

Faculty of Science

Syllabus

For

B.Sc.

(III SEMESTER COURSE)

W.E.F. - Session 2025 - 2026

**RADHA GOVIND UNIVERSITY
CHANDAUSI, SAMBHAL (U.P.)**

B.Sc. 3rd Semester

S. No.	Subject	Subject Code	Paper Title	Paper Code
1.	Desktop publishing	CP	Desktop Publishing with advance page Maker	UDESKCP201
			Desktop Publishing Lab I	UDESKCP202
2.	Physics	PH	Electricity Magnetism and Electromagnetic Theory	UELECPH201
			Physics Lab III	UPHYPH202
3.	Chemistry	CH	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201
			Chemistry Lab III	UCHEMCH202
4.	Mathematics	MA	Abstract Algebra and linear Algebra	UABSTMA201
5.	Computer Science	CS	Computer Network & Information Security	UCOMPCS201
			Computer Science Lab III	UCOMPCS202
6.	Botany	BO	Industrial Botany	UINDUBO201
			Botany Lab III	UBOTABO202
7.	Zoology	ZO	Diversity of Chordates and Comparative Anatomy	UDIVEZO201
			Zoology Lab III	UZOOLZO202
8.	Biochemistry	BC	Clinical Biochemistry	UCLINBC201
			Biochemistry Lab III	UBIOCBC202
9.	Microbiology	MB	Microbial Physiology and Metabolism	UMICRMB201
			Microbiology Lab III	UMICRMB202
10.	Biotechnology	BT	Basic Molecular Biology	UBASIBT201
			Biotechnology Lab III	UBIOTBT202
11.	Food Technology	FT	Technology of Cereals, Pulses, Bakery & Confectionary	UTECHFT201
			Food technology Lab III	UFOODFT202

1.	MATHEMATICS	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESKCP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESKCP202	1	0	0	4	0	0	40	60	100
2.		MATHEMATICS/ Major/6	Abstract Algebra and linear Algebra	UABSTMA201	6	6	0	0	40	60	0	0	100
3.		PHYSICS/Minor/6	Electricity Magnetism and Electromagnetic Theory	UELECPH201	4	4	0	0	40	60	0	0	100
4.			Physics Lab III	UPHYSPH202	2	0	0	4	0	0	40	60	100
5.		CHEMISTRY/GE/4	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201	3	3	0	0	40	60	0	0	100
6.			Chemistry Lab III	UCHEMCH202	1	0	0	2	0	0	0	100	100
		Total				20				160	240	80	120
1.	COMPUTER SCIENCE	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESKCP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESKCP202	1	0	0	4	0	0	40	60	100
2.		COMPUTER SCIENCE / Major/6	Computer Network & Information Security	UCOMPCS201	4	4	0	0	40	60	0	0	100
3.			Computer Science Lab III	UCOMPCS202	2	0	0	4	0	0	40	60	100
4.		PHYSICS/Minor/6	Electricity Magnetism and Electromagnetic Theory	UELECPH201	4	4	0	0	40	60	0	0	100
5.			Physics Lab III	UPHYSPH202	2	0	0	4	0	0	40	60	100
6.		MATHEMATICS /GE/4	Abstract Algebra and linear Algebra	UABSTMA201	4	4	0	0	40	60	0	0	100
		Total				20				160	240	120	180

1.	BOTANY	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESKCP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESKCP202	1	0	0	4	0	0	40	60	100
2.		BOTANY / Major/6	Industrial Botany	UINDUBO201	4	4	0	0	40	60	0	0	100
3.			Botany Lab III	UBOTABO202	2	0	0	4	0	0	40	60	100
4.		ZOOLOGY /Minor/6	Diversity of Chordates and Comparative Anatomy	UDIVEZO201	4	4	0	0	40	60	0	0	100
5.			Zoology Lab III	UZOOLZO202	2	0	0	4	0	0	40	60	100
6.		CHEMISTRY/GE/4	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201	3	3	0	0	40	60	0	0	100
7.			Chemistry Lab III	UCHEMCH202	1	0	0	2	0	0	0	100	100
	Total				20				160	240	120	280	800
1.	ZOOLOGY	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESKCP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESKCP202	1	0	0	4	0	0	40	60	100
2.		ZOOLOGY / Major/6	Diversity of Chordates and Comparative Anatomy	UDIVEZO201	4	4	0	0	40	60	0	0	100
3.			Zoology Lab III	UZOOLZO202	2	0	0	4	0	0	40	60	100
4.		BOTANY /Minor/6	Industrial Botany	UINDUBO201	4	4	0	0	40	60	0	0	100
5.			Botany Lab III	UBOTABO202	2	0	0	4	0	0	40	60	100
6.		CHEMISTRY/GE/4	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201	3	3	0	0	40	60	0	0	100
7.			Chemistry Lab III	UCHEMCH202	1	0	0	2	0	0	0	100	100
	Total				20				160	240	120	280	800

1.	CHEMISTRY	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESCP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESCP202	1	0	0	4	0	0	40	60	100
2.		CHEMISTRY / Major/6	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201	4	4	0	0	40	60	0	0	100
3.			Chemistry Lab III	UCHEMCH202	2	0	0	4	0	0	40	60	100
4.		BOTANY /Minor/6	Industrial Botany	UINDUBO201	4	4	0	0	40	60	0	0	100
5.			Botany Lab III	UBOTABO202	2	0	0	4	0	0	40	60	100
6.		ZOOLOGY /GE/4	Diversity of Chordates and Comparative Anatomy	UDIVEZO201	3	3	0	0	40	60	0	0	100
7.			Zoology Lab III	UZOOLZO202	1	0	0	2	0	0	0	100	100
	Total				20				160	240	120	280	800
1.	BIOTECHNOLOGY	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESCP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESCP202	1	0	0	4	0	0	40	60	100
2.		BIOTECHNOLOGY / Major/6	Basic Molecular Biology	UBASIBT201	4	4	0	0	40	60	0	0	100
3.			Biotechnology Lab III	UBIOTBT202	2	0	0	4	0	0	40	60	100
4.		BIOCHEMISTRY /Minor/6	Clinical Biochemistry	UCLINBC201	4	4	0	0	40	60	0	0	100
5.			Biochemistry Lab III	UBIOCBC202	2	0	0	4	0	0	40	60	100
6.		FOOD TECHNOLOGY /GE/4	Technology of Cereals, Pulses, Bakery & Confectionary	UTECHFT201	3	3	0	0	40	60	0	0	100
7.			Food technology Lab III	UFOODFT202	1	0	0	2	0	0	0	100	100
	Total				20				160	240	120	280	800

1.	MICROBIOLOGY	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESCKP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESCKP202	1	0	0	4	0	0	40	60	100
2.		MICROBIOLOGY / Major/6	Microbial Physiology and Metabolism	UMICRMB201	4	4	0	0	40	60	0	0	100
3.			Microbiology Lab III	UMICRMB202	2	0	0	4	0	0	40	60	100
4.		BIOTECHNOLOGY /Minor/6	Basic Molecular Biology	UBASIBT201	4	4	0	0	40	60	0	0	100
5.			Biotechnology Lab III	UBIOTBT202	2	0	0	4	0	0	40	60	100
6.		FOOD TECHNOLOGY /GE/4	Technology of Cereals, Pulses, Bakery & Confectionary	UTECHFT201	3	3	0	0	40	60	0	0	100
7.			Food technology Lab III	UFOODFT202	1	0	0	2	0	0	0	100	100
	Total				20				160	240	120	280	800
1.	BIOCHEMISTRY	DESKTOP PUBLISHING/SEC/4	Desktop Publishing with advance page Maker	UDESCKP201	3	4	0	0	40	60	0	0	100
			Desktop Publishing Lab I	ULABCCP202	1	0	0	4	0	0	40	60	100
2.		BIOCHEMISTRY / Major/6	Clinical Biochemistry	UCLINBC201	4	4	0	0	40	60	0	0	100
3.			Biochemistry Lab III	UBIOCBC202	2	0	0	4	0	0	40	60	100
4.		BIOTECHNOLOGY /Minor/6	Basic Molecular Biology	UBASIBT201	4	4	0	0	40	60	0	0	100
5.			Biotechnology Lab III	UBIOTBT202	2	0	0	4	0	0	40	60	100
6.		FOOD TECHNOLOGY /GE/4	Technology of Cereals, Pulses, Bakery & Confectionary	UTECHFT201	3	3	0	0	40	60	0	0	100
7.			Food technology Lab III	UFOODFT202	1	0	0	2	0	0	0	100	100
	Total				20				160	240	120	280	800

B.Sc. 3rd Semester

Syllabus

Subject- Desktop publishing

Course Title: Desktop Publishing with advance Page Maker

Subject code: UDESKCP201

Unit: I[No. of Lectures: 8]

Working with a publication, Opening a Publication, Creating a New Document, Setting the Margins, Setting the Page Size, Setting the Page Orientation, Introduction, Placing Graphics, Placing in-Line Graphics, Converting an Independent Graphic to an In-Line Graphic, Aligning In-Line Graphics, Sizing Graphics, Cropping Graphics, Object Linking and Embedding (OLE), Setting Up an OLE Liked Object, Embedding an OLE Object, Text Wrap.

Unit: II[No. of Lectures: 12]

Introduction, Using the Control Palette, Control Palette Basics, Modifying Objects by Adjusting Values, Using the Reference-Point Proxy, Setting Measurement and Nudge Preferences, Moving Objects, Rotating an Object, Reflecting an Object, Skewing an Object, Removing Transformation, Aligning and Distributing Objects, Grouping and Ungrouping, Rules for Grouping Objects, Changing the Staking Order of Objects, Locking Objects. Working with large amount of texts. Long documents features: Compiling Chapters into a Book, Preparing the Book, Combing the Chapters, Numbering Pages, Restarting Page Numbering, Creating a Table of Contents.

Unit: III[No. of Lectures: 10]

Creating PDF Files with Acrobat, Creating an Adobe Acrobat File, Font Issues, Managing Automatic Hypertext Links, Using the Tables Editor, Setting Adobe Table Defaults, Adobe Table Preferences, Typing, Editing and Formatting Text in Adobe Table, Formatting Text in a Table, Exporting and Saving Adobe Tables, Exporting Tables from Adobe Table, Exporting a Table as Text, Exporting a Table as a Graphic, Saving Adobe Tables, Importing and Updating Table, Sorting Pages, Balancing Columns, Create Keyline, Bullets and Numbering, Add Continued Line Creating Master Pages, Setting Up Pages, Use Of story editor , Page maker style sheets, working with frame, working with layers.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Desk Top Publishing From A to Z by Bill Grout and Osborne; McGraw Hill
- DTP (Desk Top Publishing) for PC user by Houghton; Galgotia Publishing House Pvt. Ltd., Daryaganj, New Delhi.
- ADOBE PAGEMAKER 6:5 - Shashank Jain & Satish Jain — First Edition 2001, BPB Publications.
- PAGEMAKER 6.5 COMPLETE - R. ShammsMortier, Rick Wallace, Rick Wallace, Phil Gaskill, Richard Romano, Carla Rose, Ellen Wixted, First Indian Edition 1997, Techmedia.
- DESKTOP PUBLISHING ON PC - M.C. Sharma, First Edition 1997, BPB Publications.
- BPB'S DTP COURSE (DESKTOP PUBLISHING) — Satish Jain & M. Geethalyer. First Edition 62009. BPB Publications.
- PAGEMAKER 7 FOR WINDOWS - Ted Alspach, First Indian Edition 2002, Techmedia.

- ADOBE PAGEMAKER 7.0 - Shashank Jain & Satish Jain — First Indian Edition 2002, BPB Publications.

Desktop Publishing Lab I **UDESCKP202**

Unit [No. of Lectures: 30]

- Creating and opening a document in Page Maker.
- Formatting and editing a document in Page Maker 15P.
- Saving and printing a given document in Page Maker.
- Insertion of graphics in Page Maker.
- Working with a publication in Page Maker.
- Using the Control Palette in Page Maker.
- Use of page maker to prepare the Book and Combining the Chapters.
- Reflecting an Object, Skewing an Object and Removing Transformation.
- Design Letter head and business card using Page Maker.
- Cash Memo and Certificate making in Page Maker.
- Use of various tools in Sign Board Design.
- Use of various tools to design professional logos.
- Design Newspaper Advertisement and flyers.
- Type a Doc Using Story Editor.
- Build Booklet and perform Page Numbering and editing.
- Page Layout Design for Newsletter.
- Creating and formatting PDF Files with Acrobat.
- Creating Page maker style sheets and frames.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Desk Top Publishing From A to Z by Bill Grout and Osborne; McGraw Hill
- DTP (Desk Top Publishing) for PC user by Houghton; Galgotia Publishing House Pvt. Ltd., Daryaganj, New Delhi.
- ADOBE PAGEMAKER 6:5 - Shashank Jain & Satish Jain — First Edition 2001, BPB Publications.
- PAGEMAKER 6.5 COMPLETE - R. ShammsMortier, Rick Wallace, Rick Wallace, Phil Gaskill, Richard Romano, Carla Rose, Ellen Wixted, First Indian Edition 1997, Techmedia.
- DESKTOP PUBLISHING ON PC - M.C. Sharma, First Edition 1997, BPB Publications.
- BPB'S DTP COURSE (DESKTOP PUBLISHING) — Satish Jain & M. Geethalyer. First Edition 2009. BPB Publications.
- PAGEMAKER 7 FOR WINDOWS - Ted Alspach, First Indian Edition 2002, Techmedia.
- 8 ADOBE PAGEMAKER 7.0 - Shashank Jain & Satish Jain — First Indian Edition 2002, BPB Publications.

Subject- Physics
Course Title: Electricity Magnetism and Electromagnetic Theory
Subject code: UELECPH201

Unit: I [No. of Lectures: 12]

- An overview of thermal and hydroelectric power plants in Madhya Pradesh.
- Electrostatic field; Electric flux; Gauss's theorem of electrostatics; Application of Gauss's theorem: Electric field due to infinite long charged wire: Uniformly charged spherical shell and solid sphere; charged plate; Conservative nature of electrostatic field; Laplace and Poisson's equations; Uniqueness theorem.
- Dielectrics; Polar and non-polar molecules; Parallel plate capacitor with a dielectric; Electrical susceptibility and dielectric constant; Polarization and Polarization vector (P); Displacement vector (D); Intensity of Electric field (E); Relationship between D, E and P.
- Gauss's law in dielectrics; Clausius – Mossotti relation, Langevin-Debye formula; Ferroelectric materials; Hysteresis loop for ferroelectrics.

Unit: II Magneto statics [No. of Lectures: 12]

Lorentz force equation and magnetic field B; Bio-Savart's law; Calculation of magnetic intensity H for solenoid and anchor ring.

Ampere's circuital law and its applications for solenoid and Toroid; Basic law of magneto statics in differential form $\nabla \cdot \vec{B} = 0$ and $\nabla \times \vec{B} = \mu_0 \vec{J}$; Free and bound currents; Magnetization and magnetization vector M; Magnetic permeability and susceptibility; Derivation of $\vec{M} = \vec{J}_b$ for a non-uniformly magnetized substance; Relationship between B, H and M. Diamagnetic, Paramagnetic and Ferromagnetic substances; B – H Curve and Hysteresis loss. General idea about AC and DC motors, Motor winding.

Unit: III Current electricity [No. of Lectures: 12]

Network theorems: Concept of ideal current and voltage sources; Thevenin's theorem; Norton's theorem; Milliman's theorem; Maximum power transfer theorem.

Transient current: Growth and decay of current in LR circuit, charging and discharging of a capacitor through resistor; Measurement of high resistance by leakage; charging and discharging of a condenser through an inductance and resistance.

Alternating currents: Complex number and their applications in alternating current circuits (RL, RC and LC); Series LCR (acceptor) and parallel LCR (rejector) circuits; Power factor. A.C. bridges: Maxwell's bridge; Owen's bridge; Anderson's bridge; Kelvin's bridge.

Unit: IV Motion of charged particles in electric and magnetic field [No. of Lectures: 12]

- Motion of charged particles in electric and magnetic field: Construction and working principle of Cyclotron and Betatron; Thomson's method for the determination of specific charge (e/m) of electron.
- Ballistic galvanometer: Torque on a current loop; Current and charge sensitivity; Electromagnetic damping; Logarithmic damping; CDR.
- Introduction to CRO: Block Diagram of CRO; Applications of CRO: (1) Study of Wave form, (2) Measurement of voltage, current, frequency, and Phase difference.
- Electromagnetic induction: Faraday's Law; Lenz's Law; self and mutual inductance; Reciprocity theorem; self-mutual of coil; Mutual inductance of two coils; Energy stored in magnetic field.

Keywords/Tags: Motion of charged particles, specific charge, Ballistic galvanometer, CRO, Electromagnetic induction.

Unit: VElectrodynamics[No. of Lectures: 12]

- Equation of Continuity for current; Maxwell's displacement current; Derivation of Maxwell's equation; pointing theorem.
- Electromagnetic wave equation; Plane electromagnetic wave in vacuum and dielectric media; Reflection and refraction at a plane boundary of dielectric; Polarization by reflection and Fresnel's equation; Brewster's Law.
- Electromagnetic waves in conducting medium; Reflection and refraction of Electromagnetic waves by the ionosphere; Secant law; Skip distance and maximum usable frequency.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Electricity & Magnetism – R. Murugesan.
- Electricity and Magnetism – A.S. Mahajan & A.A. Rangwala.
- Introduction to Electrodynamics – D. Griffith.
- Electricity & Magnetism – E.M. Purcell & D.J. Morin.
- Electromagnetic Field Theory – Bo Thidé.
- Classical Electricity & Magnetism – W.K.H Panofsky & M. Philips.
- Electromagnetics – J. Edminister (Schaum series).
- Classical Electrodynamics – J.D. Jackson.

Physic slab III

UPHYSPPH202

- To draw the B-H curve and determination of Hysteresis loss
- Determination of voltage, frequency and phase difference using CRO
- Study of sensitivity of CRO
- Verification of the Thevenin's theorem
- Verification of the Norton's theorem
- Verification of maximum power transfer theorem
- Verification of the super position theorem
- Measurement of self-inductance using Maxwell's bridge
- Measurement of unknown inductance using Kelvin's bridge
- Determination of self-inductance by Anderson's bridge
- To study of the charging and discharging of a condenser through a resistor
- Determination of impedance and power factor using LCR circuit
- Study of frequency response curve of a series LCR circuit and determination of resonant frequency, Quality factor, and Band width.
- To study of frequency response curve of a parallel LCR circuit and determination of anti-resonant frequency and Quality factor.
- Determination of Dielectric constant of Kerosene by resonance method
- Determination of Self-Inductance of a Coil by Rayleigh's Method using Ballistic Galvanometer
- Verification of Millman's theorem
- To study the magnetic field along the axis of a circular

- Determination of M and H using vibrational magnetometer and deflection magnetometer
- Comparison of capacity of two capacitors using Ballistic Galvanometer

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- G.L. Squires, Practical Physics, CUP
- B.L Flint & H.T Worsnop, Advanced Practical Physics for students, Asia Publishing House
- D. Chattopadhyay & P.C Rakshit, an Advanced Course in Practical Physics, New Central Book Agency
- S.P Singh, Advanced Practical Physics, Pragati Prakashan
- D.C Tayal, University Practical Physics, PHI
- P.R Sasi Kumar, Practical Physics, PHI

Subject- Chemistry

Course Title: Transition Elements, Chemi energetics, Phase Equilibrium

Subject code: UTRANCH201

Unit: I Knowledge tradition of Indian chemistry [No. of Lectures: 2]

Ancient Indian Chemists and their works: Nagarjuna, Vagbhata, Govndacharaya, Yashodhra, Somadeva, etc.

Introductory Idea about rasas

Mainrasa: Maharas, Uparas, Commonras, Ratna, Dhatu, poison, Alkali, salt, Lauhhashma.

Maharas: Abram, Vaikrant, Bhasik, Vimala, Shilajatu, Sasak, Chapala, Rasak.

Uparas: Gandhak, Garik, Kashik, Suvari, Lalak, Manah, Shila, Anjana, Kankushtha.

Common Rasa: Koyla, Gauripashan, Navasara, Varataka, Agnijar, Lajavarta, GiriSindoor, Hingul, MurdadShrangakam.

CHEMISTRY OF D -& FBLOCK ELEMENTS

Chemistry of Transition elements: First, Second and third Transition series.

General group trends with special reference to electronic Configuration, Coordination Geometry, Colour, Variable Valency, spectral, magnetic and Catalytic properties, Ability to form Complexes.

Chemistry of inner transtition elements:

Lanthanide sand Actinides General group trends with special reference to Electronic Configuration, Oxidation states, Colour and Magnetic properties. Lanthanides Contraction. Separation of Lanthanides (Ion- exchange method only).

Transuranic elements: General Introduction.

Keywords/tags: knowledge tradition of Indian Chemistry, transitionelements, Spectral Properties, Magnetic properties, Catalyticproperties, Lanthande CONTRACTION.

Unit: II COORDINATION CHEMISTRY [No. of Lectures: 10]

Structures, Stereo chemistry and Metal Ligand bonding in Transition metal Complexes

Werner theory for complexes, Electronic interpretation by Sidwik.

Valency Bond Theory (VBT)- Postulates and applicationsfor Tetrahedral, square planner and Octahedral complexes, Limitation.

Crystal Field Theory(CFT) – Postulates and application: crystal field splitting of d - Orbital, crystal field stabilisation energy (CFSE) in Tetrahedral , Square planerand Octahedral complexes , CFSEof weak and strong fields. Factors affecting the crystal field parameters.

Measurement of $Dq(\Delta)$ and factors affecting its magnitude. Comparison of octahedral and tetrahedral coordination. Tetragonal distortions from octahedral geometry. Jhan-Teller theorem. Square planar geometry. Limitation of CFT.

Qualitative aspects of Ligand field and Molecular Orbital (MO) Theory.

Spectro chemicaland Nephelauxetic series.

Coordination number, coordination geometries of metal ions, types of ligand.

2. Isomerism in coordination compounds:

Structural isomerism: Ionization, Linkage, Coordination- Ligand Isomerism.

Stereoisomerism:

Geometrical Isomerism: Square planar metal complexes of type- $[MA_2B_2]$, $[M(AB)_2]$, $[MABCD]$. OCAHEDRAL METAL COMPLEXES OF TYPE – $[MA_4B_2]$, $[M(AA)_2B_2]$, $[MA_3B_3]$.

Optical isomerism: Tetrahedral complexes of type – $[MABCD]$. Octahedral complexes of type – $[M(AA)_2B_2]$, $[M(AA)_3]$.

Keywords/tags: Stereochemistry of complexes, VBT, CFT, CFSE.

UNIT: III THERMODYNAMIC[No. of Lectures: 12]

1. First law of Thermodynamics

Concept of heat (Q), work (W), internal energy (U), Statement of first law, Enthalpy (H), Relation heat capacities.

Calculations of Q, W, ΔU and ΔH under

Isothermal and adiabatic condition for Reversible, Irreversible and free (idea and Van der Waals) expansions of gases,

Joule Thomson effect and its theory, Inversion temperature.

2. Second law of Thermodynamics

Carnot cycle, Statement of the second law of thermodynamics.

Concept of Entropy, Calculation of entropy changes for reversible and irreversible processes, Concept of residual entropy.

Free energy Functions: Gibbs and Helmholtz energy. Variation of entropy

(S), Gibbs free energy (G), work function (A) with temperature (T), volume (V) & pressure (P). Free energy change and spontaneity, Gibbs- Helmholtz equation.

3. Third law of thermodynamics:

Nernst heat theorem and its significance, statement of third law, calculation of absolute entropy of substances.

Keywords/ Tag: Thermodynamics, Law of thermodynamics, Carnot cycle enthalpy, Free Energy.

UNIT: IV ELECTROCHEMISTRY [No. of Lectures: 12]

1. Electrical Conduction: Conduction in metal and in electrolyte solution. Specific, equivalent, and molar conductivity. Measurement of equivalent conductance's. Effect of dilution on conductivity. Migration of ions, Kohlrausch law and its applications.

2. Weak and strong electrolytes: theory of strong electrolyte, Debye- Hückel- Onsager (DHO) theory and equations.

3. Transport numbers: Determination of transport Number by Hittorf method and Moving boundary method.

4. Electrode reactions: Nernst equation, Derivation of equation for single electrode potential.

5. Electrodes: Reference electrodes, standard hydrogen electrode, Quinhydrone electrode, Glass electrode, Calomel electrode.

6. Standard electrode potentials, electrochemical series and its applications.

7. Electrochemical cells: Nernst equation, calculation of e.m.f of cell

Keywords: electrical transport, conduction, DHO theory, Transport number, Nernst Equation, Electrochemical series.

UNIT: V PHASE EQUILIBRIUM[No. of Lectures: 12]

1. Concept of phases, components and degree of freedom.

2. Thermodynamics. Derivation of Gibbs phase Rule for reactive and non-reactive systems.

3. Clausius – Clapeyron equation and its applications to solid –liquid, Liquid – Vapour and Solid –Vapour equilibrium.

4. Phase diagram for one component for system with applications- water and Sulphur. phase diagrams for systems of solid –liquid equilibrium involving – eutectic, Congruent and Incongruent melting points. Water and sulphur system, Ag-Pb and Mg –Zn system, NaCl-H₂O system.

5. Binary solution: Raoult's Law, Ideal and Non ideal or Azeotropic mixtures, immiscible

liquids, steam distillation.

Keywords/tags: Phase Equilibrium, Gibbs phase Rule, Clausius-Clapeyron Equation, Raoult's Law.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Bariyar, A. and Goyal, S., B.Sc. Chemistry Combined, (In Hindi) Krishna Educational Publishers Year: 2019.
- Lee, J.D., Concise Inorganic Chemistry, Wiley, 2008, Fifth Edition.
- Kalia, K.C., Puri, B.R., Sharma, L.R., Principles of Inorganic Chemistry, Vishal Publishing Co. 2020.
- Sodhi, G. S., Textbook of Inorganic Chemistry, Viva Books Private Limited, New Delhi, 2013.
- Singh, J., Singh, J. and Ananda vardhan, S., A Logical Approach to Modern Inorganic Chemistry, Anu Books, 2019. (
- Gopalan, R., and Ramalingam, V, Concise Coordination Chemistry, Vikas Publishing House Pvt. Ltd., New Delhi, 2005. 1st edition.
- Madan, R. L., Chemistry for degree students, B.Sc. II year, S. Chand & Company Ltd., New Delhi, 2011.
- Prakash, S., Tuli, G. D., Basu, S. K., and Madan, R. D., Advanced Inorganic Chemistry, Vol. II, S. Chand & Company Ltd., New Delhi, 2007. 19th Edition.
- Malik, W. U., Tuli, G. D., and Madan, R. D., Selected Topics in Inorganic Chemistry, S. Chand & Company Ltd., Delhi, 2014.
- Puri, B. R., Pathania, M.S., Sharma, L. R., Principles of Physical Chemistry. Vishal Publishing Co. 2020.
- Gurtu, J. N., Gurtu A., Advanced Physical Chemistry, Pragati Prakashan, Meerut, 2017, Edition: IV.
- Day, M.C. and Selbin, J., Theoretical Inorganic Chemistry, ACS Publications 1962.
- Atkins' Physical Chemistry, 10th Edition, Oxford University Press, 2014.
- Levine, I. N., Physical Chemistry, 6th Ed, McGraw Hill Education, 2011.
- McQuarrie, A., Simon, J. D., Physical Chemistry: A Molecular Approach, 1st Ed University Science Books, California (1997).
- Books published by M.P. Hindi Granth Academy, Bhopal.

Reference Books:

- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K., Inorganic Chemistry: Principles Structure and Reactivity, Pearson Education India, 2006.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J., Concepts and Models in Inorganic Chemistry, John Wiley & Sons, 1994.
- Barrow, G.M., Physical Chemistry, Tata McGraw-Hill, 2007.
- Miessler, G.L., Fischer, P.J., and Tarr, D.A., Inorganic Chemistry, 5th edition, Pearson, 2014.
- Weller, M., Overton, T., Rourke, J., Armstrong, F., Inorganic Chemistry: Seventh International Edition, Oxford, 2018.
- Glasstone, S., Textbook of Physical Chemistry, Macmillan, 1951.

Chemistry Lab III UCHEMCH202

Section A: Preparation of Inorganic complexes (No. of Lectures-12)

Tetra amine copper (II) sulphate
Copper (II) acetylacetonate complex
Iron (III) acetylacetonate
Tetraaminocarbonatocobalt (III) nitrate
Potassium tri(oxalate) ferrate (III)
Nickel (II) dimethylglyoximate

Section B: Thermochemistry

- (a) Determination of heat capacity of a calorimeter using following experiment-
- (i) Change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution of sulphuric acid or enthalpy of neutralization)
- (ii) Heat gained by cold water is equal to heat lost by hot water
- (b) Determination of enthalpy of following:
Neutralization of hydrochloric acid with sodium hydroxide
Ionization of ethanoic acid
Hydration of Salt
- (c) Determination of enthalpy (endothermic and exothermic) of aqueous solution of salt (KNO₃, NH₄Cl)
- (d) Determination of basicity of a diprotic acid by the thermochemical method- Calculation of the enthalpy of neutralization of the first step in term of the changes of temperature observed in the graph of temperature versus time for different additions of a base.
- (e) Study of the solubility of benzoic acid in water and determination of enthalpy change (ΔH)

Section C: Phase Equilibria:

- a) Determination of critical solution temperature (CST), composition of phenol water system at CST and to study the effect of impurities of sodium chloride and succinic acid on it.
- b) Construction of the Phase diagram using cooling curves or ignition tube method:
- Simple eutectic and
 - Congruently melting system
- c) Distribution of benzoic acid between water and cyclohexane
- d) Study of the equilibrium of following reactions by the distribution method:
- $I(aq) + I^-(aq) \rightleftharpoons I_2(aq)$
 - $Cu^{2+}(aq) + nNH_3 \rightleftharpoons Cu(NH_3)_n^{2+}$

Section D: Purification/Separation of compounds by fractional distillation/Steam distillation

Keywords/Tags: Inorganic complexes, Heat capacity, Enthalpy, Calorimeter, Critical

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Goswami A.K., Mehta, A., Khanam Rehana, O.R.S., UGC Practical Chemistry VOL.I Pragati Prakashan, 2015
- Goyal, S., B.Sc. Chemistry Practical, Krishna publication, 2017
- Vogel, A.I., A Textbook of Quantitative Inorganic Analysis, ELBS
- Khosla, B.D., Garg, V.C., & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011)

- Ratnani, S., Agarwal, S., Mishra, S.K., Practical Chemistry, McGraw Hill India, 2018, 1st Edition
- Pandey, O.P., Bajpai, D.N., Giri, S., Practical Chemistry, B.Sc. 1st, 2nd, 3rd, S.Chand, 2010
- Reference books:
- Gerasimchuk, N., Tyukhtenko, S., Inorganic synthesis: A mutual for Laboratory, Experiments, Cambridge Scholars publishing, 2019
- Gopalan, R., Inorganic chemistry for Undergraduates, University Press, 2009

Subject- Mathematics
Course Title: Abstract Algebra and linear Algebra
Subject code: UABSTMA201

Unit: I (No. of lectures: 18)

1.1 Historical background:

1.1.1 A brief historical background of the Algebra in the context of India and Indian heritage and culture

1.1.2 A brief biography of Brahmagupta

1.2 Groups, Subgroups and their basic properties

1.3 Cyclic groups

1.4 Coset decomposition

1.5 Lagrange's and Fermat's theorem

1.6 Normal subgroups

1.7 Quotient groups

Unit: II (No. of lectures: 18)

2.1 Homomorphism and Isomorphism of groups 2.2 Fundamental theorem of homomorphism

2.3 Transformation and permutation group S_n ($n < 5$) 2.4 Cayley's theorem

2.5 Group auto Isomorphism

2.6 Inner auto Isomorphism

2.7 Group of auto Isomorphisms

Unit: III (No. of lectures: 18)

3.1 Definition and basic properties of rings 3.2 Ring homomorphism

3.3 Subring

3.4 Ideals

3.5 Quotient ring

3.6 Polynomial ring

3.7 Integral domain

3.8 Field

Unit: IV (No. of lectures: 18)

4.1 Definition and examples of Vector space

4.2 Subspaces

4.3 Sum and direct sum of subspaces

4.4 Linear span, Linear dependence, linear independence and their basic properties

4.5 Basis

4.6 Finite dimensional vector space and dimension

4.6.1 Existence theorem

4.6.2 Extension theorem

4.6.3 Invariance of the number of elements

4.7 Dimension of sum of subspaces

4.8 Quotient space and its dimension

Unit: V (No. of lectures: 18)

5.1 Linear transformation and its representation as a matrix

5.2 Algebra of linear transformation

5.3 Rank-Nullity theorem

5.4 Change of basis, dual space, bi-dual space and natural isomorphism

5.5 Ad joint of a linear transformation

5.6 Eigenvalues and Eigenvectors of a linear transformation

5.7 Diagonalization.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Text books:

- I. N. Herstein: Topics in Algebra, Wiley Eastern Ltd. New Delhi. 1977.
- K. B. Datta: Matrix and Linear Algebra, Prentice hall of India Pvt. Ltd. New Delhi. 2000.
- Gerard G. Emch, R. Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005.
- Reference Books:
 - Surjeet Singh and Qazi Zameeruddin: Modern Algebra, Vikas Publishing House Pvt Ltd; Eighth edition, 2006.
 - N. Jacobson: Basic Algebra. Vol. I and II, W. H. Freeman, 1980.
 - S. Luther and I. B. S. Passi: Algebra. Vol. 1 and II, Narosa Publishing House, 1997.
 - Shanti Narayan: A text Book of Modern Abstract Algebra, S. Chand and Company. New Delhi, 1967.
 - K. Vasishtha and A. R. Vasishtha: Modern Algebra, Krishna Publication; 68th edition, 2015.
 - K. Hoffman and R. Kunze: Linear Algebra. 2nd Edition, Prentice Hall Englewood Cliffs, New Jersey, 1971.
 - R. Vasishtha and J. N. Sharma: Linear Algebra, Krishna Prakashan Media (P) Ltd., 2019.
- Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House, 1962.

Subject- Computer Science
Course Title: Computer Network & Information Security
Subject code: UCOMPCS201

Unit: I (No. of Lecturer 8)

Introduction to Computer Network:

Use of computer network: Access to information, person to person communication, electronic commerce, Internet of things;

Types of computer network: Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network.

Network Technology: Personal Area Network, Local Area Network Metropolitan Area Network, Wide Area Network, internetworks, example of network (Internet, Mobile network, wireless network-Wi-Fi);

Reference Model: OSI, TCP/IP, and Critique of the OSI and TCP/IP reference models; Policy, Legal & Social Issues: Online speech, net neutrality, security & privacy, disinformation.

Keywords: IoT, Broadband, LAN, MAN, WAN, OSI, TCP/IP.

Unit: II (No. of Lecturer 8)

Physical Layer:

Guided Transmission Media: Twisted pairs, coaxial cable, Fiber Optics;

Wireless Transmission: The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra- wideband communication;

Cellular Network: Common concept – cells, handoff, paging: 1G, 2G, 3G, 4G & 5G technology.

Keywords: Coaxial cable, fiber optics, 2G, 3G, 4G, 5G.

Unit: III (No. of Lecturer 12)

Data Link Layer:

Service Provide to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting Codes, Error Correcting codes.

Data Link Protocol: Basic transmission and receipt, simplex link layer protocol, Full duplex, Sliding window protocol, Packet over SONET, ADSL, Point- to – Point Protocol.

Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks, and Structure of a Switch.

Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge and Gateways (fundamental concepts).

Keywords: error correcting codes, error detecting codes, SONET, ADSL, point-to- point protocol, Router, Modem, Repeater, Hub, Switch, Bridge, Gateways.

Unit: IV (No. of Lecturer 12)

Network Layer:

Network Layer Issues, Routing Algorithm: Optimality, principle of shortest path algorithm, Blooding Distance Vector Routing, Broadcast Routing; congestion in network, traffic management approaches; IP Addresses, IPv4 Addresses, IPv6 Addresses,

Virtual- Circuit Network: Frame Relay and ATM,

Transport Layer: Process- Process Delivery: UPD, TCP.

Application Layer: DNS, SMTP, POP, ftp, http and https.

Basic of Wi-Fi (Fundamental concept only).

Streaming audio and video: digital audio and video, streaming stored media, real-time streaming.

Keywords: routing algorithm, IPv4, IPv6, ATM, SMTP, POP, ftp, http, https, Wi-Fi, video streaming.

Unit: V (No. of Lecturer 10)

Network Security and Information Security: Fundamental of network and information security: principles of security and attack, Security Goals (Confidentiality, Integrity and Availability), Non- Repudiation.

Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability, Vulnerability and Threats: Phishing Attacks, E-mail threats, Web-threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransom ware.

Malware: Worms, Virus, Spams, Adware, Spyware, Trojans.

Security Technology: Firewalls, Intrusion detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication.

Keywords: phishing, SQL injection, Worms, Computer virus, Spyware, Trojans, Firewall, Cipher, Cryptography.

Unit: VI (No. of Lecturer 10)

Computer and Cyber- crimes: Cyber- crimes and related concepts, distinction between cyber-crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber-crimes, cyber stalking, forgery and fraud crime related to IPRs, cyber terrorism, Ransom ware attacks, computer vandalism.

Cyber Laws: Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits. Scope of cyber laws: e-commerce, online contracts, IPRs (copyright, Trademarks and software patenting), e-taxation e-governance and cyber- crimes, Cyber law in India with special reference to Information Technology Act, 2000 and recent amendments.

Keywords: cyber- crime, cyber stalking, and cyber- fraud, IPR, IT laws, e- commerce, e- taxation, e- governance, mail bombs.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Textbooks:

- Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- Michael E Whitman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- M. Merkow, J. Breithauth, Information Security Principles and Practices, 2nd Edition, 2014, Pearson Education
- G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning.
- Praveen Kumar Shukla, Surya Prakash Tripathi, Ritendra Goel “Introduction to Information Security and Cyber Laws”, 2014, Dreamtech Press.
- Faiyaz Ahamad, KLSI “Cyber Law and Information Security”, 2013, Dreamtech Press.
- Books published by M.P. Hindi Granth Academy, Bhopal.

Reference books:

- Kurose James F., Ross Keith W., Computer Networking, A Top-Down Approach, Sixth Edition, 2017, Pearson
- Micki Krause, Harold F. Tipton, Handbook of Information Security Management; Vol. 1 -

3, CRC Press LLC.

- B. A. Forouzan: Data Communications and Networking, Fourth edition, TMH Publishing Company Ltd.
- Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India.

Computer Science Lab III **UCOMPCS202**

Unit: I Study of UTP network cable

- Study the color code of UTP cable
- Categories of UTP n/w cable
- Shielding of n/w cable
- Electricity interference with n/w cable
- Maximum length for which data cable can be used
- Crimping of RJ45 connector and Punching of data n/w cable
- Penta scanning of cabling work
- Rules of UTP laying

Unit: II Knowledge of Structured Cabling and its components

- Information outlet with box
- Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
- Patch Panel

Rack Management

Unit: III Study of Optical Fiber cable

- Different cores of OFC (6 core, 12, 24 core)
- Multimode & Single mode OFC cable
- Shielding Of OFC
- Splicing/ Termination of OFC
- OTDR Testing
- LIU fixing
- LIU management (pigtail/ fiber patch cord)
- Media Convertor
- SFP module
- Rules of OFC laying

Unit: IV Use of tools

- Crimping Tool
- Punching Tool
- Nose Plier
- Wire Stripping and cable Cutter
- Multimeter
- RJ45, RJ11, RJ12, Cat5 Cat6 Network Cable Tester
- In-Line Coupler (RJ45 F/F)
- RJ45 NETWORK SPLITTER ADAPTER 2- way.

Unit: V Configuration/ Management of Local Area Network

- Implementation of file and printer sharing.
- Installation of ftp server and client.
- Connect the computer in local Area Network
- Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: ping, ipconfig, getmac, hostname, nslookup, tracert, arp, pathping, systeminfo.
- Configure VLAN using Managed switch Device/ Packet Tracer
- Implementation of Subnet ting in class A,B and C
- Ping between 2 systems using IPv6
- Configuration of NAT for incoming packet request
- Configuration of Software / Hardware firewall to block outgoing requests to facebook.com

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- Michael E Whitman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- Books published by M.P. Hindi Granth Academy, Bhopal.

Reference books:

- Hacking Exposed, Stuart McClure, Joel Scrambray, George Kurtz, TMH.
- Computer Security Art and Science, Matt Bishop, Pearson/PHI.

Subject- Botany
Course Title: Industrial Botany
Subject code: UINDUBO201

Unit: I[No. of Lectures: 12]

1. Plants in Timber Industry:

1.1 Timber yielding trees of India and their product (Shisham, Sal, Teak, Deodar, Babool).

1.2 Bamboo and Cane Industry.

1.3 Kattha's Industry.

Unit: II[No. of Lectures: 12]

1. Leaf Based Industries-

1.1 Utility products of leaf (Palash, Banana).

1.2 Tea Industry (Production of various types of teas).

1.3 Leaf oil Industry (Mint, Camphor, Neem, Tulsi, Eucalyptus and Lemon grass).

1.4 Leaves used as spices (Kasoori Methi, Pudina, Curry patta, Onion, Tejpatta).

Unit: III[No. of Lectures: 12]

1. Flower based Industries —

1.1 Perfume products of Gulab, Jasmine, Henna

1.2 Color industry (Food and Holi colors).

1.3 Raw material for Fermentation (Mahua).

Unit: IV[No. of Lectures: 12]

1. Fruits and Seeds based Industries-

1.1 Jams, Jellies, Juice, Sauce and Pickles.

1.2 Poha and Daal Industry.

1.3 Edible Oil Industry (Groundnut, Soybean)

1.4 Starch, Glucose, and Dextrose Industry.

Unit: V[No. of Lectures: 12]

1. Other parts of plants based Industries-

1.1 Sugar and Jaggery Industries.

1.2 Jute and Agarbatti stick making industry.

1.3 Project proposal preparation for establishment of an industry.

1.4 Grants and funding provider organizations of India.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Gerald E Wickens Economic Botany, principles and Practice, Kluwer Academic Publishers (2001)
- Kocchar, S.L. Economic Botany, Cambridge University Press, UK (2016)
- Simpson, B.B. and Ogorzal, M.C. Economic Botany, Tata Macgray Hill Publisher (1986)

Botany Lab III
UBOTABO202

- Preparation of Holi colors from locally available flowers
- Preparation of food colors from locally available flowers
- Perfume extraction process by distillation method
- Preparation and preservation techniques of jams, jellies and prickles.
- Extraction and preservation of juices (lemon and orange etc.)
- Preparation of different types of teas (Tulsi tea, lemon tea etc.)
- Identification, collection and extraction of oil yielding leaves.
- Identification, collection and specimen preparation of leafy spices.
- Hands on training for preparation of "Douna and Pattal" using Palash and Banana leaves.
- Visit to any plant based industry.
- Herbarium preparation of different parts of plants used in various industries

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Simpson, B.B. and Ogorzaly, M.C. Economic Botany, Tata Macgray Hill Publisher (1986)

Subject- Zoology
Course Title: Diversity of Chordates and Comparative Anatomy
Subject code: UDIVEZO201

Unit: I (No. of Lecturer 12)

1. Introduction to Chordates:

- 1.1 Traditional Knowledge on Animal Science in ancient Indian Civilization.
- 1.2 Origin of Chordates, General characteristics and outline classification of Phylum Chordata up to orders according to Parker and Haswell, Seventh Edition.

2. Protochordata:

- 2.1 General characteristics and classification of Sub – Phylum Urochordata and Cephalochordate.
- 2.2. Type study of Herdmania and retrogressive metamorphosis in ascidian tadpole.
- 2.3 Type study of Amphioxus and its Affinities.

3. Agnatha

- 3.1 Comparison of Petromyzon and Myxine.

Keywords: Chordata, Herdmania, Amphioxus, Cephalochordate, Petromyzon

Unit: II(No. of lectures: 12)

1. Pisces

- 1.1 General Characteristics and classification of Pisces.
- 1.2 Accessory respiratory organs, Parental care in fishes.

2. Amphibia

- 2.1 General Characteristics and classification of Amphibia.
- 2.2 Parental care in Amphibia and Paedomorphosis.

3. Reptilia

- 3.1 General Characteristics and classification of Reptilia.
- 3.2 Difference between Poisonous and Non Poisonous snakes, Venom and Antivenom.
- 3.3 Poison apparatus and biting mechanism in snake.

Keywords: Pisces, Parental care, Amphibia, Reptiles, and Poison apparatus.

Unit: III (No. of lectures: 12)

1. Aves

- 1.1 Brief Introduction of “Birdman” of India – Dr. Salim Ali.
- 1.2 General characteristics and classification of Aves.
- 1.3 Migration of birds, principles and aerodynamics of flight.
- 1.4 Flight adaptation in birds.

2. Mammalia

- 2.1. General characteristics and classification of mammals.
- 2.2. Adaptive radiation in mammals with reference to locomotory appendages.
- 2.3. Introduction of ZSI (Zoological Survey of India).

Keywords: Aves, Aerodynamics, Flight adaptation, Mammalia, Adaptive radiation, Locomotory appendages.

Unit: IV (No. of lectures: 14)

1. Comparative Anatomy of Vertebrates.

- 1.1. Comparative study of integument and its derivatives of Vertebrates.
- 1.2. Comparative study of appendicular skeleton (Limb and girdles) of Vertebrates.
- 1.3. Comparative study of digestive system of Vertebrates.
- 1.4. Comparative study of respiratory system of Vertebrates.

Keywords: Integuments, Derivatives, Girdles, Digestive system, Respiratory system

Unit: V(No. of lectures: 10)

1. Comparative Anatomy of Vertebrates.

1.1. Comparative study of aortic arches and heart of Vertebrates.

1.2. Comparative study of Brain of Vertebrates.

1.3. Comparative study of Urinogenital System of Vertebrates.

1.4. Study of Eye and Ear of Mammals.

Keywords: Heart, Brain, Kidney, Urinogenital System, Eye, Ear

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Dhami, P. S., and Dhami, J. K. “Chordate Zoology” R. Chand & Co. (2006).
- Young J. Z. “The Life of Vertebrates. III Edition”, Oxford University Press. (2004).
- Parker T. J. & Haswell, W. A., “Textbook of Zoology – Vertebrates”, VII Edition, Volume II. (1972).
- Hyman, L. H. “Hyman’s Comparative Vertebrate Anatomy” Third Edition, Univ. of Chicago Press, Chicago & London.
- Kent, G. C., Cart R. K., “Comparative Anatomy of the Vertebrates” 9th Edition, McGraw Hill, Boston, USA. (2015).
- Jordan and Verma; “Chordate Zoology” Revised & enlarged edition, S. Chand & Co. (1965).
- Jordan E. L., “Chordate Zoology” S. Chand & Co., New Delhi (2009 reprint).
- Kotpal, R. L. “Modern Textbook of Zoology – Vertebrates”, Rastogi Publications, Meerut (2017).
- Tortara, G. J. 8 Derrickson, B. H. “Principles of Anatomy & Physiology”, Global Edition, John Willey & Sons, In. (2017).
- Kotpal, R. L, Shastri. Shukla. “Comparative Anatomy” Edition – I, Rastogi Publications, Meerut (2017).
- Sinha A. K., Adhikari S., Ganguly B. B “Biology of Animals” Vol II, New Central Book Agency, Calcutta (2012).
- Deoras, P. J., “Snakes of India” National Book Trust of India, (1981).
- Kotpal, R. L., Shastri Shukhla. “Comparative Anatomy and development Biology”, Edition – I, Rastogi Publications, Meerut (2019).
- Banerjee, Ananda., “Common birds of the Indian Subcontinent” A field Guide, II Edition, Rupa & Co., New Delhi (2008).
- Ali, Salim. “The Book of Indian Birds”, 12th Edition, Bombay Natural History Society, Mumbai (1968).
- Kulshreshtha, S. K., “Comparative Anatomy of Vertebrates” II revised Edition, Anmol Publications Pvt. Ltd, New Delhi, 2004.
- Books Published by MP Hindi Granth Academy, Bhopal.

Zoology Lab III **UZOOLZO202**

Unit: I Study of museum specimens: (No. of Lectures: 6)

- Protochordata: Herdmania, Amphioxus.
- Fishes: Scoliodon, Stegostoma, Torpedo, Heteropneustes, Labeo, Exocoetus, Hippocampus, Anabas, Eel, Flat Fish.
- Amphibia: Necturus, Bufo, Rana, Salamander, Hyla, Axolotl larva, Mild wife Toad, Ichthyophis.
- Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Chameleon, Draco, Viper, Naja, Hydrophis.
- Aves: Local Birds, Vulture, Great Indian Bustard, Lesser Florican.
- Mammalia: Bat, Funambulus, Platypus, Rat.

Unit: II Study of Histological slides (No. of Lectures: 2)

- T. S. of Duodenum, Stomach, Small Intestine, Liver, Pancreas, Testis, Ovary, V. S. of Skin, L. S. of Kidney of vertebrates.

Unit: III Osteology (No. of Lectures: 3)

- Study of Limb Bones and Girdles of Vertebrates (Amphibia, Reptilia, Aves, Mammalia).

Unit: IV Study of different types of feathers/beaks of birds. (No. of Lectures: 2)

Unit V: (No. of Lectures: 8)

- Dissection of Local fish (Only demonstration of commercially available local fish/ through computer simulation method/ through YouTube videos/ through models and charts.)

a) General Viscera, arterial system.

b) Cranial nerves V, VII, IX and X.

Unit: VI Mounting of Scales of fishes. (No. of Lectures: 2)

Unit: VII Comparative study of heart and brain of vertebrates. (No. of Lectures: 2)

Unit: VIII (No. of Lectures: 3)

Study of local bird fauna of surrounding area (College campus/ Village/ Garden / Ward).

Unit: IX Collection. (No. of Lectures: 2)

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Lal, S. S., "Vertebrate Practical Zoology", 11 revised editions, Rastogi publications, Meerut (2009).
- Sharma, VijayLaxmi, "Practical Zoology", Paragon Industrial publication (2004).
- Verma P. S., "Manual of Practical Zoology - Chordates", S. Chand Co. Ltd. 11th Edition (2010).
- Prakash, M., & Arora, C. K., "Laboratory animals", Anmol Publications, New Delhi (1998).
- Yadav Varshney, "Practical Zoology", Kedarnath Ramnath (2015).
- Books Published by MP Hindi Granth Academy, Bhopal.

Subject- Biochemistry
Course Title: Clinical Biochemistry
Subject code: UCLINBC201

Unit: I Introduction and Historical background of Physiology and Biochemistry
(No. of lectures: 12):

Biomolecules and Regulatory mechanism.

1. Contribution of Indian Scientists-
 - 1.1 Contribution of Charak.
 - 1.2 Contribution of Sushrut.
2. Biomolecules-
 - 2.1 Micro and Macro molecules.
 - 2.2 Water and Buffer System.
3. Enzymes-
 - 3.1 Definition and general properties.
 - 3.2 Nomenclature and Classification and functions.
 - 3.3 Mechanism and Regulation of Enzyme action.
 - 3.4 Co- Enzyme.
4. Vitamins and Minerals-
 - 4.1 Types and Sources.
 - 4.2 Biological importance.
 - 4.3 Deficiencies and Disorders.

Keywords: Biomolecules, Buffer system, Enzymes, Vitamins

Unit: II Metabolism, Physiology and Regulation (No. of lectures: 14)

1. Protein –
 - 1.1 Structure, Nomenclature, Classification and Biological importance.
 - 1.2 Metabolism – Deamination, Decarboxylation, Transamination of amino acids and Ornithine cycle
2. Carbohydrates
 - 2.1 Structure, Nomenclature, Classification and Biological importance.
 - 2.2 Metabolism - Glycogenesis, Gluconeogenesis, Glycogenolysis, Glycolysis, Citric Acid Cycle and Electron Transport Chain.
3. Lipids –
 - 3.1 Structure, Classification and Biological importance.
 - 3.2 Metabolism-Beta oxidation of fatty acids.
4. Physiology of Digestion, regulation and disorders.
5. Homeostasis and Basal Metabolic rate (BMR).
6. Thermoregulation

Keywords: Proteins, Carbohydrates, Krebs cycle, Digestion, Homeotherms

Unit: III Respiration, Excretion and Immune System (No. of lectures: 12)

1. Respiration –
 - 1.1 Mechanism -Inspiration and Expiration.
 - 1.2 Physiology-Exchange and Transport of Gases (Oxygen and carbon dioxide), Chloride shift, role of Respiratory pigment.
 - 1.3 Disorders – Apnea, Hypoxia, Asphyxia, Carbon monoxide poisoning, Bronchitis, Asthma.
2. Excretion –
 - 2.1 Physiology – Urea, Urine formation and Counter Current mechanism.

- 2.2 Excretory products, disorders.
- 2.3 Osmoregulation.
- 3. Immunity –
- 3.1 Innate and acquired Immunity.
- 3.2 Immune cells and Immunoglobulin's.
- 3.3 Antigen responses.

Keywords: Chloride shift, Excretion, Urea, Immunity, Antigen

Unit: IV Neuromuscular Co-ordination (No. of lectures: 10)

- 1. Nerves –
- 1.1 Structure and type of Neurons.
- 1.2 Physiology of nerve impulse conduction.
- 1.3 Neuromuscular disorders – Epilepsy, Alzheimer's and Parkinson's disease.
- 2. Muscles –
- 2.1 Structure and type of muscles.
- 2.2 Physiology of muscles contraction and its Biochemistry.
- 2.3 Muscular disorders – Fatigue.

Keywords: Neuron, Impulse conduction, Muscle

Unit: V Hormones, Endocrine system and Reproductive Physiology (No. of lectures: 12)

- 1. Hormones
- 1.1 Definition and Classification
- 1.2 Mechanism of hormone action
- 2. Endocrine system
- 2.1 Structure, functions and disorders of Pituitary gland.
- 2.2 Structure, functions and disorders of Thyroid and Parathyroid gland.
- 2.3 Structure, functions and disorders of Adrenal gland
- 2.4 Structure, functions and disorders of Thymus gland, Pineal gland and Pancreas.
- 3. Reproductive Physiology
- 3.1 Physiology of reproduction
- 3.2 Sex Hormones

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Lehninger A.L., Cox. M.M. and Nelson, D.L. "Principles of Biochemistry". Edition W.H. Freeman and Co., New York. (2008).
- Berg, J.M., Tymoczko, J.L. and Stryer, L." Biochemistry", VI Edition W.H. Freeman and Co., New York. (2007)"
- Murray, R.K., Bender, D.A., Botham, K.M. Kennelly, P.J., Rodwell, V.W. and Well, P.A. "Harper's Illustrated Biochemistry", XXXVIII Edition, International Edition, The McGraw-Hill Companies Inc. (2009).
- Hames. B.D. and Hooper, N.M." Instant Notes in Biochemistry". II Edition, BIOS Scientific Publishers Ltd., U.K (2000).Guyton, A.C. & Hall, J.E., "Textbook of Medical Physiology", XI Edition Hercourt Asia PET Ltd., W.B. Saunders Company (2006).
- Tortara, G.J. & Grabowski, S.," Principles of Anatomy & Physiology", XI Edition, John Wiley & sons (2006).
- Victor P. Eroshenko, diFiore's "Atlas of Histology with Functional correlations" XII Edition, Lippincott W. & Wilkins (2008).
- Vander A. Sherman J. And Luciano D, "Vander's Human Physiology: The Mechanism of

Body Function". XIII Edition, McGraw Hills. (2014).

- Hoar, W.S., "General Comparative Physiology & Biochemistry", Prentice & Hall (1975).
- Subrahmaniyam, S. and Madhavankutty, K. "The Textbook of Physiology", Orient Longman Ltd, New Delhi (1977).
- Jain, J.L.et. al. "Fundamental of Biochemistry", S. Chand & co. New Delhi (2005).
- Rastogi Veer Bala, "Text book of Animal Physiology", new Age International Publishers (2008).
- Singh H.R., "Text book of Animal Physiology and Biochemistry", Vishal Publishing Co., 9th Edition (2014).

Biochemistry Lab III **UBIOCBC202**

Unit: I (No. of lectures: 7)

- Qualitative estimations of Protein, Carbohydrates and Lipids.
- Study of effect of temperature and pH on salivary amylase activity.
- Study of enzymatic activity of Trypsin and Lipase.
- Detection of ammonia, urea and uric acid.

Unit: II (No. of lectures: 12)

- Estimation of hemoglobin using haemometer.
- Preparation of haemin crystals.
- Preparation of blood smear, study and identification of blood cells.
- Determination of ABO blood groups. RBC, WBC counting.

Unit: III (No. of lectures: 5)

- Measurement of blood pressure using sphygmomanometer.
- Principles and uses of instruments-Sphygmomanometer, Stethoscope, biochemistry analyser.
- Study of endocrine glands through histological slides of pituitary gland, adrenal gland, thyroid gland, pancreas, testis, ovary, spleen and thymus.
- Study of histological slides of organ systems of mammalian oesophagus, stomach, duodenum, ileum, rectum, liver, trachea, lung, and kidney.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Lehninger A.L., Cox M.M. and Nelson, D.L. "Principles of Biochemistry". W.H. Freeman and Co., New York. (2008).
2. Hames. B.D. and Hooper, N.M. Instant "Notes in Biochemistry", II Edition, BIOS Scientific Publishers Ltd., U. K. (2000).
3. Guyton, A.C. & Hall, J.E "Textbook of Medical Physiology", XI Edition Herculat Asia PET Ltd., W.B. Saunders Company (2006).
4. Tortora, G.J. & Grabowski, S. "Principles of Anatomy & Physiology", XI Edition John Wiley & sons (2006).
5. Victor P., Eroschenko., diFiore's "Atlas of Histology with Functional correlations" XII Edition, Lippincott W. & Wilkins. (2008).
6. Tembhare, T.B., "Techniques in Life Sciences", Himalaya Publications (2010).
- Mali, R.P., Afsar, S.K.. "A Practical manual on Innovative Animal Physiology"" Oxford Book Company (2015).
8. Dr Pal, G.K., Dr Pal, Pravati., "Practical Physiology", 4" Edition, Orient Blackswan (2016).
9. Sawhney S.K. & Singh Randhir, " Introduction to Practical Biochemisty", Narosa Publishing House.

Subject- Microbiology
Course Title: Microbial Physiology and Metabolism
Subject code: UMICRMB201

Unit: I (No. of Lecturer: 15)

1.1 Bio-molecules: An Overview.

1.2 Carbohydrate: Characters, Classification and Structure of Monosaccharides, Disaccharides, Polysaccharides (Storage polysaccharides and structural polysaccharides).

1.3 Synthesis and Breakdown of Carbohydrates: Aerobic and anaerobic chemolithotrophy with an example of each. Phototrophic metabolism. Aerobic respiration, anaerobic respiration and

Fermentation, Sugar degradation pathways i.e. EMP (EmbdenMeyerhof-Parnas), ED (Entner-Doudoroff), Pentose phosphate pathway (PPP), TCA (Tricarboxylic Acid) cycle. Electron transport chain (ETC): Components and comparison of mitochondrial and bacterial ETC.

Key words- biomolecules, carbohydrates, synthesis of carbohydrates, respiration, Fermentation,

Unit: II (No. of Lecturer: 18)

Protein

2.1 Amino acids: Classification, biochemical structure and Significance.

2.2 Protein: Primary, secondary, tertiary and quaternary structures. Denitrification; nitrate/nitrite and nitrate/ammonia respiration; Fermentative nitrate reduction.

Introduction to biological nitrogen fixation Ammonia assimilation. Assimilatory nitrate reduction, dissimilatory nitrate reduction,

2.3 Enzymes: Structure of enzyme, Apo enzyme and cofactors, Prosthetic group-TPP, coenzyme -NAD, metal cofactors.

Classification of enzymes, Nomenclature, Mechanism of action of enzymes: active Site, transition state complex and activation energy. Lock and key hypothesis, and Induced Fit hypothesis. Km, and allosteric mechanism, Effect of pH and temperature on enzyme activity.

Enzyme inhibition: competitive; non-competitive.

Key words- Aminoacids, Proteins, Enzymes

Unit: III (No. of Lecturer: 15)

Lipids and Vitamins

3.1 Lipids: Definition and major classes of storage and structural lipids. Biosynthesis of lipids and fatty acids.

3.1.1 General structure of lipids, Fatty acids - structure and functions. Storage lipids, Structural lipids.

3.1.2. Phosphoglycerides: Building blocks, general structure, functions and properties,

3.1.3 Functions of lipids

3.2 Vitamins: Concept and types of vitamins -water soluble and fat soluble, their structure, biosynthesis and their role in metabolism

Key words- Lipids, Fatty Acids, Vitamins

Unit: IV (No. of Lecturer: 12)

Nucleic acids

4.1 Nucleic acids: Physical and chemical properties of Nucleic Acids, Biosynthesis of nucleotides, Structure and functions of DNA and RNA.

4.2 Basic concept of nucleic acids protein interactions.

Key words- DNA, RNA, Nucleic Acids

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Pawar. C.B. Cell Biology. Himalaya Publishing House 2010
- David T. Plummer. An Introduction to Practical Biochemistry. McGraw Hill Education, 3rd Edition, 2017.
- Lehninger Principles of Biochemistry by Nelson DL and Cox MM, W.H. Freeman and Company, 5th Ed., 2008.
- Biochemistry by Voet, D. and Voet J.G., John Wiley and Sons, 3rd Ed., 2004.
- Campbell, PN and Smith AD Biochemistry Illustrated, Published by Churchill Livingstone, 4th Edition, 2011.
- Satyanarayana and Chakrapani, Biochemistry, Elsevier, 5th Edition. 2020
- Ganesh MK & Shivashankara AR Laboratory Manual for Practical Biochemistry, Jaypee publications, 2nd Edition 2012

Microbiology Lab III

UMICRMB202

Unit (No. of Lab Hours 30)

- Qualitative/Quantitative tests for carbohydrates, reducing sugars, and non-reducing sugars.
- Qualitative/Quantitative tests for Proteins.
- Study of secondary and tertiary structures of protein with the help of models.
- Qualitative/Quantitative tests for lipids.
- Study of effect of temperature, substrate concentration, enzyme concentration, pH and heavy metals on enzyme activity.
- Isolation of DNA.
- Study of Structure of DNA and RNA with the help of Charts and models.
- Separation of amino acids by paper Chromatography.
- Separation of Sugars by Paper Chromatography.
- Any other practical(s) based on theory paper.

Keywords: Carbohydrate tests, Lipid tests, Protein tests, Protein structure, Enzyme activity, DNA Structure, RNA Structure.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Ganesh MK & Shivashankara AR, “Laboratory Manual for Practical Biochemistry”, Jaypee publications, 2nd Edition 2012
- Dubey, R.C. and Maheshwari, D.K., “Practical Microbiology”, S. Chand & Co. Ltd., New Delhi, (2002).
- Gopal Reddy, M., Reddy, M.N., Saigopal, D.V.R. and Mallaiah K.V., “Laboratory Experiments in Microbiology”, Himalaya Publishing House, Mumbai. (2007).
- Aneja, K.R., “Laboratory Manual of Microbiology and Biotechnology. 2nd Edition”, Meditech Scientific International. (2018).

Subject- Biotechnology
Course Title: Basic Molecular Biology
Subject code: UBASIBT201

Unit: I (No. of Lectures: 12)

1.1 Genome organization:

Anatomy of gene, gene structure of prokaryotes and eukaryotes. Flow of genetic information.

1.2 Cell signalling: Hormones and their receptors, second messengers, signalling through G protein coupled receptors

1.3 Cancer: Oncogenes, Tumour suppressor genes, Cancer and the cell cycle; Apoptosis, Necrosis.

Unit: II (No. of Lectures: 12)

2.1 Replication: Prokaryotic and Eukaryotic replication: models for replication, Unit of replication, replication initiation, elongation and termination, replication inhibitors

2.2 DNA repair: Direct reversal, Excision repair -nucleotide and base excision, Mismatch repair Trans lesion DNA synthesis, Recombination repair, SOS Response

2.3 DNA recombination: Models for recombination, Enzymes and proteins involved in recombination, Site-specific recombination

Unit: III (No. of Lectures: 12)

Transcription: Prokaryotic and Eukaryotic transcription: RNA polymerases, General and specific transcription factors, Promoters, insulator, repressor, enhancer.

Unit: IV (No. of Lectures: 12)

Translation: Prokaryotic and eukaryotic translation: Translation machinery, initiation, elongation and termination factors, translational inhibitors.

Regulation of translation.

Unit: V (No. of Lectures: 12)

5.1 Control of gene expression in Prokaryotes: DNA binding proteins, posttranscriptional control of gene expression. Gene regulation in Bacteria, Gene silencing, Overview of ribozyme technology

5.2 Control of gene expression in Eukaryotes: enhancers, chromatin remodelling,

5.3 Mutation: Types and causes, mutant types – lethal, conditional, biochemical, loss of function, gain of function

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Molecular Biotechnology, Channarayappa.
- Lewin's Gene XII -J. E. Kerb's, Jones and Barlett.
- Molecular Cell Biology -H. Lodish, [et.al.](#), W H Freeman & Co (Sd), 2016, 8th edition
- Cell Biology -G. Karp, Wiley, 2013, 7th edition
- Molecular Biology of Cell-B. Alberts and A, Johnson, Garland Sciences, 2014
- Molecular Biology, P. K. Gupta.
- Biotechnology-B.D. Singh
- Biotechnology-U. Satyanarayana
- Books published by M.P. Hindi Granth Academy, Bhopal

UMICRMB202

Unit (No. of Lab hours)

- Isolation of genomic DNA.
- Isolation of Plasmid DNA.
- Visualization of DNA using EtBr
- Electrophoresis of DNA-linear, circular and super coiled plasmid.
- Isolation of DNA from Tissue/Blood/Microorganism
- Plasmid restriction map.
- Quantification of DNA using UV/VIS spectrophotometer
- Effect of UV on microbial/plant cell.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Laboratory manual of Biotechnology by P.N. Swamy, Rastogi Publication, Meerut.
- Manual of Experiment in Biotechnology by Leera Lakhaw, Sheeba Khan, Kailash Pustak Sadan Bhopal.
- Biotechnology –A lab project in molecular biology by Thiel, Bissen, Lyone. TATA Mc GrawHill.
- Molecular Biology Principles and practices by Siwach and Singh.
- Books published by M.P. Hindi Granth Academy, Bhopal

Course Title: Technology of Cereals, Pulses, Bakery & Confectionary
Subject code: UTECHFT201

Unit: I (No. of Lectures: 12)

1. Introduction to Cereals and development in Cereals based products

1.1 Wheat -Types, structure and composition

1.2 Wheat milling, Wheat flour byproducts; Factors affecting quality parameters

1.3 Rice: Types, structure and composition and methods of milling, Concept of Parboiled rice

1.4 Rice bran: Composition and applications

Keywords- Wheat, Rice, Bakery, Milling

Unit: II (No. of Lectures: 12)

2. Technology of Milling of Pulses

2.1 Concepts of Milling of Pulses —Tempering, dry ,splitting , polishing and de husking

2.2 Improved milling methods- Dry and Wet milling

2.3 Pulses- structure and composition, Nutritive value, Anti-nutritional factors.

Keywords: Pulses, De-husking, Anti-nutritional factors, Milling

Unit: III (No. of Lectures: 12)

3. Introduction to Corn, Barley milling and by products.

3.1 Corn composition and milling — dry and wet milling and use as breakfast cereals.

3.2 Oat composition, processing of oats, by products of oatmeal milling.

3.3 Barley composition and milling- malting of barley, changes during malting, uses of malt in industry. , \, 1

Keywords-Corn, Oats, Barley, Malting, Milling

Unit: IV (No. of Lectures: 12)

4.1 Importance & types of Millets, composition of different type of millets and food uses

4.2 Ragi: Composition, products, Health implications

4.3 Jowar: Composition, products, Health implications

4.4 Bajra: Composition, products, Health implications

Keywords- Millets, Ragi, Jowar, Bajra, Milling

Unit: V (No. of Lectures: 12)

5. Introduction of Baking and Confectionary

5.1 Principle of baking, implications and applications

5.2 Confectionery products: Nature of ingredients

5.3 Stages of cooking Sugar, Shortening — Fats and oil, Egg, Moistening agent, Leavening Agents ,

5.4 Chocolate: Process of chocolate tempering, Chocolate designs, garnishes and presentations

Keywords- Baking, Confectionery, Tempering, Shortening, Leavening, Milling

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Chemistry and Technology of Oils and Fats. Prentice Hall Chakrabarty, M.M. (2003).
- Cereal and Cereal Products. Aspen Dendy, D.A.V., & Dobraszczyk, B.J. (2001).
- Fats and Oils - Chemistry and Technology. App. Sci.Publ. Hamilton, ILL, & Bhati, A. (1980)
- Principles of Cereal Science and Technology. 2nd Ed. AACC. Hoseney, R.S. (1994).
- Technology of Cereals. 4th Ed. Pergamon Press Kent, N.L. (1983).

Food technology Lab III **UFOODFT202**

Unit: I (No. of Lectures: 5)

- Preparation and analysis of Rice and rice bran based products.
- Determination of elongation ratio in different rice sample.
- Preparation of and analysis of wheat based products.
- Preparation of Bread and Biscuits.
- Determination of ash content.

Unit: II (No. of Lectures: 7)

- Drying of pulses by different method to safe storage moisture content.
- Determination of de husking efficiency for each pretreatment
- Development of value added products from different pulses and with other combinations
- Preparation of papad and quality evolution.
- Adulteration tests in different samples.

Unit: III (No. of Lectures: 8)

- Preparation of and analysis of Corn bases products.
- Preparation of and analysis of Oat based products.
- Preparation of and analysis of barely based products.
- Quality assessment / parameters of above products.

Unit: IV (No. of Lectures: 5)

- Preparation of and analysis of Jowar based products.
- Preparation of and analysis of Bajra based products.
- Preparation of and analysis of Ragi based products.
- Nutritional analysis of various products.

Unit: IV (No. of Lectures: 5)

- Demonstration of cooking stages of sugar.
- Preparation of Candy.
- Preparation of Chocolate.

Keywords: Chocolate, Candy, Barley, Bajra, Rice, Wheat products.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- International Journal of Food Science and Technology 2012, 47,627-632
- IS 12711:1989 Bakery products- Methods of Analysis
- IS 12741 – 1989 Bakery products – Methods of sampling
- ISI Handbook of Food Analysis (Part IV) – 1984 Page 121