No: 557/HRDD/SE   Dated: 28/02/2014

NOTIFICATION

Rules for open competitive examination to be conducted by the Sikkim Public Service Commission for selection of candidates for appointment to the post of **Post Graduate Teacher** in various subjects is hereby published for general information:

1. The number of vacancies to be filled on the result of the examination will be specified in the Notice issued by the Sikkim Public Service Commission.
2. The examination will be conducted by the Sikkim Public Service Commission according to the syllabus and plans as indicated in the **Appendix I** to these rules.
3. The Date and the place of the examination will be fixed by the Sikkim Public Service Commission.
4. Candidates must write answers whether objectives or descriptive type in their own handwriting. In no circumstances will they be allowed the help of a scriber to write the answers for them only visually challenged candidates are allowed.
5. The Commission shall have discretion to fix qualifying marks in any or all subjects to the written examination.

A candidate who obtains minimum qualifying marks in the written examination as may be fixed by the Commission shall be called for Class room demonstration test/personality test where the candidate's ability and knack to express and teach the given subject shall be tested. There will be a maximum of 50 marks to be assigned by the Commission at their discretion.

6. The decision of the Commission as to the eligibility or otherwise of a candidate for admission to the written examination shall be final.
7. No candidate will be admitted to the examination unless he holds a certificate of admission issued by the Commission.
8. A candidate must pay fees as may be prescribed by the Commission.
9. A candidate who is or has been declared by the Commission to be guilty of any attempt on his part to obtain support for his/her candidature by any means shall render himself/herself liable to be disqualified for admission to the competitive examination.

10. A candidate who is or has been declared by the Commission guilty of impersonation or of submitting false and fabricated documents which have been tampered with or making statement which are incorrect or false or suppressing material information, or otherwise resorting to any other irregular or improper means for obtaining admission to the examination hall or of using or of attempting to use unfair means in the examination hall may, in addition to rendering himself/herself liable to a criminal prosecution, be debarred
    (a) By the Commission permanently or for specified period for admission to any examination or appearing at any interview held by the Commission for selection of candidates.
    (b) By the State Government form any employment under them.

11. After the examination and interview, the names of the successful candidates will be arranged by the Commission in order of merit as disclosed by the aggregate marks finally awarded to each candidate. Candidates shall be considered for appointment to the available vacancies in the order in which their names appear in the list.

12. The terms and the manner or announcement of results of the examination shall be decided by the Commission at its discretion. The Commission will not enter in to any correspondence with any candidate regarding results.

13. Conditions of eligibility for appearing at the competitive examination have been indicated in the Appendix-II to these rules.

14. Candidates already in Government service or in Government owned undertaking or similar organizations, whether in temporary capacity or as work charged employees shall be, required to submit their application along with the 'No Objection Certificate' from their employers.

15. Success in the examination confers no right to appointment unless Government is satisfied after such enquiry as may be considered necessary that a candidate having regard to his character and antecedent is suitable in all respect for appointment.

16. A candidate must be in good mental and bodily health and free from any physical defect likely to interfere with the discharge of his duties as a Teacher of Government School. A candidate who (after such medical examination as may be prescribed by the competent authority) is found not to satisfy these requirements will not be appointed.

17. If a candidate's handwriting is not easily legible, a deduction may be made in this account from the total marks otherwise accruing to him/her.

18. Credit will be given for good English including orderly, effective and exact expression combined with economy of words in all subjects of

the examination and not only in subjects, which are especially devoted to English.

19. No travelling and daily allowances will be paid for the journey performed in connection with the examination, interview and medical examination.

20. All other matters not specified or for which no provision has been made in these rules shall be regulated by rules and orders applicable to the Service to which recruitment is being made.

BY ORDER AND IN THE NAME OF THE GOVERNOR

(Dr. Thomas Chandy) IFS.
SECRETARY
Human Resource Development Department

Rules relating to the subjects and standards of the competitive examination of candidates for the post of Post Graduate Teacher under Human Resource Development Department, Government of Sikkim.

1. (A) The examination shall include compulsory and main subjects and every candidate shall take all the compulsory subjects and one (1) main subject.

    (B) A candidate shall specify in the application form the main subject he/she desires to take, but may intimate any change of attention to the Secretary, Sikkim Public Service Commission not later than the date prescribed for the last date for submission of application forms.

2. A candidate shall answer the papers in English and Language papers in respective language.

3. No candidate shall be considered to have qualified the written examination unless he/she obtains at least 45% marks in the aggregate of all subjects. Provided that the number of candidates to be called for the Classroom Demonstration Test after a particular written examination shall be determined by the Sikkim Public Service Commission at its discretion, and that this number shall, as far as possible be restricted to five times the number of vacancies notified for recruitment through that examination.

4. The compulsory and the main subjects and maximum marks fixed for each subject shall be as shown in the statement below.

COMPULSORY SUBJECTS.

SL.NO marks	SUBJECTS	Maximum
1.	General English	50 marks
2.	General Knowledge	50 marks
	Total:	**100 marks**

POST GRADUATE TEACHER- MAIN SUBJECTS (ANY ONE) 300   Marks

1. MATHEMATICS
2. BIOLOGY
3. CHEMISTRY
4. PHYSICS
5. COMMERCE
6. ENGLISH
7. POLITICAL SCIENCE
8. ECONOMICS
9. HISTORY
10. GEOGRAPHY
11. SOCIOLOGY
12. NEPALI
13. HINDI

5. Class room Demonstration/Personality Test   50

The standard and contents of papers in general, shall be similar to those of Post Graduate level examination of a recognized Indian University.

   i.   General English and General knowledge papers shall be of two hours duration and the main paper of three hours duration.
   ii. Knowledge of customs, manners and one of the languages viz. Sikkimese Bhutia, Lepcha, Limboo and Nepali and suitability for appointment in peculiar conditions prevailing in Sikkim shall be considered as desirable qualification.

6. If the candidate's handwriting is easily illegible, a deduction may be made in this account from the total marks otherwise accruing to him/her.
7. Credit shall be given for good English including orderly, effective and exact expression combined with economy of words in all subjects of the examination and not only in subjects, which are especially devoted to English.

NOTE: *In the event of a tie, order of merit shall be determined in accordance with the highest marks accrued in the written examination and should the marks in the written examination of the candidates who tie be equal then the order of merit shall be in accordance with the highest marks obtained by such candidates in the aggregate of compulsory subject.*

DETAILED SYYLABUS FOR THE POST OF GRADUATE TEACHER COMPETITIVE EXAMINATION

GENERAL ENGLISH

SECTION A: Reading Comprehension:

(i)   Passage: Questions on the basis of the reading of the passage.

(ii)   Question Types   a)   Sentence Completion
b)   Table completion
c)   Multiple choices

II   Vocabulary:

a) Matching words with correct meaning
b) Synonyms
c) Antonyms
d) Inferring meaning of words in passage

SECTION B: **III**   Writing:

a) Letter (formal/informal)
b) Paragraphs on given topics
c) Notice, Essay writing
d) Visual Interpretation

SECTION C: IV   Grammar Use of

a) Preposition
b) Articles
c) Modules
d) Verbs
e) Voice
f) Phrasal verbs

TYPES

a)   editing

b)   Gap filling

c)   Identifying errors and correcting

d)   Writing correct form of verbs.

SECTION D: V   Making sentences using idioms to bring out their meaning.

Knowledge of current events of National and International importance. The paper will also include questions on Indian culture, Indian Policy and Indian economy.

Right to Education Act, 2009

General awareness about Sikkim

Social & Education conditions of Sikkim.

CLASS ROOM DEMONSTRATION/ PERSONALITY TEST

The candidates will be interviewed by the Commission who will have before them a record of his/her career. He/she will be given a topic to teach in class room ambience. The object of the interview is to assess the personal suitability of the candidate for the service or service for which he/she has applied to the Commission.

The test is intended to judge the mental caliber of the candidate. In broad terms this is really an assessment of not only his/her intellectual qualities but also his/her ability and knack to express and teach the required subject to the students, his/her command over the subject and medium of instructions. His/her personal interest in imparting quality education to the students. His/her social traits, awareness on evils like alcohol and drug abuse, interest in the current affairs. Some of the qualities to be judged are mental alertness, critical powers of assimilation, care and logical exposition, balance of judgment, variety and dept of interest, ability for social cohesion and leadership, intellectual and moral integrity.

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SYLLABUS FOR POST GRADUATE TEACHERS

ECONOMICS

Part – I

1. **Introduction:**
   Central problems of an economy and their solution in different economic systems. Price mechanism. Production possibility curve. Consumers' and Producers' surpluses. The elementary theory of demand and supply. The elasticity of demand and supply. Applications of the demand-supply apparatus in price control, rationing, and taxation.

2. **Theory of Consumer Behaviour:**
Concepts of cardinal utility, Derivation of demand curve, Limitations of cardinal utility analysis. Ordinal Utility Theory Consumer's Preferences. Indifference Curves. Budget Line. Consumer's Equilibrium. Income and Substitution Effects. Price consumption curve and the derivation of demand curve for a commodity.

3. **The Theory of Production and Cost:**
The concept of production function. Isoquants. Producer's equilibrium with a single variable input and with two variable inputs. Returns to a factor and returns to scale. Cobb-Douglas production function. Different concepts of cost and revenue. Short-run and long-run cost analysis.

4. **Theory of the Firm and Market Structure :**

   (i)   Characteristics of perfect competition. Short-run and long-run equilibrium of the firm and the industry. Short-run and Long-run supply curve of the firm and the industry.
   (ii)   Monopoly and its features. Equilibrium under monopoly. Discriminating monopoly.
   (iii) Characteristics of Monopolistic Competition and Oligopoly.

5. **The Marginal Productivity Theory of Factor Pricing:** Factor demand. Supply of labour. Determination of wages. Rent and its determination. Concept of interest-gross and net interest, real and money interest. Elements of profits.

6. **National Income and its Determination:** Concepts of national income and related aggregates. Different methods of measuring national income. Difficulties in measurement. Consumption function. Investment and saving. Aggregate demand and aggregate supply. Multiplier analysis with AD curve and price level changes. Aggregate supply in short run and long run. Fiscal policy-impart of changes in Govt. expenditure and taxes.

7. **Money, Banking and Inflation:** Functions of Money. Fisher's version and Cambridge version of quantity theory of money. Keynesian liquidity preference. Functions of Central Banks and Commercial Banks. Credit creation. Instruments of monetary policy and Reserve Bank of India. Performance of the nationalized commercial banks in recent years. Demand-pull and cost-push inflation. Anti-inflationary monetary and fiscal policies.

8. **Public Finance:** Principles of taxation. Incidence of taxes, Effects of taxation. Public Debt and its effects. Revenue and expenditure of the central Government. Deficit financing. Centre-State financial relations.

9. **International Trade:** Basis of trade, Gains from trade. Arguments for free trade and protection. Balance of Trade and balance of payments. Measures for correction of disequilibrium in balance of payments. The theory of exchange rates.

Part – II

10. **Economic Development and Environment:** Features of Less Developed Countries. The problems of sustainable development. Human development in Sikkim, Anomalies of Sectoral Growth and State Finances.

11. **India's Foreign Trade and Foreign Capital:** Changes in the pattern and direction of India's exports and imports. India's balance of payments. Government policies. Foreign Institutional Capital. Foreign direct investment. Foreign Aid. Role of multinational in developing countries. The I.M.F. and the World Bank. India and WTO.

12. **Agriculture in the Indian Economy:** Problems and solutions regarding low productivity. Land reforms. Technological changes and their impact on the economy. Agricultural credit. Agricultural labor. Agricultural marketing.

13. **Indian Industrial Development:** Industrial policy (pre and post 1991). Roles of large, traditional and small scale industries. Industrial labor and industrial relations. Social security for industrial workers. Public Vs. Private sector. Role and performance of the public sector.

14. **Indian Planning:** Overall objectives of the Five Year Plans. Achievements and failures. Economic reforms since 1991. Globalization and its impact on India.

ENGLISH

Section – A – POETRY

1. John Donne : Love and Religious poems
2. John Milton : Paradise Lost Bk-1
3. Alexander Pope : Rape of the Lock
4. William Wordsworth : The Prelude
5. John Keats : Ode to a Nightingale & Ode on a Grecian Urn
6. P. B. Shelly : Ode to the West Wind & To a Skylark
7. William Blake : The Tiger & The Lamb
8. Tennyson : Tithonus
9. Robert Browning : Andrea del Sarto
10. T. S. Eliot : The Wasteland
11. W. B. Yeats : Sailing to Byzantium & The Second Coming
12. Toru Dutt : Our Casuarinas Tree & My Vocation
13. Kamala Das : My Grandmother's House & The Old Play hour
14. Nissim Ezekiel : Night of the Scorpion & Enterprise

Section – B – DRAMA

1. William Shakespeare : Macbeth & Merchant of Venice
2. Ben Jonson : Every Man In His Humor
3. William Congreve : The Way of the World
4. Oliver Goldsmith : She Stoops to Conquer
5. G. B. Shaw : Arms And The Man
6. Girish Karnad : Tughlaq

Section – C – NOVEL

1. Jane Austen : Pride and Prejudice
2. Charles Dickens : Hard Times
3. Thomas hardy : Return of the Nature
4. E. M. Forster : A Passage to India
5. Mark Twain : Tom Sawyer
6. Alice Walker : The Color Purple
7. R. K. Narayan : Swami and Friends
8. Mulk Raj Anand : The untouchable

Section – D – GRAMMAR & COMPOSITION

1. Articles, Preposition, Adverbs, Adjectives, Active and Passive Voice, Common errors in tense.

2. Précis'
3. Letters (Formal and informal)
4. Reports
5. Essay

CHEMISTRY

Unit – 1

Structure of Atom

Atomic numbers, isotope and isobars. Rutherford's model and its limitations. Bohr's model and its limitations, Fire series of atomic spectra of hydrogen atom, concept of shells and sub shells, dual nature of matter and light, De Broglie's relationship, Heisenberg uncertainty principle, concept of orbital, 4 quantum no's, shapes of s, p and d orbital, rules for filling electrons in orbital – Aufbau principle, Pauli exclusion principle and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbital.

Unit – 2

Classification of Element and Periodic Properties

Development of Modern periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements atomic radii, ionic radii, ionization potential, electron affinity, electro negativity, Pauling scale of electro negativity Natural radio activity, radioactive disintegration, half life, average life period, radio carbon dating, Birding energy, nuclear fission and fusion.

Unit – 3

Chemical Bonding and Molecular Structure

Valence electrons, ionic bond, covalent bond : bond parameters. Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridizations, involving s, pond d orbital and shapes of some simple molecules, str. Of IF_7, SF_6, ICF_2, molecular orbital; theory of homonuclear diatomic molecules (qualitative idea only), hydrogen bond.

Unit – 4

States of Matter: Solids, Liquids and Gases

Classification of solids based on different binding forces : molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, voids, no. of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

Three states of matter, Intermolecular interaction type of bonding, melting and boiling points. Role of gas laws in elucidating the concept of the molecule, Boyle's law. Charles Law, Gay Luscac's Law, Avogadro's Law. Ideal behavior, empirical derivation of gas equation, Avogado's number. Ideal gas equation. Derivation from ideal behavior, liquefaction of gases, critical temperature. Liquid state : Vapor pressure, viscosity and surface tension (qualitative idea only, on mathematical derivations).

Unit – 5

Equilibrium

Equilibrium in physical and chemical processes dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium – Le chatelievs principle; ionic equilibrium – ionizations of acids and bases, strong and weak electrolytes, degree of ionization, concept of pH. Hydrolysis of salt (elementary idea) Buffer solution, solubility product, common ion effect (with illustrated examples).

Unit – 6
Redox Reactions and Electrochemistry

Concept of oxidation and reduction, red ox reaction, oxidation no., balancing red ox reactions, applications of red ox reaction.

Red ox reaction, conductance in electrolytic solution, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's law, electrolysis and laws of electrolysis (Elementary idea), dry cell – electrolytic cell and galvanic cells; lead accumulator. E.M.F. of a cell, standard electrodes potential, Nernst equation and its application to chemical cells, fuel cells; corrosion, ionic mobility.

Unit – 7

Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties – relative lowering of vapor pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Henry's Law, Rault's Law.

Unit – 8

Chemical Kinetics

Ate of reaction (1st, 2nd, 3rd and order), factors affecting rate of reaction, concentration, temperature catalyst; order and molecularity of a reaction rate low and specific rate constant, integrated rate equations and half life (only for zero and 1st order reactions); concept of collision theory (elementary idea, no mathematical treatment), Phendounimolecular reaction.

Unit – 9

Surface Chemistry

Adsorption – Physiorption and chemisorptions; factors affecting adsorption of gases on solids; catalysis; homogenous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state; distinction between true collusions, colloids and suspensions; lyophilic, lyophabic, multi molecular and macro molecular colloids; properties of colloids, Tindal effect, Brownian movement, electrophoresis, coagulation; emulsion – types of emulsions., Schultz Hardy rule.

Unit – 10

S-Block Elements and P- Block Elements

Group 1 and Group 2 elements:

General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization energy; atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.

Group 13 elements:
General introduction, electronic configuration, occurrence variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of 1st element of the group, boron – physical and chemical properties, some important compounds: borax, boric acids, baron hydrides. Aluminum uses, reactions with acids and alkalis.

Group 15 elements:
Neural introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen preparation, properties and uses; compounds of nitrogen; preparation and properties of ammonia and nitric acid, oxides of nitrogen structure only); Phosphorous – allotropic forms; compounds of phosphorous; preparation and properties of phosphate, halides (Pcl_3, PCL_5) and oxiacids (elementary idea only).

Group 16 elements:

Group 17 elements:
General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens; preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds ox acids of halogens (structures only)

Unit – 11
d – AND f – Clock Elements

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals metallic characters, ionization energy, oxidation states, ionic radii, colour catalytic property, magnetic properties interstitial compounds alloy formation, preparation and properties of $K_2 Cr_2 O_7$ and $KMnO_4$.

Unit – 12
Coordination Compounds

Introduction, Ligands, Perfect and Imperfect complex, double and complex salts, coordination number, color, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, Bonding; isomerism importance of coordination compounds, in qualitative analysis, types of ligands, optical and geometrical Isomerism.

Unit – 13
Organic Chemistry: Basic Principles

General Introduction, method, classification and IUPAC Nomenclature of organic compounds, Hybridization of atomic orbital of carbon molecular geometry of CH_4, C_2H_4 and C_2H_2.

Electronic displacement in a covalent Bond : inductive effect, electrometric effect, reonarrce and hyper conjugation.

Hemolytic and Heterolytic fission of covalent Bond; free radicals, carbonation, carbonions,structure electrophiles and nucleophiles, types of organic reactions.

Unit – 14

Hydrocarbons: Classification

Alkanes, alkenes, alkynes, addition reaction, geometrical isomerism, Elementary idea of E_1 and E_2 reactions for alkene and alkyne formation, Hoffmann & Saytzeff rule, Markonikov's Rule, peroxide-effect, acidity of 1 – alkynes.

Aromatic Hydrocarbons : Introduction IUPAC Nomenclature, Huckel's rules aromaticity and Benzene : resonance anti aromaticity; chemical properties; mechanism of electrophilic substitution – Nitration, Sulphonation, halogenations, Friedel Craft's alkylation and acylation : directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.

Unit – 15
Optical and Geometrical Isomerism

Asymmetric carbonator, optical rotation, R/S configuration, Dextro, Laevorotation, optical activity of tartaric acid geometrical isomerism of malefic and numeric acids.

Unit – 16
Alcohols, Phenols, Ethers, Aldehyde, Ketone and Carboxylic Acids

Alcohols: Classification, identification of primary, secondary and tertiary alcohols by Victor Mayer's method.

Phenols: methods of preparation, acidic nature of phenol, electrophilic substitution, Reimer-Tiemam Reaction.

Ethers: Nomenclature, method of preparation, Williamson's Synthesis, chemical properties.

Aldehydes and Ketrones : Nature of carbonyl group, methods of preparation, Aldol Condensation, Camizzaro-reaction, Per Kin Reaction, Benzoin Condensation, Halo form reaction.

Carboxylic acids: Nomenclature, acidic nature, method of preparation and H.V.Z. Reaction.

Unit – 17
Organic compounds containing Nitrogen

Amines : Aromatic & alfatic, classification, structure, method of preparation, chemical properties, identification of primary, secondary, and tertiary amines, by Hinesburg method, Diazonium Salts, Coupling reactions, Synthetic use of aromatic diazonium salts. Preparation of Cinnamic acid, picric acid.

POLITICAL SCIENCE

1. **Political Theory**

    (a)   Meaning, nature and scope of Political Science
    (b)   Theory of origin of the State, Social contract theory, Theory of force, Marxist, Patriarchal, Matriarchal, Evolutionary theory.
    (c)   Forms of Government : Parliamentary and presidential; unitary and federal
    (d)   Citizenship – Characteristic features of citizenship, acquisition and loss.
    (e)   Law, liberty, equality and justice – meaning, nature and types
    (f)   Doctrine of decentralization – Method of decentralization – Local Self Government and federalism.

2.   **Indian Government and Politics**

(a)   Preamble of the Constitution
(b)   Fundamental rights and duties
(c)   The Union and the State Executives
(d)   The Union and the State Legislatures – Composition and functions
(e)   The Indian Judiciary – The Supreme Court and the High Court's Composition, jurisdictions and powers – Judicial Review and Judicial Activism
(f)   Party system : features and trends – Coalition politics in India
(g)   Major issues in Indian politics – Regionalism, Caste & Communalism.

3. **Comparative Government & Politics (UK, USA & SWISS)**

(a)   British Constitution : Sources with special references to conventions, rule of law, Parliamentary Sovereignty, the executive and legislature
(b)   US Constitution: Basic features of the Constitution – Bill of Rights, System of checks and balances – The executive, legislature and judiciary.
(c)   Swiss Constitution : Basic features of the Constitution – Direct democracy referendum and initiative

4. **International Relations**

(a)   Meaning of International relation & International politics
(b)   Cold War : Origin, evolution and impact on international relations, features of post cold war
(c)   Impact of the collapse of USSR in international politics
(d)   Indo-China relations, its changing dimensions
(e)   Indo-US relationship with special reference to Indo-US nuclear deal
(f)   Features and determinants of Indian foreign policy with reference to non-alignment and its relevance in the semi polar world.
(g)   India and its relation with her neighbors: Pakistan, Sri Lanka, Nepal, Bangladesh and Bhutan.

COMMERCE

Part - I

1. **Introduction to Business :**

   Concepts, characteristics, objectives. Classification of business as industry and commerce. Distinctive features of business. Impact of technology on business. Social responsibility of business.

2. **Spectrum of Business Organizations :**

   Sole Proprietorship, Partnership, Joint Stock Company, Co-operative form of organizations.

3. **International Business :**

   Export-Import procedure and documentation. International Trade Institutions and Agreements –WTO, UNCTAD, World Bank, IMF.

4. **Consumer Protection Act, 1986 :**

   Salient features, Definition and concept of various term such as Complaint, Consumer, Unfair Trade Practices. Consumer Disputes Redressal Agencies such as District Forum, State Commission and National Commission.

5. **Industrial Development :**

   The Sikkim Industrial Promotion and Incentive Act, 2000 (including amendments); Salient features, Industries and economic development, Problems and obstacles to industrial development.

Part – 2

6. **Accounting; Meaning :**

   Objectives, characteristics of accounting information, accounting principles, Accounting concepts, Accounting Standards issued by ICAI, Cash and accrual basis of accounting, Rectification of Errors, Bank Reconciliation Statement.

7. **Final Accounts :**

Preparation of Manufacturing, Trading and Profit & Loss Account with adjustment entries, Balance sheet of sole proprietor.

8. **Partnership :**

Treatment of goodwill, Admission of a partner, Retirement of a partner, Dissolution of partnership firm, piecemeal distribution, Amalgamation of partnership firms.

9. **Shares and Share capital :**

Issue, Forfeiture and re-issue of shares, Rights and Bonus Shares, Redemption of Preference Shares, Buy-back of shares, issue and redemption of Debentures.

10. **Marginal Costing :**

Definition of Marginal cost and Marginal Costing, Contribution, Profit/Volume ratio, Break-Even analysis, Managerial applications of Marginal Costing.

11. **Cash Flow Analysis :**

Meaning, Uses and significance of Cash Flow Statement, Preparation of Cash Flow Statement as per relevant Accounting Standard issued by ICAI.

12. **Capital Budgeting :**

Meaning and nature of Capital Budgeting, Methods of evaluation of Capital Budgeting such as pay-Back period, Rate of Return, Net Present Value, Internal Rate of Return, and Profitability Index Methods.

MATHEMATICS

Unit - I

1. Complex Numbers and Quadratic Equation.

Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex numbers. Argand plan and polar representation of complex numbers. Statement of Fundamental Theorem of algebra, solution of quadratic equations in the complex number system.

2. Binomial Theorem :

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, general and middle term in binomial expansion, simple applications.

3. Sequence and Series :

Sequence and Series. Arithmetic progression (A.P.), arithmetic mean (A.M.) Geometric progression G. P., sum of an terms of a G.P. geometric mean (G.M.) relation between A.M. Sum to n terms of the special series – n, n^2 and n^3.

Unit – 2
COORDINATE GEOMETRY

1. Straight Lines :

Brief recall of 2 D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope-form, slope-intercept form, two-point, intercepts form and normal form. General equation of a line. Distance of a point from a line.

2. Conic Section :

Sections of cone: circles, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

Unit – III

Calculus

1. **Limits of functions :**

   (Finite and infinite limits). Limits of rational and irrational functions. Limit of trigonometric, exponential and logarithmic functions.

   Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions and their derivative. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations.

2. **Applications of derivatives :**

   Applications of derivatives : rate of change, increasing/decreasing functions, tangents & normal, approximation, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. **Integrals :**

   Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type. Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. **Applications of the integrals :**

   Applications in finding the area under simple curves, especially lines, areas of circles/parabolas/ellipses (in standard form only), area between the two above said curves (the region should be clearly identifiable).

5.   Differential Equations :

Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type.

Unit – IV
VECTORS AND THREE DIMENSIONAL GEOMETRY

1.   Vectors :

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors.

2.   Three-Dimensional Geometry :

Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes, (iii) a line and a plane. Distance of a point from a plane.

Unit – V
LINEAR PROGRAMMING

1.   Linear Programming :

Introduction, definition of related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible region, feasible and infeasible solutions, optional feasible solutions (up to three non trivial constrains).

2.   **Relation and functions :**

Types of relations, reflexive, symmetric, transitive and equivalence relations. One to one and onto functions. Composite functions, inverse of a function. Binary operations.

Unit – VI
PROBABILITY

1.   **Probability :**

Multiplication theorem on probability. Conditional probability, independent events, total probability, Bye's theorem, Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomials distribution.

2.   **Determinants :**

Determinant of a square matrix (up to 3 x 3 metrics), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

BIOLOGY

1.   **Evolution and Diversity in Living World**

- Organic origin and Evolution : theories and evidences
- Diversity of living organisms
- Classification of the living organisms including microbes (five kingdom classification, major groups and principles of classification within each kingdom)
- Systematic and binomial System of nomenclature

- Salient features of animal (non chordates up to phylum level and chordates up to class level) and plant (major groups: Angiospe rms up to subclass) classification.
- Botanical gardens, Herbaria, Zoological parks and museums.

2. Cell : Structure and Function

- Cell: Cell wall, cell membrane and cell organelles' (plastids, mitochondria, endoplasmic reticulum, Golgi bodies/dictyosomes, ribosome's, lysosomes, vacuoles, centrioles) and nuclear organization.
- Mitosis, meiosis, cell cycle.
- Basic chemical constituents of living bodies
- Structure and functions of carbohydrates, proteins, lipids and nucleic acids.
- Enzymes: types, properties and function.

3. Structural Organization and Sexual Reproduction in Animals and Plants

- Tissues in animals and plants.
- Morphology, anatomy, classification and functions of different types of tissues and parts of flowering plants : Root, stem, leaf, flower, fruit and seed.
- Plant growth and development – dynamics of growth hormone. Physiology of flowering and seed germination.
- Pollination and fertilization in flowering plants.
- Development of seeds and fruits. Types of fruits and seeds and their dispersal mechanisms.
- Description of some important families such as
  - Brassicaceae
  - Fabaceae
  - Asteraceae
  - Phocaea
  - Orchidaceous
  - Solanaceae and their economic importance
- Morphology, anatomy and functions of different systems of an annelid (earthworm), an insect (cockroach) and an amphibian (fog).
- Plant-animal interaction (interdependence)

- Human reproduction: reproductive system in male and female, menstrual cycle. Production of gametes, fertilization, implantation, embryo development, pregnancy and parturition.
- Reproductive health – birth control, contraception and sexually transmitted diseases.

4.   Genetics and Biometry

- Mendelian inheritance
- Chromosome theory of inheritance, deviations from Mundelein ratio (gene interaction – incomplete dominance, co-dominance, complementary genes, multiple alleles)
- Sex determination in human beings and some plants
- Linkage and crossing over.
- Inheritance pattern of hemophilia and blood groups in human beings.
- DNA: replication, transcription, translation.
- Gene expression and regulation.
- Genome and Human Genome Project.
- Genetic Engineering cloning, transgenic
- DNA fingerprinting, genomics, gene libraries and gene banks.
- Sampling and analysis of data, central tendency, probabilities and correlation.

5.   Plant and Human Physiology

- Movement of water, food, nutrients and gases, plants and water mineral nutrition, Respiration, Electron Transport System, Photosynthesis, Plant growth and development.
- Digestion and absorption (animals, human
- Breathing and respiration (animals, human)
- Body fluids and circulation (animals, human)
- Excretory products and elimination (animals, human)
- Locomotion and movement (Plants & animals)
- Control and coordination (animals, humans)
- Biophysics (diffusion, osmosis, active transport)

6.   Biology and Biotechnology in Human Welfare
- Animal husbandry and economic botany (food, fiber and medicine yielding plants)
- Basic concepts of immunology, vaccines, pathogens, parasites.
- Plant pathology – a general account of important diseases of crop plants of India and the control (with emphasis on biological control agents and biopesticides)

- Plant breeding, tissue culture, food production.
- Microbes in household food processing, industrial production, sewage treatment and energy generation. Cancer biology & therapy. AIDS, Detection of HIV infection, detection of Sexually Transmitted Diseases, Adolescence and drug/alcohol abuse.
- Recombinant DNA technology.
- Applications of biotechnology in Health, Agriculture and Industry
- Genetically modified (GM) organisms, ethical and biosafety issues. Insulin and Bt. Cotton.
- Biomedical technologies: Diagnostic images, monitoring of body's vital functions. Biochemical autoanalysers, ELISA: mechanism and application, Endoscopy, Transplantation, Haemodialysis, prosthesis and replacement surgery, cryosurgery, immunotherapy, Hormone therapy, gene therapy etc.

7. Ecology & Environment : (In general and Sikkim related)

- Ecosystems : components and functions, types food chain/web and energy flow, nutrient cycle
- Species, population and community. Ecological adaptations.
- Centers of diversity and conservation of biodiversity, Biodiversity hotspots, National parks and sanctuaries.
- Environmental issues.
- Natural Resources and their conservation.
- Pollution and global environmental change.

SOCIOLOGY

Unit – I

1. Introducing Sociology :

The nature and scope of Sociology: Sociology as distinct from common sense. Sociology and other social sciences – the scientific and humanistic orientations to sociological study.

2. Basic concepts :

- ✓ Society, Community, Association, Institution, Groups
  Social Status, Status and Role, Norms and Values, Folkways and Norms
- ✓ Marriage, Family and Kinship
- ✓ Social Stratification & Social Mobility
- ✓ Culture – Culture change, Diffusion, Cultural Lag, Cultural Relativism, Ethnocentrism, Acculturation
- ✓ Socio-Cultural Process Cooperation, Competition, Conflict, Accommodation, Assimilation, Socialization, Social Distance, Relative Deprivation.

Unit – II

1. Major Sociological Perspectives

- ✓ Evolutionary Perspectives (Augusta Comte/Herbert Spencer/H. Morgan)
- ✓ Functionalist Perspectives (Emile Durkheim/Talcou Parsons/Radcliff Brown/ Robert Merton/Malinowski)
- ✓ Conflict Perspectives (Karl Marx/ Dahrendorf/ Coser)
- ✓ Social Action Perspectives
- ✓ Phenomenological Perspective.

2. Sociological Thought –

- ✓ The Pioneers-Comte-Positivism, Spencer; Social Darwinism
- ✓ The Classical Tradition – Durkheim (Social Fact, Social Solidarity and Suicide). Max Weber (Protestant Ethic and the Spirit of Capitalism, Social Action and Authority), Karl Marx (Materialistic Conception of History and Class struggle)

3.   Indian Sociological Thought –

Raja Ram Mohan Roy – Social Reform movement
M. K. Gandhi – Idea of Swaraj, Rural Development

Unit – III

Society in India & Issues related to Sikkim

1. Basic Social Institutions in Indian Society – Caste/ Family/ Kinship
2. Social Change – Role of Industrialization, Urbanization. Westernization, Sanskritisation, Education and Social Legislations.
3. Sociology of Tribes and Minorities – Social Justice – equal opportunities and special opportunity. Protective Discrimination, Reservation Policy – critical review.
4. Major Social Issues and Problems –

   ✓ Caste & Gender
   ✓ Social Consequences of Globalization and economic Liberalization
   ✓ Poverty, Corruption, Problem of Youth, Juvenile Delinquency, Old Age Problems, Mass Illiteracy, Divorce, substance Abuse, Suicide, Dowry, Domestic Violence.
   ✓ Communalism, Globalization.

PHYSICS

Unit – I
Work, Energy, Power and Motion of System of Particles and Rigid Body

Notion of potential energy, potential energy of springs, conservative forces, conservation of mechanical energy (kinetic and potential energies); non-conservative forces, elastic and inelastic collisions in one and two dimensions.

Vector product of vectors; moment of a force, torque, angular momentum, conservation of angular momentum with some examples. Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration.

Moments of inertia for simple geometrical objects, Statement of parallel and perpendicular axes theorems and their applications.

Unit – II
Properties of Bulk Malter/General Properties of Malter

Viscosity, Stokes's law; terminal velocity, Reynold's number, streamline and turbulent flow. Bernoulli's theorem and its applications. Surface energy and surface tension angle of contact, application of surface tension ideas to drops, bubbles and capillary rise.

Elasticity : Hook's law, elastic module and their relations; torsion of a cylinder; internal bending moment, cantilever.

Heat, temperature, thermal expansion, specific heat – calorimeter; change of state – latent heat. Heat transfer-conduction, convection and radiation, thermal conductivity, Newton's law of cooling.

Kinetic theory of gases; pressure exerted by ideal gas; mean free path; Maxwell's law of distribution of velocity, rams, mean and most probable velocities; Law of equibartion of energy; Transport Phenomena and Brownish Motion (Qualitative studies)

Behavior of real gases; equation of state for real gases, critical contents and law of corresponding states.

Unit – III

Thermodynamics

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics), Heat, work and internal energy. First law of thermodynamics.

Second law of thermodynamics : reversible and irreversible processes. Heat engines and refrigerators.

Concept of Entropy; its physical interpretation and change in reversible and irreversible process.

Maxwell's thermodynamic relations

Unit – IV

Oscillations and Waves

Periodic motion – period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M.) and its equation; phase; oscillations ofa sprint-restoring force and force constant; energy in S.H.M. – Kinetic and potential energies; simple pendulum – derivation of expression for its time period; free, forced and damped oscillations, resonance.

Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

Unit – V

Electrostatics

Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long, straight wire, uniformly charged infinite place sheet and uniformly charged thin spherical shell (field inside and outside).

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charge and electric dipole in an electrostatic field.

Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization capacitors and capacitance,

combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor. Van de Graff generator.

Unit – VI
Current Electricity and Magnetic Effects of Current and Magnetism

Kirchhoff's laws and simple applications. Wheatstone bridge, meter bridge. Potentiometer – principle and its applications to measure potential difference and for comparing emf of two cells; measurement of internal resistance of a cell. Biot-Savart law and its application to current carrying circular loop. Amphere's law and its applications to infinitely long straight wire, straight and toriodal solenoids.

Force on a moving charge in uniform magnetic and electric fields. Cyclotron. Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current-carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter. Dia,Para and Ferromagnetism.

Unit – VII
Electromagnetic Induction and Alternating Current

Electromagnetic Induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance.

Displacement current.

Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LC oscillations (Qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattles current. AC generator and transformer.

Unit – VIII
Optics and Dual Nature of Matter and Radiation

Optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, combination of thin lenses in contact. Refraction and dispersion of light through a prism.

Optical instruments : Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.

Wave optics : Diffraction of light; classes of diffraction, half period zones and explanation of rectilinear propagation of light. Frauhffer's diffraction – single shit, double shit and plane diffraction grating.

Wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens' principle. Interference. Young's double slit experiment and expression for fringe width. Resolving power of microscopes and astronomical telescopes, Polarization, plane polarized light; Brewster's law, uses of plane polarized light and Polaroid.

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation – particle nature of light. Matter waves – wave nature of particles, de Broglie relation. Davisson-Germer experiment.

Unit – IX
Atoms & Nucleus

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.

Composition and size of nucleus, atomic masses, isotopes, isobars; isotones, Radioactivity-alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

Nuclear Reaction, conservation laws, Q-value of nuclear reaction.

Unit – X
Electronic Devices

Semiconductors; semiconductor diode – Characteristics in forward and reverse bias, diode as a rectifier, Characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

Unit – XI

Communication Systems

Elements of a communication system (block diagram only); bandwidth of signals speech, TV and digital data); bandwidth of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. Need for modulation. Production and detection of an amplitude-modulated wave.

Optical fiber, structure : core and cladding, step under and graded index fiber; bandwidth and channel capacity; energy ton, attenuation and dispersion in fiber.

Unit – XII

Quantum Mechanics

Wave nature of material particles; de Broghie hypothesis of malter waves, wave-particle duality; Heisenberg's uncertainty principle. Schordinger equation, Wave function and its interpretation, particle in a one-dimensional infinite well, energy eiger value.

Unit – XIII

Special Theory Relativity

Reference systems, inertial frames, Galleon invariance and conservation laws, Michelson-Morley experiment, postulates of special theory of relativity, Lorentz transformation, length contraction, time dilation, relativistic velocity addition, variation of mass with velocity mass energy equivalence.

GEOGRAPHY

Unit – I

Physical Geography

1. Physical Geography: Meaning, nature and scope, its relation with other branches of earth sciences.
2. The constitution of the earth's interior and earth movements: Interior of the earth; continental drift; plate tectonic – plate movement and interactions, volcanism, seismicity and mountain building. Endogenetic and exogenetic forces; folds and faults – origin, classification and landforms expressions.
3. Denudation: Weathering, mass wasting and erosion – processes of erosion, deposition and resulting landforms: river, wind, and glacier, underground water and marine.

Unit – II

Atmospheric Circulation, Oceanic Circulation and Hydrology:

1. Composition and structure of the atmosphere; insulation and heat balance; distribution of temperature; atmospheric pressure; planetary and periodic wind with special reference to monsoon; precipitation – types; importance of the ozone layer and green house effect.
2. Tides – origin and types; currents – causes of formation and world distribution of ocean currents; tsunami – meaning, causes and consequences.
3. Mode of occurrence of water in the earth; hydrological cycle; factors affecting run-off, infiltration, ground water movement and storage.

Unit – III

Human Geography

1. Human geography : definition, nature, scope and branches;
2. Population: distribution, density and growth of world population; age and sex composition; migration – types, causes and consequences; theories of population growth – Malthus and Demographic Transition.
3. Settlement: definition, types and characteristics of human settlements – rural & urban.
4. Resources: concept and classification; conservation and sustainable development of resources.
5. Economic activities : concept and classification – primary, secondary and tertiary
6. Languages, religion and races – definition and world distribution ;

Unit – IV

Environmental Geography

1. Definition and scope; structure and component; biomes – meaning and concept;
2. Environmental hazards; definition, classification and different approaches; hazard assessments and mitigation. Atmospheric environment and global warming, disaster management – landslides, earthquakes, floods and cyclone.

Unit – V

India

Physical : Relief, drainage, climate, soil, natural vegetation – types and distribution of forest. Agriculture : salient features, problems & remedial measures, regionalization of Indian agricultural, typology of agricultural regions and their relevance in agricultural planning; Industry : industrial development and Indian economy; industrial regions of India; Population; distribution, density, growth and migration; ethnic composition : caste, tribe (Santhal, Khasi & Bhil), race and religion.

Sikkim : Physical : relief, drainage, climate, soil and natural vegetation. Population – distribution, density and growth. Social and economic dimensions.

Unit – VI

Practical Geography:

1. Introduction to Cartography: Scales and map projections; cartographic methods of representing data.
2. Role of field work in Geography : Type and sources of data, sampling techniques : meaning and types
3. Remote Sensing and G.I.S.: definition and components of remote sensing; aerial photogrammetric and satellite remote sensing; G.I.S. – concept and application in Geography.
4. G.P.S.: principles and applications.

HISTORY

Indian History

1. **The organization of Government in ancient India with reference to the following :**
   - The Mauryan Empire
   - The Gupta Empire
   - The Chola Empire
   - Delhi Sultanate
   - Mughal administration

2. **Religion in Ancient India, with reference to the following :**
   - The Vedic Religion and Brahmanical Religion
   - Buddhism, Jainism and Heterodox Sects
   - Bhakti movement.

3. **The Interaction between Ancient Indian culture and Islamic culture and the emergence of a synthetic Indian Culture –**
   Art, Architecture, Language, Music and dance.

4. (a) **The Establishment of British Rule in India :**
   - Factors behind British success,
   - Wars against Indian powers: Maratha Confederacy, Mysore and the Punjab.
   - Policy of subsidiary alliance and the Doctrine of lapse.

   (b) **Resistance to colonial rule:**
   - The revolt of 1857,
   - Nationalism – Gandhinian Era.

World History

1. **Origins of modern politics and the rise of the Nation – State system :**
   - The American Revolution and the Constitution.
   - The French Revolution and aftermath, 1789 – 1815,
   - Rise of Nationalism in the 19th Century: Germany and Italy.

2. **The World Wars – I and II :**
   - Causes and consequences.

3. **Cold War :**
    - Emergence of the Blocs,
    - Integration of West Europe and U.S. strategy; Communist East Europe,
    - Emergence of Third World and Non- Alignment,
    - U. N. and Dispute Resolution.

History of Sikkim
    - Rise of Feudalism in Sikkim
    - Reforms during Tashi Namgyal's period.