General Tamil – I

(SUBJECT CODE: IFLA)

(120 Hours)

நோக்கங்கள்

1. மரபுக் கவிதைகளின் மூலம் இலக்கிய நயங்களை அறிந்துகொள்ளல்.
2. புதுக்கவிதைகள் எழுதும் முறையை புரிந்துகொள்ளல்.
3. உரைநடை, சிறுகதை, நாடகங்களின் மூலம் சிந்தனையை வெளிப்படுத்தும் திறன்களை வளர்த்துக்கொள்ளல்.
4. வெற்றிப்படிகள் என்ற தன் முன்னேற்ற நூலின் வழித் தன்னம்பிக்கை பெறல்
5. மொழித்திறன்களின் மூலம் இலக்கணங்களை நடைமுறையில் பயன்படுத்தல்.

அலகு -1: மரபுக் கவிதைகள்

1. தமிழ்த்தாய் வாழ்த்து - பேரா. சுந்தரம்பிள்ளை
2. அ) மலரும் மாலையும்
   கோயில் வழிபாடு
   வாழ்க்கைத் தத்துவங்கள் } கவிமணி தேசிய விநாயகம் பிள்ளை
   ஆ) ஆசிய ஜோதி
   புத்தர் மயங்கி விழுதல்
3. செந்தமிழ் நாடெனும்.....
   யாமறிந்த மொழிகளிலே.....
   கண்ணன் பாட்டு (இரண்டு தலைப்புகள்) } பாரதியார்
   கண்ணன் என் சேவகன்
   கண்ணன் என் அரசன்
4. அழகின் சிரிப்பு – அழகு, நிலவு, புறாக்கள்,
   அரசியல் வகையில் அயல் மொழிப் பெயர்கள், } பாரதிதாசன்
   உலகம் உன்னுடையது,
   தமிழனுக்கு வீழ்ச்சியில்லை.
5. பட்டுக் கோட்டையார் பாடல்
   புது நாளினை எண்ணி உழைப்போம் } பட்டுக்கோட்டை கல்யாணசுந்தரம்
   தூங்காதே தம்பி தூங்காதே.....
6. இயேசு காவியம்
   அ) ஊதாரிப்பிள்ளை } கண்ணதாசன்
   ஆ) வள்ளல் அழகப்பா மறைந்தார்..

அலகு -2: புதுக்கவிதை, ஹைக்கூ, சென்ரியு, லிமரிக் கவிதைகள்

7. அப்துல் ரகுமான் - அ) அன்பு ஆ) நெருப்பின் கிளை

இ) குப்பையைக் கிளறும் சிறகுகள்

8. மு. மேத்தா - அ) தீபங்கள், தீவைக்கலாமா?

ஆ) தேசப்பிதாவுக்கு ஒரு தெருப்பாடகனின் அஞ்சலி

9. வைரமுத்து - சுயகொள்ளி

10. அறிவுமதி - ஹைக்கூ கவிதைகள்

11. தமிழச்சி தங்கபாண்டியன் - எஞ்ச்சோட்டுப் பெண்

12. ஈரோடு தமிழன்பன் - ஒரு வண்டி சென்ரியா

13. சிற்பி பாலசுப்ரமணியன் - ஒரு கிராமத்து நதி

14. நிர்மலா சுரேஷ் & ஈரோடு தமிழன்பன் - லிமரிக் கவிதைகள்

15. நாஞ்சில் யோமா சேகர் - சிவப்புச் சீதனம்

அலகு - 3

இலக்கிய வரலாறு – 18,19,20 ஆம் நூற்றாண்டு மரபுக் கவிதைகள்,
புதுக்கவிதை, உரைநடை, சிறுகதை,
புதினம், நாடகம்.

அலகு - 4 சிறுகதைத் தொகுப்பு
வெற்றிப்படிகள் - தன் முன்னேற்ற நூல், தொகுப்பு.

அலகு -5: மொழித்திறன்

1. பிழை நீக்கி எழுதுதல்
2. பொருந்திய சொல்
3. கலைச் சொல்லாக்கம்
4. மரபுத் தொடர்களை வாக்கியத்தில் அமைத்தல்
5. கடிதம் (உறவு முறை, அலுவலகக் கடிதம்)
6. நேர்காணல்
7. தமிழ்ப் பழமொழிகள்

பார்வை நூல்கள்

1. கவிமணி தேசிக விநாயகம் பிள்ளை (1938), மலரும் மாலையும், சென்னை: பாரி நிலையம்.
2. பாரதியார் (1991), பாரதியார் கவிதைகள் (திருத்தமான பதிப்பு) சென்னை: சீனி விசுவநாதன் பதிப்பு.
3. பாரதிதாசன் (2005), பாரதிதாசன் கவிதைகள், திருச்சி: பாரதிதாசன் பல்கலைக்கழக உயராய்வு மையம்.

4. மு.அருணாசலம், (1975) தமிழ் இலக்கிய வரலாறு, சென்னை: தமிழியல் ஆய்வு மற்றும் வெளியீட்டு நிறுவனம்.
5. கவியரசு கண்ணதாசன் (1982), இயேசு காவியம், திருச்சிராப்பள்ளி: கலைக்காவிரி பதிப்பகம்.
6. http://elthu.com/kavignar/kavimani-desigair.
7. books.tamilcube.com>books.
8. http://elthu.com/kavignar/Bharathidasan.php

General Tamil – II

(SUBJECT CODE: IFLB)

(120 Hours)

நோக்கங்கள்

1. பக்தி இலக்கியங்களை அறிந்து கொள்ளல்,
2. சிற்றிலக்கியங்களின் பொருளை புரிந்துகொள்ளல் ,
3. இலக்கிய வரலாற்றில், சைவ, வைணவ, கிறிஸ்துவ, இஸ்லாமிய இலக்கியங்களின் வளர்ச்சியை அறிந்துகொள்ளல் ,
4. தமிழ் அறிவியல் கட்டுரைகளின் மூலம் சிந்தித்து எழுதும் திறன் வளர்த்தல் ,
5. பயன்பாட்டுத் தமிழின் மூலம் இலக்கணங்களை வாழ்வில் பயன்படுத்தல்.

அலகு– 1 செய்யுள் - பக்தி இலக்கியங்கள்

1. திருமூலர் - திருமந்திரம் 5 பாடல்கள் மட்டும்
2. தேவாரம் - திருஞானசம்பந்தர் பாடல்கள் (5 பாடல்கள்)
3. அப்பர் தேவராம் - மறுமாற்றத் திருத்தாண்டகம்
4. மாணிக்கவாசகர் - திருவாசகம் (முத்திக்கலம் புரைத்தல்)
5. ஆண்டாள் - திருப்பாவை (பத்து பாடல்கள்)
6. குலசேகராழ்வார் - பெருமாள் திருமொழி
7. எச்.ஏ. கிருட்டிணப்பிள்ளை - இரட்சணிய யாத்திரிகம்
8. பட்டினத்தார் - தாய்மரித்த போது பாடியது
9. குணங்குடி மஸ்தான் சாகிபு – நந்தீஸ்வரக் கண்ணி

அலகு– 2 சிற்றிலக்கியங்கள்

10. முக்கூடற்பள்ளு – நாட்டுவளம் (மூத்தபள்ளி)
11. குற்றாலக் குறவஞ்சி - நாட்டுவளம், மலைவளம்-திரிகூடராசப்பக் கவிராயர்
12. மீனாட்சியம்மை பிள்ளைத்தமிழ் - குமரகுருபரர்
13. நந்திக் கலம்பகம் - கையறு நிலைப்பாடல்
14. தனிப்பாடல்கள் - காளமேகப் புலவர் & ஔவையார் பாடல்கள்
15. இராமலிங்க அடிகளார் (வள்ளலார்) – திருவருட்பா ஆறாம் திருமுறை கோடையிலே இளப்பாறிக்.....(5 பாடல்கள்)

அலகு– 3 இலக்கிய வரலாறு – பக்தி இலக்கியங்கள், சைவம், வைணவம், கிறித்தவம், இஸ்லாம்.

சிற்றிலக்கியங்கள் - குறவஞ்சி, பள்ளு, பரணி, கலம்பகம், பிள்ளைத்தமிழ்

அலகு– 4 தமிழில் அறிவியல் கட்டுரைகள் (தொகுப்பு)

அலகு– 5 பயன்பாட்டுத் தமிழ்

1. அகர வரிசைப்படுத்துதல்
2. ஒருபொருள் குறித்த பல சொற்கள்
3. பல பொருள் குறித்த ஒரு சொல்
4. எழுத்துப் பிழை நீக்கி எழுதுதல்
5. ஒற்றுப் பிழை நீக்கி எழுதுதல்
6. தொடர் பிழை நீக்கம்
7. பிறமொழிச் சொற்களை நீக்கி எழுதுதல்

பார்வை நூல்கள்

1. ஜெகத்ரட்சகன்.எல்(1993), நாலாயிரத்திவ்ய பிரபந்தம், சென்னை: ஆழ்வார்கள் ஆய்வு மையம்.
2. திருஞான சம்பந்தர் மூர்த்தி நாயனார் (1955), தேவாரப் பதிகங்கள், தருமபுர ஆதினம் உரிமை பதிப்பு.
3. குணங்குடி மஸ்தான் சாகிபு , திருப்பாடற்றிரட்டு, சென்னை: வெளியீட்டாளர் இரத்தின நாயகர் அண்ட் சன்ஸ்.
4. பட்டினத்தார்(1967), பட்டினத்துப் பிள்ளையார் திருப்பாடல்கள், திருநெல்வேலி: தென்னிந்திய சைவ பதிப்பகம்.
5. மு.அருணாசலம், (1975) தமிழ் இலக்கிய வரலாறு, சென்னை: தமிழியல் ஆய்வு மற்றும் வெளியீட்டு நிறுவனம்.

GENERAL ENGLISH

(100 Hours)

(SUBJECT CODE: IFLC)

OBJECTIVES:

- To promote competency in Language skills and strengthen the students knowledge in Vocabulary and Grammar.
- To teach them the basics in learning English.
- To enhance the reading and writing skills of the students.

UNIT I: VOCABULARY

1. Gender
2. Number
3. Misspelt Words

UNIT II: GRAMMAR

1. Common Errors
2. Spotting Errors

UNIT III: STRUCTURES

1. Word Formation
2. Sentence Formation

UNIT IV: READING COMPREHENSION

1. Comprehension
2. Close Reading

UNIT V: NON-VERBAL COMMUNICATION

1. Prose Comprehension
2. Jumbled Sentences
3. Filling Pay-in-slips
4. Precise Writing
5. Hints Developing

REFERENCES

1. Thomson, A. J and Martinet, A.V, (1986). *A practical grammar*. UK: Oxford University Press
2. Radha Krishna Pillai. G., K. Rajeev. K and Bhaskara Nair. P, (2008). *Written english for you*. New Delhi: Emerald Publications.

FUNCTIONAL ENGLISH
(100 Hours)

(SUBJECT CODE: IFLD)

OBJECTIVES:

- To provide practical, functional hands-on-learning experience to students in essential English grammar and usage.

UNIT I: WORD POWER

1. Synonyms
2. Antonyms
3. Prefixes and Suffixes

UNIT II: KNOWLEDGE OF BASIC GRAMMAR

1. Articles
2. Preposition
3. Question Tag

UNIT III: KNOWLEDGE OF BASIC GRAMMAR

1. Voice
2. Infinitive gerund and participle

UNIT IV: APPLICATION OF ENGLISH GRAMMAR

1. Errors in the use of Articles
2. Errors in the use of Preposition
3. Errors in the use of Verbs

UNIT V: SENTENCE WRITING AND UNDERSTANDING

1. Sentence Pattern
2. Writing a Correct Sentence
3. Comprehension

REFERENCES

1. Luca Konig, (2016). *Correction of errors in written and spoken English*. UK: Oxford Press
2. Geoffrey Leech and Jain Suart, (2003). *Communicative grammar of English*. UK: Pearson Longman.
3. Agarwala N.K, (2014). *English grammar and composition*. New Delhi: Goyal Brothers Prakhasan.
4. Kokila S.Thangasamy, (2014). *Communicative English for college students.* Gandhigram (T.N): Arichum Blooms.

MATHEMATICS

CORE PAPER – I
CALCULUS
(120 Hours)

SUBJECT CODE: IFCM

Unit - 1

Differentiation - Successive Differentiation - n^{th} derivates - Leibnitz formula for n^{th}derivative of a product - Envelope, Curvature, Evoultes.

Unit - 2

Partial differentiation - Errors and approximations - Maxima and minima for functions of two or more variables.

Unit - 3

Integration - Standard methods - Definite integrals - Reduction formula - integration as summation.

Unit - 4

Beta and Gamma functions - Recurrence formula of Gamma functions-Properties of Beta functions-Relation between Beta and Gamma functions.

Unit - 5

Evaluation of double and triple integrals - Changing the order of integration - Change of variables - Applications in double and triple integrals.

REFERENCES

1. Arumugam, S., & Issac, A. T. (2001). *Calculus (Vol.* 1 & 2). New Gamma Publishing House.
2. Narayanan, S.A., (2002). *Calculus (Vol.* 1 & 2). S. Viswanathan Pvt. Ltd.

CORE PAPER - II
CLASSICAL ALGEBRA
(120 Hours)

SUBJECT CODE: IFCN

Unit - 1

Theory of Equations - Relation between roots and coefficients - Symmetric functions of roots - Formation of equation - Transformation of equation.

Unit - 2

Reciprocal equation - Descartes rule of signs- Diminishing and increasing the roots - Newton's Method of divisors - Horner's method.

Unit - 3

Inequalities - AM $\geq$ GM $\geq$ HM and applications - Cauchy Schwartz inequality - Weirstrass inequality.

Unit - 4

Applications to maxima and minima.

Unit - 5

Binomial Exponential and Logarithmic series - Summation of series.

REFERENCES

1. Arumugam, S., & Thangapandian Issac, A. (1996). *Set Theory, Number Theory and Theory of Equations.* New Gamma Publishing House.
2. Pillai, T. M., T. N., & K. G. (1996). *Algebra* (Vol. 1 and 2). Viswanathan Private Limited.

CORE PAPER – III
DIFFERENTIAL EQUATIONS WITH LAPLACE TRANSFORM
(120 Hours)

SUBJECT CODE: IFCO

Unit - 1

Ordinary differential equation - Non-Homogenous equations of the first degree in x and y- First order and first degree exact equation - Integrating factors - equations of the first order but of higher degree- Equations solvable for p, y and x and Clairaut's form.

Unit - 2

Linear differential Equations with constant coefficients - Particular integrals - Second order homogenous equations with variable coefficients-Equations reducible to the linear homogeneous equations - Variation of parameters - Simultaneous differential equations of the form $dx/P = dy/Q = dz/R$ – n^{th} order exact differential equation - Orthogonal trajectory.

Unit - 3

Partial differential equation of the first order - Derivation of partial differential equations - Classification on integrals - Lagrange's method of solving linear partial differential equations - Charpit's method of solving non-linear partial differential equations - Standard forms - Equations reducible to the standard forms.

Unit - 4

The Laplace transforms and its results - Laplace transform of periodic functions - Some general theorems - Evaluation of integrals - Inverse Laplace transform.

Unit - 5

Solving ordinary differential equation with constant coefficients, variable coefficients and simultaneous linear equations using Laplace transform.

REFERENCES

1. Arumugam, S., & Thangapandian Issac, A. (2002). *Differential Equations.* New Gamma Publishing House.
2. Narayanan, S., and Manickavasagam Pillai, T.K., (1996). *Calculus* (Vol. II and III), S. Viswananthan Pvt. Ltd.
3. Narayanan, S., and Manickavasagam Pillai, T.K., (1996). *Differential Equations*, S. Viswananthan Pvt. Ltd.

CORE PAPER – IV
ANALYTICAL GEOMETRY (3D) AND VECTOR CALCULUS
(120 Hours)

SUBJECT CODE: IFCP

Unit - 1

The plane - Angle between two planes - length of perpendicular - Bisecting plane - Distance between two planes.

Unit - 2

The straight line - symmetric form - Image of a point - Image of a line about a plane - The plane and the straight line - Angle between a plane and straight line - Coplanar lines - Shortest distance between two lines.

Unit - 3

The sphere - Equation of the sphere - Length of the tangent plane- Section of a sphere - Intersection of two spheres - Equation of the tangent plane - Cone and cylinder.

Unit - 4

Vector Differentiation - Gradient - Divergent - Curl - Properties and problems.

Unit - 5

Vector Integration - Line Integral - Surface Integral - Volume Integral - Green's theorem - Stoke's Theorem (Statements only) - Simple problems.

REFERENCES

1. Dr. S. Arumugam and Issac, (1996). *Analytical geometry of 3 dimensions and Vector Calculus*. New Gamma Publications.
2. Manickavasagam Pillai. T.K., and Narayanan (1998). *Analytical geometry of 3 dimensions* (Part II). S.V. Publications.

CORE PAPER - V
SEQUENCES AND SERIES
(120 Hours)

SUBJECT CODE: IFCQ

Unit - 1

Sequences - Bounded, Convergent, divergent and Oscillating sequences - Algebra of limits - Behaviour of monotonic sequences.

Unit - 2

Cauchy's first limit theorem - Cauchy's second limit theorem - subsequences - Cauchy sequences - upper and lower limits of sequences.

Unit - 3

Infinite series - Tests of convergence of series of positive terms - Comparison test - Kummer's test - Root test, condensation test - Integral test - Convergence of geometric, harmonic, exponential, binomial and logarithmic series.

Unit - 4

Alternating series - Absolute convergence - Tests of convergence of series of arbitrary terms - Rearrangement of series - Multiplication of series - power series.

Unit - 5

Fourier series - Trigonometric series - Even and odd functions - Half range Fourier series - extension to intervals of length 2π.

REFERENCES

1. Dr. S. Arumugam and Thanga Pandi Issac, (1997). *Sequences and series*. New Gamma Publishing House.

CORE PAPER - VI
PROGRAMMING IN C
(120 Hours)

SUBJECT CODE: IFCR

Unit - 1

Identifiers, Key words, Variables - Operators and expressions - Data types.

Unit - 2

Input Output statements - Control statements - Looping statements.

Unit - 3

Arrays - Strings, function - Call by values, call by reference - string function.

Structures - User defined data types - Unions.

Unit - 4

Introduction to pointers - Passing an address to a function, function returning pointers - Pointers and arrays - passing an array element to a function - array of pointers to string, limitation of array of pointers - Dynamic memory allocation.

Unit - 5

Introduction to files.

REFERENCES

1. Les Han Cook, Morris Kringer, (1986). *The C primer*. McGraw Hill Book Co.
2. Kanetkar, Y., (2007). *Understanding C Pointers*. BPB Publications, New Delhi.
3. Gottfried. C, (1996). Programming Schaum outline series,
4. Balagurusamy. E, (1999). *Programming in C*. Tata Mc Graw Hill.

PHYSICS

CORE PAPER-I

(120 Hours)

SUBJECT CODE: IFCD

MECHANICS, PROPERTIES OF MATTER AND SOUND

Total: 120hrs

UNIT I: (24hrs)

Projectile, Impulse, Impact-

Projectile – Path of a projectile- Range of projectile- Impulse and Impact-Direct and Oblique impact-Final velocity and loss of kinetic energy due to direct impact- Oblique impact-Motion of particle in a vertical motion

Friction

Friction-Laws of friction-angle of friction-resultant reaction-cone of friction-equilibrium of a body on a rough inclined plane to the horizontal and when the inclination in greater then the angle of friction- friction clutches.

UNIT II: (24hrs)

Motion Of rigid Body

Moment of inertia-Perpendicular and Parallel axis theorem- Moment of inertia of Solid sphere about an axis through its Centre of gravity-Simple Harmonic Motion-Free and damped vibrations of a body- Compound Pendulum-Theory-Experiment to determine the acceleration due to gravity "g"-Torque and angular momentum-Conservation Of angular momentum.
Centre of gravity, centre of pressure and floating bodies

Centre of gravity-Centre of gravity of a solid hemisphere-hollow hemisphere and solid cone. Centre of pressure- rectangular and triangular laminas - triangular lamina immersed in a liquid.

Conditions of equilibrium of a floating body -Stability of floating bodies: Meta centre-Determination of meta centric height of a ship

UNIT III: (24hrs)

Gravitation

Newton's law of gravitation- Kepler's Law of Planetary motion – Deduction ofNewton's law of gravitation form Kepler's Laws of gravitation – Determination of G- Boy's method – Gravitational potential – Gravitational field at a point due to spherical shell – Variation of 'g' with latitude, altitude and depth.

Elasticity

Hooke's law-Different moduli of elasticity- Relation between elastic moduli- Poisson's Ratio-Poisson's Ratio in terms of Elastic constants- Work done in stretching and twisting a wire – Torsional oscillation – Determination of Rigidity modulus by static torsion-Bending Of beams-Definitions-Expressions for the bending moment-Cantilever-Expression for depression of the loaded end of a cantilever- Determination of a Young's modulus by Cantilever oscillations and Non uniform bending -Young's modulus by koenig's method-Uniform bending .

UNIT IV: (24 hrs)

Surface Tension:

Definition and dimensions of surface tension-Molecular forces-Explanation of surface tension on kinetic theory-Work done on increasing the area of surface-Angle of contact-Spreading of one liquid over another-Excess pressure inside a liquid drop and soap bubble-experimental determination of surface tension-Jaegar's method-Variation of surface tension with temperature.

Viscosity

Newton's law of viscous flow – streamlined and turbulent flow – Poiseuille's formula for the flow of a liquid through a horizontal capillary tube – Experimental determination of co-efficient of a liquid by Poiseuille's method - Ostwald's viscometer – Terminal velocity and Stokes' formula - Viscosity of gases – Meyer's formula - Rankine's method

UNIT V: (24hrs)

Acoustics

Newton's Formula for velocity of sound –- Musical Sound and Noise – Speech- Intensity and loudness-Decible- intensity level Measurement of intensity of sound .

Reverberation and time of reverberation – absorption coefficient- Sabine's formula – Factors Affecting the Acoustics of Buildings – Sound distribution in an Auditorium – Requisitesfor good acoustical auditorium.

Ultrasonics

Production and detection – Piezo electric crystal method - Magnetostriction Method -Medical applications of Ultrasonic waves – Acoustic Grating-Velocity of ultrasonics in liquid-Applications-Non destructive testing(NDT)-Medical, industrial and scientific applications of ultrasonic waves.

REFERENCES

1. Murugeshan, R., (2012). *Properties of matter*. S. Chand & Co. Pvt. Ltd., Revised edition.
2. D.S. Mathur, (2010). *Elements of Properties of matter*, S. Chand & Co. Pvt. Ltd. Revised edition, 2010.
3. Brijlal and Subramanyam, N. (2005). *Properties of matter*. Vikas Publishng. Pvt. Ltd.
4. Brijlal and Subramanyam, N. (2008). *A Text Book of Sound.* Vikas Publishing. Pvt. Ltd.

5. Srinivasan M. N., (1991).*Sound,* Himalaya Publications, New Delhi.
6. Baldevraj *(*2004).*Science and Technology of Ultrasonics*, Narosa.
7. D.Halliday, R.Resnick and J.Walker, (2001), *Fundamentals of Physics*, New York,Wiley,.
8. CRC Handbook of Physics & Chemistry, (1999)., CRS Press, NY,
9. R P. Feynman, R B Leighton and M Sands,(1998),*The Feynman Lectures on Physics*, VoIs. I, II, and III, New Delhi, Narosa.
10. http://bookboon.com/en/physics-ebooks

CORE PAPER-II
THERMAL PHYSICS AND STATISTICAL METHODS
Total: 120hrs

SUBJECT CODE: IFCE

UNIT I: (24hrs)

Thermometry

Types of thermometers -Platinum resistance thermometer – Sebeck effect-Thermo electric thermometer-Helium vapour pressure thermometer-Callender& Griffith's bridge .

Calorimetry

Definitions-Newton's law of cooling- Specific heat of capacity of gases- Dulong & Petit's law-Specific heat capacity of solids - Specific heat capacity of liquid-Callender and Barne's continuous flow method- Specific heat of capacity of gases- C_p and C_v by Regnault's method.

UNIT II: (24hrs)

Transmission of heat :

Conduction – Co-efficient of the thermal conductivity – Cylindrical flow of heat – determination of thermal conductivity of rubber and bad conductor – Lee's disc method-Relation between thermal and electrical conductivities-Wiedmannfranz law-– Applications of conduction of heat

Black body radiation– Stefan's law- Boltzmann law- Experimental Determination of Stefan's constant –Distribution of energy in the spectrum of black body-Wein's Law – Planck's theory of radiation-Pyrometry-solarconstant-sources of solar energy-applications.

UNIT III: (24hrs)

Kinetic theory of gases

Postulates of kinetic theory of gases-degrees of freedom and Maxwell's law of equipartion of energy Maxwell's law of distribution of molecular velocities – Experimental verification – equilibrium speed distribution of velocities. Mean free path – transport phenomena – diffusion – viscosity and thermal conduction of gases – Vander walls equation – relation between Vander Wall's constant and critical constants.

Thermodynamics I

Zeroth law of thermodynamics- First law of thermodynamics – application of first law of thermodynamics-Isothermal process-Adiabatic process –Gas equation during a diabatic process equations of the adiabatic curve- Reversible and Irreversible process– Second law of thermodynamics- Carnot's Theorem- Carnot's reversible engine-Rankine cycle-steam engine-Otto engine-diesel engine-working and efficiency.

Thermodynamics II

First laten heat equation-second laten heat equation-Thermo dynamics scale of temperature-Entropy-Change of entropy-entropy diagramme-Third law of thermodynamics-Maxwell's thermodynamics relation's and applications-joule Kelvin effect- Claussius and Clapeyron equation.

UNIT IV: (24hrs)

Low Temperature Physics

Joule – Thomson effect –Kelvin effect- porous plug experiment-liquefaction of oxygen-liquefication of air-linde's process-liquefaction of helium – Kammerling – Onne's method – Helium I and II – Lambda point – production of low temperatures – adiabatic demagnetization – practical applications of low temperature – refrigerators and air-conditioning machines.

Superconductivity

Type I and II superconductors – Meissner effect – applications of superconductors – superconducting magnets- superconducting levitations.

UNIT V: (24hrs)

Statistical Methods

Phase Space – Micro and Macro canonical ensembles- different types of ensembles- degrees of freedom- statistical equilibrium - Definition - Probability theorem in Statistical thermodynamics.

Maxwell – Boltzmann law – distribution of velocity – Quantum Statistics — Fermi –Dirac Distribution Law – Bose–Einstein distribution law – comparison of three statistics- Applications of Bose Einstein and Fermi-Dirac gases as degenerate gases.

REFERENCES

1. Mathur. D.S., (2002). *Heat and Thermodynamics*. S. Chand & Co.
2. Brij Lal and Subramaniam, S (2008). *Heat and Thermodynamics*. Chand & Co. 16th Edition.
3. Gupta and Kumar, (1996). *Elementary statistics*. Pragati Prakashan Meerut.
4. Rajam, J. B. and C. L. Arora, (1981).*Heat and Thermodynamics.* S. Chand & Co. New Delhi
5. Sathya Prakash and Agarwal, (2008). *Statistical Mechanics.* Kedarnath Ramnath publishers.
6. Halliday,D., Resnick and Walker, (2001). *Fundamentals of Physics.* 6th Edition. Wiley, NY.
7. Gupta, A.B. and Roy, H. (2002). *Thermal Physics*, Books and Allied (P) Ltd.
8. http://bookboon.com/en/physics-ebooks

EXTENSIBLE LEARNING PHYSICS –I

SUBJECT CODE: IFCF

Total: 120 hrs

Unit –I (24 hrs)

Motion

Transporting Systems – Story of Transport – Types of motion -Motion along straight line – rectilinear motion - Motion along circular path –periodic motion -Definition - speed , velocity and acceleration .

Friction

Definition – factors affecting friction –static and sliding friction - Increasing friction – Grip – reducing friction - lubricants – wheels – types of frictions – fluid frictions – drags.

Activities and demonstrations

Modern transporting systems – Features and advantages – systems at rest and moving in daily life – Understanding periodic motion - stone tied with a rope –motion of a pendulum clock – demonstration of rectilinear and circular motions – objects in rest and motion - rolling ball and motion of a military tanker. Demonstration of friction through relative motions between surfaces – examples and explanation of sliding frictions - walking on wet muddy track and oily surfaces - uses of lubricants in automobiles and machines - working of ball bearings – effect of different shapes while objects move through fluids.

Unit – II (24 hrs)

Force

Definition – pushing and pulling forces – forces due to interaction –change of state of motion – change of shape of the body –realization of force –contact forces – non contact forces- electrostatic force – gravitational force – units and explanation.

Pressure:

Definition-pressure exerted by liquids-pressure exerted by gases -Traditional unit of pressure-SI unit of pressure-Manometric units-imperial and customary units-non-SI metric units- atmospheric pressure-Hydrostatic pressure-torr-Manometer –barometer-blood pressure.

Activities and demonstrations

Demonstration of pushing and pulling forces from day today activities – demonstration of interactive forces –muscular forces while breathing and digestion -gravity of astronauts in space ship.Demonstration of distribution of pressure at pointed edge and flat surface-examples-relation between pressure and length of the water column in a pipe-Pressure of atmosphere and your head-Techniques for measuring blood pressure.

Unit – III (24 hrs)

Measuring Systems and Units

Units and Measurements – methods and units – ancient methods of measurement – Indian methods of measurements – Unit – standard units of measurement – CGS – MKS – International system of units – SI units.

Methods of Measurement

Measurements of time – speed- oscillatory motion – measurement of time period of a simple pendulum –units of time and speed – ancient method of measuring length and area - measuring devices –sand clock – water clock – speedometer – odometer –digital measuring devices and principles.

Activities and demonstrations

Hands span measurements and length of a foot – length and breadth of a class room and tables – correct measurements using meter scale – comparison between conventional method of measurements and standard measurements .Finding the period of oscillation of simple pendulum - time and distance covered chart of a moving ball –preparation of distance – time graph of a car from odometer reading – analyzing distance -time graph of the bus

Unit – IV (24 hrs)

Heat and Temperature measurements:

Definitions-temperature-Temperature measurements-various unit of temperature-Thermometer-Clinical thermometer-Laboratory thermometer-conversion of temperature from Fahrenheit to centigrade and Kelvin scale.

Transportation of heat

Conduction-Convection and radiation -Explanation of flow of heat-insulators-experiment to describe conduction and convection-Transfer of heat by convection in air-heating property of black and white paper-natural fossils and fuels.

Activities and demonstrations

Explanation on methods of reading a clinical thermometer- limitations - temperature of human body-verification of body temperature with different people - normal temperature that of animals-features and handling methods of laboratory thermometer.Demonstrating conduction of heat in metals - demonstration of convection in air -sea breeze and land breeze.

Unit – V (24 hrs)

Sound

Production of sound – vibrating bodies – musical instruments – sound produced by humans – larynx – vocal cords – propagation of sound in air and vacuum - hearing of sounds – mechanism of human ear –audible and inaudible sounds – difference between noise and music – limitations – loudness.

Environmental Physics

Solar energy-wind energy–tidal energy-green house effect-green house gases-ozone hole-terrestrial radiation-physics of cloud formation-sources of noise pollution-sources of radioactive pollution.

Activities and demonstrations

Demonstration of propagation of sounds through solid , liquid and vacuum – toy telephone – Measurement of sound from various devices – preparation chart on loudness of sound from various sources.Problem of radioactive waste disposal-noise pollution effect on general health-demonstration of disposal of urban waste and industrial waste.

REFERENCES

1. CRC Handbook of Physics & Chemistry, (1999),NY,CRS Press,.
2. D.Halliday, R.Resnick and J.Walker,(2001).Fundamentals of Physics, NY ,Wiley,
3. D.Halliday, R.Resnick and K.S.Krane,(1994).Physics, Vols I, II &III Extended,
4. Dr.J.P.Sharma.(2009),Comprehensive Environmental studies, New Delhi, Laxmi publications
5. NCERT (NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING) Text Books for standard VI,VII,VIII,New Delhi.
   NY ,Wiley
6. R P. Feynman, R B Leighton and M Sands,(1998),The Feynman Lectures on Physics, VoIs. I, II, and III, New Delhi,.Narosa,
7. Tamil Nadu Text Books for CBSE VI,VII, VIII.
8. Tamil Nadu Text Books for standard VI,VII, VIII.
9. https//www.practicalphysics.org
10. https://www.education.com>activity >physics
11. https://www.iop.org>education>itp>resources
12. https://www.nsf.gov>news>physics.

CORE PRACTICAL- I

SUBJECT CODE:

(120 Hours)

(Any 12 Experiments)

1. Measurements of length (or diameter) using Vernier calipers, ScrewgaugeandTravelling microscope.
2. Young's modulus – non uniform bending – pin and microscope.
3. Young's modulus – non uniform bending – optic lever method
4. Young's modulus cantilever depression – scale and telescope method.
5. Rigidity modulus – torsional pendulum.
6. Rigidity modulus–static torsion– scale and telescope method.
7. Surface tension and interfacial surface tension – drop weight method.
8. Co-efficient of viscosity of liquid – graduated burette – Radius of cappellet method.
9. Comparison of viscosities – (h1/h2)..
10. Compound Pendulum – Determination of 'g'and 'k'
11. Thermal conductivity of a bad conductor – Lee's disc method.
12. Specific heat of liquid – Newton's law of cooling.
13. Sonometer – frequency of tuning fork.
14. Melde's string frequency of vibrator
15. Viscosity by capillary flow method
16. Sonometre frequency of AC
17. Joules calorimeter –determination of specific heat capacity of liquid
18. Spectrometer –refractive index of prism – μ of a liquid.
19. Determine the frequency of a given tuning fork – Sonometer

REFERENCES

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

ALLIED MATHEMATICS – I

SUBJECT CODE: IFAC

(120 Hours)

Unit – I ALGEBRA

Statement of Binomial, Exponential and Logarithmic series – Approximation and limit expression obtained by Binomial, Exponential and Logarithmic series.

(Omit summation problems)

Unit – II MATRICES

Rank of a matrix – Simultaneous linear equations – Eigen values and Eigen vectors – Cayley-Hamilton Theorem (without proof) and its applications.

Unit – III FINITE DIFFERENCES

Interpolation – Binomial method – Lagrange's interpolation.

(Omit exercises)

Unit – IV TRIGNOMETRY

Expansions of Cos nθ, Sin nθ and tan nθ - Expansion of Sin θ and Cos θ in a series of ascending powers of θ - Hyperbolic functions – Relation between Hyperbolic functions – Inverse Hyperbolic functions – Real and Imaginary parts.

Unit –V DIFFERENTIAL CALCULUS

Curvature – Circle, radius and center of curvature – Coordinates of center of Curvature – Evolute and Involute – Radius of Curvature when the curve is given in polar coordinates – p-r Equation of the curve.

REFERENCES

1. S. Narayanan, R. HanumanthaRao, ManickavachagamPillai and P. Kandasamy, S. Viswanathan , (2007). *Ancillary Mathematics (Volume I)*. Printers & Publishers Pvt. Ltd.
2. Kandasamy.P and Thilagavathy.K, (2004). *Mathematics for B.Sc., Branch I; Vol I.* S. Chand and Company Ltd., New Delhi.

ALLIED MATHEMATICS –II

SUBJECT CODE: IFAD

(120 Hours)

Unit – I

INTEGRATION: Reduction formula

FOURIER SERIES : Fourier series – Even and odd functions – Half range Fourier series – Development in Cosine series – Development in sine series.

Unit –II

ORDINARY DIFFERENTIAL EQUATIONS: Variable separable – Homogeneous equations – Non-Homogeneous equations – Linear equations – Bernoulli's equations – First order higher degree equations.

Unit – III

PARTIAL DIFFERENTIAL EQUATIONS: Derivation of Partial differential equations-Eliminations of arbitrary constants / functions – Different integrals of partial differential equations – Four standard types of first order equations – Lagrange's equations.

Unit –IV

LAPLACE TRANSFORMS: Definition – Laplace transforms of standard functions – Inverse Laplace Transforms – Applications to solve ordinary differential equations.

Unit – V

VECTOR ANALYSIS: Vector differentiation – Gradient of a scalar point function – Divergence and Curl – Formula connecting Divergence and Curl – Vector integration – Line integral – Volume integral – Surface integral – Statement of Stoke's and Gauss theorem – Simple applications. (Chapter 8 : Sections : 1.11, 1.12, 1.17 to 1.20, 2, 4, 5, 6, 9)

REFERENCES

1. S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy (2007). *Ancillary Mathematics (Volume II).* S. Viswanathan Printers & Publishers Pvt Ltd.
2. .K. Manickavachagam Pillay and S. Narayanan, (2007). *Calculus (Vol. III)* Viswanathan Printers & Publishers Pvt Ltd.

CHEMISTRY

CORE PAPER- I

SUBJECT CODE: **IFCA**

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - I

(120 Hours)

UNIT- I

Structure of atom-discovery of electron, determination of e/m ratio, determination of charge of electron.Black body radiation- Failure of Classical theory is explaining black body radiation, Planck's quantum theory. Einstein's theory of photo electric effect, Compton effect, Davisson and Germer experiment, de- Broglie hypothesis, Heisenberg's uncertainty principle. Physical significance of wave function, well – behaved wave function. Quantum numbers and their significance.Concept of atomic orbitals.Shapes of s, p and d orbitals.Nodal planes and nodal points in atomic orbitals.

UNIT-II

Atomic orbitals, quantum numbers- principal, azimuthal, magnetic and spin quantum numbers and their significance, Pauli's exclusion principle, Hund's rule, aufbauprinciple,(n + l) rule, stability of half filled and completely filled orbitals.

Classification of s, p, d & f block elements, atomic volume, atomic and ionic radii, ionization potential, electron affinity and electronegativity – variation along periods and groups. Factors influencing periodic properties.

UNIT- III

Chemical bonding- Ionic bonding- factors influencing the formation of ionic bond-characteristics of ionic compounds – Born-Haber cycle. Covalent bond - factors influencing the formation covalent bond-partial ionic character in covalent bond-Fajan's rule and coordinate bond.

UNIT- IV

Classification of organic compounds, functional group, homologous series.IUPAC system of nomenclature -mono functional compounds, priority rules for multifunctional componds – Isomerism – Types of isomerism (structural andstereoisomerisms) with appropriate examples. Polar, non-polar molecules, electron donating and withdrawing groups.Polar inductiveeffect, mesomeric effect, electromeric effect and hyperconjugation.Homolytic and heterolytic fission- free radicals, carbocations, carbanions and their stabilities. Electrophiles and nucleophiles.

UNIT- V

Alkanes-general methods of preparation of alkanes, Hybridisation in methane.Chemical properties of alkanes-halogenation, nitration, sulphonation, oxidation, thermal decomposition, isomerisation and aromatization.

Alkenes-general methods of preparation of alkenes.Hybridisation in ethylene. Chemical properties of alkenes-hydrogenation, halogenation, hydrohalogenation(Markovnikoff's rule and peroxide effect), hydration, hydroboration, oxidation by $KMnO_4$ and ozonolysis.

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 Inorganic Chemistry, Delhi, Milestone publishers & distributors.
3. Puri, B.R. and Sharma, L.R, (2011), Principles of Physical Chemistry, Jalandhar, Vishal publishing company.
4. http://www.chem1.com/acad/webtext/atoms/index.html
5. http://periodicvideos.com/
6. https://www.wyzant.com/resources/lessons/science/chemistry/introduction_to_organic_chemistry.

CORE PAPER- II

SUBJECT CODE: IFCB

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - II

(120 Hours)

UNIT-I

Chemical bonding- Valence Bond theory-formation of H_2 molecule- concept of resonance-resonance energy- resonance structures of CO_3^{2-} ion, O_3 and CO molecules. Molecular Orbital theory (MOT)-bonding and antibonding molecular orbitals. M.O. diagram and bond order calculations for H_2, He_2, N_2 and O_2. Valence Shell Electron Pair Repulsion (VSEPR) theory-geometry of BeF_2, BF_3, CH_4, NH_3, H_2O and PCl_5 only.Hydrogen bonding-intermolecular, intramolecular-consequences.

UNIT- II

General methods of preparation of alkynes, properties of alkynes-acidity of alkynes, hydration, hydroboration, oxidation with $KMnO_4$,ozonolysis and polymerization.Alkadienes-preparation-stability of conjugated dienes-1,2 and 1,4 addition. Diels- Alder reaction.

Alkyl halides-preparation by direct halogenations of alkenes, hydrohalogenation of alkenes and alkynes.Aliphatic nucleophilic substitution-S_N1 and S_N2 mechanisms.Grignard reagent preparation.Synthesis of alcohols, ketones, carboxylic acids and ethers from Grignard reagents.

UNIT- III

Cycloalkanes-synthesis by internal Wurtz reaction and Dieckmann reaction-ring opening reaction of cyclopropane and cyclobutane.Baeyer's strain theory, Sache-Mohr theory.Aromaticity - Huckle's rule and its applications to benzene, naphthalene, pyridine, pyrrole, cyclopropenylcation and cyclopentadienyl anion. Aromatic hydrocarbons - mechanism of aromatic electrophilic substitution reactions- nitration, sulphonation, Friedel-Crafts alkylation and acylation of benzene.

UNIT- IV

Gaseous state-postulates of kinetic theory of gases-derivation of kinetic gas equation-derivation of Boyle's law, Charles' law, Avogadro's law, ideal gas equation, Graham's law of diffusion and Dalton's law of partial pressures from kinetic gas equation. Maxwell's distribution of molecular velocities (derivation not necessary).Root mean square velocity, average velocity and most probable velocity (derivation of equations not necessary). Collision diameter, collision frequency and mean free path (definition only).

UNIT- V

Colloids-classification, preparation and purification of colloids.Properties of colloids-optical, kinetic and electrical properties.Origin of charge of colloidal particles.Emulsions and gels-elementary treatment only.

Solid state-crystalline and amorphous solids-difference between them. Crystal systems- definitions of space lattice, Unit cell, Bravais lattice. Weiss and Miller indices.

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 Inorganic Chemistry, Delhi, Milestone publishers & distributors.
3. Puri, B.R. and Sharma, L.R, (2011), Principles of Physical Chemistry, Jalandhar, Vishal publishing company.
4. http://www.askiitians.com/iit-jee-chemical-bonding/
5. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/chapt5.htm
6. https://www.studyadda.com/notes/neet/chemistry/states-of-matter/kinetic-theory-of-gases/9024.

CHEMISTRY FOR SCHOOL EDUCATION - PAPER – I

(120 Hours) **SUBJECT CODE: IFCC**

UNIT- I

Air

Air – composition – demonstration experiment showing (i) the presence of water vapour in air (ii) presence of oxygen in air (iii) Dust particles in air (iv) dissolved air in water and (iv) soil air.

Wind

Wind – definition – demonstration experiments showing (i) the pressure exerted by air (ii) the increased wind speed accompanied by reduced air pressure (iii) the movement of air form higher pressure to lower pressure (iv) warm air lighter than cold air.

UNIT – II

Soil

Soil – definition – Profile – types of soil – properties of soil – soil moisture – soil erosion. Determination of soil percolation rate.Determination of percentage of water absorbed by soil.

Microorganisms

Microorganisms – definition – application of microorganisms – domestic use – commercial use – medicinal use, environmental cleaning – fertility improvement of soil.Food preservation – chemical method.Nitrogen fixation – nitrogen cycle.

UNIT- III

Physical and Chemical Changes

Demonstration experiments showing physical change and chemical change – Azo formation, lime water carbon dioxide reaction, exchange reaction with copper sulphate and blade, crystallisation with copper sulphate solution. Rusting of iron and galvanisation. Iron pillar near Qutubminar. Demonstration experiment showing the effect of saliva on starch.

Separation Techniques

Definitions and demonstration experiments about sedimentation, decantation, filtration, evaporation, condensation and saturation.

UNIT- IV

Food and Nutrition

Components of food - Nutrients – definition- major nutrients. Carbohydrates – definition – classification – test for carbohydrates. Proteins – classification – test for proteins. Fats – test for fats. Vitamin and minerals – deficiency diseases.Chart / Electric display to matchvitamins and deficiency diseases.

Acid, bases and salts

Definition of acids, bases and salts and indicators. Extractions of natural dyes. Test for acids and bases. Demonstration of the functioning of an inhibitor with an acid-base titration. Demonstration of degree of solubility and miscibility with suitable substances.

UNIT –V

Metals and non-metals

Metals and non-metals - Physical and chemical properties and uses. Demonstration experiments on (i) conducting materials (ii) chemical properties of metals and displacement reactions.

Fuels

Fuels – definition – fuel efficiency.Coal – coke – petroleum refining – natural gas. Combustion – types of combustion – ignition temperature – inflammable substances. Global warming – acid rain.Demonstration experiments showing (i) air essential for burning (ii) heating water in a paper cup.

REFERENCES

1. 6^{th}, 7^{th} and 8^{th} Standard science books, New Delhi, NCERT (National Council of Educational Research and Training).
2. http://ncert.nic.in/textbook/textbook.htm?kech1=0-7
3. http://chemistrynoteslecture.com/Units%20112%20High%20School%20Chemistry.html
4. https://byjus.com/ncert-solutions-class-8-science/chapter-18-pollution-air-water/

CORE PRACTICAL - I

SUBJECT CODE:

(120 Hrs)

A. Qualitative Inorganic analysis

Semi micro method of analysis of a mixture containing two cations and two anions of which one may be an interfering acid radical requiring elimination during the analysis of basic radical.

a. Basic radicals: Lead, copper, zinc, bismuth, cadmium, tin, iron, aluminium, manganese, magnesium, cobalt, nickel, calcium, barium, strontium, ammonium
b. Acidic radicals: Sulphate, carbonate, nitrate, chloride, bromide, iodide, oxalate, arsenite, arsenate, phosphate, borate and chromate

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

ALLIED MATHEMATICS – I

(120 Hours) **SUBJECT CODE: IFAC**

Unit – I ALGEBRA

Statement of Binomial, Exponential and Logarithmic series – Approximation and limit expression obtained by Binomial, Exponential and Logarithmic series.

(Omit summation problems)

Unit – II MATRICES

Rank of a matrix – Simultaneous linear equations – Eigen values and Eigen vectors – Cayley-Hamilton Theorem (without proof) and its applications.

Unit – III FINITE DIFFERENCES

Interpolation – Binomial method – Lagrange's interpolation.

(Omit exercises)

Unit – IV TRIGNOMETRY

Expansions of Cos nθ, Sin nθ and tan nθ - Expansion of Sin θ and Cos θ in a series of ascending powers of θ - Hyperbolic functions – Relation between Hyperbolic functions – Inverse Hyperbolic functions – Real and Imaginary parts.

Unit –V DIFFERENTIAL CALCULUS

Curvature – Circle, radius and center of curvature – Coordinates of center of Curvature – Evolute and Involute – Radius of Curvature when the curve is given in polar coordinates – p-r Equation of the curve.

REFERENCES

1. Narayanan, S., HanumanthaRao, ManickavachagamPillai and Kandasamy.,P, (2007). *Ancillary Mathematics* (Volume I), S. Viswanathan Printers & Publishers Pvt. Ltd.
2. Kandasamy.P and Thilagavathy.K., (2004). *Mathematics for B.Sc*., Branch I; Vol – I, S. Chand and Company Ltd., New Delhi,.

ALLIED MATHEMATICS –II

(120 Hours) **SUBJECT CODE: IFAD**

Unit – I

INTEGRATION: Reduction formula

FOURIER SERIES: Fourier series – Even and odd functions – Half range Fourier series – Development in Cosine series – Development in sine series.

Unit –II

ORDINARY DIFFERENTIAL EQUATIONS: Variable separable – Homogeneous equations – Non-Homogeneous equations – Linear equations – Bernoulli's equations – First order higher degree equations.

Unit – III

PARTIAL DIFFERENTIAL EQUATIONS: Derivation of Partial differential equations-Eliminations of arbitrary constants / functions – Different integrals of partial differential equations – Four standard types of first order equations – Lagrange's equations.

Unit –IV

LAPLACE TRANSFORMS: Definition – Laplace transforms of standard functions – Inverse Laplace Transforms – Applications to solve ordinary differential equations.

Unit – V

VECTOR ANALYSIS: Vector differentiation – Gradient of a scalar point function – Divergence and Curl – Formula connecting Divergence and Curl – Vector integration – Line integral – Volume integral – Surface integral – Statement of Stoke's and Gauss theorem – Simple applications. (Chapter 8 : Sections : 1.11, 1.12, 1.17 to 1.20, 2, 4, 5, 6, 9)

REFERENCES

1. Narayanan, S., HanumanthaRao, ManickavachagamPillai and Kandasamy.,P, (2007). *Ancillary Mathematics* (Volume II), S. Viswanathan Printers & Publishers Pvt. Ltd.,
2. Manickavachagam Pillay, T.K. and Narayanan, S. (2007). *Calculus* (Vol. III), S. Viswanathan Printers & Publishers Pvt Ltd.

ALLIED ZOOLOGY

(For Botany & Chemistry major students) **SUBJECT CODE: IFAB**

(120 Hours)

Unit I: Outline classification of the animal kingdom.

Invertebrata- Classification and Characterisitics
Protozoa – Type study : *Entamoeba* ; conjugation in *Paramecium* – protozoan parasites

Porifera – Type study : *Sycon*
Coelenterata - Type study : *Obelia geniculata*- poymorphism; corals

Unit II

Platyhelminthes - Type study : *Taenia solium*
Aschelminthes- Type study : *Ascaris* ; parasitic adaptations

Unit III Annelida – Type study : Earthworm ; coelom ; metamerism
Arthropoda – Type study : Prawn ; appendages

Mollusca – Type study : *Pila ;* pearl production

Echinodermata – Type study : Asterias ; larval forms of echinoderms

Unit IV: Chordata – Classification and characteristics, Prochordates - Type study : Amphioxus

Shark (Morphology and anatomy – except skeletal and muscular system)

Frog (Morphology and anatomy – except skeletal and muscular system)

Calotes (Morphology and anatomy – except skeletal and muscular system)

Unit V : Pigeon (Morphology and anatomy – except skeletal and muscular system)

Rabbit (Morphology and anatomy – except skeletal and muscular system)

REFERENCES

1. EkambaranathaAyyar, M and Ananthakrishnan, T.N. (1993).*Outlines of Zoology.Vol.I and II*, Madras :Viswanathan and Co..
2. Linville & Kelly (1993). *Textbook of General Zoology*. NewDelhi: Discovery publishing House.
3. Dhami,P,S&Dhami,J,K. *Invertebrate Zoology*. New Delhi: S. Chand and Co.
4. Jordan, E.K. and P.S. Verma. (1993). *Chordate Zoology.*(12th ed.).New Delhi:S. Chand & Co. Ltd.,
5. Trilok Chandra Majupuria. (1962). *A textbook of Invertebrate Zoology*. Jullundur City: S.Nagin.

ALLIED ZOOLOGY PRACTICAL

(For Botany & Chemistry Major Students)

(120 Hours)

I. DISSECTION

Cockroach: Digestive and Nervous system

Prawn : Nervous system

II. MOUNTING

Mouth parts of cockroach, mosquito, house fly, prawn appendages ,placoid scales

III – SPOTTERS

Entamoeba, Plasmodium, Paramoecium, Paramoecium-Conjugation, Sycon, Obeliageniculata, (colony& medusa) , Fasciola hepatica (Entire & Transverse section), Taeniasolium (Entire & Transverse section), Leech (Entire & Transverse section), Earth worm , Prawn, Pila , Fresh water mussel, star fish , Amphioxus, Shark, Frog , Pigeon and Rat.

IV Record

BOTANY

CORE PAPER I

SUBJECT CODE: IFCG

BIO DIVERSITY- I: ALGAE, FUNGI, LICHENS AND BRYOPHYTES

(120 Hours)

Algae

Unit I

Distribution, Pigmentation, flagellation, storage products and cell wall composition of various divisions of Algae. General account and classification of Algae (Fritsch system 1935).

Unit II

Range of structure, reproduction, life histories and phylogeny of the following genera:

*Ulva, Sargassum, Gracilaria, Nostoc, Spirulina*andDiatoms. Economic importance of Algae.

Fungi

Unit III

General Characters, Classification by Alexopoulos (1979) and economic importance of Fungi- Medicine- Food- Bio pesticides - Enzymes-Bio fertilizer -Industrial uses

Structure, reproduction and life histories of the following:

Zygomycotina	:	*Mucor*
Ascomycotina	:	*Peziza*
Basidiomycotina	:	*Agaricus*
Deuteromycotina	:	*Cercospora*

Lichens

Unit IV

Salient features of lichens with special reference to *Usnea*. Economic importance of Lichens.

Bryophytes

Unit V

Classifications of Bryophyta(Watson 1971) - Structure and reproduction of the following: Hepaticopsida (*Marchantia*); Anthocerotiopsida (*Anthoceros*); Bryospida (*Funaria*).

REFERENCES

1. Vashista Sinha, B.R, Singh, V.P, (2002), *Botany for Degree students- Algae* 9th revised edition, S.Chand& Company Ltd., New Delhi.
2. Pandey, B.P,(2000) *Text Book of Botany Algae,*S.Chand& Company, New Delhi.
3. Sharma, O.P,(1992), *Text Book of Algae*, Tata McGraw Hill Publication Company Ltd., New Delhi
4. VashistaB.R ,(1982), *Botany for Degree Students – Fungi*-S.Chand& Co New Delhi.
5. Chopra G.L., (1990) *A Text book of Fungi*, S.Nagin& Co. Meerut, India
6. Pandey, B.P, (1997) College Botany Vol. I Fungi & Pathology.
7. PremPuri,(1981), *Bryophytes –Morphology, growth and differentiation* – Atma Ram & Sons, Delhi.
8. Dube, H., 1978, A textbook of Fungi, Bacteria and Virus. Vikas Publishers.
9. www.biology discussion. Com
10. www.biologywise.com
11. http://phycolab.yolasite.com/students.php

CORE PAPER – II

SUBJECT CODE: IFCH

BIOBASICS I – BOTANY

(120 Hours)

Unit I -Origin of Life

Origin of universe- Spontaneous generation-Early conditions of earth .Origin of Biomolecules _ Muller's Experiment

Factors affecting Life

Biotic and abiotic factors and their influence on microbes, plants, animals, soil, wind, light, temperature, rainfall and fire.

Unit II-Basics of Life:

Basic unit- Outline of Microscopic structures of cell and its organelles.ProkaroteAnd Eukaryote organisms

Unit III- Diversity of Living Organisms

Basis of Classification -Classification and Evolution-The Hierarchy of Classification. Tree of Life - The Five Kingdoms.Salient features of the Thallophyta(Algae, Fungi and Lichens), Bryophyta, Pteridophyta , Gymnosperms and Angiosperms

Unit IV-Morphology

Root : types of root system- Trap root Fibrous root and adventitious root.Modifications of Root for support, storage and respiration

Stem- Types of shoot system- Modification of the shoot system for Food storage- zupport- Protection- vegetative propagation- assimilation of food.

Leaf- Venation- types of venation-Phyllotaxy- types of phyllotaxy.Modification of Leaf

Unit V- Morphology

Inflorescence-Racemose,Cymose,Mixed and special types

Flower-Description of floral parts-Structure of Calyx -Structure and types of Corolla-Aestivation. Androecieum structure and types; Gynoceium – structure and types -Placentation types.

REFERENCES

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

CORE PAPER: III

SUBJECT CODE: IFCI

BIO DIVERSITY II - PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

(120 Hours)

PTERIDOPHYTES

Unit I

General Characters and Classification based on Reimer (1954); Structure and reproduction of the following: Psiloptopsida – *Psilotum*; Lycopsida – *Selaginella*

Unit II

Structure and reproduction of the following: Sphenosida – *Equisetum*; Pteropsida – *Adiantum.*

GYMNOSPERMS

Unit III

Gymnosperms: General Characters and Classification (Chamberlain 1935). Structure and reproduction of the following: Cycadales – *Cycas*,

Unit IV

Structure and reproduction of the following Coniferales - *Pinus*.

PALEOBOTANY

Unit V

Study of fossils and fossilization. Kinds of fossils-compression, casts, molds, petrification, impressions and coal balls. Dating of fossils-Radio carbon dating Geological time scale.Type study- *Lepidodendron, Calamites* and *Williamsonia.*

REFERENCES

1. Vashista, P.C, (1967), *Botany for Degree Students Vol. IV*, S.Chand& Co. New Delhi.
2. Vashista, P.C, (1976), *Botany for Degree Students Vol. V (Gymnosperms)*S.Chand& Co. New Delhi.
3. Sukla& Mishra, S.P, (1982), *Essentials of Palaeobotany,*Vikas Publishing House.
4. Smith, G.M, (1955),*Cryptogamic Botany Vol. I & II,* McGraw Hill Company.
5. Chamberlain, C.A, (1986), *Gymnosperms – Structure and Evolution,* CBS Publishers & Distributors
6. Sporne, K.R, (1976), *Morphology of Pteridophytes*B.I.Publishers
7. Sporne, K.R, (1976), *Morphology of Gymnosperms,*B.I.Publishers.
8. Arnold, C.A, (1947), *An introduction to Palaeobotany,* McGraw Hill Publisher.
9. www.biology discussion. Com
10. www.biologywise.com
11. http://phycolab.yolasite.com/students.php

CORE PRACTICAL – I

SUBJECT CODE:

BIO DIVERSITY – I & II

(120 Hours)

1. Micro preparation of the types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identifying types of algae mixtures.
4. Making suitable micro preparations of the types prescribed in Pteridophytes and Gymnosperms.
5. Observing and identifying the fossil slides included in the syllabus.

REFERENCES

1. Arnold, C.A, (1947), *An introduction to Palaeobotany,* McGraw Hill Publisher.
2. Chamberlain, C.A, (1986), *Gymnosperms – Structure and Evolution,* CBS Publishers & Distributors
3. Chopra G.L., (1990) *A Text book of Fungi*, S.Nagin& Co. Meerut, India
4. Dube, H., 1978, A textbook of Fungi, Bacteria and Virus. Vikas Publishers.
5. Pandey, B.P, (1997) College Botany Vol. I Fungi & Pathology.
6. Pandey, B.P,(2000) *Text Book of Botany Algae,*S.Chand& Company, New Delhi.
7. PremPuri,(1981), *Bryophytes –Morphology, growth and differentiation* – Atma Ram & Sons, Delhi.
8. Sharma, O.P,(1992), *Text Book of Algae*, Tata McGraw Hill Publication Company Ltd., New Delhi
9. Smith, G.M, (1955),*Cryptogamic Botany Vol. I & II,* McGraw Hill Company.
10. Sporne, K.R, (1976), *Morphology of Gymnosperms,*B.I.Publishers.
11. Sukla& Mishra, S.P, (1982), *Essentials of Palaeobotany,*Vikas Publishing House.
12. Vashista Sinha, B.R, Singh, V.P, (2002), *Botany for Degree students- Algae* 9th revised edition, S.Chand& Company Ltd., New Delhi.
13. Vashista, P.C, (1967), *Botany for Degree Students Vol. IV*, S.Chand& Co. New Delhi.
14. Vashista, P.C, (1976), *Botany for Degree Students Vol. V (Gymnosperms)*S.Chand& Co. New Delhi.
15. Vashista B.R ,(1982), *Botany for Degree Students – Fungi*-S.Chand& Co New Delhi.
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ALLIED ZOOLOGY

(For Botany & Chemistry major students) **SUBJECT CODE: IFAB**

(120 Hours)

Unit I: Outline classification of the animal kingdom.

Invertebrata - Classification and Characterisitics
Protozoa – Type study: *Entamoeba*; conjugation in *Paramecium* – protozoan parasites

Porifera – Type study : *Sycon*
Coelenterata - Type study : *Obelia geniculata*- poymorphism; corals

Unit II
Platyhelminthes - Type study: *Taenia solium*

Aschelminthes- Type study : *Ascaris* ; parasitic adaptations

Unit III Annelida – Type study: Earthworm ; coelom; metamerism

Arthropoda – Type study: Prawn; appendages

Mollusca – Type study : *Pila ;* pearl production

Echinodermata – Type study : Asterias ; larval forms of echinoderms

Unit IV: Chordata – Classification and characteristics, Prochordates - Type study : Amphioxus

Shark (Morphology and anatomy – except skeletal and muscular system)

Frog (Morphology and anatomy – except skeletal and muscular system)

Calotes (Morphology and anatomy – except skeletal and muscular system)

Unit V: Pigeon (Morphology and anatomy – except skeletal and muscular system)

Rabbit (Morphology and anatomy – except skeletal and muscular system)

REFERENCES

1. Ekambaranatha Ayyar, M and Ananthakrishnan, T.N. 1993, Outlines of Zoology, Vol.I and II, Madras. Viswanathan and Co.
2. Ayyar, E.K. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol. 1 (Invertebrate), Parts I & II. Madras. S. Viswanathan (Printers and Publishers) Pvt Ltd.,
3. Jordan, E.K. and P.S. Verma, 1993. Invertebrate Zoology, 12th Edition, New Delhi, S. Chand & Co Ltd
4. Kotpal, R.L., 1988 – 1992. (All Series) Protozoa, Porifera, Coelentereta, Annelida, Arthropoda, Mollusca, Echinodermata, Meerut , Rastogi Publications.
5. Jordan, E.K. and P.S. Verma, 1993. Chordate Zoology, 12th edition, New Delhi.,S. Chand & Co. Ltd.,

6. Jordan, E.K. and P.S. Verma, 1995. Chordate Zoology and Elements of Animal Physiology, 10th edition, New Delhi. S. Chand & Co Ltd.
7. Nigam, H.C., 1983. Zoology of Chordates, Jalandhar , Vishal Publications.
8. http://onesourcebook.com/download/biology-of-invertebrates.pdf
9. http://www.ebooksdownloads.xyz/search/an-introduction-to-the-invertebrates
10. https://thebookee.net/in/invertebrate-zoology-p-s-verma-and-jordan-free-pdf-books-download.
11. http://www.e-bookdownload.net/search/anatomy-of-the-chordates-fourth-edition
12. https://www.kopykitab.com/Chordate-Zoology-by-E-L-Jordan-And-Dr-P-S-Verma
13. http://bestlibrary.co/download/chordate-zoology.pdf

ALLIED ZOOLOGY PRACTICAL

(For Botany & Chemistry Major Students)

(120 Hours)

I. DISSECTION

Cockroach: Digestive and Nervous system

Prawn: Nervous system

II. MOUNTING

Mouth parts of cockroach, mosquito, house fly, prawn appendages, placoid scales

III – SPOTTERS

Entamoeba, Plasmodium, Paramoecium, Paramoecium-Conjugation, Sycon, Obeliageniculata, (colony& medusa), Fasciola hepatica (Entire & Transverse section), Taeniasolium (Entire & Transverse section), Leech (Entire & Transverse section), Earth worm , Prawn, Pila, Fresh water mussel, star fish, Amphioxus, Shark, Frog , Pigeon and Rat.

IV Record

ZOOLOGY

CORE PAPER - I

SUBJECT CODE: IFCJ

INVERTEBRATA
(120 Hours)

UNIT I (20hrs)

General characters and classification of invertebrate up to class. Levels of organization - unicellular, multicellular, acoelom, eucoelom, pseudocoelom, segmentation

UNIT II (20 hrs)

Protozoa - General characters and classification with examples; Type study – paramoecium; parasitic protozoans.

Porifera- General characters and classification - Type study - sycon; canal system in sponges

UNIT III (20 hrs)

Coelenterata – General characters and classification – Type study – obelia; polymorphism; coral reefs.

Helminthes - General characters and classification –Type study –Liver fluke; parasitic helminthes

UNIT IV (20 hrs)

Annelida - General characters and classification – Type study – Neries; metamerism

Arthropoda- General characters and classification - Type study - prawn, cockroach; economic importance of insects.

UNIT V (20 hrs)

Mollusca - General characters and classification – Type study – Fresh water mussel ; Torsion in gastropod

Echinodermata - General characters and classification – Type study – star fish; larvae of echinoderms; water vascular system.

REFERENCES

1. Parker and Haswell, 1964. Text Book of Zoology, Vol I (Invertebrate), New Delhi A.Z.T,B.S. Publishers and Distributors
2. Hickman, C.P. Jr., F.M.Hickuman and L.S. Roberts, 1984. Integrated Principles of Zoology, 7th Edition, St. Louis , Times Merror/Mosby College Publication.
3. Hyman L.H. 1951 The Invertebrata, Vol I to VI. New York , Mc Graw – Hill Book Co., New York
4. Borradile, L.A. Eastham, L.E.S. and J.T. Saunders. 1977 The Invertebrate , London, Cambridge University Press.

5. Adam Sedgewick – A students text books of Zoology – Vol I and III – Alahabad., Central Book Depot, Alahabad.
6. Barnes , R.D, 1982 Invertebrate Zoology VI edition , Philadelphia. Holt Saunders International.
7. 7 Ayyar, E.K. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol. 1 (Invertebrate), Parts I & II. Madras. S. Viswanathan (Printers and Publishers) Pvt Ltd.,
8. Jordan, E.K. and P.S. Verma, 1993. Invertebrate Zoology, 12th Edition, New Delhi, S. Chand & Co Ltd
9. Kotpal, R.L., 1988 – 1992. (All Series) Protozoa, Porifera, Coelentereta, Annelida, Arthropoda, Mollusca, Echinodermata, Meerut , Rastogi Publications.
10. http://onesourcebook.com/download/biology-of-invertebrates.pdf
11. http://www.ebooksdownloads.xyz/search/an-introduction-to-the-invertebrates
12. https://thebookee.net/in/invertebrate-zoology-p-s-verma-and-jordan-free-pdf-books-download

CORE PAPER II

SUBJECT CODE: IFCK

CHORDATA

(120 Hours)

UNIT I (20 hrs)

General characterisitics of chordates; Cephalochordata, Hemichordata, Urochordata, Agnatha – General characters , cyclostomata – General characters - Type study -petromyzon.

UNIT II (20 hrs)

Pisces- General characters and classification – Type study –Shark; accessory respiratory organs, lung fishes; parental care and migration in fishes.
Amphibians - General characters and classification – Type study – Frog, parental care in amphibians

UNIT III (20 hrs)

Reptiles - General characters and classification – Type study –Calotes; poisonous and non-poisonous snakes, poison apparatus; chelonia, sphenodon and crocodilian

UNIT IV (20 hrs)

Aves - General characters and classification – Type study – Pigeon; flightless birds; flight adaptations; migration in birds

Mammals - General characters and classification – Type study –Rabbit; egg laying mammals; marsupials , placental mammals; dentition and adaptive radiation in mammals.

UNIT V (20 hrs)

Comparative study of integument, heart, brain in mammals.

REFERENCES

1. Hickman, C.P. Jr., F.M. Hickman and L.S. Roberts, 1984. Integrated Principles of Zoology, 7th Edition, St. Louis ,times Merror/Mosby College Publication..
2. Newman, H.H., 1981. The Phylum Chordata, Agra , Satish Book Enterprise.
3. Parker and Haswell, 1964. Text Book of Zoology, Vol II (Chordata), New Delhi , A.Z.T, B.S. Publishers and Distributors
4. Waterman, Allyn J. et al., 1971. Chordate Structure and Function, New York,
5. Mac Millan & Co.
6. Ayyar, E.K. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol. II (Chordata), Madras S. Viswanathan (Printers and Publishers) Pvt Ltd.
7. Jordan, E.K. and P.S. Verma, 1995. Chordate Zoology and Elements of Animal Physiology, 10th edition, New Delhi. S. Chand & Co Ltd.
8. Nigam, H.C., 1983. Zoology of Chordates, Jalandhar , Vishal Publications.
9. http://www.e-bookdownload.net/search/anatomy-of-the-chordates-fourth-edition
10. https://www.kopykitab.com/Chordate-Zoology-by-E-L-Jordan-And-Dr-P-S-Verma
11. http://bestlibrary.co/download/chordate-zoology.pdf

CORE PRACTICAL - I

SUBJECT CODE:

INVERTEBRATA & CHORDATA (120 Hours)

I. DISSECTION

Cockroach: Digestive system, Nervous system, Reproductive system,

Prawn : Digestive system, Nervous system

Fish : Digestive system

II. MOUNTING

Mouth parts: Cockroach, House fly, Mosquito

Prawn appendages: Cephalic, Thoracic, Abdominal

Fish : scales

III – SPOTTERS

Classify giving reasons:

Paramoecium	Sycon sponge	Aurelia	Calotes	Rabbit
Liver fluke	AscarisNereisNajaNaja			
Prawn	Fresh water mussel	Star fish	Columba	

Draw labeled sketches:

T.S. of Taeniasolium	Physalia	Paramecium	T.S. of liver fluke
Obelia medusa	Ephyra larva	Redia larva	
Cercaria larva	Mysis larva	Alima larva	

Biological significance:

Paramecium – Conjugation	Velella	Heteronereis	Amphioxus
Trochophore larva	Chaetopterus	Peripatus	Balanoglossus
Limulus	Chiton	Entamoeba	Hippocampus
Plasmodium	Obelia colony	Liver fluke – miracidium	
Taenia – Mature proglottid	Ascaris	Millipede	Ichthyophis

Centipede	Sepia	Octopus	Rhacophorus
Sea cucumber	Sea urchin	Leech	Chameleon
Nauplius larva	Zoea larva	Sacculina on crab	
Sea anemone on Hermit crab			

Relate structure and function:

Sponge – Spicules	Sponge – Gemmule	Taenia – Scolex
Nereis – Parapodium	Prawn – Petasma	Honey bee – Sting apparatus
Scorpion – Book lung	Starfish – Pedicellariae	Starfish - Tube foot
Draco / wing	Pigeon – synsacrum /keel	

Medical Importance

Parasitic protozoans, Parasitic helminthes.

Economic Importance

Sponges , corals, shells, prawns

IV RECORD

V Field visit to Museum -Report

BASIC ZOOLOGY

SUBJECT CODE: IFCL

(120 hrs)

Unit I

Diversity of organisms – Micro organisms

Virus – classification; AIDS virus; Bacteria - classification; structure and shape; Fungi; Algae; protozoa; Uses of microbes in medicine and agriculture; microbes in food preservation; microbes in genetic engineering; diseases caused by microbes in animals and humans.

Animals: General characteristics - protozoa, sycon, coral, worm , insect , prawn, mollusk, echinoderm, fish, frog, snake, bird, mammal .

Basis of classification:

Need for classification - Five Kingdoms – criteria - Monera, Protista, Fungi, Plantae, Animalia; Features; Binomial nomenclature, history, necessity and principles of binomial nomenclature

Activities:

Observation of drop of water, curd, other sources, bread mould under the microscope; experiment showing fermentation of dough – increase in volume (using yeast).

Identification of animals up to class levels in the institutional campus and making a project report with their salient features

Unit II

Animals in daily life: Different animals used in daily life; uses of animals - for food, fibre, drought; different animal products; animal fibers; Sericulture – types of silk; Apiculture; poultry – silver revolution

Animal protection and management - care of domestic and wild animals and conservation of wild life; zoos, sanctuaries, forest reserves etc.; endangered fauna species, red data book; endemic species, migration.

Activities: Visit to fish farm, poultry farm, cattle farm; honey bee culture farm and sericulture units. Films on wild life, TV programmes, visit to zoo/ forest area/sanctuaries etc.; case study with information on disappearing tigers; data on endemic and endangered species from MEF, Govt.of India, NGOs

Unit III

Cellular grade of organization

Cell- fundamental unit - Structure of cell ; Types of human cells: nerve, flame, gland cell, egg, RBC, muscle, epithelial cell

Cell organelles– Endoplasmic reticulum, ribosomes, Golgi apparatus, lysosome, mitochondria, centriole, nucleus

Unit IV

Tissue and organ grade of organization:

Tissues: epithelial, vascular, connective, nerve, muscular tissues

Organs: eye, kidney

Cellular respiration: aerobic, anaerobic; metabolism: anabolism, catabolism

Activities: Use of a microscope, preparation of a slide & observation of cheek cells, permanent slides showing different cells, tissues, blood smear

Unit V

Design of body:

Body contour – fish – swimming; bird, flight adaptations in birds; horse - running adaptations

Body movements - In man - Bones, muscles, cartilage, joints and types of joints; skeleton – axial and appendicular; model of skeleton, X-rays of arms or legs, chest, hips, jaws, vertebral column in animals - Fish, earthworm, snail cockroach, snake and birds.

Activities: To study X-rays of human , to find out the direction in which joints bend, feel the ribs, backbone etc. Observation/ discussion on movement and skeletal system in other animals.

REFERENCES

1. B.S. Beckett , 1986 Biology– A modern introduction .– New York , Oxford University Press
2. Robert Wallace , 1992 ,Biology Science of Life , New York, Sanders and Ferl-Harper Collins College Publishers.
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11. T.S.Ranganathan 2000 , Human anatomy ,New Delhi S.Chand & Co. , Ltd.
12. TamilNadu Text book : for standards VI,VII,VIII , 2017 Chennai, Tamil Nadu text books and educational service corporation
13. https://en.wikibooks.org/wiki/General_Biology/Classification_of_Living_Things/Classification_and_Domains_of_Life
14. https://books.google.co.in/books/about/Classification_of_Living_Organisms.
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16. https://www.curwensville.org/cms/lib2/PA01000485/Centricity/Domain/111/cellOrganization.pdf
17. http://longfiles.com/vnomi0qlout2/Cellular_Respiration_(Biology_Collection).pdf.html
18. https://www.exploringnature.org/graphics/teaching_aids/Tissue_identification.pdf

ALLIED BOTANY

SUBJECT CODE: IFAA

(120 Hours)

Unit – I

General classification of plant kingdom. Prokaryotes – Bacteria – structure, nutrition, reproduction and economic importance. Structure and reproduction of T4 Bacteriophage.

Structure, life cycle of the following (No developmental details). Algae - Nostocand Chara. Fungi - Saccharomyces, Agaricusand Penicillium.

Lichens, Economic importance of algae, fungi and lichens. Structure and life cycle of the following (No developmental details) Bryophytes - Marchantia and Funaria.

Unit – II

Structure and life cycle of the following (No developmental details) Pteridophytes – Lycopodium , Adiantum and Ophioglossum. Structure and life cycle of the following Gymnosperm - Cycas.

UNIT III

Root-Types and Modification; Stem-Aerial Modifications; Leaf- Phyllotaxy, simple and compound leaves and modifications; Inflorescence- Racemose, Cymose, Mixed and special types. Flower-Description of floral parts; Fruits-Simple-berry,drupe,pepo, hesperidium, legume, loculicidalcapsule, achene. aggregate of berries, Multiple-sorosis. Seed-dispersal

UNIT IV

General outline of Bentham and Hooker's system of classification study of the range of characters and plants of economic importance in the following families: Brassicaceae ,Cucurbitaceae, Asteraceae, Solanaceae, Euphorbiaceae,Liliaceae.

UNIT V

Simple and compound tissues. Primary structure of dicot stem, root and leaf. Structure of mature anther. Structure of mature ovule- its types. Structure of pollengrain. Development of male gametophyte and female gametophyte, Fertilization

Transpiration, Respiration- Glycolysis, Kreb's cycle, Electron Transport System. Photosynthesis-Light and Dark reaction (Calvincycle). Nitrogen metabolism-Biological nitrogen fixation, non-biological nitrogen fixation

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2. Pandey, B.P, (2011). *Botany for Degree students*, S. Chand & Co.Ltd., New Delhi .
3. Pandey, B.P, (2010,) *Modern Practical Botany vol I, II, III*, S.Chand & Company Ltd. New Delhi.

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ALLIED BOTANY PRACTICALS
(120 Hours)

SUBJECT CODE:

1. Micro preparation of the types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Description in technical terms ,plants belonging to any of the families prescribed.
4. Dissection of flower, construction of floral diagram and floral formula
5. To describe simple experimental set up in Plant Physiology of the syllabus.

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EDUCATION

SUBJECT CODE: IFEA

CHILDHOOD AND GROWING UP
(100 Hours)

Objectives:

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

1. understand the growth, stages and dimensions of child development
2. compare various theories and its contributions to child development
3. analyse the gender stereotyping and issues, concerns of marginalized children
4. understand the adolescent behaviours
5. Identify the various socializing agencies and their role on child development
6. comprehend the role of play and media on child development
7. examine the impact of urbanization and economic change on child development.

Unit I Growth and development of childhood

Meaning and concepts of growth and development-Principles of growth and development- Difference between growth and development- Impact of nature and nurture on child development.

(Suggested instructional approaches and methods:

i. Talk by teachers/experts on the principles of growth and development.

ii. A debate on the influence of nature and nurture on individual development.)

Unit II Stages and dimensions of development

Stages: infancy, early childhood and adolescence and their dimensions of development : physical, cognitive, moral , emotional and social.

(Suggested instructional approaches and methods:

i) Talk by the teacher/psychologist on the various stages of child development.

ii) Invited talk by experts on dimensions of child development.)

Unit III Theories of child development

Psycho-social stages (Erikson), Cognitive development (Piaget), Moral development (Kohlberg), Socio-cultural approach to cognitive development (Vygotsky), Ecological systems theory (Bronfenbrenner).

(Suggested instructional approaches and methods:

i) Teacher talk on child development theories.

ii) Student seminar on various theories of child development.)

Unit IV Socializing agencies of child development

Agencies of socialization: Family, school, peer, and community

(Suggested instructional approaches and methods:

i) Presentation of report based on field study/ case study on child rearing practices.

ii) Seminar on family, school and peer influence on socializing process.)

Unit V Gender stereotypes and gender roles

Gender stereotypes in early child, middle childhood and adolescence - Influences of gender stereotyping: biological, cultural and environmental -Gender identity in middle childhood and in adolescence - Gender schema theory- strategies for development non-gender – stereotyped children.

(Suggested instructional approaches and methods:

i) Invited lecture by a Feminist on gender stereotypes.

ii) Seminar on strategies for development of non-gender stereotyped children.)

Tasks and Assignments:

1. Submission of a case study report on an adolescent student in the practice teaching school.

Unit VI Marginalized children: issues and concerns

Meaning and concept of marginalized children – Children living in urban

slum; deprived; socially deprived girls (Dalit and Tribal girls); abused child; children growing up in poverty, street children, HIV affected children and children working in unorganized sectors – child labour - Measures to promote the status of marginalized children.

(Suggested instructional approaches and methods:

i) Presentation of report of the problems of marginalized children based on field study.

ii) Seminar on the problems of marginalized children and the measures to be taken.)

Unit VII Understanding adolescence

Meaning of adolescence – study of adolescent behavior in their natural settings – at play or in school settings – using observation, interview schedules, case study method and

interacting with them – understanding of the physical, social and moral behaviours of children and adolescents

(Suggested instructional approaches and methods:

i) Teacher talk/ Group discussion on the influences of play on child and adolescent development.

ii) Presentation of report of the adolescent behavior using observation and other techniques.**)**

Unit VIII Play and child development

Meaning and characteristics of play - kinds of play and their role in child development – play activities of childhood – factors influencing children's play –contribution of play to children's physical, social, emotional and cognitive development

(Suggested instructional approaches and methods:

a. Teacher talk / Group discussion on kinds of play and child development.

b. Invited lecture by an expert or psychologist on various aspects of children's development.)

Unit IX Media and child development

Impact of media on early childhood experiences and development – impact of mass media and social media on adolescent development – Influence of media violence on children's and adolescent's behaviour - effects of media on racial and gender stereotyping – regulating healthy media use

(Suggested instructional approaches and methods:

i) Make a short film on the impact of mass media on children/ adolescents.

ii) Group discussion on media violence on children).

Unit X Urbanisation and economic change on child development

Impact of urban culture, population density, migration of family, and environmental effects (air, water, noise) on child development - effects of liberalization, privatization, and globalization (LPG) on child development with special reference to India.

(***Suggested instructional approaches and methods***:

i) Invited talk/teacher talk on urbanization and child development.

ii) Report presentation based on the group discussion about the impact of liberalization, privatization, and globalization on child development.)

Tasks and Assignments:

1. Submission of a report on various issues and concerns of marginalized children in your neighbourhood.
2. Contact various socializing agencies and submit a detailed report on their role on child development.

REFERENCES

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2. Baron.A. Robert (2000). *Pshychology*. New Delhi: Prentice-Hall of India.
3. Bert Laura. E. (2014). *Child development*. New Delhi: PHI Learning.
4. Hurlock, Elizabeth. B. (1980). *Development Psychology*. New Delhi: McGrawHill Education.
5. Hurlock, Elizabeth. B. (1980). *Adolescent Development*. New Delhi: Tata McGraw Hill.
6. Hurlock, Elizabeth. B. (2015). *Child development*. New Delhi: McGraw Hill Education.
7. Thangasamy, Kokila. (2014). *Psychology of learning and human development.* Madurai: MaaNila Publisher.
8. www.simplypschology.org
9. psychlassics.yorkn.ca
10. Psychology.wikia.com

LANGUAGE ACROSS THE CURRICULUM

(100 Hours)

SUBJECT CODE: IFEB

Objectives:

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

1. understand the language background of the learner,
2. know language diversity in the classroom,
3. understand the nature of communication process in the classroom,
4. understand the nature of reading comprehension in different content areas,
5. develop multilingual awareness among the learners.

Unit I Language and Society

Language: Meaning, concept and functions - Understanding of Home language and School Language - Understanding the language background of the learner - Developing oral and written language in the classroom - Language and Culture.

(Suggested instructional approaches/methods:

i. Organise the students to participate in Discussion on Home Language Vs. School Language.

ii. Visit a school in your neighbourhood and find out the language background of students and conduct a seminar highlighting the language diversity that exists in the classroom.)

Unit II Language diversity in classrooms

First Language and Second Language Acquisition - Using of First and Second Language in the classroom - Difference between language as a school subject and means of Communication. - Relationship between language mastery and subject mastery. - Mastery in first language and subject - mastery in second language and subject. - Understanding of multilingualism in classroom.

(Suggested instructional approaches/methods:

i) Observe two Language classes of secondary schools (one rural and the other urban) and record the discipline-based language, teacher language and student language during interaction-Make a comparative analysis.

ii) Conduct a seminar on: "Language is the vehicle that carries the content".)

Unit III Position of English Language in the Indian Context

Position of English as a second language in India – Communication process in the classroom - The nature of classroom disSUBJECT; oral language in the classroom; discussion as a tool for learning; the nature of questioning in the classroom – types of questions and teacher control.

(Suggested instructional approaches/methods:

i) Arrange an extempore speech competition regarding importance and development of language.

ii) Discussion on common errors in pronunciation and its remedial exercises for students.)

Unit IV Language across Curriculum

Language for specific purpose and subjects – Social Sciences, Science and Mathematics - Critical review of medium of instruction – Factors related to poor reading comprehension - Developing skills of reading comprehension - Theories of Language- Deficit theory and Discontinuity theory - Educational implications of language - Understanding the nature of classroom interaction.

(Suggested instructional approaches/methods:

i) Participation in two Extempore Presentations, one Debate, one Paragraph writing and one Application writing.(To be the basis of Evaluation after exhaustive sessions to improve communication skills.

ii) Discussion on "Language development in the school is the responsibility of all the teachers".)

Unit V Language related issues

Bilingualism - Multilingualism - Challenges of teaching language in multicultural classroom - Nature of reading comprehension in the content areas. - Developing writing skills for writing in specific content areas. - Strategies for developing oral language in the classroom that promotes learning in the subject areas. - Reading in the content areas – Social Sciences, Science and Mathematics; nature of expository texts Vs.narrative texts; transactional Vs. reflexive texts; Schema theory; text structures; examining content areas textbooks; reading strategies for note-making, summarizing; making reading-writing connections; process writing; analyzing children's writing to understand their conceptions; writing with a sense of purpose – writing to learn and understand.

(Suggested instructional approaches/methods:

i. Talk to the students and find out the different languages that they speak. Prepare plan to use multilingualism as a strategy in the English classroom.

ii. Interact with 5 student-teachers and present a paper on:

- the structure of their language
- pronunciation
- vocabulary

Task and Assignments:

1. Based on Eller Deficit Theory: Children's from lower socioeconomic classes "cannot speak complete sentences, do not know the names of common objects, cannot form concepts or convey logical thoughts."

Step-1: Student teachers have to find the students who are undergoing this type of problem.

Step-2: According to Eller theory, give a remedial treatment by teaching correct pronunciation.

Step-3: The pronunciation of the students before training and after training can be recorded to find the progress of the students.

2. Take a few passages from Science, Social Science and Maths textbooks of Classes VI-VIII/ IX-X/ XI-XII and analyse on the following issues and offer your findings and suggestions.

a. How the different registers of language are have been introduced?

b. Does the language clearly convey the meaning of the topic being discussed?

c. Is the language learner-friendly?

d. Is the language too technical?

REFERENCES

1. Agnihotri, R.K. (1995), *Multilingualism as a classroom resource*. Heinemann Educational Books.
2. Earl Stevick.W.(1982), *Teaching and Learning Languages*. Cambridge: Cambridege University Press.
3. Krashen, S.D.(1981), *The study of second language acquisition and secondlanguage learning*. Oxford: Oxford University Press.
4. Richards,J.C.(2006), *Communicative language teaching today*. Cambridge: Cambridge University Press.
5. Thangasamy, Kokila (2016) *Communicative English for College Students*. Chennai: Pavai Publications.

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6. Widdowson, H. (1978), *Aspects of language teaching*. Oxford: Oxford University Press.
7. Wallace, M.J. (1998). *Study skills in English.* Cambridge: Cambridge University Press.
8. Forum for across the curriculum teaching – http://www.factworld.info/
9. Language for understanding across the curriculum – www.det.act.gov.au>LUAChandbook
10. Curriculum guide – Language arts language across the curriculum – www.moe.gov.jm>sites>default>files.

UNDERSTANDING DISCIPLINES AND SUBJECTS

Objectives:

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

1. reflect on the role of disciplines and subjects in school curriculum.
2. acquaint with the development of curriculum with social, political and intellectual contexts.
3. understand the paradigm shift in selection of content.
4. analyze the advantages of learner centered curriculum.
5. explore the aspects of life oriented curriculum.

Unit I Disciplines and Subjects

Disciplines and subjects- meaning, definition and concepts – Distinction between school subjects and academic disciplines - Importance of the knowledge of disciplines and subjects - Need and importance of studying school subjects - Curriculum content – meaning, definitions and importance - John Dewey's ideas on disciplinary knowledge and curriculum - Relationship between school subjects and academic discipline

(***Suggested Instructional Approaches/ Methods*:**

i) Teacher talk on meaning and concepts of three different school subjects.

ii) Small group discussion on differences of any three school subjects.)

Unit II Disciplines and Subjects in Socio-Cultural Perspectives

Emergence and development of knowledge, subject and curriculum in social, political and intellectual contexts - Changes in social science, natural science and linguistics - Concepts of knowledge-firm, objective and impersonal-diverse, dialogical, subjective, fluid and porous frame - Redefinitions of school subject from socio-cultural perspectives - School subjects and social justice

(***Suggested Instructional Approaches/ Methods*:**

i) Discussion about the historical and cultural influences in any one of your school subjects.

ii) Group discussion on the redefinition of school subject from socio-cultural perspectives.)

Unit III Selection of Content

Selection of subject-matter or content of the curriculum: self-sufficiency, significance, validity, interest, utility, learn ability and feasibility - Reasons for inclusion or exclusion of a subject from the school curriculum – Recent developments in school subject.

(Suggested Instructional Approaches/ Methods:

ii) Student seminar on selection of content.

iii) Seminar on recent developments in school subjects.)

Unit IV Learner Oriented Curriculum

Disadvantages of discipline oriented Curriculum - Advantages of learner oriented curriculum - Social oriented curriculum for social reconstruction - Designing learner centered curriculum, syllabus and textbooks

(Suggested Instructional Approaches/ Methods:

i) Teacher talk on learner oriented curriculum.

ii) Discussion on the social oriented curriculum for social reconstruction.)

Unit V Life-oriented Curriculum

Life-oriented curriculum – Inter-disciplinary curriculum: the growing need for inter-disciplinary curriculum- Broad field curriculum- Need for curriculum integration - Teaching of science and mathematics for national development - Selection of content- Based on the experiences of children- communities- their natural curiosities- their subjects.

(Suggested Instructional Approaches/ Methods:

a. Discussion on life-oriented curriculum.

b. Student seminar on disciplinary approach to school subjects.)

Tasks and Assignments:

1. Select a unit from your major subject in the school syllabus of any standard and analyze the social, political and cultural influences in it.
2. Critically evaluate the relevance of school subject for social justice and social reconstruction.

REFERENCES

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2. Cullen, Roxanne.,Haris, Michael and Hill, Reinhold, R. (2012). *The learnercentered curriculum.* San Francisco: Jossey-Boss.

3. Ellis, Arthur K. (2013). *Exemplars of Curriculum*.New York: Routledge.

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5. Ivor F. Goodson and Colin J. Marsh (1996). *Studying school subjects:* A guide.New York: Routledge.

6. Kelly.A.V. (2009) *The curriculum: Theory and practice*. New Delhi: Sage Publications.

7. Kridel, Craig. (2010). *The encyclopedia of curriculum studies.* New Delhi: Sage Publications.

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9. www.students notes.in/b.ed/…/understand/20school/20/subject.pdf.

10. www.pcer.ac.in/wp_content/uploads/2015/12/ understanding_disciplinesand-school-subjects.pdf.

EPC 1: READING AND REFLECTING ON TEXTS

(30 Hours)

SUBJECT CODE:

The aim of this SUBJECT is to enhance the professional capacities of a student-teacher, specifically reading and writing skills.

SUBJECT objectives: To enable student-teachers:

1. To enhance their capacities as readers and writers by becoming participants in the process of reading.
2. To read diverse texts/books and learn to think together.
3. To use their reading and writing skills for effective preparation for the other SUBJECTs.

Teacher/Learner Activities for Transaction of the SUBJECT

To translate these objectives into practice, the teachers in colleges of education should:

1. Engage the student-teachers in reading interactively - individually and in small groups.
2. Offer opportunities to the student-teachers to read wide variety of texts (such as empirical, conceptual and historical texts, policy documents, studies about schools, teaching and learning, texts about people's experiences relating to teaching, learning and schools.
3. Engage the student-teachers in reading the autobiographical narratives, field notes, ethnographies (scientific description of different races cultures), etc. and develop different types of reading skills and strategies
4. Engage the student-teachers in reading expository texts so that they can make predictions, check their predictions, answer question and then summarize or retell what they have read.
5. Engage the student-teachers to analyses various text structures and develop comprehension of them.
6. Engage the student-teachers in developing their writing skill by providing various contexts for writing.
7. Prepare the student-teachers for selected readings and writings required for other SUBJECTs.

8. Train the student-teachers, through structured tasks, in writing with of sense of purpose and audience and responding to a text with one's own opinion or writing within the context of others' ideas.

9. Train the student-teachers to learn to combine both reading and writing that leads to the development of critical skills.

10. Read any three books related to education and make a critical a presentation.

Tasks and Assignments:

Preparing a Record on "Reading and Reflecting on Texts".

1. Every student-teacher should prepare and submit a comprehensive record of the reading writing activities done throughout the SUBJECT for his/her teacher's feedback and evaluation.

2. Read any three books related to education and submit a review of them.

Recommended Books for Reading and Reflecting

1. வரதராசன், மு. (1979). கல்வி. சென்னை: பாரிநிலையம்.

2. அமனஷ்வீலி. (2006). குழந்தைகளின் எதிர்காலம். சென்னை: அறிவுப் பதிப்பகம். (044 2848 2441.∴2848 2973).

3. உதயமூர்த்தி, எம்.எஸ். (2015). வெற்றிக்கு முதல் படி. சென்னை: கங்கை புத்தக நிலையம் (044 - 2434 2810).

4. அப்துல் கலாம், ஆ.ப.ஜெ. (2006). கலாமைக் கேளுங்கள். சென்னை: நியூசெஞ்சுரிபுக்ஹவுஸ் (044 - 2625 8410).

5. சுவாமி விவோனந்தர். (1997). புதிய இந்தியாவைப் படைப்போம். சென்னை: ஸ்ரீராமகிருஷ்ண மடம்.

6. கோகிலா தங்கசாமி. (2016). சிறந்த ஆசிரியராக. சென்னை: பாவை பதிப்பகம், (9443323840).

7. சோமவள்ளியப்பன். (2013). நல்லதாக நாலுவார்த்தை. சென்னை: ஆப்பிள் பப்ளிஷிங் இணடர் நேஷனல், (044 -32440099.∴33464677).

8. அழகியநாதன், எம்.பி.(2008). அறிவுலகமேதை ஆல்பர்ட் ஐன்ஸ்டீன். சென்னை:அறிவுப் பதிப்பகம். (044 -2848 244.∴2848 2973).

9. ஜெயசீலன், சூ.ம.(2015). இதுநம் குழந்தைகளின் வகுப்பறை. சென்னை: அரும்பு பதிப்பகம். (94870 36865 ∴ 90429 82821)

10. குப்புசாமி. பி.ச.(2015). ஓர் ஆரம்பப் பள்ளி ஆசிரியரினின் குறிப்புகள்: கோவை: விஜயா பதிப்பகம், (0422-2382614).

11. நடராஜன் ஆயிஷா. (2013). இது யாருடைய வகுப்பறை? சென்னை: புக்ஸ் ∴பார் சில்ரன், (044 -2433 2424).

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23. Shiv Khera. (2014). *Freedom is not free*. New Delhi: Bloomsbury Publishing India, (www.bloomsbury.com).

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Note: This list is not intended to be exhaustive.)