GENERAL TAMIL – III
(120 Hours)

SUBJECT CODE:

நோக்கங்கள்

1. இக்கால இலக்கியங்களின் சிறப்பினை அறிந்து கொள்ளல்
2. தொடர்நிலைச் செய்யுளில் கூறப்பட்ட நயத்தை புரிந்துகொள்ளல்
3. சமயப்புலவர்கள் இயற்றிய புராணங்களின் பொருளினை அறிந்து கொள்ளல்.
4. காப்பியங்களின் வழிக் கூறப்படும் நடைமுறைத் தத்துவத்தை பயன்படுத்தல்.
5. கட்டுரை, அறிக்கை எழுதும் திறன் வளர்த்தல்.

அலகு - 1

சிலப்பதிகாரம்	-	கொலைக்களக் காதை
மணிமேகலை	-	ஆதிரை பிச்சையிட்ட காதை

அலகு - 2

சீவகசிந்தாமணி	-	கேமசரியார் இலம்பகம்
கம்பராமாயணம்	-	குகப்படலம்

அலகு - 3

பெரியபுராணம்	-	கண்ணப்பநாயனார்
தேம்பாவணி	-	வளன் சளித்த படலம்
சீறாப்புராணம்	-	மானுக்குப் பிணை நின்ற படலம்

அலகு - 4

இலக்கிய வரலாறு	-	ஐம்பெருங்காப்பியம் இரட்டைக் காப்பியம் சோழர்காலக் காப்பியங்கள் சைவ, வைணவ பக்தி இலக்கியங்கள். சமண, பௌத்தத் தமிழ்த் தொண்டு.

அலகு - 5

கட்டுரைகள்	-	கம்பலைமானுடம்

அலகு - 6

பண்பலை வானொலி நிகழ்ச்சித் தொகுப்பு.
சுற்றுலா வழி காட்டிப் பயிற்சி முறைகள்.
பொதுக் கூட்டம் (அ) விழாவில் குறிப்பு எடுத்தல்.

பார்வை நூல்கள்

1. டாக்டர்.உ.வே.சா. (2008), சிலப்பதிகாரம், சென்னை: டாக்டர் உ.வே.சா பதிப்பகம்.
2. புலியூர்க்கேசிகன், (2010), மணிமேகலை, சென்னை: செண்பகா பதிப்பகம்.
3. பள்ளத்தூர் பழ. பழனியப்பன்(2015), கம்பராமாயணம், சென்னை: வானதி பதிப்பகம்.
4. ஷெரீப்.மு.(1992) சீறாப்புராணம், சென்னை: சீதக்காதி நூல் வெளியீட்டகம்.
5. நச்சினார்க்கினியர், (1987) சீவகசிந்தாமணி, தஞ்சாவூர்: தமிழ்ப் பல்கலைக்கழகம்.
6. இராமசுப்பிரமணியம்.வ.த.(2004), பெரிய புராணம், சென்னை: திருமகள் நிலையம்.

7. மரிய அந்தோணி(1982), தேம்பாவணி, பாளையங்கோட்டை: வீரமாமுனிவர் ஆய்வுக்கழகம்
8. சிற்பி பாலசுப்பிரமணியம், கம்பலைமானுடம், சென்னை: வானதி பதிப்பகம்.

GENERAL TAMIL - IV
(120 Hours)

SUBJECT CODE:

நோக்கங்கள்

1. எட்டுத்தொகை நூல்களின் பாடப்பொருளை அறிந்துகொள்ளல்,
2. பத்துப்பாட்டு நூல்களின் பட்டினப்பாலை, சிறுபானாற்றுப்படையின் கருத்தினை புரிந்துகொள்ளல்,
3. திருக்குறளின் கருத்தினை வாழ்வில் பயன்படுத்தல்,
4. சங்க இலக்கியங்களின் சிறப்பியல்புகளை அறிந்துகொள்ளல்,
5. மொழிபெயர்ப்புத் திறன்களை வளர்த்தல்,

அலகு– 1

புறநானூறு -	பாடல் எண் :	18	நீரும் நிலமும்……..
		91	எமக்கு ஈத்தனையே…..
		74	குழவி இறப்பினும்…..
		216	கேட்டல் மாத்திரை….
அகநானூறு -	பாடல் எண் :	34	சிறுகரும்பிடவின்…(முல்லை)
		124	நன்கலம் களிற்றொடு…(முல்லை)
		134	வானம் வாய்ப்ப…
நற்றிணை -	பாடல் எண் :	01	நின்றசொல்லர்..
		110	பரசங் கலந்த…
		172	விளையாடுஆயமொடு..
குறுந்தொகை -	பாடல் எண் :	03	நிலத்தினும் பெரிதே…
		25	யாரும் இல்லைதானேகள்வின்..
		38	கானமஞ்சைஅறை..
		40	யாயும் ஞாயும்…
		58	இடிக்குங் கேளிர்..!
ஐங்குறுநூறு -	பாடல் எண் :	வேட்கை பத்து	
கலித்தொகை -	பாடல் எண் :	09	எறித் தருகதிதாங்கி
		11	அரிதாயஅறனெய்தி…

அலகு– 2

பட்டினப்பாலை - (120 முதல் 220 வரிகள் வரை)

சிறுபாணாற்றுப்படை - (கடையெழு வள்ளல்களின் சிறப்பு, நல்லியக் கோடனின் தலைமைச் சிறப்பு மட்டும்)

அலகு– 3

திருக்குறள் -
அறிவுடைமை
நட்பாராய்தல்
ஆள்வினை உடைமை
கள் உண்ணாமை
பொழுதுகண்டு இரங்குக

அலகு– 4

இலக்கிய வரலாறு -
1. சங்க இலக்கியமும் அதன் சிறப்பியல்புகளும்
2. திருக்குறளின் அமைப்பும் சிறப்பும்

அலகு– 5

நாடகம் - மனோன்மணியம் - நாடகம் - ஆசிரியர்– சுந்தரம்பிள்ளை

அலகு– 6

- 1.மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்து தமிழுக்கு)
- 2. மொழித்திறன் - நிறுத்தக்குறிகள்.
- 3. தன்விவரப் படிவம் தயாரித்தல்.
- 4. செய்திசேகரித்தல், நேர்காணல்.

பார்வை நூல்கள்

1. துரைசாமிப்பிள்ளை.சு.ஒளவை (1951), புறநானூறு, சென்னை: சைவ சித்தாந்த பதிப்பகம்.
2. வேங்கடசாமிப்பிள்ளை, (2008), அகநானூறு, சென்னை: சைவ சித்தாந்த பதிப்பகம்.
3. நாராயணசாமி ஐயர்.அ. (1952), நற்றிணை, சென்னை: சைவ சித்தாந்த பதிப்பகம்.
4. சோமசுந்தரனார். பொ.வே. (2007), குறுந்தொகை, சென்னை: சைவ சித்தாந்த பதிப்பகம்.
5. சோமசுந்தரனார். பொ.வே.(1961), ஐங்குறுநூறு, சென்னை: சைவ சித்தாந்த பதிப்பகம்.
6. நச்சினார்க்கினியார், (1943), கலித்தொகை, சென்னை: சைவ சித்தாந்த பதிப்பகம்.
7. சோமசுந்தரனார். பொ.வே.(2008), பத்துப்பாட்டு, சென்னை: சைவ சித்தாந்த பதிப்பகம்
8. தேவநேய பாவனார் (2000), திருக்குறள் , சென்னை: இந்து பப்ளிகேஷன்.
9. பெ.சுந்தரம் பிள்ளை (1950), மனோன்மணியம், சென்னை: சைவ சித்தாந்த பதிப்பகம்.

LANGUAGE THROUGH LITERATURE – I

(100 Hours)

SUBJECT CODE:

OBJECTIVE

- To promote competency in language skills.

UNIT I – PROSE

1. Bookshop Memories - George Orwell
2. On Marriage - Ernest Barker

UNIT II – POETRY

1. Let me Not To the Marriage of True Minds - William Shakespeare
2. Sonnet on His Blindness - John Milton

UNIT III – TALES

1. Taming of the Shrew
2. Julius Caesar

UNIT – IV – SPOKEN ENGLISH

1. Greeting
2. Introducing
3. Making a request
4. Seeking Permission
5. Expressing Gratitude
6. Complementing / Congratulating

UNIT - V

1. Letter Writing
   Application for Job
   Letters of Inquiry and Complaint
2. Situational Messages.

REFERENCES

1. Menon K.P.K, (2005). *Prose in practice*. Chennai: Macmillan India.
2. Natarajan. K, (2011). *The musical thought*. Chennai: New Century Book House.
3. Dodd. E.F, (2011). *Six tales from shakespeare*. Chennai: Macmillan India.
4. Radhakrishna Pillai.G & Rajeevan.K, (2014) *Spoken english for you.* New Delhi: Emerald Publishers.
5. Thangasamy, S. Kokila, (2011). *Polite eng*lish. Gandhigram (T.N): Anichum Blooms Publishers.

LANGUAGE THROUGH LITERATURE – II
(100 Hours)

SUBJECT CODE:

OBJECTIVE

- To attain proficiency in communication skills.

UNIT I – PROSE

1. Thoughts at the Ferry - E.V. Lucas
2. A Disappointed Man - Robert Lynd

UNIT II – POETRY

1. Thou Art Indeed Just, Lord - Gerard Manley Hopkins
2. Hawk Roosting - Ted Hughes

UNIT III – SHORT STORIES

1. After Twenty Years - O. Henry
2. The Shephere's Daughter - William Saroyan

UNIT – IV – SPOKEN ENLGIHS

1. Offering help
2. Apologizing
3. Making suggestions
4. Expressing likes and dislikes
5. Leave taking
6. Agreeing and disagreeing

UNIT - V

1. Developing hints into a paragraph.
2. Write a dialogue based on the given situation

REFERENCES

1. Menon K.P.K, (2005). *Prose in practice*. Chennai: Macmillan India.
2. Natarajan. K, (2011). *The musical thought*. Chennai: New Century Book House.
3. Radhakrishna Pillai.G & Rajeevan.K, (2014). *Spoken english for you.* New Delhi: Emerald Publishers.

MATHEMATICS

CORE PAPER – VII
GROUPS AND RINGS
(120 Hours)

SUBJECT CODE:

Unit 1: Group Theory: Introduction – Algebraic Structure –Groupoid-Semi-Group-Monoid-Group- More Examples for Group – Basic Properties of Groups – Equivalent Definitions of a Group – Order of an Element – Permutations – Cayley Tables for Finite Groups – Subgroups – Cyclic Groups.

Unit 2: Subgroups Generated by a set S – Cosets – Normal Subgroups – Factor Group (Quotient Group) – Homomorphism – Isomorphism – Transference of Group Structure – Automorphism – Direct Products – Internal Direct Products.

Unit 3: Ring Theory: Introduction – Elementary Properties of Rings – Subrings – Integral Domain - Ideals.

Unit 4: Factor Rings (Quotient Rings) – Maximal and Prime Ideals – Homomorphism of Rings – Isomorphism of Rings – Transference of Ring Structure – Field of Quotients of an Integral Domain.

Unit 5: Special Class of Rings: Unique Factorization Domain – Euclidean Domain – Prinicipal Ideal Domain and Unique Factorization Domain – Notherian and Artinian Rings – Polynomial Rings.

REFERENCES

1. Murugan M., (2017).*A First course in Groups and Rings*, Muthali Publishing House, Chennai,
2. Arumugam S. and Thangapandi Isaac A., (1996).*Morden Algebra*, Scitech Publications, Chennai.

CORE PAPER - VIII
LINEAR ALGEBRA AND BOOLEAN ALGEBRA
(120 Hours)

SUBJECT CODE:

Unit 1: Vector Spaces: Introduction – Definition and Examples – Subspaces – Linear Transformation – Span of a set – Linear Independence – Basis and Dimension – Rank and Nullity – Matrix of a Linear Transformation.

Unit 2: Inner Product Spaces: Introduction – Definition and Examples – Orthogonality – Orthogonal Complement.

Unit 3: Bilinear forms: Introduction – Bilinear forms – Quadratic forms.

Unit 4: Lattices: Introduction – Partially ordered sets – Lattices – Distributive Lattices – Modular Lattices.

Unit 5: Boolean Algebra: Definition – Principle of Duality – Sub-algebra – Boolean Function – Disjunctive Normal Form – Conjunctive Normal Form – Conversion – Switching Circuits.

REFERENCES

1. Arumugam S.and Thangapandi Isaac A.(1996),*Morden Algebra*, Scitech Publications, Chennai.
2. Schaums outline series, (1999).*Boolean algebra and switching circuits*, Tata McGraw Hill.

CORE PAPER - IX
REAL ANALYSIS I
(120 Hours)

SUBJECT CODE:

Unit 1: Preliminaries - Sets and functions, Countable sets, Uncountable sets, Inequalities of Holder and Minkowski,. Metric Spaces - Definitions and examples, Bounded sets in a metric space, Open ball in a metric space, Open sets, Subspaces, Interior of a set, Closed sets, Closure, Limit point, Dense sets.

Unit 2: Complete Metric Space - Completeness, Baire's Category theorem.

Unit 3: Continuity - Continuity, Homeomorphism, Uniform continuity, Discontinuous functions on **R**.

Unit 4: Connectedness - Definition and examples, Connected subsets of **R**, Connectedness and continuity.

Unit 5: Compactness - Compact space, Compact subsets of **R**, Equivalent characterisation for compactness, Compactness and continuity.

REFERENCES

1. Arumugam S. and Thangapandi Isaac A., (1996). *Modern Analysis*, New Gamma Publishing House.
2. Golberg R., (1985).*Methods of Real Analysis*, Oxford and IBH Publishing Co.

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CORE PAPER - X
REAL ANALYSIS II
(120 Hours)

SUBJECT CODE:

Unit 1: Metric Spaces $C[a, b]$: Point wise convergence, Uniform convergence, Test for uniform convergence, The metric space $C[a, b]$.

Unit 2: Contraction mapping and its Applications: Introduction - Definition - Examples, Contraction mapping theorem.

Unit 3: Completion of a metric space: Introduction - Definition - Examples, Completness.

Unit 4: Differentiability of a function - Differentiability and continuity, Chain rule, Rolle's theorem and Mean value theorems.

Unit 5: Definition, existence and properties of Riemann integral - First and second fundamental theorem of Calculus - Mean value theorem of Integral calculus, Taylor's series - Taylor's theorem.

REFERENCES

1. Arumugam S. and Thangapandi Isaac A.,(1996). *Modern Analysis*, New Gamma Publishing House.
2. Golberg R., (1985).*Methods of Real Analysis*, Oxford and IBH Publishing Co.

CORE PAPER – XI
STATISTICS I
(120 Hours)

SUBJECT CODE:

Unit 1: Theory of Probability - Sample space - Probability function - Laws of Addition - Boole's inequality - law of multiplication - Problems - Baye's theorem - problems.

Unit 2: Random Variables - Distribution function - Discrete and continuous random variables - Probability density function - various measures of central tendencies - Dispersion, Skewness at Kurtosis for continuous probability Distributions.

Unit 3: Joint probability mass function - marginal and conditional probability functions - Independent random variables.

Unit 4: Mathematical Expectation - Moment generating function - Cumulants - Theoretical discrete distributions - Binomial - Poisson - Moments - Cumulants.

Unit 5: Curve Fitting and Principle of Least Squares.

REFERENCES

1. Gupta S.C. and Kapoor V.K., (2001). *Elements of Mathematical statistics* third edition, Sultan Chand & Sons.
2. Gupta S.P., (2001).*Statistical Methods*, Sultan Chand and sons.

CORE PAPER - XII
STATISTICS II
(120 Hours)

SUBJECT CODE:

Unit 1: Theoretical, continuous Distributions – Rectangular distribution – Normal distribution characteristics of normal distribution – Mode of a normal distribution – Moment generating function – Cumulants – Points of inflexion of normal curve – mean deviation from mean for normal distribution – Area property – Fitting of normal distribution – Problems.

Unit 2: Correlation and regression – Coefficient of correlation for a Bivariate Frequency – Rank correlation – Regression lines.

Unit 3: Sampling and Large sample tests and chi square distribution.

Unit 4: Exact sampling Distributions – Small sample tests.

Unit 5: Analysis of Variance – Design of Experiments – Latin square.

REFERENCES

1. Gupta S.C. and Kapoor V.K., (2001). *Elements of Mathematical statistics* third edition, Sultan Chand & Sons
2. Gupta S.P., (2001).*Statistical Methods*, Sultan Chand and sons.

PHYSICS

CORE PAPER III
ANALOG, DIGITAL ELECTRONICS AND MICROPROCESSOR
(120 Hours)

SUBJECT CODE:

OBJECTIVES

To enable the students to know about the basic knowledge of semi conductor, power supply and their applications in day-to-day life. To gain knowledge on OP-AMP,Digital fundamentals, Basics 8085 microprocessor and their importance in various applications.

ANALOG ELECTRONICS

UNIT – I (24hrs)

SEMICONDUCTOR AND POWER SUPPLY

Band theory of solids – Types of semiconductor – Majority and minority carriers – Mobile charge carriers and immobile ions – Drift current in intrinsic semiconductor – PN junction – Depletion layer – Barrier voltage – Effect of temperature – Forward biased and reverse biased PN junction – Zener breakdown – Avalanche breakdown – h-parameters in CE and CB configuration. Rectifiers – Half wave - Full wave rectifiers – Voltage regulation using Zener diode and transistor.

UNIT-II: (24hrs)

AMPLIFIERS, OSCILLATORS AND OPERATIONAL AMPLIFIER

Single stage CE transistor amplifiers –RC and transformer coupled two stage amplifiers – Direct-coupled amplifier using complementary and symmetry of two transistors – Darlington pair- general theory of feed back- Properties of negative feed back-Criterion for oscillation - Comparison between an amplifier and an oscillator –Hartley and Colpitt's oscillator - Crystal controlled oscillator – Astable, Mono stable and Bi stable multi vibrators.

Characteristics of ideal and practical operational amplifiers – Sign changer- Scale changer – AC inverting amplifier – Adder – Subtractor - Integrator – Phase shifter- Differentiator.

DIGITAL FUNDAMENTAL AND DEVICES

UNIT-III: (24hrs)

NUMBER SYSTEMS AND LOGIC GATES

Number System – Binary, octal and Hexa decimal number system – Boolean algebra – simplification of Boolean expressions- Karnugh Maps - Basic logic gates – Symbols and their truth tables-AND, OR, NOT, NAND, NOR ,XOR AND XNOR gates NAND and NOR as a universal gates - De Morgan's theorem .

UNIT-IV: (24hrs)

COMBINATIONAL AND SEQUENTIAL DIGITAL SYSTEMS

Half adder – Full adder - Half subtractor – Full subtractor – 4 Bit binary adder – Flip-flops - RS flip flop – D-flip-flop- - JK flip flop and Masteer slave flip-flop - Digital to Analog converter (R-2R ladder D/A converter) – Analog to Digital converter (counter type A/D converter) – Counters –Controlled shift counters-Mod10 counter – Ring counters –shift registers.

MICROPROCESSOR (8085)

UNIT –V (24HRS)

8085 MICROPROCESSOR FUNDAMENTALS AND PROGRAMMING

Introduction to microprocessor – Basic components of a microcomputer – I/O devices – Memory – ROM – RAM – Architecture of 8085 – Address bus – Data bus – Control bus – Pin configuration – Registers Arithmetic and logic unit – Flags – Instruction format – Types of instructions – Addressing modes – Assembly language programming – Programmes for 1s and 2s complement,8 bit addition, 8 bit subtraction, biggest and smallest from the given list.

REFERENCES

1. Theraja B.L.,(2004). *Basic Electronics solid state*, New Delhi, S. Chand and company Ltd
2. Albert Paul Malvino Donald P. Leach, (1991). *Digital Electronics and Applications*, New Delhi, Tata McGraw- Hill
3. NagoorKani A, (1999). *Microprocessor and its applications*, RBA Publication, Chennai.
4. R.S. Sedha, (2010). *Applied Electronics*, S.Chand and company Ltd New Delhi,
5. A.P Mathur, (2001), *Introduction to Microprocessor*, New Delhi, Tata McGraw Hill
6. Ramesh Gaonkae . (1999). *Microprocessor and its Application* , Mumbai , Penram Publication.

CORE PAPER IV
ELECTRICITY AND MAGNETISM
(120 Hours)

SUBJECT CODE:

OBJECTIVES

To enable the students to know about the fundamental concepts of Coloumb's law, Ohm's law, Kirchhoff's laws, electromagnetic induction and electrostatics and how they might be applied in real life. To understand the magnetic properties of materials in detail.

ELECTRICITY

UNIT-I (24hrs)

ELECTROSTATICS

Coulomb's law – Electric field and electric intensity-Electrostatic potential-Electrostatic potential at a point due to charged conductor and charged sphere-Energy of a system of charges-Gauss's theorem and its applications- Mechanical force experienced by unit area of a charged sphere – Electrified soap bubble – Electrical images.

Capacitors: Capacity of a conductor- Energy of a charged conductor- Sharing of energy between two capacitors - Principle of a capacitor - Capacity of a spherical and cylindrical condensers- Capacitors in series and in parallel- Quadrant Electrometer-Capacity of a Quadrant Electrometer Electrolytic condenser –Guard ring condenser.

UNIT-II: (24hrs)

CURRENT ELECTRICITY AND THERMOELECTRICITY

Electric current – Nernst theory of electrode potentials-Cells-Theory of voltaic cells-Dry cell-Atomic Battery-Electrical measurements-Definitions and units of Volt, electric current and Resistance -Ohm's law –Verification of Ohm's law– Resistances in series and parallel – Ammeters and voltmeters – Cells in parallel and series –Lorentz-Drude theory of electrical conduction and derivation for electrical conductivity -Kirchhoff's laws-Potentiometers-Comparison of emf of two cells.

Thermoelectricity- Seebeck effect–Laws of thermo emf- Peltiereffect – Peltier coefficient – Determination of Peltier coefficient (Caswell's method) – Thomson effect – Starling method -Thomson coefficient – Thermo electric power – Application of thermodynamics to Thermocouple – Thermoelectric diagrams and their uses.

UNIT- III: (24hrs)

ELECTROMAGNETIC INDUCTION AND TRANSIENT CURRENTS

Faraday's laws – Lenz's law - Fleming's right hand rule – Self inductance – Self inductance of a long solenoid – Determination of self inductance by Rayleigh's method – Mutual inductance – Mutual inductance between two solenoids – Determination of mutual inductance.

Helmholtz Equations - Growth and decay of current in a circuit containing resistance and inductance. Growth and decay of charge in a circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – Moving coil Galvanometer – Moving coil ballistic galvanometer -Moving iron galvanometer – watt-Hour meter

MAGNETISM

UNIT- IV: (24hrs)

MAGNETIC POTENTIAL AND MAGNETOMETERS

Magnetic potential – Potential and intensity at a point due to a bar magnet- Magnetic intensity at any point due to bar magnet - Magnetic potential at a point due to a magnetized sphere – Magnetic shell – Potential at a point due to a magnetic shell – Magnetometers –

Deflection magnetometer-magnetic length of a magnet-Vibration magnetometer-Permeability – Susceptibility – Relation between μ and χ - Gauss theorem and its applications.

UNIT –V: (24hrs)

MAGNETIC PROPERTIES OF MATERIAL AND EARTH'S MAGNETIC FIELD

Magnetic induction – Magnetization – Properties of dia, para and ferro magnetic materials – Anti ferro magnetism and ferri magnetism - Electron theory of magnetism – Langevin's theory of para magnetism - Weiss's theory of ferro magnetism – Cycle of magnetization and Hysterisis - Experiment to draw M-H curve (horizontal model) – Energy loss due to hysteresis. Earth as a magnetic sphere-Magnetic maps-Sun-spot activity- Geomagnetic prospecting.

REFERENCES

1. Brijlal and Subramaniam, (1992). *Electricity and Magnetism*, Ratan Prakashan Educational & University Publishers,
2. R. Murugesan,(1998). *Electricity and Magnetism* , New Delhi, Sultan Chand & Sons,
3. Sehgal, Chopra and Sehgal,(1980). *Electricity and Magnetism*, New Delhi, Sultan Chand & Sons,
4. http://bookboon.com/en/physics-ebooks

EXTENSIBLE LEARNING PHYSICS –II
(120 Hours)

SUBJECT CODE:

OBJECTIVES

- To enable the students to enhance their capability of understanding about the basics of laws of motion, force, work, energy and sources of energy.
- To enable the students to enhance their capability of understanding about the basics of electricity, magnetism, optical instruments and conventional sources of energy.
- To improve their Scientific and technical skills through activities.

Unit –I (24hrs)

Uniform Motion and Non Uniform Motion

Motion along straight line- Definition of Uniform motion an non uniform motion- Measuring rate of motion -Speed with direction-rate of Change of velocity-Graphical representation of motion-Distance-time graphs-Velocity-Time Graphs-Equation of Motion By graphical Methods-Equation for Velocity –Time Relation-Equation for position Time relation-Equation for position –Velocity Relation-Uniform Circular Motion.

Laws of motion and momentum

Balanced and Unbalanced force -First law of Motion - Inertia and mass-Second law of motion-Mathematical formulation of Second law of motion-Third law of motion-Conservation of Momentum-Conservation laws.

Activities and demonstrations

Preparation of data regarding the motion of two different objects – Average distance covered by a moving car –Measurement of time while walking between two destinations- Preparing distance - time graph of uniform motion and non-uniform motion of a car from time verses velocity data – Describing circular motion through stone with thread.Pushing a box on a rough floor –Inertial force while travelling in a motor car –rolling of a marble in an inclined plane –demonstration of coin, card, tumbler and horizontal flick – starting of a car with dead battery – catching a fast moving cricket ball – bullet and recoil of Gun – conservation of momentum : cork and test tube

Unit – II (24hrs)

Work and energy

Work-Scientific Concept Of work-Work Done by a Constant Force-Energy-Forms Of energy-Kinetic Energy-Potential energy- Potential energy of an object at a height-Law Of conservation Of energy-Rate of doing work – kilo Watt hour.

Sound waves and Acoustics

Production of sound- Propagation of sound- longitudinal waves-Characteristic of a sound waves-Speed of sound in different media- Reflection of sound –Echo-Reverberation-Uses of Multiple reflection of sound-Range of hearing-Applications of Ultra sound -SONAR - Structure of Human ear.

Activities and demonstrations

Listing of activities which is normally considered to be work in day to-day life – lifting of an object –demonstration of positive and negative work-Different forms of Energy: group discussion –understanding of work and energy while moving a trolley on a stops placed table - energy associated with a spring , toy car with winding key and an arrow – observing, discussing the features of the house electric meter.Understanding of vibration of a tuning fork by keeping on water surface and hanging ball- preparing list of musical

instruments –Understanding of sound waves in medium and Vacuum – longitudinal waves in a slinky – demonstration of reflection of sound waves : pipes using chart paper – demonstration of sound created by megaphone and horn. - Ultrasonic waves generated by a bat.

Unit – III (24hrs)

Electricity

Electric current – electric potential and potential difference – Ohm,s law – Resistance – resistance in series – resistors in parallel – Heating effect of electric current – applications – electric power - domestic electric circuits.

Magnetism

Magnetic field and field lines — Right hand thumb Rule - Magnetic field due to a current carrying conductor – circular loop – solenoid – Force on a current carrying ciondutor in a magnetic field – Electro magnetic induction – Electric motor – Generator.

Activities and demonstrations

Demonstration of electric circuit using battery , switch and bulb – preparing the list of various symbols of commonly used electric components – Study of resistors in Series and parallel by connecting three or four resistors and measurement of voltage at various points of resistor ends –Preparing chart on home appliances power consumption and calculating monthly average electric bill charge. Action of the magnetic compass placed near the circuit containing thick copper wire – observations and discussions on bar magnet near the iron fillings –producing pattern of concentric circles indicating magnetic field around a straigt conducting wire - preparation of electromagnet using nail , insulated copper wire and a battery .- chart preparation about the scientists who are contributed to electricity and magnetism.

Unit – IV (24hrs)

Ray optics – Mirrors

Reflection of light – Image formation by spherical mirrors – ray diagram of images formed by spherical mirrors–images formed by concave and convex mirrors – Uses of concave and convex mirrors –Mirror formula and magnification

Ray optics: Lenses

Refraction of light – Refraction through a rectangular glass slab – Refractive index – Refraction by Spherical Lenses – image formation by lenses – Lense formula and magnification – power of a lens.

Activities and demonstrations

Testing the images on curved polished objects while it is moving farther and nearer (stainless steel bowl and spoon) – Preparing the table on size of an object viewing in plane mirror, covex mirror and concave mirror.Observing the stick partly immersed in the bucket filled with water – write your experience while picking a coin placed at the bottom of the bucket filled with water by keeping eye to a side above water. Observing the line drawn on a paper and glass slab partly placed on it – focusing sunlight on a paper through convex lens – calculating approximate focal length of a covex lens by forming image on a wall.

Unit – V (24hrs)

Sources of Energy: Conventional energy

Good sources of energy – Fossil fuels - advantages and disadvantages of fosil fuels - basics of thermal power plant – Hydro power plant – schematic view of hydro power plant - Bio – mass – Bio – gas production plant – wind energy.

II YEAR

Sources of Energy: Non - Conventional energy

Solar Energy – Solar cells –Energy from the sea – Tidal energy – wave energy – Ocean thermal energy – Geo thermal energy – Nuclear energy – renewable source of energy – environmental consequences.

Activities and demonstrations

Model preparation to demonstrate thermoelectric power production (cooker , rotor- blade assembly, cycle dynamo, bulb) - Listing of different hydroelectric projects in India – Survey on wind velocity rich areas in India. Construction of solar cooker using low cost material and observe the heating performance- Preparing chart on nuclear power plants – group discussion on advantages and disadvantages of Ocean Thermal Energy and geo thermal energy.

REFERENCES

1. CRC Handbook of Physics & Chemistry, (1999). New York,CRS Press,
2. D. Halliday, R.Resnick and J.Walker,(2001). *Fundamentals of Physics*, New York, Wiley
3. D.Halliday, R.Resnick and K.S.Krane, (1994). Physics Vols I, II & II Extended , New York, Wiley
4. NCERT (NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING) text books for standard IX,X,New Delhi.
5. R P. Feynman, R B Leighton and M Sands, (1998). The Feynman Lectures on Physics, VoIs. I, II, and III, New Delhi, Narosa.
6. Tamilnadu Text Books for CBSE IX,X.
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8. www.ncert.nic.in
9. https//www.practicalphysics.org
10. https://www.education.com>activity >physics
11. https://www.iop.org>education>itp>resources
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CORE PRACTICAL - II
(120 Hours)

SUBJECT CODE:

1. Metre bridge – Resistance and specific resistance.
2. Determination of 'M'–Tan C position.
3. Carey Foster bridge –R and P
4. Potentiometer – low range voltmeter calibration.
5. Potentiometer - low range ammeter calibration.
6. Potentiometer –Temperature coefficient R.
7. Figure of Merit – Ballistic galvanometer.
8. Field along the axis of the coil – Determination of B_H.
9. Sonometer – A.C frequency.
10. Junction diode characteristics.
11. Zener diode characteristics.
12. Construction of Half wave rectifier.
13. 12 – 0 – (-12) Dual IC regulated power supply
14. Verification of truth tables of AND, OR, NOT, NAND, NOR and EX-OR gates.
15. NAND as universal gate.
16. Transistor characteristics – CE mode.
17. OP-AMP – Adder and Subtractor.
18. OP-AMP – Inverting and Non inverting
19. OP-AMP - Sign changer and Scale changer

REFERENCES

1. S. Srinivasan, (2005).A Text Book of Practical physics, New Delhi, S. Sultan Chand publications.
2. R. Sasikumar, (2011). Practical Physics, New Delhi, PHI Learning Pvt. Ltd.
3. https//www.practicalphysics.org.

ALLIED CHEMISTRY
(120 Hours)

SUBJECT CODE:

UNIT- I Chemical Calculations

Formula mass – Avogadro number – Mole concept – Stoichiometric equations – Methods of expressing the concentration of solutions. Calculations based on the principle of volumetric analysis. Preparation of standard solutions.

Periodic Classification

History of periodic classification – IUPAC periodic table – IUPAC nomenclature for element, with atomic number more than 100 – Classification of elements in to s, p, d and f blocks. Atomic and ionic radii – variation along periods and groups. Ionisation energy – Electronegativity and electron affinity – factors influencing them – variation along periods and groups.

UNIT- II Basic concepts in organic chemistry

Organic chemistry – catenation – classification – functional group – homologous series – isomerism – cleavage of bonds – Types of organic reactions – types of reagents – polar and non-polar molecules – polar effects (inductive, mesomeric and electromeric).

Chemical bonding

Chemical bonding – classification of molecules – types of bonds – ionic bond – factors influencing – lattice energy and Born-Haber cycle. Covalent bond – characteristic of covalent bond – Fajan's rules. Coordinate covalent bond. VSEPR Theory.

UNIT- III Electrochemistry

Electrochemistry – Electrode potential – single electrode potential – calomel electrode – standard hydrogen electrode – measurement of single electrode potential – electrochemical series – applications. Types of electrodes. Electrochemical cells – reversible and irreversible cells – standard cell – measurement of EMF – batteries – lead storage – nickel cadmium cells.

Corrosion

Corrosion – Definition – theories of corrosion – factors influencing corrosion – types of corrosion – corrosion fatigue – corrosion control.

UNIT- IV Environmental chemistry

Pollution – Definition – causes of pollution – types of pollution – Air pollution – control – acid rain – photochemical smog – ozone hole – greenhouse effect. Water pollution - Organic pollutants – inorganic pollutants – suspended solids and sediments – radioactive materials – thermal pollutants. Sewage – sewage treatment – determination of BOD and COD. Land pollution – control. Radioactive pollution – effects – protection and disposal. Noise pollution – measurement – source – effect – control.

Water and water treatment

Water quality parameters – hard and soft water – hardness of water – types of hardness – estimation of hardness by EDTA method –Boiler corrosion – water softening – external treatment – lime soda process and zeolite process –demineralisation process. Electro-osmasis – electrodyalysis.

UNIT- V Fuels

Fuels – Characteristics of a good fuel – advantages and disadvantages of solid, liquid and gaseous fuels – calorific value of a fuel – theoretical calculation of calorific value. Coal – classification – analysis – difference between coal, coke and charcoal. Liquid fuels – origin – refining – cracking. Gaseous fuels – Natural gas – Liquefied petroleum gas – water gas – biogas.

Polymers

Polymers – polymerisation – definition – degree of polymerisation. Polymer structure and nomenclature - types of polymerisation – mechanism of polymerisation – free radical – ionic and co-ordinaiton. Preparation, properties and uses of polyethylene, polyvinylchloride, polypropylene, Teflon, polyurethane, nylon and polyester resins.

REFERENCES

1. Bahl, B.S. and Arun Bahl, (2010), Advanced Organic Chemistry, New Delhi, S. Chand & Company Private Limited.
2. Puri, B.R. and Sharma, L.R, (2011), Principles of Physical Chemistry, Jalandhar, Vishal publishing company.
3. Ravikrishnan, A., (2007), Applied chemistry, Chennai, Sri Krishna Publication.
4. Krishnamurthy, N., Vallinayagam, P., Jeyasubramanian, K., (2001) Applied Chemistry, Delhi, Tata McGraw-Hill publishing company limited.
5. https://www.khanacademy.org/science/chemistry/chemical-reactions-stoichiome
6. https://www.wyzant.com/resources/lessons/science/chemistry/introduction_to_organic_chemistry
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ALLIED CHEMISTRY PRACTICAL
(120 Hours)

SUBJECT CODE:

Quantitative analysis:

1. Estimation of hydrochloric acid using sodium carbonate
2. Estimation of hydrochloric acid using link sodium hydroxide and standard oxalic acid
3. Estimation of Ferrous iron using link potassium permanganate and standard oxalic acid.
4. Estimation of oxalic acid using link potassium permanganate and standard ferrous ammonium sulphate.
5. Estimation of ferric iron using standard potassium dichromate and external indicator Potassium ferrocyanide.

Qualitative analysis:

Qualitative analysis of simple organic compounds containing any one functional group.

Acids, aldehydes, ketones, diamide, amines, simple phenols and carbohydrates.

Preparation of the following organic compounds (Demonstration Only)

1. Aspirin from methyl salicylate
2. Acetanilide from aniline
3. Benzoic acid from ethylbenzoate.

REFERENCES

1. Venkateswaran, V., Veeraswamy, R. and Kulandaivelu, A.R, (2006), Basic Principles of Practical Chemistry, New Delhi, Sultan Chand & Sons Private Limited.
2. https://en.wikipedia.org/wiki/Qualitative_inorganic_analysis
3. https://archive.org/stream/manuchemianalqual00newtrich#page/n19/mode/2up
4. https://www.britannica.com/science/qualitative-chemical-analysis.

CHEMISTRY
CORE PAPER - III
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - III
(120 Hours)

SUBJECT CODE:

UNIT I

Classification of oxides based on their chemical behaviour-acidic, basic, amphoteric and neutral oxides. Classification based on oxygen content-normal oxides, peroxides, super oxides, dioxides and mixed oxides. Hydrogen peroxide-preparation, properties structure and uses. Preparation, properties, structure and uses of oxy acids of sulphur-H_2SO_3, H_2SO_5, H_2SO_4, $H_2S_2O_7$ and $H_2S_2O_8$.

UNIT II

Metallurgy-concentration of ores-gravity separation, froth flotation, magnetic separation, chemical separation. Extraction – roasting – calcinations-smelting, purification of metals-electrolysis, zone-refining, vapour phase refining- van-Arkel method.

Position of alkali metals in periodic table. Anomalous behavior of lithium. Diagonal relationship between Li and Mg. Occurrence, extraction, properties and uses of Li and Na.

UNIT III

Transition elements-general characteristics-position in the periodic table, trends in physical and chemical properties. Occurrence, extraction, properties and uses of titanium, vanadium, molybdenum and tungsten. Chemistry of titanium dioxide, titanium tetrachloride, vanadium pentoxide, ammonium metavanadate and ammonium molybdate.

UNIT IV

Definition of terms-system, surrounding and boundary, types of systems, state of a system, properties of a system, extensive and intensive properties, thermodynamic processes, thermodynamic equilibrium, nature of work and heat. First law of thermodynamics-statement and significance, internal energy and enthalpy, reversible and irreversible processes. Heat capacity-correlation between Cp and Cv. Thermochemistry-Hess's law and its applications, relation between heat and energy, determination of heat of a reaction and bond energy, temperature dependence of heat of a reaction-Kirchoff's equation.

UNIT V

Preparation of formaldehyde, acetaldehyde, benzaldehyde, cinnamaldehyde, acetone, acetophenone and benzophenone, addition reactions with Grignard reagent, HCN, $NaHSO_3$ and NH_3.Reduction reactions with $LiAlH_4$, Wolf-Kishner and Clemmenson reductions, mechanisms of aldol, Cannizaro, Perkin, Knoevenagel, Claisen and Haloform reactions. Tests for aldehydes and ketones, differences between aldehydes and ketones.

REFERENCES

1. Bahl, B.S. and Arun Bahl, (2010), Advanced Organic Chemistry, New Delhi, S. Chand & Company Private Limited.
2. Madan, R.D., (2008), Modern Inorganic chemistry New Delhi, S. Chand & Company Private Limited.
3. Puri, B.R. and. Sharma, L.R, (2011), Principles of Inorganic Chemistry, Delhi, Milestone publishers & distributors.

4. Puri, B.R. and Sharma, L.R, (2011), Principles of Physical Chemistry, Jalandhar, Vishal publishing company.
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6. http://www.askiitians.com/revision-notes/chemistry/
7. http://www.askiitians.com/revision-notes/chemistry/aldehydeketone-and-carboxylic-acid/

CORE PAPER - IV
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - IV
(120 Hours)

SUBJECT CODE:

UNIT I

Alcohols-general methods of preparation-industrial preparation of methanol and ethanol, properties of alcohols-hydrogen bonding in alcohols- distinction among primary, secondary and tertiary alcohols. Preparation, properties and uses of ethylene glycol and glycerol. Preparation, reactions and uses of methyl mercaptan.

UNIT II

Need for the second law of thermodynamics-various statements, cyclic process, Carnot's cycle. Efficiency of a heat engine, thermodynamic scale of temperature. Entropy – definition, physical significance, entropy changes in reversible and irreversible processes. Work and free energy functions, variation of free energy changes with temperature and pressure. Maxwell's relations. Gibbs – Helmholtz equations. Third law of thermodynamics – statement and need for the third law.

UNIT III

The concept of chemical potential and its significance. Equilibrium constants Kp and Kc-relation between them. Temperature dependence of equilibrium constants.van't-Hoff equation, Le Chatelier's principle-statement and applications. Colligative properties-thermodynamic derivations of molar depression in freezing point, elevation of boiling point, their usefulness in determining molar masses.Osmotic pressure and its measurement-principle of reverse osmosis.

UNIT IV

f-block elements-position in the periodic table, general characteristics of lanthanides and actinides- lanthanide contraction and its consequences-occurrence, oxidation states, magnetic properties and colour. Separation of lanthanides by fractional crystallization method and ion exchange method.Extraction and uses of thorium and uranium.

UNIT V

Composition of nucleus, nuclear forces (meson theory)-nuclear stability- mass defect, binding energy, packing fraction, n/p ratio and magic numbers. Isotopes, isobars, isotones and isomers-basic idea only-detection of isotopes by Aston's mass spectrograph method.
Radioactive disintegration-modes of decay-rate of disintegration.Half-life period and average life.Nuclear fission-atom bomb and nuclear fusion-hydrogen bomb and stellar energy, uses of radioactive isotopes in medicine, analytical chemistry and carbon dating.

REFERENCES

1. Puri, B.R. and. Sharma, L.R, (2011), Principles of Inorganic Chemistry, Delhi, Milestone publishers & distributors.
2. Puri, B.R. and Sharma, L.R, (2011), Principles of Physical Chemistry, Jalandhar, Vishal publishing company.

3. Madan, R.D., (2008), Modern Inorganic chemistry New Delhi, S. Chand & Company Private Limited.
4. Bahl, B.S. and Arun Bahl, (2010), Advanced Organic Chemistry, New Delhi, S. Chand & Company Private Limited.
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6. http://slideplayer.com/slide/4637309/
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8. http://www.askiitians.com/iit-jee-chemistry/organic-chemistry/general-methods-of-preparation-of-alcohols.aspx

CHEMISTRY FOR SCHOOL EDUCATION – II
(120 Hours)

SUBJECT CODE:

UNIT- I Matter

Matter – Classification – activity based learning about physical nature of matter. Characteristics of particles of matter – activity based learning. States of matter - change of states of matter – activity based learning. Mixtures – types – activity based learning. Definition and properties of solution and suspension.

Separation of components of a mixture – activity based learning. Demonstration experiments showing distillation and fractional distillation. Air – separation of components of air – chart preparation. Crystallisation – activity based learning. Water purification – chart preparation. Substances - types. Difference between Mixtures and Compounds – chart preparation. Demonstration experiments showing the variation in solubility with temperature.

UNIT -IIStructure of the atom

Charged particles in matter. Comparison of the properties of electrons, neutrons and protons – chart preparation. Thomson model of atom. Rutherford's model of atom – drawbacks. Bohr's model of atom. Distribution of electrons in different orbits for first eighteen elements. Electronic model showing the schematic atomic structure of these elements. Chart preparation for the electronic distribution of first eighteen elements.

Atoms and molecules

Laws of chemical combination – activity based learning. Atom, atomic mass, molecule, molecular mass, molecules of elements, molecules of compounds, definition of ions. Writing chemical formula of compounds – chart preparation. Molecular mass – mole concept. Preparation of electronic chart display matching mass number and chemical formula.

UNIT – III Chemical Reactions and Equations

Chemical reaction – activity based learning. Chemical equations – writing and balancing – chart preparation. Types of chemical reactions – activity based learning. Effects of oxidation in everyday life.

Acid, Base and salts

Chemical properties of acids and bases – activity based learning. pH scale – importance of pH in everyday life. Family of salts, pH of salts – activity based learning. Preparation and uses of sodium chloride, sodium hydroxide, bleaching powder, backing soda and washing soda. Water of crystallisation – plaster of paris – uses. Demonstration of soda ash fire extinguisher application.

UNIT – IV Periodic classification

Dobereiner's triads, Newland's law of octaves, Mendeleev's periodic table – achievements, limitations. Modern periodic table – activity based learning. Match making chart preparation to identity the elements and position.

Metals and non-metals

Physical and chemical properties of metals and non-metals – activity based learning. Reactivity series – chart preparation. Reaction of metals with non-metals. Properties of ionic compounds – activity based learning. Demonstration experiment showing conductivity of salt solution. Extraction of metals – flow chart preparation. Refining of metals – demonstration experiments involving refining of copper metal. Corrosion and its prevention – activity based learning.

UNIT – V Carbon and its compounds

Covalent bonding in hydrogen, oxygen, nitrogen and methane molecules. Allotropes of Carbon. Saturated and unsaturated compounds. Differentiating the structure of cyclohexane and benzene. Functional groups. Homologous series – activity based learning. Nomenclature of carbon compounds – chart making. Chemical properties of carbon compounds – activity based learning. Properties of ethanol and ethanoic acid activity based learning. Soaps and detergents – difference, cleaning action – activity based learning. Model making for simple organic compounds like, methane, ethane, ethanol, ethanoic acid and benzene.

Natural resources

Resources on earth – air, role of atmosphere in climate control, movement of air - activity based learning. Rain – rain fall patterns in India – activity based learning, Water pollution. Soil-soil erosion – activity based learning. Chart preparation about water cycle, nitrogen cycle, carbon cycle and oxygen cycle. Greenhouse effect. Ozone layer – importance, factor influencing ozone layer. Micro and macro nutrients for plant growth. Definitions of manure, fertiliser, herbicide and pesticide.

REFERENCES

1. 10^{th} Standard science books, New Delhi, NCERT (National Council of Educational Research and Training).
2. http://ncert.nic.in/textbook/textbook.htm?iesc1=0-15
3. http://chemistrynoteslecture.com/Units%201-12%20High%20School%20Chemistry.html
4. https://byjus.com/ncert-solutions-class-9-science/

CORE PRACTICAL – II
(120 Hours)

SUBJECT CODE:

(Quantitative inorganic analysis, qualitative organic analysis and organic preparation)

A. VOLUMETRIC ANALYSIS

Acidimetry and Alkalimetry

1. Estimation of sodium carbonate using link hydrochloric acid and standard sodium carbonate.
2. Estimation of hydrochloric acid using link sodium hydroxide and standard oxalic acid.
3. Estimation of carbonate and bicarbonate in a mixture by Warder's method.

Permanganometry

4. Estimation of ferrous iron using link potassium permanganate and standard oxalic acid.
5. Estimation of oxalic acid using link potassium permanganate and standard ferrous ammonium sulphate.
6. Estimation of calcium using link potassium permanganate and standard oxalic acid.

Dichrometry

7. Estimation of ferric iron using standard potassium dichromate and external indicator potassium ferricyanide.
8. Estimation of ferric iron using standard potassium dichromate and internal indicator diphenylamine.
9. Estimation of potassium dichromate using link sodium thiosulphate and standard potassium dichromate.

Iodometry and iodimetry

10. Estimation of copper using link sodium thiosulphate and standard potassium dichromate.

Argentometry(demonstration)

12. Estimation of chloride using link silver nitrate and standard sodium chloride.

EDTA Titration

13. Estimation of hardness of water by EDTA method.

B. ORGANIC CHEMISTRY PRACTICALS

Qualitative analysis of monofunctional groups

Organic compounds containing any one of the following functional groups/compounds may be given for analysis:

Acids, esters, aldehydes, ketones, nitro compounds, anilides, amines, carbohydrates, amides, phenols, naphthols, dihydric phenols, aromatic nuclear halogen compounds and aromatic side chain halogen compounds, urea and thiourea.

Organic Preparations

Preparation of acetanilide from aniline, benzanilide from aniline, benzoic acid from ethyl benzoate, para bromo acetanilide from acetanilide, aspirin, nitrobenzene, glucosazone and salicylic acid from methyl salicylate.

REFERENCES

1. Venkateswaran, V., Veeraswamy, R. and Kulandaivelu, A.R, (2006), Basic Principles of Practical Chemistry, New Delhi, Sultan Chand & Sons Private Limited.
2. Thomas, A., (1981), Practical Chemistry, Cannanore, Scientific Book Centre.
3. http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
4. https://in.okfn.org/files/2013/07/An-Introductory-Course-of-Quantitative-Chemical-Analysis.pdf

5. https://www.thinkiit.in/iit-qrp/english/theory/chemistry/organic/practical-organic-chemistry/
6. https://www.bookrix.com/book.html?bookID=deepakpant1_1276415412.1891009808#0,558,23526

ALLIED PHYSICS
(120 Hours)

SUBJECT CODE:

UNIT - I (24 Hrs)

Elasticity and Mechanics

Hooke's law-Different moduli of elasticity- Relation between elastic moduli- Poisson's Ratio- Bending of moment –Determination of young's modulus by non uniform bending-Torsional oscillation –Torsion Pendulum-Determination of Rigidity modulus and moment of inertia. Centre of Gravity – Centre of Gravity of a solid hemisphere – hemisphere and Solid Cone.

Relativity

Postulates of special theory of relativity –Lorentz transformation – time dilation and length contraction –

Addition of velocities – Mass energy relation

UNIT - II (24Hrs)

Sound

Transverse vibration of stretched strings- velocity of transverse waves-Simple Harmonic Motion- Melde's string experiment –Intensity of sound –Doppler effect- Microphone and loud speaker. Acoustics of buildings - Reverberation - Reverberation time – Sabine's formula -conditions for good acoustical auditorium.

Optics

Wave optics –Interference- Michelson interferro meter – Velocity of light and splitting of spectral lines- diffraction-Newtons ring – plane diffraction grating –determination of wavelength .Polarisation – production and analysis of circularlly and elliptically polarized light

UNIT - III (24Hrs)

Thermal Physics

Newton's law of cooling – Verification – Specific Heat Capacity of liquid by Cooling - Bomb Calorimeter. Conduction : Coefficient of thermal conductivity – Good and bad Conductor - Lee's disc experiment Stefan's law of radiation – Solar Constant.

Electricity and magnetism

Krichoff's Law's and their applications to Wheatstone's network - Potentiometer- Internal resistance of a cell and thermo emf measurement- – Capacitor- energy of charged capacitors – Field along the axis of solenoid – tangent galvanometer – Moving coil galvanometer – self induction – mutual induction – Circuit control and protective devices – types of switches – fuses – circuit brakers.

UNIT - IV (24 Hrs)

Atomic Physics

Atom models – Vector atom Models – Pauli's exclusion Principle – various quantum numbers and quantization of orbits. X-rays – Continuous and Characteristic X-rays – Mosley's Law and its importance .

Nuclear Physics

Nucleus – Nuclear Size – Charge – Mass and Spin – Liquid drop model – Binding energy –Radio activity – Half life period – mean life period -Nuclear Radiations and their properties,Nuclear fission and fusion – atom bomb – Thermo nuclear reactions – Nuclear reactor

UNIT - V (24Hrs)

Quantum Mechanics

Principle of Uncertainty – wave function – Schrödinger's one dimensional equation – Eigen function and Eigen values – Application -Particle in a box — one dimensional potential well

Electronics

Semicondutors –P type materials –N-type materials – PN junction theory – diode characteristics – Zener diode – V-I characteristics – transistor – transistor characteristics – common emmiter transistor circuit- Operational amplifier- Ideal Operational amplifier – Adder –subtractor.

Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions -1's and2's complement of a Binary number and Binary – Binary Subraction by 1's and 2's complement methods – Basic logic gates – AND, OR, NOT, NOR, NAND and EXOR Gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra.

REFERENCES

1. Properties of matter and sound – R.Murugesan , S.Chand & Co. Delhi.
2. Sound – Saigal – S.Chand & Co. Delhi.
3. Heat and Thermodynamics – Brijlal and Subramaniam , S.Chand & Co. Delhi.
4. Optics – Brijlal and Subramaniam, S.Chand & Co. Delhi.
5. Magnetism and Electricity – Khare and Srivastava – Atma Ram and Sons – New Delhi.
6. Modern Physics – Murughesan – S.Chand and Co.
7. Hand Book of Electronics – Gupta and Kumar – Pragati Prakasan. Meerut.

ALLIED PHYSICS PRACTICAL

Total : 120hrs **SUBJECT CODE:**

1. Measurements of length (or diameter) using Vernier calipers, Screw gauge andTravelling microscope
2. Young's Modulus - Non uniform bending – Pin and Microscope Method
3. Young's Modulus - uniform bending
4. Compound pendulum
5. Rigidity modulus – Torsional pendulum
6. Coefficient of Viscosity of Liquid using graduated burette.
7. Specific heat capacity of liquid by Cooling Method.
8. Lee's Disc – Thermal Conductivity of Bad Conductor.
9. Spectrometer – Grating – Normal incidence method.
10. Spectrometer – Refractive index of Solid Prism (A,D and μ)
11. Newton's Rings – Radius of curvature of a convex lens
12. Sonometer – Verification of Three laws.
13. Meter Bridge – Verification of Resistance in Series and Parallel.
14. Moment of a magnet – Tan 'C' position
15. Characteristics of a junction diode
16. Construction of a full wave rectifier.
17. AND, OR and NOT logic gates – verification of truth table using Discrete components.
18. Potentiometer – Calibration of low range ammeter
19. Potentiometer – Calibration of voltmeter
20. NAND as Universal gate.

REFERENCES

1. A textbook of practical Physics – M.N. Srinivasan and others – Sultan Chand & Sons, New Delhi.
2. Practical Physics – A. Dhana Lakshmi and K.R. Paramasivam – Apsara.

BOTANY

CORE PAPER - IV

PLANT ANATOMY AND EMBRYOLOGY

(120 Hours)

SUBJECT CODE:

Unit I

Structure and function of simple & complex tissues. Meristematic tissues: definition,structure,function & classification.apical organization and theories:apical cell theory, Histogen theory & Tunica – Corpus theory. Root apex: Histogen theory &Korper-Kappe theory. Secretary tissues:externalglands&nectarines and internal lacticifers.

Unit II

Tissue systems: structure and function in root, stem & leaves. Epidermal tissue system: epidermis, cuticle, trichome, stomata, bulliform cells, cork and silica cells. Ground tissue systems:cortex, endodermis, pericycle, pith & pith rays.Vascular tissue systems: different types of vascular bundles and their arrangement in root and stem. Nodal anatomy: leaf trace, leaf gap, branch trace and branch gap.

Unit III

Stem thickening in monocots and dicots, Dicot root thickening. Anomalous secondary growth of Stem- *Bougainvillea, Bignonia, Nyctanthes* and *Dracaena*. Periderm structure and development: Phellem, Phellogen, Phelloderm, Rytidome and lenticels.

Unit IV

Structure and development of anther-microsporogenesis, development of male gametophyte, dehiscence of anther, structure of pollen and its germination, and viability.

Unit V

Structure and development of ovule –megasporogenesis, development of an embryosac – monosporic (*Polygonum* type), bisporic (*Allium* type) and tetrasporic (*Peperomia* type). Structure of mature embryo sac, double fertilization, apomixes. Development of an endosperm and embryo in dicots and monocots, polyembryony, structure of fruit and seed.

REFERENCES

1. Tayal, M.S., Plant Anatomy, 3rd edition, (2012), Rastogi Publications, Meerut.
2. Pandey, B.P., 1978, Plant Anatomy, S.Chand& Co., New Delhi,
3. Vasishta, P.C., A Text Book of Plant Anatomy, Pradeep Publications, Jullunder.

4. Bhojwani, S.S. and Bhatnagar, S.P., 1978, The embryology of Angiosperms, publishing House, N.Delhi.
5. Dwinedi, J.N., 1988, Embryology of Angiosperms, Rastogi and Co., Meerut.
6. Singh,V.,Pande,P.C.,Jain,D.K.,Embryology of Angiosperms,2010-11,Rastogi Publications, Meerut.
7. Esau, K., 1975, Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.
8. Fahn, A., 1974, Plant Anatomy, Pergoman Press, Oxford.
9. Maheswari, P., 1971, An introduction to Embryology of Angiosperms, Tata McGraw Hill Publishing Co.Ltd, New Delhi. 1
10. Swamy,B.G.L. and Krishnamurthy,k.V., From Flower to Fruit, Tata McGraw Hill Publishing Company Ltd.,New Delhi.

CORE PAPER - V

TAXONOMY OF ANGIOSPERSMS AND ECONOMIC BOTANY

(120 Hours)

SUBJECT CODE:

Unit - I

Principles of Taxonomy, Taxonomy and its importance. Herbarium –preparation and maintenance. Binomial nomenclature- ICN- Author citation, Key preparation, Taxonomic hierarchy and its meaning, major and minor categories (approaches to classification-Natural, Modern-their nature and limitations) systems of classifications Artificial- Linneus, Natural-Bentham and Hooker, modern-Cronquist (only outline of classification), Chemotaxonomy.

Unit - II

Detailed study of the characters and plants of economic importance of the following families Annonaceae, Zygophyllaceae, Fabaceae, Caesalpiniaceae, Mimosaceae, Cucurbitaceaeand Apiaceae

UNIT - III

Detailed study of the characters and plants of economic importance of the following families Asteraceae, Sapotaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Moraceae, Orchidaceae, Liliaceae and Poaceae.

UNIT - IV

Source and processing of Economically useful products of the following:1)Rice, 2)Black gram, 3)Sugarcane, 4)Coffee, 5)White pepper, 6)Mango & 7)Aloe.

Unit - V

Pharmacognestic values of the following plant parts with respect to Habit, Habitat, Active principles, Actions ,& Uses: 1)Roots 2)Underground stems 3)Barks 4)Leaves 5)Galls 6)Fruits 7)Seeds .

REFERENCES

1. Naik, V.K., Principles of Plant Taxonomy, IBH Oxford.
2. Vasishta, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company
3. Verma, B.K., Introduction to Taxonomy of Angiosperms (2011) PHI Learning Pvt.Ltd. N.Delhi.
4. Sharma, O.P., 1993, Plant Taxonomy, Tata McGraw Hill.
5. Chopra, G.L., 2004, Angiosperms, Pradeep Publications, Jalandar.
6. Pandey, B.P., Economic Botany, S.Chand& Company, New Delhi.
7. Sambamurthy, A text Book of Economic Botany, Wiley Eastern Pvt.Ltd. 8. Saxena, N.B., and Sabena's., 7th Edition (2010), PragatiPrakashan, Meerut.
8. Lawrence, G. H.M., 1969, Taxonomy of vascular Plants Oxford & IBH Publishing Co.N.Delhi.

9. Rendle, R.B., The Classification of flowering plants, Vol. I, II &III, Oxford-Clarendon.
10. Gamble, J.S., Flora of Presidency of Madras, Vols. I, II & III (1986) Bishen Singh Mahendra Pal Singh, Dehra Dun.
11. Albert F.Hill, Economic Botany, Tata McGraw Hill Publishing Company.

BIO BASICS II – BOTANY
(120 Hours)

SUBJECT CODE:

UNIT – I

Pollination and fertilization: – definition, Types of pollinators biotic, abiotic.Types of pollination 1. Self-pollination-autogamy,geitonogamy, advantages and disadvantages of self-pollination. Cross pollination. Agents of pollination-characteristic features of the following Hydrophily, Anemophily, Zoophily- Entomophily, Ornithophily. Contrivances for ensuring cross pollination. Coevolution of flowering plants and their pollinator.Advantage of cross pollination

UNIT – II

Outline of fertilization. Fruits: definition, types: simple, aggregate, multiple. Dry dehiscent, dry indehiscent, and fleshy fruits

UNIT - III

Seed- morphology. Dispersal of fruits and seeds- dispersal of wind, water, animal

UNIT - IV

Vegetative reproduction- different methods of propagation- cutting, layering, underground stem, aerial branches, adventitious buds. Grafting – approach grafting, true grafting, bud grafting

UNIT - V

Germination- conditions governing germinations- germination of exalbuminous seeds with epigeal cotyledons, germination of aluminous seeds, germination of monocotyledonous seeds.

REFERENCES

1. R.V. NarayanaSwamy, K. N. Rao, 2009. Outlines of Botany. V.Subramanian Pvt. Limited, Chennai.
2. B.P. Pandey, 2011. Botany for Degree students, S.Chand&Co.Ltd., New Delhi .
3. B.P Pandey, 2010. Modern Practical Botany vol I, vol II, vol III, S.Chand& Company Ltd.New Delhi.

CORE PRACTICAL – II

(100 Hours)

SUBJECT CODE:

1. Cell types and tissues
2. Non-living inclusions : starch grains, cystoliths, raphides and aleurone grains
3. Primary structure of stem, root and leaf-dicot and monocot
4. Stomatal types-anomocytic, anisocytic, paracytic, diacytic and grass type
5. Secondary structure of dicot stem and root
6. Anomalous secondary structure- *Bougainvillea, Bignonia, Nyctanthes*and *Dracaena*
7. Identification of wood based on either RLS or TLS
8. Identificatin of C.S. of anther, embryosac, monocot and dicot embryo
9. Identification of placentation types
10. Identification of various stages of dicot embryo
11. Morphological identification of Plant Parts and their modifications.
12. Dissection of floral parts of plants belonging to the families.
13. Identify and comment on use of plants.
14. Field trips (Minimum 5 Days) to places within or outside the state under the guidance of teachers to study plants in their natural habitats.
15. Preparation and submission of 10 Herbarium sheets.

REFERENCES

1. Tayal, M.S., Plant Anatomy, 3rd edition, (2012), Rastogi Publications, Meerut.
2. Pandey, B.P., 1978, Plant Anatomy, S.Chand& Co., New Delhi,
3. Vasishta, P.C., A Text Book of Plant Anatomy, Pradeep Publications, Jullunder.
4. Bhojwani, S.S. and Bhatnagar, S.P., 1978, The embryology of Angiosperms, publishing House, N.Delhi.
5. Dwinedi, J.N., 1988, Embryology of Angiosperms, Rastogi and Co., Meerut.
6. Singh,V.,Pande,P.C.,Jain,D.K.,Embryology of Angiosperms,2010-11,Rastogi Publications, Meerut.
7. Esau, K., 1975, Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.
8. Fahn, A., 1974, Plant Anatomy, Pergoman Press, Oxford.
9. Maheswari, P., 1971, An introduction to Embryology of Angiosperms, Tata McGraw Hill Publishing Co.Ltd, New Delhi. 1
10. Swamy,B.G.L. and Krishnamurthy,k.V., From Flower to Fruit, Tata McGraw Hill Publishing Company Ltd.,New Delhi.
11. Naik, V.K., Principles of Plant Taxonomy, IBH Oxford.
12. Vasishta, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company

13. Verma, B.K., Introduction to Taxonomy of Angiosperms (2011) PHI Learning Pvt.Ltd. N.Delhi.
14. Sharma, O.P., 1993, Plant Taxonomy, Tata McGraw Hill.
15. Chopra, G.L., 2004, Angiosperms, Pradeep Publications, Jalandar.
16. Pandey, B.P., Economic Botany, S.Chand& Company, New Delhi.
17. Sambamurthy, A text Book of Economic Botany, Wiley Eastern Pvt.Ltd. 8. Saxena, N.B., and Sabena's., 7th Edition (2010), PragatiPrakashan, Meerut.
18. Lawrence, G. H.M., 1969, Taxonomy of vascular Plants Oxford & IBH Publishing Co.N.Delhi.
19. Rendle, R.B., The Classification of flowering plants, Vol. I, II &III, Oxford-Clarendon.
20. Gamble, J.S., Flora of Presidency of Madras, Vols. I, II & III (1986) Bishen Singh Mahendra Pal Singh, Dehra Dun.
21. Albert F.Hill, Economic Botany, Tata McGraw Hill Publishing Company.

ALLIED CHEMISTRY
(120 Hours)

SUBJECT CODE:

UNIT- I Chemical Calculations

Formula mass – Avogadro number – Mole concept – Stoichiometric equations – Methods of expressing the concentration of solutions. Calculations based on the principle of volumetric analysis. Preparation of standard solutions.

Periodic Classification

History of periodic classification – IUPAC periodic table – IUPAC nomenclature for element, with atomic number more than 100 – Classification of elements in to s, p, d and f blocks. Atomic and ionic radii – variation along periods and groups. Ionisation energy – Electronegativity and electron affinity – factors influencing them – variation along periods and groups.

UNIT- II Basic concepts in organic chemistry

Organic chemistry – catenation – classification – functional group – homologous series – isomerism – cleavage of bonds – Types of organic reactions – types of reagents – polar and non-polar molecules – polar effects (inductive, mesomeric and electromeric).

Chemical bonding

Chemical bonding – classification of molecules – types of bonds – ionic bond – factors influencing – lattice energy and Born-Haber cycle. Covalent bond – characteristic of covalent bond – Fajan's rules. Coordinate covalent bond. VSEPR Theory.

UNIT- III Electrochemistry

Electrochemistry – Electrode potential – single electrode potential – calomel electrode – standard hydrogen electrode – measurement of single electrode potential – electrochemical series – applications. Types of electrodes. Electrochemical cells – reversible and irreversible cells – standard cell – measurement of EMF – batteries – lead storage – nickel cadmium cells.

Corrosion

Corrosion – Definition – theories of corrosion – factors influencing corrosion – types of corrosion – corrosion fatigue – corrosion control.

UNIT- IV Environmental chemistry

Pollution – Definition – causes of pollution – types of pollution – Air pollution – control – acid rain – photochemical smog – ozone hole – greenhouse effect. Water pollution - Organic pollutants – inorganic pollutants – suspended solids and sediments – radioactive materials – thermal pollutants. Sewage – sewage treatment – determination of BOD and COD. Land pollution – control. Radioactive pollution – effects – protection and disposal. Noise pollution – measurement – source – effect – control.

Water and water treatment

Water quality parameters – hard and soft water – hardness of water – types of hardness – estimation of hardness by EDTA method –Boiler corrosion – water softening – external treatment – lime soda process and zeolite process –demineralisation process. Electro-osmasis – electrodyalysis.

UNIT- V Fuels

Fuels – Characteristics of a good fuel – advantages and disadvantages of solid, liquid and gaseous fuels – calorific value of a fuel – theoretical calculation of calorific value. Coal – classification – analysis – difference between coal, coke and charcoal. Liquid fuels – origin – refining – cracking. Gaseous fuels – Natural gas – Liquefied petroleum gas – water gas – biogas.

Polymers

Polymers – polymerisation – definition – degree of polymerisation. Polymer structure and nomenclature - types of polymerisation – mechanism of polymerisation – free radical – ionic and co-ordinaiton. Preparation, properties and uses of polyethylene, polyvinylchloride, polypropylene, Teflon, polyurethane, nylon and polyester resins.

REFERENCES

1. B. S. Bahl and ArunBahl, Advanced Organic Chemistry,S.Chand&Company, Edn. (2010).
2. B. R.Puri and L. R. Sharma, Principles of Physical Chemistry, Vishal Publication, Edn. 44 (2011).
3. A. Ravikrishnan, Applied chemistry, Sri Krishna Publication, Edn (2007).
4. N. Krishnamurthy, P. Vallinayagam, K. Jeyasubramanian, Applied Chemistry, Tata McGraw-Hill publishing company limited, Second edition (2001).

ALLIED CHEMISTRY PRACTICAL
(120 Hours)
SUBJECT CODE:

Quantitative analysis:

1. Estimation of hydrochloric acid using sodium carbonate
2. Estimation of hydrochloric acid using link sodium hydroxide and standard oxalic acid
3. Estimation of Ferrous iron using link potassium permanganate and standard oxalic acid.
4. Estimation of oxalic acid using link potassium permanganate and standard ferrous ammonium sulphate.
5. Estimation of ferric iron using standard potassium dichromate and external indicator Potassium ferrocyanide.

Qualitative analysis:

Qualitative analysis of simple organic compounds containing any one functional group.

Acids, aldehydes, ketones, diamide, amines, simple phenols and carbohydrates.

Preparation of the following organic compounds (Demonstration Only)

1. Aspirin from methyl salicylate
2. Acetanilide from aniline
3. Benzoic acid from ethylbenzoate.

REFERENCES

1. V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, (2006). *Basic Principles of Practical Chemistry*, Sultan Chand & sons.

ZOOLOGY

CORE PAPER - III
CELL BIOLOGY
(120 Hours)

SUBJECT CODE:

UNIT I

History and scope of Cell Biology – Microscopy – Types – Light, Phase contrast, SEM, TEM. Cell theory. Viruses – Types, cell size and shape – Bacteria – Types, cell size and shape. Phages, Viroids

UNIT II

Ultra structure of Animal cell. Cytoplasm – Structure, Composition & Function. Plasma Membrane – Ultra structure - Theories and models. Functions – Transport of small molecules, Endocytosis.

UNIT III

Ultra structure and function of Endoplasmic reticulum, Ribosomes, Golgi complex, Lysosomes, Centrioles and basal bodies.

UNIT IV

Ultra structure and function of Mitochondria. Nucleus – Nuclear membrane – Nucleoplasm – Chromosomes – Heterochromatin and Euchromatin – Nucleolus. Giant chromosomes: Polytene chromosomes: occurrence and structure. Lamp brush chromosomes: occurrence and structure.

UNIT V

Cell division – Cell cycle. Amitosis. Mitosis and Meiosis: all stages, nature of chromosomes during different stages and significance.

REFERENCES

1. DeRobertis, E.D.P. and E.M.F. DeRobertis, 1988. Cell and Molecular Biology, 8th edition, HonKong, New Age International Ltd
2. Giese, A.C., 1979. Cell Physiology, Philadelphia, London ,Saunders Co.
3. Powar, C.B., 1989. Essential of Cytology, Bombay , Himalaya Publishing House
4. Veerbala Rastogi 1969 Introductory cytology. Meerut. Kedar Nath Ram Nath
5. Verma, P.S. and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th edition, New Delhi , S.Chand & Co.,
6. https://archive.org/details/cytology00wils
7. https://www.amazon.in/Text-Book-Cytology-P-S-Verma-ebook/dp/B00QUYL0F4
8. http://www.freebookcentre.net/biology-books-download/An-introduction-to-cytology.html

CORE PAPER - IV

GENETICS

(120 Hours)

SUBJECT CODE:

UNIT I

Introduction to Genetics - Basis of Mendelian Inheritance and Mendelian laws. Incomplete dominance and co-dominance, Pleiotropism. Interaction of genes: Allelic and non allelic interactions, supplementary genes, complementary genes. Polygenic (quantitative) inheritance.

UNIT II

Multiple alleles: Definition, characteristics and examples: coat colour in rabbits, Rh factor and erythroblastosis foetalis; Blood Groups and their Inheritance in Human ; Linkage and Crossing Over: Complete and Incomplete Linkage, Crossing Over types, Mechanisms, Mapping of Chromosomes.

UNIT III

Sex determination: sex chromosomes; X and Y male heterogametic and female heterogametic chromosomes. Mechanism of sex determinations [XX-XO, XX-XY, ZZ-ZW types]; Sex-linked, sex-influenced and sex-limited characters – Pedigree analysis.

UNIT IV

Mutation: Definition – kinds of mutations – gene mutations – molecular basis of gene mutations – substitution and frame shift mutations – mechanisms – factors influencing mutations – induced mutations – mutagens. Chromosome mutations – numerical and structural changes. Numerical changes: euploidy and aneupoloidy. Structural changes: deletion, duplication, insertion, inversion, translocation.

UNIT V

Human Genetics - Normal chromosome component in human beings, classification and grouping of human chromosomes - Chromosomal anomalies and disorders: Down's syndrome, Turner's and Klinefelter's syndromes, Gene mutations- albinism, PKU, alkaptonuria.

REFERENCES

1. Verma, P.S. and V.K. Agarwal, 1995. Genetics, 8th edition, New Delhi ,S. Chand & Co
2. Goodenough, V., 1978. Genetics, 2nd ed., New York Holt, Rinchart and Winston
3. Watson, J.D. and W.A. Benjamin, 1976. Molecular Biology of the Gene, New York, Benjamin Co. Inc.,
4. Winchester, 1967. Genetics, New Delhi, Oxford IBH Publications
5. P.S. Verma & V.K. Agarwal , 1999 . Concept of Genetics, Human genetics & Eugenics — New Delhi , S. Chand & Company
6. http://web.iitd.ac.in/~amittal/SBL101_Essentials_of_Genetics.pdf
7. http://gsi.semmelweis.hu/files/ebook/Genetics%20genomics_en.pdf
8. http://www.agrimoon.com/wp-content/uploads/Principle-of-Genetics.pdf

BASICS IN ZOOLOGY – II
(120 Hours)

SUBJECT CODE:

UNIT I

Our Environment **- Physical Resources:**

Air, Water, Soil. Air for respiration, for combustion, for moderating temperatures; movements of air and its role in bringing rains across India.

Air, water and soil pollution (brief introduction). Holes in ozone layer and the probable damages ; waste production and their solutions ; solid waste management; radioactive waste management; greenhouse effect and climate change; deforestation ; Biodegradable and non-biodegradable substances.

Bio-geo chemical cycles in nature**:** Water, oxygen, carbon and nitrogen.

Natural Resources:

Sources of energy: Different forms of energy, conventional and non-conventional sources of energy: fossil fuels, solar energy; biogas; wind, water and tidal energy; nuclear energy. Renewable versus non-renewable sources.

Management of natural resources: Conservation and judicious use of natural resources. Forest and wild life; Coal and Petroleum conservation. Examples of people's participation for conservation of natural resources. Big dams: advantages and limitations; alternatives, if any. Water harvesting. Sustainability of natural resources.

Biodiversity and its Conservation

Concept of biodiversity; patterns of biodiversity; importance of biodiversity; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, national parks, sanctuaries.

UNIT II

Bio Molecules

Chemical constituents of living cells: biomolecules, structure and function of proteins, carbodydrates, lipids, nucleic acids, enzymes, types, properties, enzyme action

Cell Cycle and Cell Division

Cell cycle, mitosis, meiosis and their significance.

Heredity and evolution: Heredity; Mendel's contribution- Laws for inheritance of traits: Sex determination: brief introduction; Basic concepts of evolution.

UNIT III

Human Physiology

Alimentary canal and digestive glands, role of digestive enzymes and gastrointestinal hormones; Peristalsis; disorders - indigestion, constipation, vomiting, jaundice, diarrhoea.

Respiratory system in humans; mechanism of breathin; disorders – Asthma, emphysema, occupational respiratory disorders.

Composition of blood, blood groups, coagulation of blood; Structure of human heart and blood vessels; ; double circulation; disorders - hypertension, coronary artery disease, angina pectoris, heart failure.

Human excretory system - structure and function; urine formation ; disorders - uraemia, renal failure, renal calculi, nephritis; dialysis and artificial kidney.

UNIT IV

Human Physiology

Muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal system - myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Central nervous system; peripheral nervous system and visceral nervous system; generation and conduction of nerve impulse; sense organs

Human endocrine system - hypothalamus, pituitary, pineal, thyroid, parathyroid, adrenal, pancreas, gonads; disorders; dwarfism, acromegaly, cretinism, goiter, diabetes, Addision's disease.

Male and female reproductive systems; Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control – Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies - IVF, ZIFT, GIFT

UNIT V

Human Health and Diseases

Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology - vaccines; Cancer, HIV and AIDs; Adolescene, drug and alcholol abuse.

Microbes in Human Welfare

In household food processing, industrial production, sewage treatment, energy generation and

Biotechnology and its Application

Recombinant DNA Technology: Application of Biotechnology in health: Human insulin and vaccine production, gene therapy; Genetically modified organisms-Bt crops; Transgenic Animals; bio safety issues, bio piracy and patents.

REFERENCES

1. NCERT , CBSE & TN TEXT BOOKS OF CLASS 9, 10, 11, 12
2. Verma, P.S. 2004 Cell biology , Genetics , molecular biology , Evolution and Ecology, New Delhi , S.Chand & Co.
3. V.K. Agarwal, 1995. Cell and Molecular Biology, 8th edition, New Delhi , S.Chand & Co
4. NCERT , CBSE , TN TEXT BOOKS OF CLASS 9, 10, 11, 12
5. John Hall 2015, Guyton & Hall Text book of Medical Physiology , USA, Saunders
6. R.C.Dubey 1993 Text book of Biotechnology , New Delhi , S.Chand publishing Co.
7. R.C.Dubey & D.K.Maheswari 2013, Text book of Microbiology , New Delhi , S.Chand publishing Co.
8. https://medicforyou.in/satyanarayana-ebook-download-free-pdf
9. http://www.textbooksonline.tn.nic.in/books/12/std12-biochem-em.pdf
10. https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf.
11. http://www.freebookcentre.net/medical_books_download/Human-Physiology-Lecture-Notes.html
12. https://moorthibio.weebly.com/uploads/4/7/5/6/4756207/ebooksclub.org__biotechnology.pdf
13. https://archive.org/details/ost-biology-microbiology

CORE PRACTICAL - II

(100 Hours)

SUBJECT CODE:

CELL BIOLOGY

1. Micrometry – Use of Microscopes, Camera Lucida, Stage and Ocular Micrometer.
2. Blood smear preparation – Differential Count of WBC.
3. Counting of RBC and WBC using Haemo cytometer.
4. Mounting of Buccal epithelium and observing living cells using vital staining.
5. Mitosis in Onion root tip squash
6. Study of prepared slides of histology

a. Columnar epithelium b. Ciliated epithelium c. Areolar Connective tissue
d. Cartilage T.S. e. Bone T.S.
f. Cardiac tissue g. Striated muscle h. Non striated muscle
i. Nervous tissue j. Ovary T.S. k. Testis T.S.

GENETICS

7. Mendelian crosses – Examples for Incomplete dominance and co-dominance, lethal genes, supplementary genes, complementary genes, epistasis, polygenic (quantitative) inheritance, skin colour in man.
8. Study of the biology of Drosophila.
9. Observation of Common mutants of Drosophila
10. Human blood grouping.
11. Normal karyotype in human beings,
12. Chromosomal anomalies and disorders: Down's, Turner's and Klinefelter's syndromes
13. Gene mutations: autosomal mutations like albinism, PKU, alkaptonuria, sickle cell anaemia, thalassemia, sex chromosomal mutations: haemophilia, Polygenic traits: cleft palate / lip.

REFERENCES

1. Verma, P.S. and V.K. Agarwal, 1995. Genetics, 8th edition, New Delhi ,S. Chand & Co
2. Goodenough, V., 1978. Genetics, 2nd ed., New York Holt, Rinchart and Winston
3. Watson, J.D. and W.A. Benjamin, 1976. Molecular Biology of the Gene, New York, Benjamin Co. Inc.,
4. Winchester, 1967. Genetics, New Delhi, Oxford IBH Publications
5. P.S. Verma & V.K. Agarwal , 1999 . Concept of Genetics, Human genetics & Eugenics — New Delhi , S. Chand & Company
6. http://web.iitd.ac.in/~amittal/SBL101_Essentials_of_Genetics.pdf
7. http://gsi.semmelweis.hu/files/ebook/Genetics%20genomics_en.pdf
8. http://www.agrimoon.com/wp-content/uploads/Principle-of-Genetics.pdf

ALLIED CHEMISTRY
(120 Hours)

SUBJECT CODE:

UNIT- I Chemical Calculations

Formula mass – Avogadro number – Mole concept – Stoichiometric equations – Methods of expressing the concentration of solutions. Calculations based on the principle of volumetric analysis. Preparation of standard solutions.

Periodic Classification

History of periodic classification – IUPAC periodic table – IUPAC nomenclature for element, with atomic number more than 100 – Classification of elements in to s, p, d and f blocks. Atomic and ionic radii – variation along periods and groups. Ionisation energy – Electronegativity and electron affinity – factors influencing them – variation along periods and groups.

UNIT- II Basic concepts in organic chemistry

Organic chemistry – catenation – classification – functional group – homologous series – isomerism – cleavage of bonds – Types of organic reactions – types of reagents – polar and non-polar molecules – polar effects (inductive, mesomeric and electromeric).

Chemical bonding

Chemical bonding – classification of molecules – types of bonds – ionic bond – factors influencing – lattice energy and Born-Haber cycle. Covalent bond – characteristic of covalent bond – Fajan's rules. Coordinate covalent bond. VSEPR Theory.

UNIT- III Electrochemistry

Electrochemistry – Electrode potential – single electrode potential – calomel electrode – standard hydrogen electrode – measurement of single electrode potential – electrochemical series – applications. Types of electrodes. Electrochemical cells – reversible and irreversible cells – standard cell – measurement of EMF – batteries – lead storage – nickel cadmium cells.

Corrosion

Corrosion – Definition – theories of corrosion – factors influencing corrosion – types of corrosion – corrosion fatigue – corrosion control.

UNIT- IV Environmental chemistry

Pollution – Definition – causes of pollution – types of pollution – Air pollution – control – acid rain – photochemical smog – ozone hole – greenhouse effect. Water pollution - Organic pollutants – inorganic pollutants – suspended solids and sediments – radioactive materials – thermal pollutants. Sewage – sewage treatment – determination of BOD and COD. Land pollution – control. Radioactive pollution – effects – protection and disposal. Noise pollution – measurement – source – effect – control.

Water and water treatment

Water quality parameters – hard and soft water – hardness of water – types of hardness – estimation of hardness by EDTA method –Boiler corrosion – water softening – external treatment – lime soda process and zeolite process –demineralisation process. Electro- osmosis – electrodyalysis.

UNIT- V Fuels

Fuels – Characteristics of a good fuel – advantages and disadvantages of solid, liquid and gaseous fuels – calorific value of a fuel – theoretical calculation of calorific value. Coal – classification – analysis – difference between coal, coke and charcoal. Liquid fuels – origin – refining – cracking. Gaseous fuels – Natural gas – Liquefied petroleum gas – water gas – biogas.

Polymers

Polymers – polymerisation – definition – degree of polymerisation. Polymer structure and nomenclature - types of polymerisation – mechanism of polymerisation – free radical – ionic and co-ordinaiton. Preparation, properties and uses of polyethylene, polyvinylchloride, polypropylene, Teflon, polyurethane, nylon and polyester resins.

REFERENCES

1. B. S. Bahl and ArunBahl, Advanced Organic Chemistry,S.Chand&Company, Edn. (2010).
2. B. R.Puri and L. R. Sharma, Principles of Physical Chemistry, Vishal Publication, Edn. 44 (2011).
3. Ravikrishnan, Applied chemistry, Sri Krishna Publication, Edn (2007).
4. N. Krishnamurthy, P. Vallinayagam, K. Jeyasubramanian, Applied Chemistry, Tata McGraw-Hill publishing company limited, Second edition (2001).

ALLIED CHEMISTRY PRACTICAL
(120 Hours)

SUBJECT CODE:

Quantitative analysis:

1. Estimation of hydrochloric acid using sodium carbonate
2. Estimation of hydrochloric acid using link sodium hydroxide and standard oxalic acid
3. Estimation of Ferrous iron using link potassium permanganate and standard oxalic acid.
4. Estimation of oxalic acid using link potassium permanganate and standard ferrous ammonium sulphate.
5. Estimation of ferric iron using standard potassium dichromate and external indicator Potassium ferrocyanide.

Qualitative analysis:

Qualitative analysis of simple organic compounds containing any one functional group.

Acids, aldehydes, ketones, diamide, amines, simple phenols and carbohydrates.

Preparation of the following organic compounds (Demonstration Only)

1. Aspirin from methyl salicylate
2. Acetanilide from aniline
3. Benzoic acid from ethylbenzoate.

REFERENCES

1. V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & sons (2006).

EDUCATION

CONTEMPORARY INDIA AND EDUCATION
(100 Hours)

SUBJECT CODE:

OBJECTIVES

At the end of the course, the student-teachers will be able to:

1. develop an understanding of the nature of social diversity and the educational demands of the diverse communities
2. explain the salient features of Indian constitutional values on education
3. analyse the causes for inequality, discrimination and marginalisation in education
4. develop an understanding of the educational policies and programmes during the pre-independent and post-independent periods
5. examine the issues of language policy in education
6. develop an understanding on the emerging trends in education.

Unit - I Understanding the social diversity

Social diversity: Meaning and definition - Levels of social diversity: Individual, regional, linguistic, religious, castes and tribes - Education for understanding the social diversity in India.

***Suggested instructional approaches/methods*:**

i. Invited talk on the social diversity of Indian society.
ii. Report presentation based on the group discussion on the role of education to understand the social diversity in India.

Unit - II Educational demands of individuals and diverse communities

Universalisation of primary education - Programmes to achieve universalisation of education: SSA, RMSA, RUSA, integrated education and inclusive education - Challenges in achieving universalisation of education - Education for collective living and peaceful living: Four pillars of education as viewed by Delor's Commission Report.

***Suggested instructional approaches/methods*:**

i. Report presentation based on the group discussion/student seminar on the efforts taken by the Government of India and Tamil Nadu to achieve universalisation of education.
ii. Report presentation based on the group discussion/student seminar suggesting the curriculum for collective and peaceful living of people

Unit - III Indian Constitutional values on education

Preamble of the constitution - Fundamental rights and duties of citizens - Directive principles of State policy and education - Challenges to fulfill the constitutional obligations: freedom, justice, equality, fraternity and education - Right to Education Act.

***Suggested instructional approaches/methods*:**

i. Invited talk/teacher talk on the constitutional provisions to enjoy freedom, justice, equality in education.
ii. Invited talk /legal expert(s) talk on the salient features of Right to Education Act.

Unit - IV Inequality, discrimination and marginalisation in education

Social inequity in society - Causes for inequality, discrimination and marginalization in education - Types of inequity: caste, class, gender, regions - Elimination of social inequities through education - Education for marginalized groups: Dalits, tribals, and women.

***Suggested instructional approaches/methods*:**

i. Report presentation based on the field study /observation about the difficulties of tribals and dalits in accessing education.
ii. Report presentation based on the brainstorming session on the effective use of education for elimination of social inequities

Unit - V Policy frameworks on education: Pre-independent India

Salient features of Vedic, Buddhist and Jain system of education – Development of education during the pre-independent period – Characteristics of Basic education and its relevance to the present day context.

***Suggested instructional approaches/methods*:**

i. Report presentation based on the group discussion/student seminar about the relevance of basic education to the present day context.
ii. Report presentation based on the group discussion/student seminar on the impact of pre-independent period education on Indian society.

Unit - VI Policy frameworks on education: Post-independent India

Major recommendations of Kothari Commission (1964-1966) - Iswar Bhai Patel Committee (1977)- Malcom Adiseshiah Committee (1978)- New Education Policy (1986) - Programme of Action (1992)- Sachar Committee (2005) - Salient features of National Curriculum Framework (2005)- National Knowledge Commission (2005).

***Suggested instructional approaches/methods*:**

i. Student seminar/ Teacher talk on the major recommendations of different Education Committees/Commissions.
ii. Report presentation based on the group discussion/student seminar on the salient fractures of National Curriculum Framework (2005) and National Knowledge Commission - 2005

Unit - VII Educational planning and financing

Five year plans: Educational policy making and budgeting - Funding systems of education: Public, fees, students' loans, education cess and external aids.

***Suggested instructional approaches/methods*:**

i. Invited talk/teacher talk on the Indian educational funding systems and its implications.
ii. Report presentation based on student seminar/ brainstorming session suggesting alternative funding systems in education.

Unit - VIII Language policy in education

Language policy during the pre-independent and post-independent India - Language policy as specified in Indian Constitution - Views of great thinkers on medium of instruction: Views of great thinkers-Tagore, Gandhi and Vivekananda.

***Suggested instructional approaches/methods*:**

i. Report presentation based on the student seminar on the advantages and disadvantages of learning through mother tongue in relation to great education thinkers.
ii. Teacher talk/student seminar on the advantages and disadvantages of the three language formula.

II YEAR

Unit - IX Midday meal scheme as a socialisation process

Objectives of midday meal scheme – Benefits of midday meal scheme on education - Midday meal scheme as a socialization process with special reference to Tamil Nadu.

***Suggested instructional approaches/methods*:**

i. Report presentation based on the field study on the impact of midday meal scheme in rural area.
ii. Report presentation based on the debate: "Midday meal scheme is an effective tool for socialisation of children".

Unit - X Emerging trends in education

Impact of globalization, liberalization and privatization on education - Life-long learning and on-line education.

***Suggested instructional approaches/methods*:**

i. Invited talk/teacher talk on the impact of globalization, liberalization and privatization on education.
ii. Invited talk/teacher talk on the importance of life-long learning.

Tasks and Assignments:

1. Prepare a report based on the interaction/interview with legal expert(s) for the effective implementation of constitutional provisions to eliminate inequality, discrimination and marginalisation in education.
2. Write a detailed report on the five year plans implications of universalisation of education.

REFERENCES

1. Freire, Paulo. (2014). *Pedagogy of the oppressed*. New Delhi: Bloomsburry Publishing.
2. Ghosh, S.C. (2007). *History of education in India*. The University of Michigan: Rawat Publications.
3. Government of India.(2007). *National Knowledge Commission Report*. New Delhi.
4. Kumar, K. (2014). *Politics of education in colonial India*. New Delhi: Routledge.
5. Naik, J.P., Andrew, Vereker., & Nurullah, S. (2000). *A student's history of education in India (1800-1973)*.UK: Macmillan.
6. National Council for Educational Research and Training. (2005). *National curriculum framework*. New Delhi: NCERT.
7. Sedwal, M. & Kamat, S. (2008). *Education and social equity: With a special focus on scheduled castes and tribes in elementary education*. New Delhi: NUEPA.
8. http://mhrd.gov.in/sites/upload_files/mhrd/files/rte.pdf
9. http://shodhganga.inflibnet.ac.in/bitstream/10603/1918/8/08_chapter3.pdf
10. http://shodhganga.inflibnet.ac.in/bitstream/10603/4244/11/11_chapter%202.pdf

GENDER, SCHOOL AND SOCIETY

(100 Hours)

SUBJECT CODE:

OBJECTIVES

At the end of the course, the student-teachers will be able to:

1. understand the concept of gender roles in society
2. explain the gender identity and socialization process
3. identify gender roles in textbooks and curriculum
4. discuss safety of girls and women at school, home and workplace
5. understand the representation of gender in various mass media.

UNIT - I GENDER ROLES IN SOCIETY

Gender: Meaning and definition - Difference between gender and sex - Gender roles in society: family, caste, class, religion, culture, the media and popular culture, law and the state (film, advertisements, songs, etc) - Reasons for gender inequalities - Gender-just education outside school settings.

Suggested instructional approaches/ methods:

i) Seminar on reasons for gender inequalities.

ii) Discussion the roles of men and women family, caste, class, religion, culture, the media and popular culture, law and the state.

UNIT - II GENDER IDENTITY AND SOCIALIZATION PROCESS

Gender identity and socialization practices in family, school and organization - Role of school, peers, teachers, curriculum and textbooks in challenging gender inequalities or reinforcing gender parity - Actual gender roles and responsibilities assigned in schools and classrooms – Measurement of gender identity - discrimination of gender in classroom interactions, rituals and school/ routines - Processes of disciplining techniques for boys and girls - Analysis of sex-roles stereotype.

Suggested instructional approaches/ methods:

i) Presentation of a paper on gender roles based on the visit of students in a school.

ii) Seminar on the processes of disciplining techniques for boys and girls after visiting schools/ home.

UNIT - III GENDER AND SCHOOL CURRICULUM

Representation of gender roles in school textbooks and curricula - Role of schools in nurturing or challenging young people as masculine and feminine selves - Integration of gender roles in school and curriculum - Gender issues in diverse cultural constraints: Teacher's role - Developing positive attitude towards opposite genders in schools - gender bias in education - Transgender: providing opportunities for education, employment and life skills - Developing school curriculum for gender equality.

Suggested instructional approaches/ methods:

i. Student seminar on representation of gender roles in textbooks and curriculum.

ii. Workshop on developing school curriculum for equality and gender- just society.

UNIT - IV VIOLENCE ON SAFETY OF GIRLS AND WOMEN

Safety of girls and women at school, home and workplace - Sexual abuse and violence: Role of education in preventing them - Meaning and concept of body objectification - Combating female body objectification: Role of teachers and parents.

Suggested instructional approaches/ methods:

i) Brainstorming session on safety of girls at school, home and workplace.

i) Teacher talk on role of teachers and parents in combating female body objectification.

UNIT - V MASS MEDIA AND GENDER

Gender roles in mass media – Gender stereotypes in mass media - gender identity roles - Positive notions of body and self - Gender in media: magazines, TV shows, cartoons, movies and advertisements - Gender equality and language use.

Suggested instructional approaches/ methods:

ii) Student seminar on gender stereotypes in mass media.

iii) Poster show presentation on gender in media.

TASKS AND ASSIGNMENTS

1. Prepare a report on different roles of adolescents (boys and girls) in the context of emerging society.
2. Prepare a report on child abuse/violation of girl's rights by collecting data from various media resources.

REFERENCES

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EPC 2: DRAMA AND ART IN EDUCATION
(30 Hours)

SUBJECT CODE:

The aim of this course is to enhance the professional capacities of a student-teacher, specifically his/ her creativities and aesthetic sensibilities.

OBJECTIVES To enable the student-teachers:

1. To use the techniques of art, music and drama for enhancing teaching and learning.
2. To use art, music and drama for enhancing one's self, expression and creativity.
3. To identify and recognize the experts in art, music and drama in the community and involve them for enhancing of teaching-learning process.

How to use art, music and drama in Education.

The teachers in Colleges of Education should:

1. With fine arts experts, engage the student-teachers in making a work of art/a drawing/a sketch/a sculpture/a statue relating to school subjects, in doing an oil painting/a line drawing/ a rough sketch, in painting a picture/landscape/mural/in oils/in water colours/ draw a picture /a protract /a cartoon / a line / a figure / a human form/ in charcoal /in ink.
2. Engage the student-teachers in visiting art galleries /art exhibitions and cultural festivals
3. Encourage the student-teachers to understand local culture and art forms and interpret art works, movies and other media.
4. Train the student-teachers to use drama to interrogate/question and seek clarity in the areas of 'discomfort' and 'confusion' to them (such as completely segregated social environments, bounded by caste, class, religions or gender, etc).
5. Train the students-teachers in choosing themes and stage them as skits plays/dramas/street plays, so that they can develop the ability to feel empathy for and relate with others.
6. Engage the student-teachers to nurture and build their sensitivities through drama, based on experience, emotions and interpretation.
7. Guide the student-teachers to identify and recognize local artists, drama experts in schools/ colleges and use them for transformational action.
8. Motivate the student-teachers to use drama as a '**critical pedagogy'** moving beyond the classroom and develop collective consciousness by involving the community to participate in educational and social change.
9. Guide the student-teachers to experience and stage different kinds of drama/skits/street plays /folk and contemporary traditions relating to day-to-day problems of people of different walks of life.
10. Invite local experts in music and explore the possibilities of teaching certain contents in school subjects through music.

Tasks and Assignments:

1. Write a detailed report on how you have used drama as a technique for teaching your school subject.
2. Write a comprehensive report on how you have used fine arts and music for teaching your school subject.