning, selecting and summarising at the preliminary level. 7. Learn types of sentences – statement, question, exclamation, affirmative and negative. 8. Will gain and demonstrate basic competence in speaking, reading and writing.

Syllabus:

READING

1. Simple comprehension texts of description, narration, information, explanation and persuasion based on higher order thinking skills.
2. Contextualised grammar focus.
3. Vocabulary – basic synonyms and antonyms.

GRAMMAR

1. Parts of speech
2. Transformation of parts of speech
3. Nouns – gender and number; Countable and uncountable nouns
4. Verbs and tenses
5. Use of auxiliaries
6. Agreement of verb with subject
7. Use of articles
8. Use of adjectives and adverbs
9. Use of selected prepositions
10. Affirmative, negative and interrogative sentences
11. Question tags
12. Phrasal verbs
13. Direct and indirect narration

ENGLISH: ACADEMIC WRITING

Learning Objectives:

The syllabus aims to develop a critical and informed response to a range of texts/extracts, the skills of summarization and condensation, the skills of comprehension, the skills of analysis, synthesis and evaluation of content, correct usage and application of vocabulary.

Syllabus:

1. Features of Argumentative/Persuasive Writing

Reading and General Understanding

Writing practice: identifying arguments, counterarguments, non- arguments refuting arguments, style of persuasion, organizing an argumentative essay
Grammar Focus: Use of conjunctions as connectors, conditionals, noun clauses

2. Features of Comparison and Contrast Essay

Reading and General Understanding
Writing Practice: developing a comparison-contrast structure
Grammar Focus: Clauses for comparison, contrast, concession, transitions

3. Features of Literary Analysis

Reading and General Understanding

Writing Practice: plot devices, themes, symbols, figures of speech, tone, mood, style, organizing discourse structure

Grammar Focus: Conditional Sentences

4. Planning an Academic Essay

Writing Practice: discourse structure, essay-outline, paragraph-sequence, using citation.

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Semester – II (AEC- 2)

Science	Social Science/Arts	Commerce
• Environmental Science	• Environmental Science	• Environmental Science

Unit 1: Introduction to environmental studies

- Multidisciplinary nature of environmental studies
- Scope and importance; Concept of sustainability and sustainable development.

Unit 2: Ecosystems

- What is an ecosystem?
- Structure and function of ecosystem;
- Energy flow in an ecosystem: food chains, food webs and ecological succession.
- Case studies of the following ecosystems:
  a) Forest ecosystem
  b) Grassland ecosystem
  c) Desert ecosystem
  d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources: Renewable and Non – renewable Resources

- Land resources and land-use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests,
- biodiversity and tribal populations.
- Water: Use and over – exploitation of surface and ground water, floods, droughts, confl - icts
- Over water (international & inter-state), Dams – benefits and problems.
- Food resources: World food problems, changes caused by agriculture and over-grazing, effects
- of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity.
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy
- sources, growing energy needs, case studies

Unit 4: Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity; Bio-geographic zones
- of India; Biodiversity patterns and global biodiversity hotspots.
- India as a mega-biodiversity nation; Endangered and endemic species of India, threats to
- biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.
- Conservationof biodiversity: In – situandEx – situconservationofbiodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and
- Informational value.

Unit 5: Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise
- pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies

Unit 6: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human
- communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution)
- Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest
- Conservation Act. International agreements: Montreal and Kyoto protocols and Convention
- on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian
- context.

Unit7: Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
    - Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Water conservation, rain water harvesting, watershed management.
- Wasteland reclamation.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.

1. Visit to local polluted site **(any one)**

    a) Urban: Identify the major sources of air pollution in a city or town of North Bengal region.
    b) Rural: Analyse the major sources of organic pollution in villages and adjoining agricultural fields.
    c) Industry: Prepare a list of the large and medium industries in and around your college are and the probable pollutants they may produce.

2. Study of flora and fauna **(any one)**

    a) Prepare a list of the economic plants available in the college block.
    b) List the birds sighted and found nesting at the college campus and its surroundings with the season of their occurrence.
    c) Record insects associated with any common crop/grassland/tree of the college area with an idea of their habitat.

3. Visit to local area to document environmental assets **(any one)**:

a) Trip to any riverine system of Terai or the dooars: comment on the direction, volume and quality of water, flowing as observed.
b) Record the nature of vegetation/forest type/land use pattern at the site of visit.
c) Analyse the cause of deforestation and landslide on hill slope, if sighted.

4. Study of ecosystems. **(any one)**

a) Pond: water parameters – turbidity, pH, producers (phyto and zooplanktons) and related consumers (fishes and birds).
b) Grassland on hill slope: producers (plants), insects, consumers (birds, mammals, reptiles etc.)
c) Forest: practical concept of forest type, stories, dominant trees and sub – dominant vegetation, observed and reported major herbivores and carnivores in a forest ecosystem.

5. Submission of a field work (covering the above practical works undertaken)

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Semester – III (AEC- 3)

Science	Social Science/Arts	Commerce
• Course on Disaster Risk Management	• Course on Disaster Risk Management	• Course on Disaster Risk Management

Learning Objectives:

The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.

Introduction on Disaster Different Types of Disaster :

A) Natural Disaster: such as Flood, Cyclone, Earthquakes, Landslides etc.

B) Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures(Building and Bridge), War & Terrorism etc. Causes, effects and practical examples for all disasters.

Risk and Vulnerability Analysis :

1. Risk : Its concept and analysis
2. Risk Reduction
3. Vulnerability : Its concept and analysis
4. Strategic Development for Vulnerability Reduction

Disaster Preparedness and Response Preparedness:

1. Disaster Preparedness: Concept and Nature
2. Disaster Preparedness Plan
3. Prediction, Early Warnings and Safety Measures of Disaster.
4. Role of Information, Education, Communication, and Training,
5. Role of Government, International and NGO Bodies.
6. Role of IT in Disaster Preparedness
7. Role of Engineers on Disaster Management.

Response

1. Disaster Response: Introduction
2. Disaster Response Plan
3. Communication, Participation, and Activation of Emergency Preparedness Plan

4. Search, Rescue, Evacuation and Logistic Management

5. Role of Government, International and NGO Bodies

6. Psychological Response and Management (Trauma, Stress, Rumor and Panic)

7. Relief and Recovery

8. Medical Health Response to Different Disasters

10. Role of Educational Institute.

Rehabilitation, Reconstruction and Recovery

1. Reconstruction and Rehabilitation as a Means of Development.
2. Damage Assessment
3. Post Disaster effects and Remedial Measures.
4. Creation of Long-term Job Opportunities and Livelihood Options,
5. Disaster Resistant House Construction
6. Sanitation and Hygiene
7. Education and Awareness,
8. Dealing with Victims' Psychology,
9. Long-term Counter Disaster Planning

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4. Search, Rescue, Evacuation and Logistic Management

5. Role of Government, International and NGO Bodies

6. Psychological Response and Management (Trauma, Stress, Rumor and Panic)

7. Relief and Recovery

8. Medical Health Response to Different Disasters

10. Role of Educational Institute.

Rehabilitation, Reconstruction and Recovery

1. Reconstruction and Rehabilitation as a Means of Development.
2. Damage Assessment
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4. Creation of Long-term Job Opportunities and Livelihood Options,
5. Disaster Resistant House Construction
6. Sanitation and Hygiene
7. Education and Awareness,
8. Dealing with Victims' Psychology,
9. Long-term Counter Disaster Planning

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Semester – IV (AEC- 4)

Science	Social Science/Arts	Commerce
• Course on NCC	• Course on NCC	• Course on NCC

Learning Objectives:

The course aims to :

(a) Provide knowledge about the history of NCC, its organization, and incentives of NCC for their career prospects.

(b) Inculcate spirit of duty and conduct in NCC cadets.

(c) Provide understanding about different NCC camps and their conducts.

(d) Provide understanding about the concept of national integration and its importance.

(e) Provide understanding about the concept of self-awareness and emotional intelligence.

(f) Provide understanding about the concept of critical & creative thinking.

(g) Provide understanding about the process of decision making & problem solving.

(h) Provide understanding about the concept of team and its functioning.

(i) Provide understanding about the concept and importance of Social service.

Learning Outcomes:

After completing this course, the cadets will be able to: -

(a) Understand the basic concept of NCC.

(b) Respect the diversity of different Indian culture.

(c) Practice togetherness, teamwork and empathy in all walks of their life.

(d) Do their own self-analysis and will work out to overcome their weakness for better performance in all aspects of life.

(e) Critically think and analyse.

Medium of Instruction: Hindi and English

Syllabus of NCC-I

Unit I: NCC General 4 Lectures
Subtopics: • Aims, Objectives and Organization of NCC • Incentives for NCC Cadets • Duties of NCC Cadets • NCC Camps: Types and Conduct
Unit II: National Integration
Subtopics: • National Integration: Importance and Necessity • Factors affecting National Integration • Unity in Diversity • Threats to National Security
Unit III: Personality Development
Subtopics: • Factors • Self-Awareness • Empathy • Critical and Creative Thinking • Decision Making and Problem Solving
Unit IV: Social Service and Community Development
Subtopics: • Basics of Social Service • Rural Development Programmes • NGO's • Contribution of Youth

Practical/Practice Component

- Drill
- Field Craft & Battle Craft
- Map Reading
- Weapon Training
- Social Service & Community Development
- Any other Practical/Practice as decided from time to time

Suggested Readings:

- DGNCC Cadet's Hand Book - Common Subjects -All Wings (in English)
- DGNCC Cadet's Hand Book - Common Subjects -All Wings (in Hindi)
- DGNCC Cadet's Hand Book – Specialised Subjects –Army, Navy and Air Wing

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To,

The Principal Secretary,
Raj Bhavan, Bihar,
Patna

Sub:- **Regarding submission of proposed course uniform syllabus of Chemistry for 3rd to 8th Semester of 4 - Year undergraduate Course, (CBCS)**

Ref.:- Letter No.-BSU (UGC) -02/2023-1457/ GS(I) dated 14.09.2023

Sir,

In compliance with your letter no. BSU(UGC)-02/2023-1457/GS(I), dated-14.09.2023, we are submitting the proposed course syllabus of **Chemistry** for 3rd to 8th semester of the 4 - year under graduate course (CBCS) as per UGC regulations.

Yours sincerely

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Chemistry

(A)Major Core Courses

Sem	Type of Course	Name of Course	Credits	Marks
I	MJC-1 (T)	Inorganic Chemistry I: Atomic Structure & Chemical Bonding (T)	6	100
II	MJC-2 (T)	Physical Chemistry I: States of Matter & Ionic Equilibrium (T)	4	100
	MJC-2 (P)	Physical Chemistry I: States of Matter & Ionic Equilibrium (P)	2	100
III	MJC-3 (T)	Organic Chemistry: Cyclic Hydrocarbons and their Halogen Derivatives (T)	5	100
	MJC-4 (T)	Physical Chemistry: Chemical Thermodynamics and its Applications (T)	3	100
	MJC-4 (P)	Physical Chemistry: Chemical Thermodynamics and its Applications (P)	1	100
IV	MJC-5 (T)	Inorganic Chemistry: *s*-, *p*-, *d*- and *f*-block elements (T)	3	100
	MJC-5 (P)	Inorganic Chemistry: Qualitative Analysis of Inorganic Salt Mixture. (P)	2	100
	MJC-6 (T)	Organic Chemistry: Compound with OxygenContainingFunctionalGroups. (T)	3	100
	MJC-6 (P)	Organic Chemistry: identification of oxygen Containing Functional Groups (P)	2	100
	MJC-7 (T)	Physical Chemistry: Phase Equilibria, Conductance and Electrochemical Cells	5	100
V	MJC-8 (T)	Inorganic Chemistry: Coordination Chemistry (T)	3	100
	MJC-8 (P)	Inorganic Chemistry: Coordination Chemistry, preparation of complexes (P)	2	100
	MJC-9(T)	Organic Chemistry: Polynuclear hydrocarbons, nitrogen containing compounds, heterocyclic compounds, alkaloids and terpenoids (T)	5	100
VI	MJC-10 (T)	Physical Chemistry: Colligative Properties of Dilute Solutions, Chemical Kinetics and Photochemistry (T)	3	100
	MJC-10 (P)	Physical Chemistry: Colligative Properties of Dilute Solutions and Chemical Kinetics (P)	1	100
	MJC-11 (T)	Organic Chemistry: Biomolecules (T)	3	100
	MJC-11 (P)	Organic Chemistry: Biomolecules (P)	2	100
	MJC-12 (T)	Physical Chemistry: Quantum Chemistry & Spectroscopy (T)	5	100
VII	MJC-13 (T)	Inorganic Chemistry: Organometallic Chemistry symmetry and Group theory (T)	5	100
	MJC-14 (T)	Research Methodology (T)	5	100
	MJC-15 (T)	Organic Chemistry: Spectroscopy (T)	6	100
VIII	MJC-16 (T)	Analytical Methods in Chemistry (T)	4	100

Sub Total = 80

SEMESTER- III

MJC-3 (T): Organic Chemistry: Cyclic Hydrocarbons and their Halogen Derivatives (T)

Course Outcomes

After completion of the course, students will be able to understand:

CO1: the aromatic character of the molecules.

CO2: the idea to design some organic synthesis.

MJC-3: Organic Chemistry: Cyclic Hydrocarbons and their Halogen Derivatives. (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Reaction intermediates:** Carbenes, nitrenes and benzynes: Generation, structure, stability and reactions.	12
2	**Chemistry of Cyclic Hydrocarbons:** Nomenclature of monocyclic and bicyclic compounds, Baeyer's strain theory, conformation of cyclohexane, relative stability of chair, boat and twist boat forms of cyclohexane with their energy level diagram, relative stability of mono- and disubstituted cyclohexanes, Aromaticity and Huckel rules with reference to benzenoids, cyclocarbocations and cyclocarbanions, mechanism of electrophilic aromatic substitution in benzene-halogenation, nitration, sulphonation, Friedel -Crafts alkylation/acylation, energy profile diagrams of these reactions, reactivity of mono-subsituted benzene, directive influence of functional groups.	12
3	**Chemistry of Halogen Derivatives of alkanes:** General methods of preparation, properties and uses of mono- and dihalo derivatives of alkanes. Mechanism of substitution and elimination reactions *viz.* S_N1, S_N2, S_Ni, E1, E2 and E1CB mechanism.	12
4	**Halogen derivatives of arenes:** General methods of preparation, properties and uses of halogen derivatives of arenes. Mechanism: ArS_N2, ArS_N1, elimination-addition mechanism (benzyne mechanism).	12
	TOTAL	48

Suggested Readings:

1. Reaction Mechanism in Organic Chemistry - S. M. Mukherjee and S.P. Singh
2. Organic Chemistry, vol.-1, I. L. Finar
3. Organic Chemistry – Morrison & Boyd
4. Organic Chemistry: Graham Solomons
5. Oranic Chemistry: Paula Yurkanis Bruice
6. Stereochemistry in Organic Chemistry: D. Nassipuri

7. Stereochemistry- Conformation and Mechanism: P.S.Kalsi.
8. Advanced Organic Chemistry, Fourth Edition, J. March, Wiley, India (2006)
9. Greeves, N., Clayden, J.; Warren, S., Organic Chemistry, 2nd Ed., Oxford University, Press India (2014).
10. Sykes, P., A Guidebook to Mechanism in Organic Chemistry, 6th Ed., Pearson Education India (2003)

Semester-III
MJC-4: Physical Chemistry: Chemical Thermodynamics and its Applications (T)

Course Outcomes

After completion of the course, students will be able to understand:

CO1: various thermodynamic terms.

CO2: various enthalpies of transformations and Kirchoff's law.

CO3: entropy changes, Gibbs free energy change, partial molar quantities, spontaneous and non- spontaneous processes.

CO4: second and third law of thermodynamics.

MJC-4: Physical Chemistry: Chemical Thermodynamics and its Applications (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Thermodynamics-I:** Definition of thermodynamic terms: system, surroundings, types of systems, intensive and extensive properties, state and path functions, thermodynamic processes, concept of heat and work, First law of Thermodynamics-Statements, definition of internal energy and enthalpy, Heat capacities at constant volume and constant pressure with their relationship, Joule's law, Joule-Thomson coefficient and inversion temperature, calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible and irreversible processes.	12
2	**Thermochemistry:** Standard state, enthalpy of reaction, standard enthalpy of formation, Hess's law of constant heat summation and its applications, enthalpy of combustion, enthalpy of neutralization, bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy, Kirchoff's equation.	12
3	**Thermodynamics-II:** Second law of thermodynamics, need of the law, different statements of the law, Carnot theorem, Carnot cycle and its efficiency, concept of entropy, entropy as a function of V&T, P&T, entropy change in ideal gases and mixing of ideal gases, free energy and spontaneity, variation of Gibbs free energy (G) and Helmholtz free energy(A) with P,V and T, Maxwell's relations, Thermodynamic equation of state, Nernst heat theorem, third law of thermodynamics, statement, evaluation of absolute entropy from third law of thermodynamics, concept of residual entropy .	12
4	**Systems of Variable Composition:** Partial molar quantities, chemical potential, dependance of chemical potential with temperature and pressure, chemical potential of a gas in ideal gas mixture, Gibb's Duhem equation.	12
	TOTAL	48

Suggested Readings:

1. Peter, A. & Paula, J. de., Physical Chemistry 9th Ed., Oxford University Press (2011).
2. Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
3. Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
4. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
5. Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. &Will, S. Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).
6. Levine, I.N. Physical Chemistry 6th Ed., Tata Mc Graw Hill (2010).
7. Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006).

Semester-III
MJC-4 (P): Chemical Thermodynamics and its Applications (P)

Course Outcomes

After completion of this practical course, students will be skilled in determining:

CO1: different types of enthalpy changes.

CO2: the heat capacity of calorimeter.

CC-4: Chemical Thermodynamics and its Applications (Practical: 2 credits)
Practical: **Chemical Thermodynamics and its Applications** 1. Determination of water equivalent of calorimeter. 2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 3. Determination of enthalpy of ionization of ethanoic acid. 4. Determination of the basicity of a polybasic acid against standard sodium hydroxide solution. 5. Determination of heat of displacement of Cu by Zn from Cu^{2+} salt solution. 6. Determination of enthalpy of hydration of copper sulphate. 7. Determination of solubility of benzoic acid in water and ΔH for the process. 8. Determination of heat capacity of the calorimeter and integral enthalpy of solution of salts.

Suggested Readings:

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
2. Athawale, V. D. & Mathur, P. Experimental Physical Chemistry, New Age International, New Delhi (2001).

SEMESTER – IV

MJC-5 (T): Inorganic Chemistry: *s*-, *p*-, *d*- and *f*-block elements (T)

Course Outcomes

After completion of the course, the students will be able to understand: -

CO1: different oxidation states of elements with their relative stability and complex forming properties.

CO2: the ring, cage and polymers of B, Si & P.

CO3: to carry out the preparation of inorganic compounds.

CO4: the important properties of transition metals such as their oxidation states, colour, magnetic and spectral, use of Latimer diagrams in identifying oxidizing, reducing and disproportionating species.

CO5: the concepts related with noble gases, their compounds, shapes, properties and applications.

***s*-, *p*-, *d*-and *f*-block elements(Theory: 4 credits)**		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Periodic Table and Periodicity of Elements:** *s*-, *p*-, *d*- and *f*-block elements, the long form of periodic table, detailed discussion of the following periodic properties of the elements with reference to *s*- and *p*-block: (a) shielding or screening effect, Slater's rules, effective nuclear charge (b) atomic radii (covalent, metallic and van der Waals) (c) ionization enthalpy, successive ionization enthalpies, factors affecting ionization enthalpy and applications of ionization enthalpy. (d) electron gain enthalpy. (e) electronegativity: Pauling's, Mullikan, Allred Rochow's scales, group electronegativity, variations of electronegativity with bond order and partial charge. General electronic configuration of *s*- and *p*- block elements, inert pair effect, relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group, allotropy and catenation properties, complex forming tendency of *s*- and *p*- block elements,	10
2	**Compounds of *p* block elements:** Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses:- Boric acid, borates, borazines, borohydrides, calcium carbide, silicon carbide, aluminium carbide, silicates, silanes, siloxanes, silcon halides, silicones, NH_3-manufacture (Haber's process), oxides, oxy-, peroxy acids of nitrogen, phosphorus and sulphur, inter-halogen compounds, polyhalides and pseudohalides.	10
3	**Chemistry of noble gases:** Occurrence and isolation, rationalization of inertness of noble gases, nature of bonding in noble gas compounds, shape and structure of noble gas compounds using VSEPR theory, preparation and properties of XeF_2, XeF_4 and XeF_6. Clathrates.	5

4	**Chemistry of d-block elements:** General electronic configuration of d-block metals and their group trends, variable oxidation states and their relative stabilities, magnetic and catalytic properties of metals, colour, complex forming ability of metals, difference between 1st, 2nd and 3rd transition series, Chemistry of Cr, Mn, Fe and Co in various oxidation states with special reference to their following compounds: peroxo compounds of Cr, potassium dichromate, potassium permanganate, potassium ferrocyanide and ferricyanide, sodium nitropruside and sodium cobaltinitrite.	10
5	**Chemistry of f-block Elements:** General electronic configuration of f- block elements (inner transition elements - 4f and 5f series), position of lanthanides and actinides in periodic table, group trends with special reference to electronic configuration, ionic radii and lanthanide contraction, consequences of lanthanide contraction, complex forming ability of lanthanides, occurrence and isolation of lanthanides, compounds of lanthanides, sources of actinides, chemistry of actinides, separation of Np and Pu from spent fuel .	10
	TOTAL	45

Readings:

1. Lee, J. D., Concise Inorganic Chemistry, 5th Ed., Wiley India (2008).
2. Housecroft, C. E.; Constable, E. C. Chemistry-An Introduction to Organic, Inorganic and Physical Chemistry, 4th Ed., Pearson Education (2010).
3. Atkins, P.; Overton, T.; Rouke, J.; Weller, M.; Armstrong, F.; Hagerman, M., Shriver Atkins's Inorganic Chemistry, 6th Ed., Oxford University Press India (2015).
4. Miessler, G.; Tarr, D. A., Inorganic Chemistry, 3rd Ed., Pearson Education India (2008).
5. Huheey, J. E.; Keiter, E. A.; Keiter, R. L.; Medhi, O. K., Inorganic Chemistry: Principles of Structures and Reactivity, 4th Ed., Pearson Education India (2006).
6. Cotton, F. A.; Wilkinson, G.; Gaus, P. L., Basic Inorganic Chemistry, 3rd Ed., Wiley India (2007).
7. Puri, B. R.; Sharma, L. R.; Kalia, K. C., Principles of Inorganic Chemistry, 33rd Ed., Vishal Publishing (2017).

Semester-IV

MJC-5 (P): Qualitative Analysis of Inorganic Salt Mixture Containing Four Radicals (P)

Course Outcomes

After the end of this practical course students will be skilled in: -

CO1: identification of basic radicals from known and unknown salts.

CO2: identification of acid radicals from known and unknown salts.

Qualitative Analysis of inorganic salt mixture containing Four Radicals. **(Practical:2 credits)**
1. Identification of known cations (basic radicals) and anions (acid radicals) from the supplied salt.
2. Identification of cation (basic radicals) and anions (acid radicals) from unknown salt.
3. Identification of cation (basic radicals) and anions (acid radicals) from binary mixture of inorganic salts.

SuggestedReadings:

1. Raj, G., Advanced Practical Inorganic Chemistry, Krishna Prakashan, Meerut (2013).
2. Mendham, J.; Denney, R. C., Barnes, J. D.; Thomas, M.; Sivasankar, B., Vogel's Quantitative Chemical Analysis, 6th Ed., Pearson Education India (2009).

Semester-IV

MJC-6 (T): Organic Chemistry: Compounds with Oxygen Containing Functional Groups (T)

CourseOutcomes

After the completion of the course, students will be able to understand:

CO1: preparation, properties and reactions of compounds with oxygen containing functional groups.

CO2: to draw plausible mechanisms for reactions involving these functional groups.

CO3: the knowledge of various named organic reactions associated with these functional groups.

CO4: chemistry of epoxides.

CO5: the detection of *O*-containing functional groups like alcohols, phenols, carbonyl and carboxylic acid groups.

CO6: the preparation of various organic compounds by functional group transformations and other common organic reactions.

CO7: the green practices in Organic syntheses.

Compounds with Oxygen Containing Functional Groups (Theory:4credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Alcohols, Phenols, Ethers and Epoxides** **Alcohols:** Classification and nomenclature. Preparation of 1^{o}, $2^{o}$and 3^{o}alcohols using substitution reaction, addition reactions, Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acids and esters. **Reactions:** With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation. **Diols:** Oxidation of diols. Pinacol-Pinacolone rearrangement. **Glycerol:** Preparation, properties and uses. **Phenols:** Classification, nomenclature and properties **Preparation:** Cumene hydroperoxide method, from diazonium salts. **Reactions:** Electrophilic substitution: Nitration, halogenation and sulphonation. Fries and Claisen Rearrangements, Kolbe's–Schmidt Reaction, Lederer-Manasse reaction, Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten–Baumann Reaction. **Ethers and epoxides (aliphatic and aromatic):** Classification, nomenclature, preparation and properties. **Reactions:** Cleavage of ethers with HI. Syntheses of epoxides, Acid and base–catalyzed ring opening of epoxides, orientation of ring opening, reactions of Grignard and organolithium reagents with epoxides. Concept of crown ethers.	20

22.9.23 22/9/23 22.09.23 22.09.23 22/9/2023 22.9.23 22/09/23 22/09/2023 22/9/23

2	**Aldehydes and ketones (aliphatic and aromatic):** Structure, reactivity and preparation; nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives and their mechanisms; mechanisms of Aldol and Benzoin condensation, Knoevenagel condensations, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reactions, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, α-substitution reactions,oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV and PDC). Addition reactions of unsaturated carbonyl compounds: Michael addition. Active Methylene Compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.	10
3	**Carboxylic Acids and their Derivatives:** Preparation, physical properties and reactions of monocarboxylic acids. Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acid. Preparation and reactions of acid chlorides, anhydrides, esters and amides; Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement.	09
4	**Carbohydrates** Classification and general properties of carbohydrates, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides. Structure of disacharrides (sucrose, cellobiose, maltose, lactose) and polysacharrides (starch and cellulose).	09
	TOTAL	48

Suggested Readings:

1. Greeves, N.; Clayden, J.; Warren, S., Organic Chemistry, 2nd Ed., Oxford University, Press India (2014).
2. Sykes, P., A Guide book to Mechanism in Organic Chemistry, 6th Ed., Pearson Education India (2003)
3. Ghosh, S. K., Advanced General Organic Chemistry, Part-I & Part-II, 3rd Ed., New Central Book Agency (2010).
4. Bhal, B. S.; Bhal, A., A Textbook of Organic Chemistry, 22nd Ed., S. Chand and Company (2016).
5. Sengupta, S., Basic Stereochemistry of Organic Molecules, 2ndEd., Oxford University Press India (2018).
6. Finar, I. L. Organic Chemistry (Volume1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Semester-IV

MJC-6 (P): Organic Chemistry: Compounds with Oxygen Containing Functional Groups (P)

Course Outcomes:

When the students will finish this practical course, they will be skilled in: -

CO1: acetylation and benzoylation of various functional groups present in organic compounds.

CO2: oxime formation, hydrazone formation, semi-carbazone formation, iodoform test and in the bromination of phenols.

CO3: oxidation of alcohols and reduction of nitro compounds.

CO4: Aldol Condensation by conventional and green methods.

Compounds with Oxygen Containing Functional Groups (Practical:2 credits)
(a) Acetylation of one of the following compounds: phenols (β - naphthol, vanillin, salicylic acid) by any one method: Using conventional method/Using green approach. (b) Benzolyation of one of the following amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-, *p*-anisidine) and one of the following phenols (*β*-naphthol, resorcinol, *p*-cresol) by Schotten-Baumann reaction. (c) Preparation of Oxime and 2,4-dinitrophenylhydrazone of aldehydes and ketones (d) Oxidation of ethanol and isopropanol (Iodoform reaction). (e) Preparation of semicarbazone of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde. (f) Aldol condensation using either conventional or green method. (g) *S*-Benzylisothiouronium chloride from thiourea and benzyl chloride. (h) Reduction of *p*-, *m*-nitrobenzaldehyde by sodium borohydride. (i) Bromination of Phenol. (j) Hydrolysis of amides and esters.

Suggested Readings:

1. Agarwal, O. P., Advanced Practical Organic Chemistry, Krishna Prakashan, Meerut (2014).
2. Ahluwalia, V. K.; Aggarwal, R., Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, Universities Press (2000).
3. Furniss, B. S.; Hannafold, A. J.; Smith, P. W. G.; Tatchell, A. R., Vogel's Textbook of Practical Organic Chemistry, 5th Ed., Pearson Education India (2003).
4. Clarke, H. T., A Handbook of Organic Analysis: Qualitative and Quantitative, 4th Ed., CBS Publishers India (2007).
5. Vogel, A. I., Tatchell, A. R., Furnis, B. S., Hannaford, A. J. & Smith, P. W. G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
6. Mann, F.G. & Saunders, B. C. Practical Organic Chemistry Orient-Longman, 1960.
7. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry. R. Chand & Co.: New Delhi(2011).

Semester-IV

MJC-7: Physical Chemistry: Phase Equilibria, Conductance and Electrochemical Cells (T)

Course Outcomes

After completion of the course, students will be able to understand: -

CO1: the degree of ionization, pH and salt hydrolysis.
CO2: the different types of Buffer solutions.
CO3: the concepts of solubility product.
CO4: the conductivity, specific conductivity, equivalent conductivity and molar conductivity, application of conductance measurement in determining various physical parameters.
CO5: the standard electrode potential of half cells and calculate the EMF of a cell using Nernst equation.
CO6: EMF measurements in determining various parameters like free energy, enthalpy, entropy, equilibrium constants, etc.
CO7: the concentration cells with and without transference.
CO8: the principle of potentiometric titrations.

MJC-7:Physical Chemistry: Ionic Equilibria, Conductance and Electrochemical Cells (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Phase Equilibria:** Phases, components and degrees of freedom of systems, criteria of phase equilibria, Gibbs Phase Rule and its thermodynamic derivation, derivation of Clausius - Clapeyron equation and its importance in phase equilibria, phase diagram of one component system (water/sulphur) and two component system involving eutectics, congruent and incongruent melting points (lead-silver, $FeCl_3$-water and Na-K only), Nernst distribution law and its thermodynamic derivation, limitations of Nernst distribution law, modification of the distribution law in cases of association and dissociation of solutes, application of the law in the process of solvent extraction.	12
2	**Conductance:** Conductance, specific conductance (conductivity), equivalent and molar conductance, their variation with dilution for weak and strong electrolytes, Kohlrausch law of independent migration of ions, transference number and its experimental determination using Hittorf and Moving Boundary Methods, ionic mobility, applications of conductance measurements, determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt, conductometric titrations (only acid-base).	12
3	**Electrochemical cells :** Electrode and electrode potential, reference electrodes (Standard hydrogen electrode and Calomel	12

	electrode), standard electrode potential, type of electrodes, galvanic cells, electrochemical series and its significance, Nernst equation and its importance, types of electrochemical cells – chemical cells and concentration cells, concept of EMF of a galvanic cell, measurement of EMF of a cell, construction and working of a Galvanic cell, liquid junction potential and salt bridge, EMF of a concentration cell with and without transference.	
4	**Applications of EMF measurements** Determination of equilibrium constant, ΔG, ΔS and ΔH of cell reactions, calculation of solubility product of a sparingly soluble salt, the valency of ions, determination of pH using hydrogen electrode and quinhydrone electrode. Potentiometric titrations: qualitative treatment (acid-base and oxidation-reduction only).	12
	TOTAL	48

Suggested Readings:

1. Atkins, P. W.; de Paula, J.; Keeler, J., Physical Chemistry, 11th Ed., Oxford University Press India (2018).
2. Bahl, A.; Bahl, B. S.; Tuli, G. D., Essentials of Physical Chemistry, S. Chand and Company (2014).
3. Negi, A. S.; Anand, S. C., Physical Chemistry, New Age International Publishers (2007).
4. Puri, B. R.; Sharma, L. R.; Pathania, M. S., Principles of Physical Chemistry, 47th Ed., Vishal Publishing (2017).
5. Silbey, R. J.; Alberty, R. A.; Bawendi, M. G., Physical Chemistry, 4th Ed., Wiley India (2006).
6. Rakshit, P. C., Physical Chemistry, Revised Ed. Sarat Book House (2014).
7. Kapoor, K. L., A Textbook of Physical Chemistry: States of Matter and Ions in Solution, Vol. I, 6th Ed., McGraw Hill Education India (2019).

SEMESTER – V
MJC-8 (T): Co-ordination Chemistry (T)

Course Outcomes:

After completion of the course, students will be able to understand: -

CO1: ligand, denticity of ligands, chelates, coordination number and nomenclature coordination of compounds.

CO2: isomerism in coordination compounds.

CO3: Valence Bond Theory to predict the structure and magnetic behavior of metal complexes.

CO4: pairing energy, CFSE and its effects, high spin and low spin complexes.

CO5: magnetic properties and colour of complexes on the basis of Crystal Field Theory.

CO6: properties of transition metal complexes, variable oxidation states, colours, magnetic and catalytic properties.

Co-ordination Chemistry (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Introduction:** Molecular or addition compounds, double salts and coordination compounds, coordination sphere, coordination number (C.N), oxidation state (O.S.) of the central metal atom/ion, ligands and their classification, chelating ligands, chelates and their stability. Werner's theory of coordination compounds, limitations of Werner's theory, effective atomic number (EAN) rule, nomenclature of coordination compounds, isomerism in coordination compounds.	12
2	**Valence bond theory:** Valence bond theory of complex compounds, different octahedral, square planar and tetrahedral complexes of Cr, Fe, Co, Ni, Cu and Zn, strength of ligands and stability of complexes, outer and inner orbital complexes. Limitations of valence bond theory (VBT).	12
3	**Crystal field theory:** Crystal field theory, crystal field splitting of d-orbitals in octahedral, tetrahedral, tetragonal and square-planar complexes, HS and LS complexes, factors affecting the crystal field splitting energy, spectrochemical series, magnetic properties of complexes, colour of the complexes, crystal field stabilization energy (CFSE) and its calculation. variation of octahedral ionic radii. Crystal structure of spinels. Jahn-Teller effect and distortion in octahedral and tetrahedral complexes, charge transfer spectra (LMCT) and (MLCT), heat of hydration, lattice energy of bivalent metal ions of transition metals.	12
4	**Magnetic properties of transition metal complexes:** Types of magnetic behaviour, methods of determination of magnetic susceptibility, L-S coupling, correlation of the magnetic moment (spin only formula) and effective magnetic moment values, quenching of orbital contribution to magnetic moment, applications of magnetic moment data for 3d series.	12
	TOTAL	48

Suggested Readings:

1. Selected Topics in Inorganic Chemistry- Malik, Madan and Tuli
2. Chemistry for degree students- R. L. Madan.
3. Inorganic Chemistry – Gary L. Miessler and Donald A.Tarr.
4. Advanced Inorganic chemistry- F.A. Coton andWilkinson.
5. Concise Inorganic Chemistry – J.D.Lee.
6. Inorganic Chemistry - P.W.Atkins.
7. Advanced Inorganic Chemistry – Kalia, Puri andSharma

Semester-V
MJC-8 (P): Co-ordination Chemistry (P)

Course outcomes

After completion of this practical course, students will be skilled in:-

CO1: preparation of complex compounds.

CO2: complexometric titrations and colorimetric analysis.

Co-ordination Chemistry (Practical: 2 credits)
Practical **1.Preparation of inorganic compounds/ complexes.** a) Preparation of potash alum [$K_2SO_4.Al_2(SO_4)_3\ 24H_2O$] b) Preparation of potassium tris(oxalato) ferrate (III), $K_3[Fe(C_2O_4)_3]$ c) Preparation of potassium tris(oxalato) chromate (III), $K_3[Cr(C_2O_4)_3]$ d) Preparation of hexammine nickel (II) chloride, $[Ni(NH_3)_6]Cl_2$. e) Preparation of tetramminecopper(II) sulphate,$[Cu(NH_3)_4]SO_4$. f) Preparation of sodium nitropruside, $Na_2[Fe(CN)_5(NO)]$. **2.Complexometric titrations and colorimetry** a) Estimation of copper sulphate/copper ion from a given solution colorimetrically. b) Estimation of phosphate ion, $(PO_4)^{3-}$ in a given sample of water/soil colorimetrically. c) Complexometric titrations by EDTA (i) Estimation of Ca^{2+}/ Mg^{2+} in the supplied sample of water. (ii) Estimation of total hardness from the supplied sample of water.

Suggested Readings:

1. Qualitative inorganic chemistry – A. I .Vogel
2. Advance practical inorganic chemistry – Gurdeep Raj

Semester-V

MJC-9 (T): Polynuclear hydrocarbons, nitrogen containing compounds, heterocyclic compounds, alkaloids and terpenoids (T)

Course Outcomes

After completion of the course, students will be able to understand:

CO1: the chemistry of polynuclear hydrocarbons.

CO2: the named reactions related to amines nitriles, isonitriles and diazo compounds.

CO3: the chemistry of some common heterocyclic compounds.

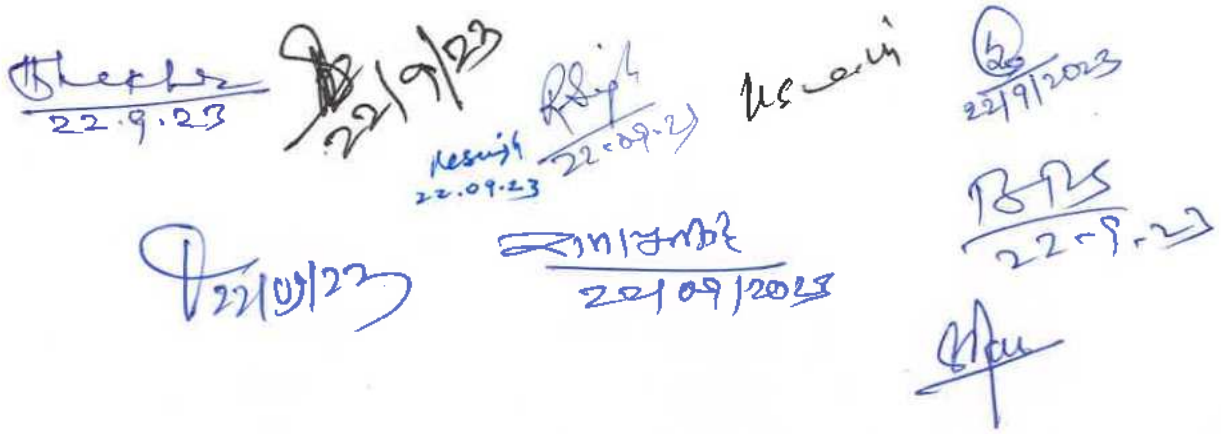
CO4: the general methods involved in structural elucidation of alkaloids and terpenoids.

Polynuclear hydrocarbons, nitrogen containing compounds, heterocyclic compounds, alkaloids and terpenoids (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Polynuclear Hydrocarbons:** Nomenclature of polynuclear hydrocarbons, preparation and properties and constitution of naphthalene, anthracene and phenanthrene.	12
2	**Nitrogen containing Compounds: Amines, Nitriles, Isocyanides and diazonium compound:** Reduction of nitro compounds under different conditions, von Richter reaction, preparation and separation of primary, secondary and tertiary amines, relative basic strength of amines, distinctions among primary, secondary and tertiary amines, preparation of diazonium salts and their synthetic applications, diazo- coupling reactions, Gomberg reaction, preparation and properties of nitriles and isonitriles.	15
3	**Heterocyclic Compounds:** Classification and nomenclature of heterocyclic compounds, aromaticity in 5- & 6-membered rings with one heteroatom, syntheses of pyrrole(Knorr-Pyrrole synthesis, Paal-Knorr synthesis, Hantzsch synthesis), Reaction synthesis and constitutions of furan, thiophene, pyridine (Hantzsch synthesis), reactions of pyrrole, furan, thiophene and pyridine. **Quinoline and isoquinoline:** Reactions, syntheses and constitution of quinoline and isoquinoline. (Skraup synthesis, Friedlander's Synthesis, Knorr Quinoline Synthesis, Bischler Napieralski Synthesis)	12
4	**Alkaloids and Terpenoids:** Natural occurrence, classification and isolation of alkaloids and terpenoids, isoprene. Isoprene and Special Isoprene rule, reactions used in general methods involved in structural elucidation of alkaloids and terpenoids.	09
	TOTAL	48

Suggested Readings:

1. Morrison R.T., Boyd R.N., (2007) Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar I.L., (2014) Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

3. Finar I.L., (2014) Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Acheson R.M., (1976), Introduction to the Chemistry of Heterocyclic compounds, John Wiley & Sons.
5. Graham Salomons T.W., Organic Chemistry, John Wiley & Sons, Inc.
6. Kalsi P.S., (2010), Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.



Semester-VI

MJC-10 (T): Colligative Properties of Dilute Solutions, Chemical Kinetics and Photochemistry (T)

Course Outcomes

After completion of the course, studentswill be able to understand:-

CO1: Colligative properties of dilute solutions and determination of these properties.

CO2: Abnormal colligative properties and molar mass.

CO3: Azeotropes, maximum and minimum boiling azeotropic mixture.

CO4: Kinetics of simple and complex reactions.

CO5: Jablonski diagram and laws of photochemistry.

Colligative Properties of Dilute Solutions, Chemical Kinetics and Photochemistry (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1.	**Colligative Properties of Dilute Solutions:** Colligative properties of solutions, Henry's law, Raoult's law (thermodynamic derivation), ideal and non-ideal solutions, azeotropes, thermodynamic derivation and experimental determination of relative lowering in vapour pressure, elevation in boiling point, depression in freezing point and osmotic pressure, abnormal colligative properties due to association and dissociation of solutes in solutions, van't Hoff's factor, abnormal molar mass, applications of colligative properties in determining molar mass of solutes, degree of dissociation and association.	15
2.	**Kinetics of Elementary Reactions:** Rate laws of first, second, third and zero order reactions, methods of determination of order of reactions, temperature dependance of reaction rate, Arrhenius equation, Activation energy, Collision theory and transition state theory of reaction rates. **Catalysis:** Theory and applications.	12
3.	**Kinetics of Complex Reactions:** Steady state approximation, integrated rate expression (first order only) for the 1. Opposing reactions 2. Parallel reactions and 3. Consecutive reactions.	12
4.	**Photochemistry:** Introduction, consequences of light absorption, Lambert-Beer's law, laws of photochemistry, Grotthus-Draper law, Stark-Einstein law of photochemical equivalence, quantum yield, photochemical reactions ($H_2 + Cl_2$, $H_2 + Br_2$, decomposition of HI), photochemical rate laws, energy transfer in photochemical reactions, Jablonski diagram, photosensitization, fluorescence, phosphorescence and chemiluminescence.	09
	TOTAL	48

Suggested Readings:

1. Physical Chemistry: P.W. Atkins (ELBS)
2. Comprehensive Physical Chemistry: Hemant Snehi
3. Theoretical Physical Chemistry: Gladstone

4. Physical Chemistry: G.M. Barrow.
5. Modern Electrochemistry: JOM Bakris and A.K.N. Reddy
6. Text Books of Polymer Science: F.W. Billmayer Jr.
7. Advanced Physical Chemistry: Gurdeep Raj

Semester-VI
MJC-10 (P): Physical Chemistry: Colligative Properties of Dilute Solutions and Chemical Kinetics (P)

Course Outcomes

After completion of this practical course, students will be skilled in:

CO1: determination of molecular mass by elevation in boiling point and depression in freezing point methods.

CO2: determination of the velocity constants of hydrolysis of esters and inversion of cane sugar.

Properties of Dilute Solutions and Chemical Kinetics (Practical: 2 credits)
Practical: **Solutions:** 1. Determination the molecular weight of non-volatile solute by Landsberger's method. 2. Determination of molecular mass of non-volatile solutes by Beckmann method. **Chemical Kinetics:** 1. Determination of the rate constant of hydrolysis of ethyl/methyl acetate catalyzed by HCl. 2. Determination of the rate constant of inversion of cane sugar. 3. Determination of the rate constant of hydrolysis of ethyl/methyl acetate with NaOH (saponification).

Suggested Readings:

1. Khosla, B. D.; Garg, V. C. & Gulati, A., *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).
2. Athawale, V. D. & Mathur, P. *Experimental Physical Chemistry* New Age International: New Delhi (2001).

SEMESTER – VI

MJC-11: Organic Chemistry: Biomolecules (T)

Course Outcomes

After completion of the course, students will be able to understand the:

CO1: genetic materials involved in living biosystems.

CO2: physicochemical properties of amino acids, peptides and proteins.

CO3: enzymes and their activity as well as some basic idea about lipids.

CO4: basics of energetics in biosystems and introduction to some synthetic and naturally occurring pharmaceuticals.

Biomolecules (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Amino Acids, Peptides and Proteins:** Classification of α-Amino Acids, General methods of synthesis, ionic properties and reactions, Zwitterions, pK_a values, isoelectric point and electrophoresis, study of peptides: Oligo and polypeptides, features of peptide bonds, syntheses of peptides using *N*-protecting, *C*-protecting and *C*-activating groups, solid-phase synthesis,elementary idea of primary, secondary, tertiary and quaternary structures of proteins.	10
3	**Nucleic Acids:** Components of nucleic acids, nucleosides and nucleotides, Structure and syntheses of Adenine, Guanine, Cytosine, Uracil and Thymine, structure of polynucleotides and DNA double helix.	10
2	**Enzymes and Lipids:** Introduction, classification and characteristics of enzymes, mechanism of enzyme action (taking trypsin as example), factors affecting enzyme action specificity of enzyme action, enzyme inhibitors and their importance, phenomenon of inhibition (competitive, uncompetitive and non-competitive inhibition), Introduction to oils and fats, classification of lipids, phospholipids, hydrogenation and iodine number, saponification value.	10
4	**Concept of energy in Biosystems and Pharmaceutical compounds:** Role of ATP in glycolysis during phosphorylation of glucose, conversion of glucose-6-phosphate to fructose-6-phosphate, phosphorylation of fructose-6-phosphate, cleavage of fructose-1,6-biphosphate, oxidation of glyceraldehyde-3-phosphate to 1,3-biphosphoglycerate, phosphoryl transfer from biphosphate to ADP, Conversion of 3-phosphoglycerate to 2-phosphoglycerate, dehydration of 2-phosphoglycerate, transfer of the phosphoryl group from phosphonyl pyruvate to ADP and overall energy balance sheet for ATP. Structure, syntheses and therapeutic uses of aspirin, paracetamol, and ibuprofen, medicinal values of curcumin (haldi), azadirachtin (neem) and vitamin C.	18
	TOTAL	48

Suggested Readings:

1. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry. VIth Edition. W.H. Freeman and Co.
2. Nelson, D.L., Cox, M.M. and Lehninger, A.L. (2009) Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
3. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009) Harper's Illustrated Biochemistry. XXVIII edition. Lange Medical Books/ McGraw-Hill.

Semester-VI
MJC-11: Organic Chemistry: Biomolecules (P)

After completion of this practical course, students will be skilled in: -
CO1: tests of amino acids and proteins.
CO2: experiments related to enzymes, oils and fats.

Biomolecules (Practical: 2 credits)
Practical: **Tests of amino acids and proteins:** 1. Estimation of glycine by Sorenson's formalin method. 2. Study of the titration curve of glycine. 3. Test of proteins. **Experiments related to enzymes, oils and fats:** 1. Study of the action of salivary amylase on starch at optimum conditions. 2. Effect of temperature on the action of salivary amylase. 3. Saponification value of an oil or a fat. 4. Determination of Iodine number of an oil/ fat. **Experiment related to pharmaceutical compounds** 1. Synthesis of salicylic acid and aspirin.

Suggested Readings:

1. Manual of Biochemistry Workshop, 2012, Department of Chemistry, Universityof Delhi.
2. Arthur, I. V. *Quantitative Organic Analysis*, Pearson.
3. Any other laboratory manual available in departmental library as advised by the instructor.

Semester-VI
MJC-12 (T): Physical Chemistry: Quantum Chemistry &Spectroscopy (T)

Course Outcomes

After completion of the course, students will be able to understand:

CO1: the postulates of quantum mechanics, Schrödinger's wave equation and its applications

CO2: the concepts related to electronic and rotational spectra.

CO3: the concepts related to vibrational and Raman spectra.

Quantum Chemistry & Spectroscopy (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Elementary Quantum Mechanics:** Postulates of Quantum Mechanics, quantum mechanical operators, properties of operator, Hermitian operator, Schrödinger wave equation and its importance, physical interpretation of wave function, probability distribution function, nodal properties, particle in one dimensional box, particle in three dimensionalbox, concept of degeneracy and zero point energy, Schrödinger wave equation for hydrogen atom, separation of variables, hydrogen like wave functions.	12
2	**Valence Bond Theory and Molecular Orbital Theory:** Basic ideas of VBT and MOT, valence bond model of H_2, construction of MO's by LCAO for H_2^+ ion, physical picture of bonding and antibonding wave functions, concept of σ, σ^*, π, π^* non-bonding orbitals, comparison between VBT and MOT. Hybrid orbitals *sp*, sp^2 and sp^3 and calculation of coefficients of atomic orbitals used in these hybrid orbitals.	12
3	**Rotational and Electronic Spectra:** Electromagnetic radiation, Energy levels of a rigid rotor, selection rules, intensity of spectral lines using population distribution and degeneracy, effect of isotopic substitution, determination of bond length and atomic mass from rotational spectra,description of non-rigid rotor, Franck-Condon principle and intensity of spectral lines, pre-dissociation and dissociation, calculation of bond dissociation energy, electronic transitions, singlet and triplet states, concept of potential energy curves for bonding and anti-bonding molecular orbitals.	12
4	**Vibrational and Raman Spectroscopy** Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, determination of force constant and bond length, relation of force constants with bond energy, effect of anharmonic motion, idea of vibrational frequencies of different functional groups, overtones, combination bands and Fermi resonance, modes of vibration, vibrational-rotational spectrum, P, Q and R branches, Raman spectrum : concept of polarizability, vibrational Raman spectra, Stokes and anti-Stokes lines, their relative intensity, principle of mutual exclusion.	12
	TOTAL	48

Suggested Readings:

1. Banwell C. N., Mc Cash E. M., (2006). Fundamentals of Molecular Spectroscopy 4th Ed. Tata McGraw-Hill: New Delhi.
2. Chandra A. K., (2001). Introductory Quantum Chemistry Tata McGraw-Hill.
3. House J. E., (2004). Fundamentals of Quantum Chemistry 2nd Ed. Elsevier: USA.
4. Lowe J. P., Peterson K., (2005). Quantum Chemistry, Academic Press.
5. Kakkar R., (2015). Atomic & Molecular Spectroscopy, Cambridge University Press.

SEMESTER – VII

MJC-13: Inorganic Chemistry: Organometallic Chemistry, Symmetry and Group theory (T)

Course Outcomes

After completion of the course, students will be able to understand the:

CO1: nomenclature and classification of Organometallic compounds.
CO2: properties of metal carbonyls including their structures.
CO3: methods of preparation of Organometallics.
CO4: concept of symmetry and group theory.

Organometallic Chemistry (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Introduction** Definition, nomenclature and classification of organometallic compounds,concept of hapticity, classification, preparation, properties and bonding of metal carbonyls, EAN rule and 18-electron rule applied to metal carbonyls, π-acceptor behaviour of CO, synergic effect, use of IR spectra in determining structure of metal carbonyls, structure of mono-, bi- and poly-nuclear metal carbonyls.	12
2	**σ- complexes** Preparation, properties, bonding and applications of Alkyls and aryls of Li, Al, Hg, Sn and Ti. Concept of multicentred bonding.	12
3	**π-Complexes** A brief account of metal-ethylene and Metal-acetylene complexes. **Zeise's salt:** Preparation, properties, bonding and synergic effect. **Ferrocene:** Preparation, reactions, structure and aromaticity, comparison of aromaticity and reactivity with that of benzene.	12
4	**Symmetry and Group Theory** Concept of symmetry, symmetry elements and symmetry operations, point groups, determination of point groups of simple molecules. Multiplication table of C_{2v} and C_{3v} point groups, group, characteristics of a group and subgroups.	12
	TOTAL	48

Suggested Readings:

1. Organometallic Chemistry: Gurdeep Chatwal and M. S. Yadav – Himalaya Publishing House.
2. Selected Topics in Inorganic Chemistry, by Dr. Wahid U. Malik, Dr. G. D. Tuli and Dr. R. D. Madan, S. Chand Publication.
3. Organometallic Chemistry – R. C. Mehrotra and A. Singh – New Age International Publication.
4. Chemistry for Degree Students – B. Sc. Third Year – by Dr. R. D. Madan- S Chand Publication.

5. General Inorganic Chemistry (Vol-II) – by Bidhan Chandra Roy and Satyanarayan Das – NCBA
6. Miessler, G.; Tarr, D. A., Inorganic Chemistry, 3rd Ed., Pearson Education India
7. Cotton F. A. Chemical applications of group theory, 3rd Ed. Interscience (Wiley), New York,
8. Gurdeep Raj, Group Theory & Symmetry in Chemistry, Krishna Prakashan Media.

Semester-VII
MJC-15: Organic Chemistry: Spectroscopy (T)

Course Outcomes

After completion of the course, students will be able to understand: -

CO1: different types of electronic transitions in organic molecules.
CO2: the principles related to ultraviolet spectroscopy.
CO3: different types of vibrations in organic molecules and the principles related to infrared spectroscopy.
CO4: the nuclear spin, shielding and deshielding effects and the principles of NMR
CO5: the principles of ESR spectroscopy.

Organic Spectroscopy (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Ultraviolet (UV)Absorption Spectroscopy:** Origin and spectrum of electromagnetic radiations, absorption and emission spectra, Lambert- Beer's law, types of electronic transitions, molar absorption coefficient, selection rules, recording and analysis of UV spectra, chromophore, auxochrome, bathochromic-, hypsochromic-, hyperchromic- and hypochromic-shifts, Woodward-Fieser rules for calculating λ_{max}., UV spectra of conjugated enes and enones.	12
2	**Infrared (IR)Absorption Spectroscopy:** Degree of freedom, Hooke's law, different types of bond vibrations in organic molecules, IR, near IR and far IR regions, selection rules for IR spectroscopy, functional group characteristic vibrations in IR, fingerprint region, factors affecting the position and intensity of IR bands, recording of IR spectra, interpretation of IR spectra of simple organic molecules.	12
3	**Nuclear Magnetic Resonance (NMR) Spectroscopy:** Principle of Nuclear magnetic resonance (^{1}H-NMR) spectroscopy, shielding and deshielding effects, chemical shift, splitting of signals, spin-spin coupling and coupling constant, number, position, area and intensity of NMR signals, interpretation of NMR spectra of simple organic molecules.	12
4.	**Electron Spin Resonance (ESR) Spectroscopy:** Introduction, principle of ESR spectroscopy, types of species taken for investigation through ESR, relaxation processes, spin-lattice relaxation, spin-spin relaxation, effect of relaxation time on line width, presentation of ESR spectra, the g–factor, hyperfine structure (electron spin and nuclear spin coupling), number and intensity of lines, ESR spectra of some simple species ($H^{\cdot}$, $CH_3^{\cdot}$, $C_2H_5^{\cdot}$, $C_6H_6^{\cdot-}$), Applications of ESR spectroscopy.	12
	TOTAL	48

Suggested Readings:

1. Organic Chemistry –Morrison and Boyd
2. Organic spectroscopy: Y.R. Sharma.
3. Organic spectroscopy -William Kemp (MacMillan)
4. Spectroscopy of Organic Compounds – P.S. Kalsi.
5. Physical methods in inorganic chemistry – Russell S. Drago.

Semester-VIII
MJC-16(T): Analytical Methods in Chemistry (T)

Course Outcomes

After completion of the course, students will be able to: -

CO1: understand accuracy and precision.
CO2: develop methods of analysis for different samples independently.
CO3: test contaminated water samples.
CO4: understand basic principle of instrument like Flame Photometer, UV-vis spectrophotometer.
CO5: learn separation of analytes by chromatography.
CO6: apply knowledge of geometrical isomers and keto-enol tautomers to analysis.
CO7: determine composition of soil.
CO8: estimate macronutrients using Flame photometry.

MJC-16 (T): Analytical Methods in Chemistry (Theory:4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Qualitative and Quantitative Aspects of Analysis:** Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression. Normal law of distribution of indeterminate errors, statistical test of data, F, Q and t test, rejection of data, and confidence intervals.	12
2	**Optical Methods of Analysis:** **UV-Visible Spectrophotometry:** Basic principle of instrumentation (choice of source, monochromator and detector) for single and double beam instrument, Transmittance. Absorbance. Basic principles of quantitative analysis: Estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. **Flame Atomic Absorption and Emission Spectrometry:** Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs). Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal, Techniques for the quantitative estimation of trace level of metal ions from water samples.	12
3	**Thermal Methods of Analysis:** Theory of thermogravimetry (TG) and basic principle of instrumentation of thermal analyser. Techniques for quantitative estimation of Ca and Mg from their mixture.	12
4	**Chromatography:** Classification, principle and efficiency of the technique, Mechanism of separation: adsorption, partition & ion-exchange, Development of chromatograms: frontal, elution and displacement methods.	12
	TOTAL	48

Suggested Readings:

1. Willard, H.H. (1988), Instrumental Methods of Analysis, 7th Edition, Wardsworth Publishing Company.
2. Christian, G.D. (2004), Analytical Chemistry, 6th Edition, John Wiley & Sons, New York.
3. Harris, D. C. (2007), Quantitative Chemical Analysis, 6th Edition, Freeman.
4. Khopkar, S.M. (2008), Basic Concepts of Analytical Chemistry, New Age International Publisher.
5. Skoog, D.A.; Holler F. J.; Nieman, T.A. (2005), Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd.

Course Structure

Chemistry

(B) Minor Courses to be offered by the department for students of other departments of science

Sem	Type of Course	Name of Course	Credits	Marks
I	MIC-1 (T)	Inorganic Chemistry I: Atomic Structure & Chemical Bonding	2	100
	MIC-1 (P)	Inorganic Chemistry Lab: volumetric analysis Organic Lab: detection, purification and separation of organic compounds	1	
II	MIC-2 (T)	Physical Chemistry: States of Matter & Ionic Equilibrium (T)	2	100
	MIC-2 (P)	Physical Chemistry: Determination of surfaces surface tension, viscosity and molecular weight (P)	1	100
III	MIC-3 (T)	Organic Chemistry: Hydrocarbons & Chemistry in everyday life.	3	100
IV	MIC-4 (T)	Chemical Thermodynamics and its Applications (T)	3	100
V	MIC-5 (P)	Chemical Thermodynamics and its Applications (P)	3	100
	MIC-6 (T)	*s*-, *p*- and d-block elements (T)	3	100
VI	MIC-7 (P)	Qualitative Analysis of Inorganic Salt Mixture Containing Four Radicals (P)	3	100
	MIC-8 (T)	Compounds with Oxygen Containing Functional Groups (T)	3	100
VII	MIC-9 (P)	Identification of Oxygen Containing Functional Groups (P)	2	100
	MIC-9 (T)	Colligative Properties of Dilute Solutions, Chemical Kinetics and Photochemistry	2	100
VIII	MIC-10 (T)	Physical chemistry: Phase Equilibria and Electrochemical cells	4	100
		Sub Total	**32**	

SEMESTER-III

MIC-3(T) : Hydrocarbons & Chemistry in everyday life

Course outcomes:

After completion of this course, student will be able to understand:

CO1: Chemistry of hydrocarbons.

CO2: applications of Chemistry in everyday life.

MIC-3(T) : Hydrocarbons & Chemistry in everyday life (Theory: 3 credits)		
Unit	**Name of Course**	**No. of Lectures**
	Aliphatic Hydrocarbons Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.	
1	**Alkanes:** (Upto 5 Carbons): Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.	11
2	**Alkenes:** (Upto 5 Carbons): Preparation: Elimination reaction, dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis Reactions: cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation,.	11
3	**Alkynes:** (Up to 5 Carbons): Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alk, $KMnO_4$.	11
4	**Chemistry in everyday life:** Air Pollution, Water Pollution, Toxic Chemicals, Inorganic and Organic Chemicals in soil, Important Fertilizers Green Chemistry, essential constituents in foods, Important drugs food preservatives	12
	TOTAL	45

Suggested Readings:

1. Organic Chemistry-Graham Solomons
2. Organic Chemistry- Morrison & Boyd.

22/9/23 22.09.23 22.09.23 22.9.23 22/9/2023 22/09/2023 22/09/2023

Semester-IV
MIC-4: Physical Chemistry: Chemical Thermodynamics and its Applications (T)

Course Outcomes

After completion of the course, students will be able to understand:

CO1: various thermodynamic terms.

CO2: various enthalpies of transformations and Kirchoff's law.

CO3: entropy changes, Gibbs free energy change, spontaneous and non- spontaneous processes.

CO4: second law of thermodynamics.

MJC-4: Physical Chemistry: Chemical Thermodynamics and its Applications (Theory: 3 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Basic concepts and first law of thermodynamics:** Definition of thermodynamic terms: system, surroundings, types of systems, intensive and extensive properties, state and path functions, thermodynamic processes, concept of heat and work, First law of Thermodynamics-Statements, definition of internal energy and enthalpy, Heat capacities at constant volume and constant pressure with their relationship, Joule's law, Joule-Thomson coefficient and inversion temperature, calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible and irreversible processes.	12
2	**Thermochemistry:** Standard state, enthalpy of reaction, standard enthalpy of formation, Hess's law of constant heat summation and its applications, enthalpy of combustion, enthalpy of neutralization, bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy, Kirchoff's equation.	11
3	**Second law of thermodynamics:** Second law of thermodynamics, need of the law, different statements of the law, Carnot theorem, Carnot cycle and its efficiency.	11
4	**Entropy and free energy:** Concept of entropy, entropy as a function of V&T, P&T, entropy change in ideal gases and mixing of ideal gases, free energy and spontaneity, variation of Gibbs free energy (G) and Helmholtz free energy(A) with P, V and T.	11
	TOTAL	45

Suggested Readings:

1. Peter, A. & Paula, J. de., Physical Chemistry 9th Ed., Oxford University Press (2011).
2. Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
3. Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).

4. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
5. Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. &Will, S. Commonly Asked Questions in Thermodynamics. CRC Press: NY (2011).
6. Levine, I.N. Physical Chemistry 6th Ed., Tata Mc Graw Hill (2010).
7. Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006).

Semester-V
MIC-5 (P): Chemical Thermodynamics and its Applications (P)

Course Outcomes

After completion of this practical course, students will be skilled in determining:

CO1: different types of enthalpy changes.

CO2: the heat capacity of calorimeter.

MIC-5: Chemical Thermodynamics and its Applications (Practical: 3 credits)
Practical: **Chemical Thermodynamics and its Applications** 1. Determination of water equivalent of calorimeter. 2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 3. Determination of enthalpy of ionization of ethanoic acid. 4. Determination of heat of displacement of Cu by Zn from Cu^{2+} salt solution. 5. Determination of enthalpy of hydration of copper sulphate.

Suggested Readings:

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
2. Athawale, V. D. & Mathur, P. Experimental Physical Chemistry, New Age International, New Delhi (2001).

SEMESTER – V

MIC-6 (T): Inorganic Chemistry: *s*-, *p*- and d-block elements (T)

Course Outcomes

After completion of the course, the students will be able to understand: -

CO1: different oxidation states of elements with their relative stability and complex forming properties.

CO2: the ring, cage and polymers of B, Si & P.

CO3: to carry out the preparation of inorganic compounds.

CO4: the important properties of transition metals such as their oxidation states, colour, magnetic and spectral, use of Latimer diagrams in identifying oxidizing, reducing and disproportionating species.

CO5: the concepts related with noble gases, their compounds, shapes, properties and applications.

***s*-, *p*- and *d*-block elements (Theory: 3 credits)**		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Periodic Table and Periodicity of Elements:** The long form of periodic table, detailed discussion of the following periodic properties of the elements a) Atomic radii (covalent, metallic and van der Waals) b) Ionization enthalpy, successive ionization enthalpies, factors affecting ionization enthalpy and applications of ionization enthalpy. c) Electron gain enthalpy. d) Electronegativity: Pauling's and Mullikan, variations of electronegativity with bond order and partial charge. General electronic configuration of *s*- and *p*- block elements, inert pair effect, relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group, allotropy and catenation properties.	14
2	**Compounds of *p* block elements:** Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses:- Boric acid, borates, borazines, silicates, silicones, NH_3-manufacture (Haber's process), oxides, oxy- and peroxy acids of nitrogen, phosphorus and sulphur.	11
3	**Chemistry of noble gases:** Occurrence and isolation, rationalization of inertness of noble gases, shape and structure of noble gas compounds using VSEPR theory, preparation and properties of XeF_2, XeF_4 and XeF_6.	8
4	**Chemistry of d-block elements:** General electronic configuration of d-block metals and their group trends, variable oxidation states and their relative stabilities, magnetic and catalytic properties of metals, colour, complex forming ability of metals, Chemistry of Cr, Mn and Fe in various oxidation states with special reference to their following compounds: peroxo compounds of Cr, potassium dichromate, potassium permanganate..	12
	TOTAL	45

22/9/23 22.9.23 22.9.23 22/9/2023 22/09/23

Readings:

1. Lee, J. D., Concise Inorganic Chemistry, 5th Ed., Wiley India (2008).
2. Housecroft, C. E.; Constable, E. C. Chemistry-An Introduction to Organic, Inorganic and Physical Chemistry, 4th Ed., Pearson Education (2010).
3. Atkins, P.; Overton, T.; Rouke, J.; Weller, M.; Armstrong, F.; Hagerman, M., Shriver Atkins's Inorganic Chemistry, 6th Ed., Oxford University Press India (2015).
4. Miessler, G.; Tarr, D. A., Inorganic Chemistry, 3rd Ed., Pearson Education India (2008).
5. Huheey, J. E.; Keiter, E. A.; Keiter, R. L.; Medhi, O. K., Inorganic Chemistry: Principles of Structures and Reactivity, 4th Ed., Pearson Education India (2006).
6. Cotton, F. A.; Wilkinson, G.; Gaus, P. L., Basic Inorganic Chemistry, 3rd Ed., Wiley India (2007).
7. Puri, B. R.; Sharma, L. R.; Kalia, K. C., Principles of Inorganic Chemistry, 33rd Ed., Vishal Publishing (2017).

Semester-VI

MIC-7 (P): Qualitative Analysis of Inorganic Salt Mixture Containing Four Radicals (P)

Course Outcomes

After the end of this practical course students will be skilled in: -

CO1: identification of basic radicals from known and unknown salts.

CO2: identification of acid radicals from known and unknown salts.

Qualitative Analysis of inorganic salt mixture containing Four Radicals. **(Practical 3 credits)**
1. Identification of known cations (basic radicals) and anions (acid radicals) from the supplied salt. 2. Identification of cation (basic radicals) and anions (acid radicals) from unknown salt. 3. Identification of cation (basic radicals) and anions (acid radicals) from binary mixture of inorganic salts.

SuggestedReadings:

1. Raj, G., Advanced Practical Inorganic Chemistry, Krishna Prakashan, Meerut (2013).
2. Mendham, J.; Denney, R. C., Barnes, J. D.; Thomas, M.; Sivasankar, B., Vogel's Quantitative Chemical Analysis, 6th Ed., Pearson Education India (2009).

Semester-VI

MIC-8 (T): Organic Chemistry: Compounds with Oxygen Containing Functional Groups (T)

CourseOutcomes

After the completion of the course, students will be able to understand:

CO1: preparation, properties and reactions of compounds with oxygen containing functional groups.

CO2: to draw plausible mechanisms for reactions involving these functional groups.

CO3: the knowledge of various named organic reactions associated with these functional groups.

CO4: chemistry of epoxides.

CO5: the detection of *O*-containing functional groups like alcohols, phenols, carbonyl and carboxylic acid groups.

CO6: the preparation of various organic compounds by functional group transformations and other common organic reactions.

CO7: the green practices in Organic syntheses.

Compounds with Oxygen Containing Functional Groups (Theory: 3 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Alcohols, Phenols, Ethers and Epoxides** **Alcohols:** Classification and nomenclature. Preparation of 1^{o}, $2^{o}$and 3^{o}alcohols using substitution reaction, addition reactions, Grignard reagent. **Reactions:** With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation. **Phenols:** Classification, nomenclature and properties **Preparation:** Cumene hydroperoxide method, from diazonium salts. **Reactions:** Electrophilic substitution: Nitration, halogenation and sulphonation. Kolbe's–Schmidt Reaction, Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Schotten–Baumann Reaction. **Ethers and epoxides (aliphatic and aromatic):** Classification, nomenclature, preparation and properties. **Reactions:** Cleavage of ethers with HI. Syntheses of epoxides, Acid and base–catalyzed ring opening of epoxides.	17
2	**Aldehydes and ketones (aliphatic and aromatic):** Structure, reactivity and preparation; nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives and their mechanisms; mechanisms of Aldol and Benzoin condensation, Knoevenagel condensations, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reactions, haloform reaction and Baeyer Villiger oxidation, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV and PDC).	10

	Addition reactions of unsaturated carbonyl compounds: Michael addition.	
3	**Carboxylic Acids and their Derivatives:** Preparation, physical properties and reactions of monocarboxylic acids. Preparation and reactions of acid chlorides, anhydrides, esters and amides; Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement.	09
4	**Carbohydrates** Classification and general properties of carbohydrates, Glucose and Fructose (open chain and cyclic structure), Mutarotation, ascending and descending in monosaccharides.	09
	TOTAL	45

Suggested Readings:

1. Greeves, N.; Clayden, J.; Warren, S., Organic Chemistry, 2nd Ed., Oxford University, Press India (2014).
2. Sykes, P., A Guide book to Mechanism in Organic Chemistry, 6th Ed., Pearson Education India (2003)
3. Ghosh, S. K., Advanced General Organic Chemistry, Part-I & Part-II, 3rd Ed., New Central Book Agency (2010).
4. Bhal, B. S.; Bhal, A., A Textbook of Organic Chemistry, 22nd Ed., S. Chand and Company (2016).
5. Sengupta, S., Basic Stereochemistry of Organic Molecules, 2ndEd., Oxford University Press India (2018).
6. Finar, I. L. Organic Chemistry (Volume1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Semester-VII

MIC-9 (P): Organic Chemistry: Identification of Oxygen Containing Functional Groups (P)

Course Outcomes:

When the students will finish this practical course, they will be skilled in: -

CO1: acetylation and benzoylation of various functional groups present in organic compounds.

CO2: oxime formation, hydrazone formation, semi-carbazone formation, iodoform test and in the bromination of phenols.

CO3: oxidation of alcohols and reduction of nitro compounds.

CO4: Aldol Condensation by conventional and green methods.

Compounds with Oxygen Containing Functional Groups (Practical: 2 credits)
(a) Acetylation of salicylic acid. (b) Benzolyation of aniline. (c) Preparation of Oximes and 2,4-dinitrophenylhydrazones of aldehydes and ketones (d) Bromination of Phenol.

Suggested Readings:

1. Agarwal, O. P., Advanced Practical Organic Chemistry, Krishna Prakashan, Meerut (2014).
2. Ahluwalia, V. K.; Aggarwal, R., Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, Universities Press (2000).
3. Furniss, B. S.; Hannafold, A. J.; Smith, P. W. G.; Tatchell, A. R., Vogel's Textbook of Practical Organic Chemistry, 5th Ed., Pearson Education India (2003).
4. Clarke, H. T., A Handbook of Organic Analysis: Qualitative and Quantitative, 4th Ed., CBS Publishers India (2007).
5. Vogel, A. I., Tatchell, A. R., Furnis, B. S., Hannaford, A. J. & Smith, P. W. G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
6. Mann, F.G. & Saunders, B. C. Practical Organic Chemistry Orient-Longman, 1960.
7. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi(2011).

Semester-VII

MIC-9 (T): Colligative Properties of Dilute Solutions, Chemical Kinetics and Photochemistry (T)

Course Outcomes

After completion of the course, students will be able to understand:-

CO1: Colligative properties of dilute solutions and determination of these properties.

CO2: Abnormal colligative properties and molar mass.

CO3: Azeotropes, maximum and minimum boiling azeotropic mixture.

CO4: Kinetics of simple and complex reactions.

CO5: Jablonski diagram and laws of photochemistry.

Colligative Properties of Dilute Solutions, Chemical Kinetics and Photochemistry (Theory: 2 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1.	**Colligative Properties of Dilute Solutions:** Colligative properties of solutions, Henry's law, Raoult's law (thermodynamic derivation), ideal and non-ideal solutions, azeotropes, thermodynamic derivation and experimental determination of relative lowering in vapour pressure, elevation in boiling point, depression in freezing point and osmotic pressure, abnormal colligative properties due to association and dissociation of solutes in solutions, van't Hoff's factor, abnormal molar mass, applications of colligative properties in determining molar mass of solutes, degree of dissociation and association.	8
2.	**Kinetics of Elementary Reactions:** Rate laws of first, second, third and zero order reactions, methods of determination of order of reactions, temperature dependance of reaction rate, Arrhenius equation, Activation energy, **Catalysis:** Theory and applications.	8
3.	**Kinetics of Complex Reactions:** Steady state approximation, integrated rate expression (first order only) for the 1. Opposing reactions 2. Parallel reactions and 3. Consecutive reactions.	7
4.	**Photochemistry:** Introduction, consequences of light absorption, Lambert-Beer's law, laws of photochemistry, Grotthus-Draper law, Stark-Einstein law of photochemical equivalence, quantum yield, photochemical reactions ($H_2 + Cl_2$, $H_2 + Br_2$, decomposition of HI), photochemical rate laws.	7
	TOTAL	30

Suggested Readings:

1. Physical Chemistry: P.W. Atkins (ELBS)
2. Comprehensive Physical Chemistry: Hemant Snehi
3. Theoretical Physical Chemistry: Gladstone
4. Physical Chemistry: G.M. Barrow.
5. Modern Electrochemistry: JOM Bakris and A.K.N. Reddy

6. Text Books of Polymer Science: F.W. Billmayer Jr.
7. Advanced Physical Chemistry: Gurdeep Raj

Semester-VIII

MIC-10: Physical Chemistry: Phase Equilibria, Conductance and Electrochemical Cells (T)

Course Outcomes

After completion of the course, students will be able to understand: -

CO1: the degree of ionization, pH and salt hydrolysis.
CO2: the different types of Buffer solutions.
CO3: the concepts of solubility product.
CO4: the conductivity, specific conductivity, equivalent conductivity and molar conductivity, application of conductance measurement in determining various physical parameters.
CO5: the standard electrode potential of half cells and calculate the EMF of a cell using Nernst equation.
CO6: EMF measurements in determining various parameters like free energy, enthalpy, entropy, equilibrium constants, etc.
CO7: the concentration cells with and without transference.
CO8: the principle of potentiometric titrations.

MIC-10: Physical Chemistry: Ionic Equilibria, Conductance and Electrochemical Cells (Theory: 4 credits)		
Unit	**Topics to be covered**	**No. of Lectures**
1	**Phase Equilibria:** Phases, components and degrees of freedom of systems, criteria of phase equilibria, Gibbs Phase Rule and its thermodynamic derivation, phase diagram of one component system (water/sulphur).	15
2	**Conductance:** Conductance, specific conductance (conductivity), equivalent and molar conductance, their variation with dilution for weak and strong electrolytes, Kohlrausch law of independent migration of ions, transference number.	15
3	**Electrochemical cells:** Electrode and electrode potential, reference electrodes (Standard hydrogen electrode and Calomel electrode), standard electrode potential, type of electrodes, galvanic cells, electrochemical series and its significance, Nernst equation and its importance, types of electrochemical cells – chemical cells and concentration cells, concept of EMF of a galvanic cell, measurement of EMF of a cell, construction and working of a Galvanic cell.	15
4	**Applications of EMF measurements** Determination of equilibrium constant, ΔG, ΔS and ΔH of cell reactions, calculation of solubility product of a sparingly soluble salt, the valency of ions.	15
	TOTAL	60

Suggested Readings:

1. Atkins, P. W.; de Paula, J.; Keeler, J., Physical Chemistry, 11th Ed., Oxford University Press India (2018).
2. Bahl, A.; Bahl, B. S.; Tuli, G. D., Essentials of Physical Chemistry, S.

Chand and Company (2014).
3. Negi, A. S.; Anand, S. C., Physical Chemistry, New Age International Publishers (2007).
4. Puri, B. R.; Sharma, L. R.; Pathania, M. S., Principles of Physical Chemistry, 47th Ed., Vishal Publishing (2017).
5. Silbey, R. J.; Alberty, R. A.; Bawendi, M. G., Physical Chemistry, 4th Ed., Wiley India (2006).
6. Rakshit, P. C., Physical Chemistry, Revised Ed. Sarat Book House (2014).
7. Kapoor, K. L., A Textbook of Physical Chemistry: States of Matter and Ions in Solution, Vol. I, 6th Ed., McGraw Hill Education India (2019).

Course Structure

Chemistry

(B) Multidisciplinary Courses to be offered by the department for students of different disciplines.

Sem	Type of Course	Name of Course	Credits	Marks
I	MDC-1 (T)	Inorganic Chemistry: Atomic Structure, Chemical Bonding and fundamentals of Organic Chemistry.	2	100
	MDC-1 (P)	Inorganic and Organic Chemistry Lab	1	100
II	MDC-2-(T)	Inorganic Chemistry: Atomic Structure, Chemical Bonding and fundamentals of Organic Chemistry.	2	100
	MDC-2 (P)	Inorganic and Organic Chemistry Lab (P)	1	100
III	MDC-3 (T)	Chemistry in Everyday Life	2	100
III	MDC-3 (P)	Inorganic and Organic Chemistry Lab (P)	1	100

Sub Total: 09

SEMESTER-III

MDC-3 (T): Chemistry in everyday life

Course outcomes:

After completion of this course, student will be able to understand:

CO1: Chemistry of hydrocarbons.

CO2: applications of Chemistry in everyday life.

MDC-3 (T): Chemistry in everyday life (Theory: 3 credits)		
Unit	**Name of Course**	**No. of Lectures**
1	**Polymers:** Monomers and polymers, classification of polymers, addition and condensation of polymers, homopolymers and copolymers, preparation, properties and applications of polymers, styrene, PVC, Teflon, acrolein, nylon-6, nylon-66, natural rubber, Buna-S, Buna-N, bakelite, neoprene, biodegradable polymers.	8
2	**Sources of energy:** Nuclear energy, solar energy, bioenergy, hydral energy, bio additives to fuels, blue and green hydrogen as fuel.	8
3	**Colloids:** True solution, suspension, colloidal solution, types of solution, preparation of colloids, Tindal effect, Brownian motion, electrophoresis, cataphoresis, dialysis.	8
4	**Chemistry in everyday life:** Air Pollution, Water Pollution, Toxic Chemicals (Inorganic and Organic), Chemicals in soil, Important Fertilizers, Green Chemistry and foods preservatives.	6
	TOTAL	30

Suggested Readings:

1. Organic Chemistry- Morrison & Boyd.
2. Environmental Chemistry, B. K. Sharma

Semester-III

MDC-3 (P): Qualitative Analysis of Inorganic Salt Mixture Containing Four Radicals (P)

Course Outcomes

After the end of this practical course students will be skilled in: -

CO1: identification of basic radicals from known and unknown salts.

CO2: identification of acid radicals from known and unknown salts.

Qualitative Analysis of inorganic salt mixture containing Four Radicals. **(Practical 1 credits)**
1. Identification of known cations (basic radicals) and anions (acid radicals) from the supplied salt. 2. Identification of cation (basic radicals) and anions (acid radicals) from unknown salt. 3. Identification of cation (basic radicals) and anions (acid radicals) from binary mixture of inorganic salts.

SuggestedReadings:

1. Raj, G., Advanced Practical Inorganic Chemistry, Krishna Prakashan, Meerut (2013).
2. Mendham, J.; Denney, R. C., Barnes, J. D.; Thomas, M.; Sivasankar, B., Vogel's Quantitative Chemical Analysis, 6th Ed., Pearson Education India (2009).