SUNRISE UNIVERSITY ALWAR

COURSE CURRICULUM FOR

BACHELOR OF SCIENCE

(PCM)

B.SC SEMESTER I, II (2025-26)

B. SC SEMESTER III, IV (2026-27)

B. SC SEMESTER V AND VI (2027-28)

Program Outcomes (POs)

On successfully completing the program the student will be able to:

1. Acquire the essential knowledge on the successful prospects of business.
2. Understand the practical issues and challenges that the trade world encounters.
3. Apply concepts, principles and procedure sin transacting business effectively.
4. Gainanalyticalskillinundertakingcommercialventuresandevaluatetheprosandcons of embarking on trade and trade related activities based on their in-depth knowledge.
5. Pursue CA, CMA, ACS, CFA, M.Com, MBA and other career-oriented programme.
6. Be employable, exhibit entre penury a drive and bimodal of principled and ethically sound business professionals

Program Specific Outcomes (PSOs)

1. Understand the concepts, principles and practices involved in undertaking business ventures.
2. Develop financial, cost, auditing, entrepreneurial, marketing and managerial skills.
3. Understand the legal guidelines relating to the business activities.
4. Gain expertise and exhibit professionalism in Business Accounting,
5. Income Tax assessment and GST calculations.
6. Acquire and apply ICT skills in business operations.
7. Be an expert in business correspondence and effective in communication.

PCM Semester Wise Course Details

Semester I										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Internal	External	Practical	Total Marks
BSCCH 101T	STRUCTURE –BONDING , MATHEMATICAL CONCEPT & STATE OF MATTER	MJR	4	0	0	4	40	60	0	100
BSCCH 101 P	CHEMISTRY LAB–I	MJR	0	0	0	2	20	30	2	50
BSCMT102T	DISCRETE MATHEMATICS & OPTIMIZATION TECHNIQUES	MJR	4	0	0	6	60	90	0	150
BSCPH103T	MECHANICS AND OSCILLATIONS	MJR	2	0	0	4	40	60	0	100
BSCPH103P	PHYSICS LAB–I	MJR	0	0	0	2	20	30	2	50
MDC 104T	GENERAL ENGLISH	MDC	2	0	0	2	20	30	0	50
SEC105T	COMPUTER FUNDAMENTAL	SEC	2	0	0	2	20	30	0	50
VAC106T	WOMEN EMPOWERMENT	VAC	2	0	0	2	20	30	0	50
AEC107T	MAKING EFFECTIVE COMMUNICATION	AEC	2	0	0	2	20	30	0	50
						26	260	390	4	650

BSCCH101T:- STRUCTURE–BONDING, MATHEMATICAL CONCEPT & STATE OF MATTER

Unit 1: Atomic Structure

- Dual nature of matter
- Photoelectric effect
- Bohr’s model
- Quantum numbers
- Schrödinger wave equation (basic concept)
- Heisenberg uncertainty principle

Unit 2: Chemical Bonding

- Ionic bond
- Covalent bond
- VSEPR theory

- Valence Bond Theory
- Molecular Orbital Theory
- Hydrogen bonding

Unit 3: Mathematical Concepts in Chemistry

- Logarithms
- Differentiation & integration (basic applications)
- Graph plotting
- Significant figures

Unit 4: States of Matter (Gaseous & Liquid State)

- Gas laws
- Ideal gas equation
- Maxwell distribution
- Real gases (van der Waals equation)
- Surface tension
- Viscosity

Books:

- P.W. Atkins – *Physical Chemistry*
- J.D. Lee – *Concise Inorganic Chemistry*
- K.L. Kapoor – *Physical Chemistry*

BSCCH101P:- CHEMISTRY LAB–I

- Preparation of standard solutions

- Acid–base titration
- Determination of density
- Surface tension (stalagmometer)
- Viscosity (Ostwald viscometer)

- Basic qualitative analysis

Practical Book:

- Vogel – *Quantitative Chemical Analysis*
- University Lab Manual

BSCMT102T:- DISCRETE MATHEMATICS & OPTIMIZATION TECHNIQUES

Unit 1: Logic & Set Theory

- Propositional logic
- Truth tables
- Set operations

Unit 2: Relations & Functions

- Types of relations
- Equivalence relation
- Functions & composition

Unit 3: Graph Theory

- Types of graphs
- Euler & Hamiltonian graphs
- Trees

Unit 4: Optimization Techniques

- Linear programming
- Graphical method
- Simple method
- Transportation problem

Books:

- Kenneth H. Rosen – *Discrete Mathematics and Its Applications*
- S.C. Sharma – *Operations Research*
- Kanti Swarup – *Operations Research*

BSCPH103T:- MECHANICS AND OSCILLATIONS

Unit 1: Laws of Motion

- Newton's laws
- Friction
- Work, energy & power

Unit 2: Rotational Motion

- Moment of inertia
- Angular momentum
- Torque

Unit 3: Gravitation

- Gravitational field
- Kepler's laws

Unit 4: Oscillations

- Simple harmonic motion
- Damped oscillations
- Forced oscillations
- Resonance

Books:

- H.D. Young & Freedman – *University Physics*
- D.S. Mathur – *Mechanics*

BSCPH103P:- PHYSICS LAB–I

- Verification of Newton's laws
- Determination of g by simple pendulum
- Moment of inertia experiment
- Spring constant determination
- Oscillation experiments

Practical Book:

- C.L. Arora – *Practical Physics*
- University Lab Manual

MDC104T:-GENERAL ENGLISH

- Parts of speech
- Tenses
- Articles & prepositions
- Comprehension
- Precis writing
- Essay writing
- Vocabulary building

Books:

- Raymond Murphy – *Essential English Grammar*
- Wren & Martin – *High School English Grammar*

SEC105T:- COMPUTER FUNDAMENTALS

- History of computers
- Hardware & software
- Input/output devices
- Operating system basics
- MS Word, Excel, PowerPoint
- Internet & email
- Cyber security basics

Books:

- V. Rajaraman – *Fundamentals of Computers*
- Peter Norton – *Introduction to Computers*

VAC106T:- WOMEN EMPOWERMENT

- Concept of gender equality
- Constitutional provisions (India)
- Women's rights & laws
- Women & education
- Women & economic development
- Government schemes for women

Key Personalities:

- **Savitribai Phule**
- **Rani Lakshmibai**

References:

- NCERT Social Science Texts
- Government of India Women & Child Development Material

AEC107T:- MAKING EFFECTIVE COMMUNICATION

- Types of communication
- Barriers to communication
- Verbal & non-verbal communication
- Public speaking
- Group discussion
- Interview skills
- Email & professional writing

Books:

- K.K. Sinha – *Business Communication*
- Dale Carnegie – *The Art of Public Speaking*

Semester II										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Internal	External	Practical	Total Marks
BSCCH201T	REACTION MECHANISM, STEREOCHEMISTRY AROMATIC HYDROCARBON & CHEMICAL	MJR	4	0	0	4	40	60	0	100
BSCCH 201P	CHEMISTRY LAB–II	MJR	0	0	0	2	20	30	2	50
BSCMT202T	CALCULUS	MJR	4	0	0	6	60	90	0	150
BSCPH203T	ELECTROMAGNETISM	MJR	2	0	0	4	40	60	0	100
BSCPH203P	PHYSICS LAB–II	MJR	0	0	0	2	20	30	2	50
MDC 204T	GENERAL HINDI	MDC	2	0	0	2	20	30	0	50
SEC205T	SCIENTIFIC WRITING AND COMMUNICATION	SEC	2	0	0	2	20	30	0	50
VAC206T	SWACHH BHARAT	VAC	2	0	0	2	20	30	0	50
AEC207T	ORGANIC FARMING	AEC	2	0	0	2	20	30	0	50
						26	260	390	4	650

BSCCH 201T:- REACTION MECHANISM & STEREOCHEMISTRY

Unit I: Basics of Organic Reaction Mechanism

- Types of bond fission (homolytic & heterolytic)
- Reactive intermediates (carbocation, carbanion, free radical, carbene, nitrene)
- Inductive, mesomeric, hyperconjugation effects
- Acids and bases (Brønsted & Lewis concept)

Unit II: Substitution & Elimination Reactions

- SN1, SN2 mechanisms
- E1, E2 reactions
- Factors affecting reactivity

Unit III: Stereochemistry

- Isomerism (structural & stereoisomerism)
- Optical isomerism
- R/S configuration (Cahn–Ingold–Prelog rules)
- E/Z notation
- Conformational analysis (ethane, butane, cyclohexane)

Reference Books:

- Morrison & Boyd – *Organic Chemistry*
- I.L. Finar – *Organic Chemistry (Vol. I)*
- P.S. Kalsi – *Stereochemistry & Reaction Mechanism*

Aromatic Hydrocarbons

Unit I: Structure & Aromaticity

- Benzene structure (Kekulé, resonance)
- Hückel's rule
- Aromatic, antiaromatic & non-aromatic compounds

Unit II: Electrophilic Aromatic Substitution

- Nitration, halogenation, sulphonation, Friedel-Crafts reactions
- Activating & deactivating groups
- Ortho/para/meta directing effects

Unit III: Polynuclear Hydrocarbons

- Naphthalene, Anthracene
- Orientation & reactivity

Reference Books:

- Bahl & Bahl – *Advanced Organic Chemistry*

- Morrison & Boyd – *Organic Chemistry*

BSCCH201P:-CHEMISTRY LAB – II

Practical Experiments:

- Organic compound qualitative analysis
- Determination of melting & boiling point
- Chromatography (paper/TLC)
- Preparation of simple organic compounds
- Volumetric analysis

Reference:

- Vogel – *Textbook of Practical Organic Chemistry*

BSCMT202T:- CALCULUS

Unit I: Differential Calculus

- Limits & continuity
- Differentiation (partial derivatives)
- Maxima & minima

Unit II: Integral Calculus

- Definite & indefinite integration
- Beta & Gamma functions
- Applications (area, volume)

Unit III: Differential Equations

- First order differential equations
- Linear differential equations

Reference Books:

- Thomas & Finney – *Calculus*
- Shanti Narayan – *Differential Calculus*
- Gorakh Prasad – *Integral Calculus*

BSCPH203T ELECTROMAGNETISM

Unit I: Electrostatics

- Coulomb's law
- Gauss's law
- Electric potential

Unit II: Magneto statics

- Biot-Savart law
- Ampere's law
- Magnetic materials

Unit III: Electromagnetic Induction

- Faraday's law
- Maxwell's equations (basic idea)

Reference Books:

- D.J. Griffiths – *Introduction to Electrodynamics*
- Brijlal & Subrahmanyam – *Electricity & Magnetism*

BSCPH203P:- PHYSICS LAB – II

Experiments:

- Determination of resistance (Carey Foster bridge)
- Study of magnetic field
- Verification of Faraday's laws
- Measurement of e/m ratio
- CRO experiments

Reference:

- B.L. Worsnop & H.T. Flint – *Advanced Practical Physics*

MDC204T:- GENERAL HINDI

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Reference: University prescribed Hindi textbook

SEC205T:-SCIENTIFIC WRITING AND COMMUNICATION

- Technical writing
- Report writing
- Research paper format
- Presentation skills
- Plagiarism & ethics

Reference:

- Day & Gastel – *How to Write and Publish a Scientific Paper*

VAC206T:- SWACHH BHARAT

- Solid waste management
- Sanitation & hygiene
- Environmental awareness
- Government cleanliness initiatives

Reference:

- Government of India Swachh Bharat Mission material

AEC207T:- ORGANIC FARMING

- Principles of organic farming
- Biofertilizers
- Vermicomposting
- Pest management
- Sustainable agriculture

Reference:

- Arun K. Sharma – *Organic Farming*

Semester III										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Internal	External	Practical	Total Marks
BSCCH 301T	CHEMISTRYOFS,P-BLOCKELEMENTSANDNOBLEGASES,NON-AQUEOUSSOLVENT,NUCLEARCHEMISTRY,HYDROCSRHONSANDALKYLHALIDE,FUNDAMENTALSOF THERMODYNAMICS,SOLUTIONSANDTHEIRCOLLIGATIVEPROPERTIES.	MJR	4	0	0	4	40	60	0	100
BSCCH 301 P	CHEMISTRY LAB–III	MJR	0	0	0	2	20	30	2	50
BSCMT302T	REALANALYSIS-I&DIFFERENTIAL EQUATIONS-1	MJR	4	0	0	6	60	90	0	150
BSCPH303T	WAVES, ACOUSTICS AND OPTICS	MJR	2	0	0	4	40	60	0	100
BSCPH303P	PHYSICS LAB–III	MJR	0	0	0	2	20	30	2	50
MDC 304T	ENVIRONMENT STUDIES	MDC	2	0	0	2	20	30	0	50
SEC305T	RADIATION SAFETY	SEC	2	0	0	2	20	30	0	50
VAC306T	FINANCIAL LITERACY AND BANKING	VAC	2	0	0	2	20	30	0	50
AEC307T	ELEMENTARY COMPUTER	AEC	2	0	0	2	20	30	0	50
						26	260	390	4	650

BSCCH 301T:-CHEMISTRY OF S,P-BLOCK ELEMENTS AND NOBLEGASES,NON-AQUEOUSSOLVENTNUCLEARCHEMISTRY,HYDROCSRHONSANDALKYLHALIDE,FUNDAMENTALSOF THERMODYNAMICS, SOLUTIONS AND THEIR COLLIGATIVEPROPERTIES

Unit 1: s-Block Elements

- General characteristics of alkali & alkaline earth metals

- Anomalous behaviour of Li and Be
- Diagonal relationship
- Hydrides, oxides, hydroxides

Unit 2: p-Block Elements (Groups 13–18)

- Electronic configuration
- Oxidation states & trends
- Acid–base behaviour of oxides
- Allotropy (C, P, S)
- Oxyacids of N, P, S, Cl

Unit 3: Noble Gases

- Occurrence & isolation
- Compounds of Xenon
- Structure & bonding in XeF_2, XeF_4, XeF_6

Books:

- J.D. Lee – *Concise Inorganic Chemistry*
- Huheey & Keiter – *Inorganic Chemistry*
- Shriver & Atkins – *Inorganic Chemistry*

Part A: Non-Aqueous Solvents

- Classification (protogenic, protophilic, aprotic)
- Liquid ammonia
- Liquid SO_2
- HF as solvent
- Autoprotolysis

Part B: Nuclear Chemistry

- Radioactivity (α, β, γ decay)
- Half-life & decay law
- Nuclear reactions
- Nuclear fission & fusion
- Applications in medicine & agriculture

Books:

- K.K. Rohatgi-Mukherjee – *Fundamentals of Physical Chemistry*
- Satya Prakash – *Nuclear Chemistry*
- Glasstone – *Sourcebook on Atomic Energy*

Unit 1: Hydrocarbons

Alkanes

- Nomenclature, isomerism
- Free radical substitution

Alkenes

- Electrophilic addition
- Markovnikov & Anti-Markovnikov rule

Alkynes

- Acidity of alkynes
- Addition reactions

Aromatic Hydrocarbons

- Benzene structure
- Electrophilic substitution

Thalidomide

- Structure & chirality
- Optical isomerism
- Biological effects
- Drug tragedy (1960s)
- Importance of stereochemistry in pharmaceuticals

Books:

- Morrison & Boyd – *Organic Chemistry*
- I.L. Finar – *Organic Chemistry*
- Bahl & Bahl – *Advanced Organic Chemistry*

- First Law of Thermodynamics
- Internal energy & enthalpy
- Hess's Law
- Heat capacity
- Second Law of Thermodynamics
- Entropy
- Gibbs free energy
- Spontaneity & equilibrium

Books:

- P.W. Atkins – *Physical Chemistry*
- K.L. Kapoor – *Physical Chemistry*
- Castellan – *Physical Chemistry*

- Types of solutions
- Raoult's law
- Ideal & non-ideal solutions
- Vapour pressure lowering
- Boiling point elevation
- Freezing point depression
- Osmotic pressure
- Abnormal molecular mass

- van’t Hoff factor

Books:

- Puri, Sharma & Pathania – *Physical Chemistry*
- Atkins – *Physical Chemistry*

BSCCH302P:- CHEMISTRY LAB–III

- Estimation of sodium carbonate & sodium bicarbonate mixture
- Determination of partition coefficient
- Determination of enthalpy change
- Preparation of organic compounds
- Qualitative inorganic analysis

Practical Book:

- Vogel – *Quantitative Chemical Analysis*
- University Practical Manual

BSCMT302T:- REAL ANALYSIS–I & DIFFERENTIAL EQUATIONS

Real Analysis – I

Core Topics:

- Real number system, supremum & infimum
- Sequences and series of real numbers
- Limits and continuity

- Differentiability and Mean Value Theorems
- Riemann integration
- Improper integrals

Reference Books:

- *Principles of Mathematical Analysis* – Walter Rudin
- *Introduction to Real Analysis* – Robert G. Bartle & Donald R. Sherbert
- *Mathematical Analysis* – Tom M. Apostol

Differential Equations

Core Topics:

- First-order differential equations
- Higher-order linear differential equations
- Series solutions
- Laplace transforms
- Systems of differential equations
- Partial differential equations (basic introduction)

Reference Books:

- *Ordinary Differential Equations* – Shepley L. Ross
- *Differential Equations with Applications and Historical Notes* – George F. Simmons

BSCPH303T:- WAVES, ACOUSTICS AND OPTICS

Core Topics:

- Simple harmonic motion
- Wave motion and superposition
- Sound waves and acoustics
- Interference and diffraction
- Polarization

- Optical instruments

Reference Books:

- *Fundamentals of Physics* – David Halliday, Robert Resnick & Jearl Walker
- *Optics* – Ajoy Ghatak

BSCPH303P:- PHYSICS LAB – III

Typical Experiments:

- Interference (Newton's rings, biprism)
- Diffraction grating
- Determination of Planck's constant
- Study of polarization
- Ultrasonic velocity measurement

Reference Book:

- *Advanced Practical Physics* – B. L. Flint & H. T. Worsnop

MDC304T:- ENVIRONMENT STUDIES

Core Topics:

- Ecosystem and biodiversity
- Natural resources
- Environmental pollution
- Climate change
- Environmental protection laws
- Sustainable development

Reference Books:

- *Environmental Studies* – Erach Bharucha
- *Textbook of Environmental Studies* – Deeksha Dave & E. Sai Baba Reddy

SEC305T:- RADIATION SAFETY

Core Topics:

- Types of radiation
- Units of radiation measurement
- Biological effects of radiation
- Radiation detection instruments
- Radiation protection principles (ALARA)
- Nuclear safety regulations

Reference Books:

- *Introduction to Health Physics* – Herman Cember & Thomas E. Johnson

VAC306T:- FINANCIAL LITERACY AND BANKING

Core Topics:

- Basics of banking system
- Types of bank accounts
- Digital payments
- Loans and interest
- Budgeting and personal finance
- Insurance and investment basics

Reference Books:

- *Personal Finance* – Jeff Madura
- Publications by Reserve Bank of India

AEC307T:- ELEMENTARY COMPUTER SYLLABUS (WITH REFERENCE BOOKS)

Core Topics:

- Basics of computer hardware & software
- Operating systems
- MS Office
- Internet & email
- Basics of programming (C / Python)
- Cyber security basics

Reference Books:

- *Computer Fundamentals* – P. K. Sinha
- *Let Us C* – Yashavant Kanetkar

Semester IV										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Internal	External	Practical	Total Marks
BSCCH 401T	CHEMISTRYOFD&FBLOCKELEMENTS,CHEMISTRY OFOXYGEN/NITROGEN-CONTAININGFUNCTIONALGROUPSANDCHEMICA LANDIONICEQUILIBRIUM,	MJR	4	0	0	4	40	60	0	100
BSCCH 401 P	CHEMISTRY LAB–IV	MJR	0	0	0	2	20	30	2	50
BSCMT402T	REAL ANALYSIS-LI &NUMERICAL ANALYSIS	MJR	4	0	0	6	60	90	0	150
BSCPH403T	MATHEMATICAL PHYSICS, STATISTICAL MECHANICS AND THERMAL PHYSICS	MJR	2	0	0	4	40	60	0	100
BSCPH403P	PHYSICS LAB–IV	MJR	0	0	0	2	20	30	2	50
MDC 404T	DIGITAL EMPOWERMENT	MDC	2	0	0	2	20	30	0	50
SEC405T	APTITUDE AND REASONING	SEC	2	0	0	2	20	30	0	50
VAC406T	FINANCIAL LITERACY AND BANKING	VAC	2	0	0	2	20	30	0	50
AEC407T	ELEMENTARY COMPUTER LAB	AEC	2	0	0	2	20	30	0	50
						26	260	390	4	650

BSCCH401T:-CHEMISTRY OF D- AND F-BLOCK ELEMENTS

Unit I: General Characteristics

- Position in periodic table

- Electronic configuration
- Variable oxidation states
- Atomic & ionic radii
- Ionization enthalpy
- Density & melting points

Unit II: Coordination Chemistry

- Ligands and nomenclature
- Isomerism in coordination compounds
- Valence Bond Theory (VBT)
- Crystal Field Theory (CFT)
- Crystal Field Stabilization Energy (CFSE)

Unit III: Magnetic & Spectral Properties

- Types of magnetism
- Spin-only formula
- Electronic spectra of transition metals

Unit IV: f-Block Elements

- Lanthanide contraction
- Oxidation states
- Separation of lanthanides
- Actinides and their properties

Reference Books

- J.D. Lee – *Concise Inorganic Chemistry*
- Huheey, Keiter & Keiter – *Inorganic Chemistry*
- Cotton & Wilkinson – *Advanced Inorganic Chemistry*

Chemistry of Oxygen & Nitrogen Containing Functional Groups

Unit I: Alcohols & Phenols

- Preparation methods
- Physical & chemical properties
- Reactions (oxidation, dehydration)

Unit II: Ethers & Epoxides

- Williamson synthesis
- Reactions & cleavage

Unit III: Aldehydes & Ketones

- Nucleophilic addition
- Aldol condensation
- Cannizzaro reaction

Unit IV: Carboxylic Acids & Derivatives

- Preparation
- Acidity
- Esterification
- Acid chlorides & amides

Unit V: Amines

- Classification
- Basicity
- Diazotization
- Hofmann bromamide reaction

Reference Books

- Morrison & Boyd – *Organic Chemistry*
- I.L. Finar – *Organic Chemistry*
- B.S. Bahl & Arun Bahl – *Advanced Organic Chemistry*

Chemical & Ionic Equilibrium

Unit I: Chemical Equilibrium

- Law of mass action
- Equilibrium constant (Kp, Kc)
- Le Chatelier's principle

Unit II: Ionic Equilibrium

- Strong & weak electrolytes
- pH and buffer solutions
- Henderson equation

Unit III: Solubility Product

- Common ion effect
- Salt hydrolysis

Reference Books

- P.W. Atkins – *Physical Chemistry*
- B.R. Puri, L.R. Sharma & M.S. Pathania – *Physical Chemistry*

BSCCH401P:- CHEMISTRY LAB – IV

- Semi-micro qualitative analysis
- Estimation experiments ($KMnO_4$, $K_2Cr_2O_7$)
- Organic functional group analysis
- Preparation of coordination compounds

Lab Manual

- Vogel – *Textbook of Quantitative Chemical Analysis*

BSCMT402T:- REAL ANALYSIS & NUMERICAL ANALYSIS

Real Analysis

- Sequences & Series
- Limits & Continuity
- Riemann Integration
- Mean Value Theorem

Numerical Analysis

- Errors in computation
- Bisection & Newton-Raphson methods
- Interpolation (Newton, Lagrange)
- Numerical differentiation & integration

Reference Books

- S.C. Malik & Savita Arora – *Mathematical Analysis*
- S.S. Sastry – *Introductory Methods of Numerical Analysis*

BSCPH403T:- MATHEMATICAL PHYSICS, STATISTICAL & THERMAL PHYSICS

Mathematical Physics

- Vector calculus
- Differential equations
- Fourier series

Statistical Mechanics

- Maxwell-Boltzmann distribution
- Bose-Einstein & Fermi-Dirac statistics

Thermal Physics

- Laws of thermodynamics
- Entropy
- Carnot cycle

Reference Books

- H.K. Dass – *Mathematical Physics*
- Saha & Srivastava – *Thermal Physics*
- B.K. Agarwal & M. Eisner – *Statistical Mechanics*

BSCPH403P:- PHYSICS LAB – IV

- Spectrometer experiments
- Hall effect
- Planck’s constant experiment
- Thermistor characteristics

Lab Manual

- C.L. Arora – *Practical Physics*

MDC404T:- DIGITAL EMPOWERMENT

Topics:

- Digital literacy
- MS Office
- Cyber security basics
- E-Governance
- Digital payments

Reference

- Government of India – Digital Literacy Material (PMGDISHA)

AEC407T:- ELEMENTARY COMPUTER LAB

- MS Word
- Excel (formulas, charts)
- PowerPoint
- Internet & Email
- Basic programming (C/Python basics)

Reference

- P.K. Sinha – *Computer Fundamentals*

VAC406T:- FINANCIAL LITERACY & BANKING

Topics:

- Indian banking system
- Types of accounts
- NEFT, RTGS, UPI
- Insurance basics
- Budgeting & investment

Reference

- Indian Institute of Banking & Finance (IIBF) study material
- RBI financial literacy booklet

SEC405T:- APTITUDE & REASONING

Topics:

- Quantitative aptitude
- Logical reasoning
- Verbal ability
- Data interpretation

Reference

- R.S. Aggarwal – *Quantitative Aptitude*
- M.K. Pandey – *Analytical Reasoning*

Semester V										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Internal	External	Practical	Total Marks
BSCCH 501T	HARD & SOFT ACIDS AND BASES, TRANSITION METAL COMPLEXES, SPECTROSCOPY, ORGANOSULPHUR COMPOUNDS, SYNTHETIC POLYMERS, DRUGS & DYES, ELECTROCHEMISTRY	MJR	4	0	0	4	40	60	0	100
BSCCH 501 P	CHEMISTRY LAB–V	MJR	0	0	0	2	20	30	2	50
BSCMT502T	ABSTRACT ALGEBRA &THREE DIMENSIONAL GEOMETRY	MJR	4	0	0	6	60	90	0	150
BSCPH503T	QUANTUM MECHANICS AND NUCLEAR PHYSICS	MJR	2	0	0	4	40	60	0	100
BSCPH503P	PHYSICS LAB–V	MJR	0	0	0	2	20	30	2	50
MDC 504T	COMMUNICATION SKILLS	MDC	2	0	0	2	60	40	0	100
SEC505T	MODERN OFFICE MANAGEMENT	SEC	2	0	0	2	20	30	0	50
AEC506T	PROJECT-I(MINOR)	AEC	2	0	0	2	20	30	0	50
						24	280	370	4	650

BSCCH 501T:- HARD & SOFT ACIDS AND BASES (HSAB THEORY)

Unit I: Basic Concepts

- Lewis acids and bases
- Classification into hard, soft and borderline species
- Pearson’s HSAB principle
- Factors affecting hardness and softness

Unit II: Applications

- Stability of complexes
- Prediction of reaction feasibility
- Biological importance
- Symbiosis concept

Reference Books

- J.D. Lee – *Concise Inorganic Chemistry*
- F.A. Cotton & G. Wilkinson – *Advanced Inorganic Chemistry*
- Huheey, Keiter & Keiter – *Inorganic Chemistry*

TRANSITION METAL COMPLEXES

Unit I: Coordination Compounds

- Nomenclature (IUPAC)
- Types of ligands
- Isomerism (structural & stereoisomerism)

Unit II: Bonding Theories

- Valence Bond Theory (VBT)
- Crystal Field Theory (CFT)
- Crystal Field Stabilization Energy (CFSE)
- Molecular Orbital Theory (basic idea)

Unit III: Properties

- Magnetic properties

- Electronic spectra
- Jahn–Teller distortion

Reference Books

- Shriver & Atkins – *Inorganic Chemistry*
- J.E. Huheey – *Inorganic Chemistry*

SPECTROSCOPY

Unit I: UV–Visible Spectroscopy

- Beer-Lambert law
- Electronic transitions
- Chromophores & auxochromes

Unit II: IR Spectroscopy

- Vibrational frequencies
- Functional group identification

Unit III: NMR Spectroscopy

- Chemical shift
- Spin-spin splitting
- Applications

Unit IV: Mass Spectrometry

- Molecular ion peak
- Fragmentation patterns

Reference Books

- P.S. Kalsi – *Spectroscopy of Organic Compounds*
- William Kemp – *Organic Spectroscopy*

ORGANOMETALLIC COMPOUNDS

Unit I: Definition & Classification

- Metal-carbon bonds
- 18-electron rule

Unit II: Important Compounds

- Ferrocene
- Zeise's salt
- Metal carbonyls

Unit III: Applications

- Catalysis
- Industrial uses

Reference Books

- Crabtree – *Organometallic Chemistry*
- Cotton & Wilkinson – *Advanced Inorganic Chemistry*

SYNTHETIC POLYMERS

Unit I: Polymerization

- Addition & condensation polymerization
- Free radical mechanism

Unit II: Types of Polymers

- Thermoplastics & thermosetting
- Biodegradable polymers

Unit III: Industrial Polymers

- PVC
- Nylon
- Bakelite
- Teflon

Reference Books

- V.R. Gowariker – *Polymer Science*

DRUGS & DYES

Drugs

- Classification (analgesics, antibiotics, antiseptics)
- Structure-activity relationship
- Chemotherapy

Dyes

- Classification (azo dyes, triphenylmethane dyes)
- Colour and constitution theory

Reference Books

- O.P. Agarwal – *Chemistry of Organic Drugs & Dyes*
- Finar – *Organic Chemistry*

ELECTROCHEMISTRY

Unit I: Conductance

- Specific & equivalent conductance
- Kohlrausch's law

Unit II: Electrochemical Cells

- Galvanic & electrolytic cells
- EMF
- Nernst equation

Unit III: Applications

- Batteries
- Corrosion
- Fuel cells

Reference Books

- P.W. Atkins – *Physical Chemistry*
- B.R. Puri & Sharma – *Physical Chemistry*

BSCCH501P:- CHEMISTRY LAB – V

- Preparation of coordination compounds
- Spectroscopic analysis
- Polymer preparation
- Electrochemical experiments

Lab Manual

- Vogel – *Quantitative Chemical Analysis*

BSCMT502T:- ABSTRACT ALGEBRA

Unit I: Group Theory

- Groups & subgroups
- Cyclic groups
- Lagrange's theorem
- Homomorphism & isomorphism

Unit II: Ring Theory

- Rings & fields
- Integral domain
- Ring homomorphism

Reference Books

- I.N. Herstein – *Topics in Algebra*
- S. Arora & N. Arora – *Abstract Algebra*

THREE-DIMENSIONAL GEOMETRY

- Direction cosines
- Plane & straight line in space
- Sphere
- Shortest distance problems

Reference Books

- Shanti Narayan – *Analytical Solid Geometry*

BSCPH503T:- QUANTUM MECHANICS & NUCLEAR PHYSICS

Quantum Mechanics

- Wave-particle duality
- Schrödinger equation
- Particle in a box
- Hydrogen atom

Nuclear Physics

- Nuclear properties

- Radioactivity
- Nuclear fission & fusion
- Nuclear reactors

Reference Books

- B.H. Bransden & C.J. Joachain – *Quantum Mechanics*
- S.N. Ghoshal – *Atomic & Nuclear Physics*

BSCPH503P:- PHYSICS LAB – V

- Frank-Hertz experiment
- Photoelectric effect
- GM counter experiment
- Absorption spectrum

Lab Manual

- C.L. Arora – *Practical Physics*

MDC504T:- COMMUNICATION SKILLS

- Verbal & non-verbal communication
- Group discussion
- Presentation skills
- Interview skills
- Business correspondence

Reference

- K.K. Sinha – *Business Communication*

SEC505T:- MODERN OFFICE MANAGEMENT

- Office organization
- Record management
- E-office tools
- Filing systems
- Office ethics

Reference

- Office Management – Sharma & Gupta

AEC506T:- PROJECT–I (MINOR)

Components:

- Topic selection
- Literature review
- Data collection
- Analysis
- Report writing
- Viva

Format:

- Introduction
- Objective
- Methodology
- Results
- Conclusion
- References

Semester VI										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Internal	External	Practical	Total Marks
BSCCH 601T	BIOINORGANIC CHEMISTRY, ORGANOMETALLIC CHEMISTRY, HETEROCYCLIC CHEMISTRY, CARBOHYDRATES, SPECTROSCOPY, QUANTUNM |MECHANICS AND MOT	MJR	4	0	0	4	40	60	0	100
BSCCH 601 P	CHEMISTRY LAB–VI	MJR	0	0	0	2	20	30	2	50
BSCMT602T	COMPLEXANALYSIS& MECHANICS	MJR	4	0	0	6	60	90	0	150
BSCPH603T	SOLID STATE PHYSICS AND ELECTRONICS	MJR	2	0	0	4	40	60	0	100
BSCPH603P	PHYSICS LAB–VI	MJR	0	0	0	2	20	30	2	50
MDC 604T	INTELLECTUAL PROPERTY RIGHT AND DEVELOPMENT	MDC	2	0	0	2	60	40	0	100
SEC605T	MODERN OFFICE MANAGEMENT	SEC	2	0	0	2	20	30	0	50
AEC606T	PROJECT-II (MAJOR)	AEC	2	0	0	2	20	30	0	50
						24	280	370	4	650

BSCCH 601T:- BIOINORGANIC CHEMISTRY

Unit I: Role of Metals in Biology

- Essential and trace elements
- Metalloproteins
- Metalloenzymes

Unit II: Oxygen Transport & Storage

- Hemoglobin & Myoglobin
- Structure and function
- Bohr effect

Unit III: Bioenergetics

- Cytochromes
- Electron transport chain
- Photosynthesis (basic idea)

Unit IV: Metal Toxicity

- Toxic metals (Hg, Pb, Cd)
- Chelation therapy

Reference Books

- I. Bertini et al. – *Bioinorganic Chemistry*
- J.E. Huheey – *Inorganic Chemistry*

NONMETALLIC CHEMISTRY

Unit I: Hydrogen & Its Compounds

- Hydrides
- Hydrogen bonding

Unit II: Group 15 & 16 Elements

- Oxides and oxyacids
- Nitrogen and phosphorus chemistry
- Sulphur and its compounds

Unit III: Halogens & Noble Gases

- Interhalogen compounds
- Xenon compounds

Reference Books

- J.D. Lee – *Concise Inorganic Chemistry*
- Shriver & Atkins – *Inorganic Chemistry*

HETEROCYCLIC CHEMISTRY

Unit I: Introduction

- Classification
- Aromaticity in heterocycles

Unit II: Five-membered Heterocycles

- Pyrrole
- Furan
- Thiophene

Unit III: Six-membered Heterocycles

- Pyridine
- Quinoline

Unit IV: Synthesis & Reactions

- Electrophilic & nucleophilic substitution

Reference Books

- R.R. Gupta – *Heterocyclic Chemistry*
- Morrison & Boyd – *Organic Chemistry*

CARBOHYDRATES

Unit I: Classification

- Monosaccharides
- Disaccharides
- Polysaccharides

Unit II: Structure

- Glucose structure determination
- Mutarotation
- Glycosidic linkage

Unit III: Important Carbohydrates

- Starch
- Cellulose
- Sucrose

Reference Books

- I.L. Finar – *Organic Chemistry*
- Bahl & Bahl – *Advanced Organic Chemistry*

SPECTROSCOPY

Unit I: UV–Visible Spectroscopy

- Electronic transitions
- Applications

Unit II: IR Spectroscopy

- Vibrational modes
- Functional group identification

Unit III: NMR Spectroscopy

- Chemical shift
- Coupling constant
- Applications

Unit IV: Mass Spectrometry

- Molecular ion peak
- Fragmentation

Reference Books

- P.S. Kalsi – *Spectroscopy of Organic Compounds*
- William Kemp – *Organic Spectroscopy*

QUANTUM MECHANICS & MOT (MOLECULAR ORBITAL THEORY)

Unit I: Quantum Mechanics

- Black body radiation
- Photoelectric effect
- de Broglie hypothesis
- Heisenberg uncertainty principle
- Schrödinger wave equation

Unit II: Molecular Orbital Theory

- LCAO method
- MO diagrams (H_2, O_2, N_2)
- Bond order
- Magnetic properties

Reference Books

- Levine – *Quantum Chemistry*
- Atkins – *Physical Chemistry*

BSCCH 601P:- CHEMISTRY LAB – VI

- Estimation experiments
- Spectroscopic identification
- Preparation of heterocyclic compounds
- Carbohydrate analysis

Lab Manual

- Vogel – *Quantitative Chemical Analysis*

BSCMT602T:- COMPLEX ANALYSIS

Unit I: Complex Numbers

- Analytic functions
- Cauchy-Riemann equations

Unit II: Complex Integration

- Cauchy's theorem
- Cauchy integral formula

Unit III: Taylor & Laurent Series

- Singularities
- Residue theorem

Reference Books

- Churchill & Brown – *Complex Variables*
- S.C. Malik – *Complex Analysis*

MECHANICS

Unit I: Statics

- Forces & equilibrium
- Centre of mass

Unit II: Dynamics

- Newton's laws
- Motion under gravity
- Projectile motion

Reference Books

- S.L. Loney – *Dynamics of a Particle*
- Bansal – *Mechanics*

BSCPH603T:- SOLID STATE PHYSICS & ELECTRONICS

Solid State Physics

- Crystal structure
- Bravais lattices
- X-ray diffraction
- Band theory
- Semiconductors

Electronics

- Diodes
- Transistors

- Rectifiers
- Amplifiers
- Logic gates

Reference Books

- C. Kittel – *Introduction to Solid State Physics*
- B.L. Theraja – *Basic Electronics*

BSCPH603P:- PHYSICS LAB – VI

- Hall effect
- Band gap measurement
- Transistor characteristics
- Logic gate verification

Lab Manual

- C.L. Arora – *Practical Physics*

MDC604T:- INTELLECTUAL PROPERTY RIGHTS & DEVELOPMENT

Topics:

- Types of IPR (Patent, Trademark, Copyright)
- Patent filing process
- WTO & TRIPS
- IPR in India

Reference

- P. Narayanan – *Intellectual Property Law*

SEC605T:- MODERN OFFICE MANAGEMENT

- Office organization
- Record & file management
- Digital documentation
- Office communication
- Ethics & professionalism

Reference

- Sharma & Gupta – *Office Management*

AEC606T:- PROJECT–II (MAJOR)

Components:

- Problem identification
- Literature survey
- Experimental/Field work
- Data analysis
- Dissertation writing
- Viva-voce

Report Structure:

1. Title Page
2. Certificate
3. Acknowledgment
4. Abstract
5. Introduction
6. Methodology
7. Results & Discussion
8. Conclusion
9. References