**ARUNACHAL PRADESH**
**PUBLIC SERVICE COMMISSION**
**ITANAGAR**

No. PSC-R(A)/19/2021 Dated Itanagar, the 20th Nov, 2025

# NOTIFICATION

## TRAINED GRADUATE TEACHER

The Arunachal Pradesh Public Service Commission with regards to the Recruitment to the post of Trained Graduate Teacher under the Department of Education, Government of Arunachal Pradesh hereby notifies the following:

1. In pursuant to the "*Marking Scheme for Direct Recruitment to the posts of Post Graduate Teacher(s) (PGTs) and Trained Graduate Teacher(s) (TGTs), Rules, 2025*" issued by the Government of Arunachal Pradesh, Department of Secondary Education, vide notification no. DSE-11027/1/2021-DSE-ED dated 31st May, 2025, the scheme of the direct recruitment for the post of **Trained Graduate Teacher** is mentioned hereunder:

| Sl. No. | Subject/Paper | Maximum Marks |
|---|---|---|
| 1. | General English, General Studies, Aptitude and Pedagogy (Objective) | 150 |
| 2. | Concerned Subject (Objective) | 300 |
| 3. | Viva-voce and Classroom Teaching | 50 |
| **Total Marks** | | **500** |

2. Syllabus of the concerned subjects (Objective)) are appended at the following annexures:
   a. Syllabus for Agriculture appended in Annexure – A
   b. Syllabus for Biology appended in Annexure – B
   c. Syllabus for Business Administration appended in Annexure – C
   d. Syllabus for Chemistry appended in Annexure – D
   e. Syllabus for Accountancy appended in Annexure – E
   f. Syllabus for History appended in Annexure – F
   g. Syllabus for Horticulture appended in Annexure – G
   h. Syllabus for Mathematics appended in Annexure – H
   i. Syllabus for Economics appended in Annexure – I
   j. Syllabus for Political Science appended in Annexure – J
   k. Syllabus for Geography appended in Annexure – K
   l. Syllabus for Hindi appended in Annexure – L
   m. Syllabus for Physics appended in Annexure – M
   n. Syllabus for English appended in Annexure – N

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The syllabus of General English, General Studies, Aptitude and Pedagogy shall be notified shortly.

This issues with the approval of the commission.

( Priytarshny P ) IAS
Secretary, APPSC

Memo No. PSC-R(A)/19/2021 Dated Itanagar, the 20th Nov, 2025

Copy to:

1. The PS to Hon'ble Chairman, APPSC for information please.
2. The Commissioner (Education), Govt. of Arunachal Pradesh, Itanagar for information
3. IT Section, APPSC to upload in the APPSC website
4. Office copy

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# TRAINED GRADUATE TEACHER

## Subject: Agriculture

**PAPER-I**

**1. Basic Agriculture**: Importance of Agriculture in national economy, scope of commercialization of India agriculture, Sustainable agriculture, crop diversification, multiple cropping, multistorey cropping, relay cropping, intercropping, organic farming.

**2. Agro meteorology**: Agro meteorology, elements of weather and climate, weather forecasting, impact of climate change on cropping pattern, rain fed agriculture technology, natural disasters like drought, flood, etc. and their mitigation.

**3. Soil Science and Soil Fertility**: Soil- its definition and component, processes and factors of soil formation, soil profile, soil types of India and their characteristic, problem of soils and their reclamation, soil properties, soil texture and structure, Nitrogen fixation, soil productivity and soil health, soil erosion and conservation. Essential plant nutrients, their function and deficiency symptoms, manures and fertilizers and Integrated Nutrient Management (INM) system.

**4. Agronomy**: Weed, their characteristics, dissemination and association of weeds with crops, principles and method of weeds control, mechanical, cultural, biological and chemical control of weeds herbicides, integrated weed management system.

Origin, history and cultivation practice of important cereal crops pulses, oilseeds, fiber crop, sugar and commercial crops grown during Kharif and Rabi seasons with special reference to climate, soil seed production, cultivars, nutrition, irrigation and other management practices.

**5. Genetics and Plants Breeding**: Genetics and plant breeding, heredity and variation, Mendel's laws of inheritance, chromosomal theory of inheritance, heterosis and its exploitation, male sterility and self-incompatibility, principles and methods of plant breeding. Seed technology, classes of seeds, production, processing and testing of seeds. Role of national and state seed agencies in production, processing and marketing of improved seeds.

**PAPER-II**

**6. Crop Protection**: Insect pests and diseases of field crops, Vegetable, fruits and plantation crops, causes and their control measure, principles and method of diseases control measure, biological control of pests and diseases, Integrated Pest Management (IMP) system. Storage pests of cereals and pulses, preservation and remedial measure of storage grains, Pesticides and their formulations, plant protection equipment, their care and maintenance.

**7. Water management, Irrigation and Drainages**: Irrigation and drainage, sources of irrigation, scheduling of irrigation, water requirement of crops, water use efficiency, method of irrigation and drainage, watershed management.

**8. Horticulture**: Horticulture and its branches, role of fruits and vegetable in human nutrition, plant propagation, plating techniques, training and pruning, cultivation practices of major fruits, vegetable and flower. Landscape gardening including raising of ornamental plants and layout and design of landscape gardens, lawns etc.



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Post- harvest handing and marketing problem of fruits, vegetables and flower. Principles and methods of preservation and processing of fruits and vegetable, important value-added products from fruits and vegetables.

**9. Crop Physiology**: Crop physiology and its importance, imbibition, surface tension, diffusion and osmosis, absorption and translocation of water and mineral, transpiration, enzymes, plants pigments, photosynthesis, aerobic and anaerobic respiration. Growth and development of plant photoperiodism and vernalization, hormones and plant growth regulators and their function.

**10. Agriculture Economics, Farm Management and Extension Education**: Farm management, importance and characteristics, types and systems of farming and factor affecting them, marketing and pricing of agriculture inputs and outputs and their costs, calculation of cost benefit ratio, Kisan Credit Card (KCC), crop insurance. Agribusiness management, important Agriculture and Horticulture based subsidiary enterprises like nursery, mushroom production, apiculture, bio-pesticides, vermicomposting, etc. and their socio-economic importance.

Agriculture extension, objection and principles, its importance and role, method of evaluation of extension programmes, training programmes, methods of communication.

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## Subject: Biology

### PAPER-I

**Unit -I: Life Processes:**

Need for the Nutrition, different modes of nutrition in animal; Photosynthesis: photosystem I and II, Mechanism of light and dark reaction, C3 and C4 plants, and CAM plant respiration. Mechanism of aerobic respiration fermentation, RQ, Factor affecting respiration. Transportation in Human body fluids, Blood and Lymph. Circulatory system, Respiratory system. Transportation in plants: Ascent of sap, absorption of water, transpiration, translocation in plants. Transportation in animal: transportation of $CO_2$ & $O_2$. Excretory system in animals, Execration in plants.

**Unit -II: Control and Co-ordination:**

Structure and functions of central nervous system in animal, neuron, nerve impulses and its co-ordination, reflex action. Sense organs: Eye and Ear structure and functions, and their defects. Control and coordination in plants: plants movements, geotropism, phototropism, chemotropism, turgor pressure, movement due to growth; Plants growth regulators: structure and functions of Auxins, Gibberellins, Cytokinins and Abscisic acid; Human endocrine and exocrine glands, Secretion of hormones and their function.

**Unit -III: The Fundamental Unit of Life:**

Essential component of living being: structure and functions of cell and its cell organelles. Cell division: mitosis and meiosis. Plants tissues: meristematic and permanent tissues. Anatomy of roots stems, leaf of dicot and monocot plants, secondary growth. Animal tissues: structure and functions of tissues, epithelial, connective, muscular and nervous tissues.

**Unit-IV: Diversity of Living Organism:**

Aims and components of biological systematics, introduction to identification, nomenclature, phylogeny and classification, basic of classification, Taxonomical Hierarchy. Plants classification: Benthem and Hooker Classification, Classification of Animal: non-chordates and chordates classification, and relationship of various phyla up to class, Binomial System of Nomenclature.

### PAPER-II

**Unit -V: Reproduction:**

Mode of reproduction in single celled organism, sexual reproduction in plants, development of male and female gametophytes, pollination, double fertilization, incompatibility, embryo development, parthenogenesis and parthenocarpy. Sexual reproduction in cockroach and frog. Human reproductive system: gametogenesis, fertilization, development of zygote up to 3 germinal layers, general aspects of placenta, parturition. Reproductive health; reproductive related diseases and ailments: PCOS, STD, HIV, AIDS, Family planning.



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**Unit -VI: Heredity and Evolution:**
Mendel's laws of inheritance, monohybrid and dihybrid crosses, Pattern of inheritance: Dominant/Recessive, Sex linked inheritance, incomplete dominant, co-dominance, polygene inheritance, hereditary and variation, multiple alleles, Sex determination, polyploidy and mutation. Gene expression (operation mode)/gene transfer technology. Evolution, Interrelationship between Paleontological, morphological, embryological and biographical. Theories of evolution: Lamarckism, Darwinism and modern synthetic theory of Human evolution.

**Unit -VII: Health and Diseases:**
Concept of Health, diseases, types and their causes; infectious and non-infectious diseases. Prevention of diseases, immunization, inherited diseases, sex–linked diseases, genetic incompatibility and genetic counseling.

**Unit -VIII: Natural Resources:**
Our Environment and Ecosystem: Structure and functions, productive energy flow, ecological succession, its types and mechanism, Role of atmosphere in climate control, wind, rain, environment, pollution, global warming, greenhouse effect, acid rain, particulate matter, polluted smog, formation of photochemical smog, depletion of Ozon layer. Water pollution: source and abatement, BOD, COD, BIO-magnification, soil pollutants. Recycling of waste. Biologeochemical Cycles - Gaseous and Sedimentary, Carbon cycle, Nitrogen cycle, Phosphorus cycle and Sulphur cycle. Concept of Biodiversity, types and importance, Loss of Biodiversity, methods of Biodiversity conservation.

**Unit -IX: Improvement in Food Resources:**
Improvement in crop yield, Animal's husbandry, need for intercropping crops, plants breeding, bio-fertilizer and Bio-Pesticides; smart agriculture.

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# TRAINED GRADUATE TEACHER

## Business Organisation and Management

**PAPER- I**

**Unit-I: Nature and Purpose of Business**

Concept of Business, Business, Profession and Employment -meaning and characteristics; Objectives of business - Economic and Social; Role of profit in business; Classification of business activities- Industry & Commerce, Types of Industries-meaning and subgroups; Commerce-meaning and types; Trade and Auxiliaries-meaning and types; Business risks: meaning, nature and causes; Corporate Social Responsibility- Concept, Rules, Arguments for and against social responsibilities; Responsibility towards owners, investors, employees, consumers, Government, community and Public; Business Ethics- concept and elements.

**Unit-II: Forms of Business Organisations**

Sole Proprietorship- Concept, Merits and Limitations; Joint Hindu Family Business -Concept, Merits and Limitations; Partnership-Concept, Types, Merits, Limitations, Types of Partners, Registration of A Partnership Firm, Partnership Deed; Cooperative Societies -Concept, Types, Merits and Limitations; Company- Concept, Types of Company, Merits and Limitations; Stages in the formation of a company; Important documents used in the formation of a company; Forms of Public Sector Enterprises; Global Enterprises (MNCs); Joint Venture; Public private Partnership; Other forms of Business- E-Business, On-line Business. Outsourcing.

**Unit-III: Small Business**

Small scale enterprise as defined by MSMED Act 2006; Features, Role of small business in Economy and Rural India; Problems of small business in India; Government schemes and agencies for small scale industries in rural, backward and hilly areas-NSIC, DIC, NABARD.

**Unit-IV: Business Services**

Concept and types of Business Services; Banking -meaning, types of banks, types of bank accounts; Functions of commercial banks; Reserve Bank of India, Regional Rural Banks; E-banking; Insurance –Principles and types; Postal and telecom services; Warehousing -concept, types and functions.

**Unit-V: Sources of Business Finance**

Concept of business finance; Owners funds-concept; Borrowed funds-concept; Equity shares, preference shares, retained earnings-their meaning, merits and limitations; Global Depository receipts, American depository receipts, debenture and bonds, public deposits, loan from commercial banks, loan from financial institutions, Trade credit- concept.

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# TRAINED GRADUATE TEACHER

**PAPER- II**

**Unit-I: Business Management (1)**

Management-Concept, Objectives, Importance; Levels of management; Business Environment-concept, importance and Dimensions; Management Functions; Fayol's Principles of Management, Taylor's Scientific Management, Classical and Neo Classical Theories.

Planning-Concept, Process, Importance, Limitations; Types of plans; Objective, Strategy, Policy, Procedure, Method, Rule, Budgeting, Budget Programme; MBO.

Organising- Concept, Importance, Process; Functional and Divisional of organisation; Formal-Informal organisation; Delegation; Decentralisation; Difference between delegation and decentralisation.

**Unit-II: Business Management (2)**

Staffing- Meaning, Process, Importance; Recruitment-meaning and sources; Selection-concept, process; Training and development – Concept, Importance, Methods; Directing-Concept & Elements; Coordination - Concept and Importance; Supervision-Concept and Elements; Motivation- Concept, Theories, Types of Motivators; Leadership-Concept and Styles; Communication-Concept, Process; Communication Network; Formal and Informal Communication; Barriers to effective Communication

Controlling: Concept and importance of controlling; Relationship between planning and controlling; Steps in the process of control; Methods of Control.

**Unit-III: Internal and External Trade**

Internal Trade: Meaning and types of Internal Trade; Services rendered by a Wholesaler and Retailer; Types of Retail Trade; Itinerant retailers- meaning and types; Fixed Shop Retailers-Meaning and Types: General Store, Second Hand Goods Shop, Single Line Stores, Street Stallholders, Departmental Stores, Chain Stores, Super Markets-Concept; Automatic Vending Machine-Concept; Role of Chambers of Commerce and Industry in promoting internal trade.

International Trade-Concept, Advantages, Disadvantages; Distinguish between Internal Trade and External Trade; Export and Import Trade; EXIM Policy, Export Procedure; World Trade Organisation.

**Unit-IV: Financial Management**

Financial Management: Concept and Objectives; Financial Decisions: Investment, Financing; Dividend-Meaning and factors affecting, Financial Planning- Concept and Importance; Capital Structure- Concept and factors affecting; Fixed and Working Capital - concept and factor affecting its requirements.

Financial Markets- concept, functions and types; Money Market and its instruments; Capital Market and its types; Distinguish between capital market and money market; Method of floatation in the Primary Market; Distinguish between Primary and Secondary Market; Stock



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Exchange-Meaning, Functions and Trading Procedure; Security and Exchange Board of India (SEBI)- Objectives, Functions.

**Unit-V: Marketing Management**

Marketing -Concept, Functions And Role; Difference between Marketing And Selling; Marketing Management-Concept, Philosophies; Marketing Mix- Concept and Elements; Product- Concept, Product Life Cycle, Product Decision, Product Line and Product Mix; Branding; Packaging; Labelling; Price-Concept, Factors determining fixation of Price; Physical Distribution-Concept, Components; Promotion-Concept, Elements of Promotion Mix; Advertising; Salesmanship; Person selling; Sales Promotion; Public Relations, Consumer Protection Act 1986.

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# TRAINED GRADUATE TEACHER

## Subject: Chemistry

**PAPER-I**

**Unit I: Atomic Structure**

Dalton's atomic theory, elements, compounds, cathoderays, X-rays, Rutherford model of atom, Bohr's model of an atom. Element configuration: - rules for filling electrons in orbitals- Aufbau principle, Pauli Exclusion Principle and Hund's rule, electronic configuration of an atom, stability of half-filled and completely filled orbitals, electronic configuration of elements upto atomic numbers thirty. Atomic number and mass number, isotopes and isorbars.

**Unit II: Periodic Classification of Elements**

Early attempts at the classification of elements, Mendeleev's periodic table, the modern periodic table and position of elements. Periodic trends of properties in modern periodic table (valency, metallic and non-metallic properties), position of hydrogen in periodic table. Isotopes of hydrogen, classification of elements into, s, p, d and f-blocks.

**UNIT III: Chemical Bonding and Chemical Reaction**

Noble gas electronic configuration as criteria of stability of atom, octet rule; atoms and ions, valency, electrovalent bond, covalent bond, bond energy, VSERP theory: shape of simple molecules. Chemical reaction: types (decomposition, displacement, isomerization, combination, redox and disproportionation reaction), chemical formula and chemical equation, mole concept, atomic and molecular mass, gram atomic mass, and gram molecular mass, determination of empirical and molecular formula, and balancing of chemical equation. Energy involved in a reaction, photochemical reaction, electrolysis of water and sodium chloride.

**UNIT IV: Acids, Bases and Salts**

Various concept of acid and bases (Lewis, Bronsted-Lowry concept), chemical properties of acids and bases, strong and weak acid and bases, pH, pOH and pkw, importance of pH in everyday life, pH of salt, preparations and uses of sodium hydroxide, bleaching powder, baking soda, washing soda and plaster of Paris.

**PAPER-II**

**UNIT V: Metals and Non-metals**

Physical and chemical properties of metals and non-metals reactivity series, reaction between metal and non-metal, properties of electrovalent compounds. Metals: occurrence, metallurgy (elementary idea), extraction of copper, iron, and aluminium, uses of metals, Alloys formation. Preparation and properties of oxygen, silicon, phosphorus and sulphur.



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**UNIT VI: Carbon and Its Compound**

Bonding in organic compound, versatile nature of carbon, hydrocarbon: saturated and unsatured, homologous series, alkyl radicals. Nomenclature of hydrocarbon and its derivatives (halides, alcohols, aldehydes, ketones, carboxylic acids). Isomerism in alkanes, alkenes and alkynes. Alcohols: properties, uses of methyl alcohol and ethyl alcohol. Polymers: natural and synthetic (nylon, polyester, plastic, rubber), soaps, and detergents. Fuels: fossil fuel, coal, natural gas, classification of fuel, calorific value of fuel, ignition temperature and ideal fuel.

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# TRAINED GRADUATE TEACHER

## Financial Accounting & Financial Statement Analysis

**PAPER- I**

**Unit-I: Introduction to Accounting**

Accounting- Concept, meaning, objectives, advantages and Limitations; Basic Accounting Terms- Entity, Business Transaction, Capital, Drawings. Liabilities (Non-Current and Current), Assets (Non-Current, Current); Expenditure (Capital and Revenue), Expense, Revenue, Income, Profit, Gain, Loss, Purchase, Sales, Goods, Stock, Debtor, Creditor, Voucher, Discount (Trade discount and Cash Discount); GAAP; Accounting Principles; Accounting Concepts, Accounting Standards; Cash and Accrual Basis of Accounting; Materiality and Objectivity; GST.

**Unit-II: Records and Process of Accounting**

Vouchers, Transaction, Accounting Equation, Rules of Debit and Credit, Cash Book; Purchase Book; Sales Book; Purchase/ Sales Return Book; Book of Original Entry - Journal, Ledger, Posting from Journal and Subsidiary Books, Balancing of Accounts.

**Unit-III: Depreciation, Provisions and Reserves**

Depreciation: Meaning, Features, Need, Causes, factors; Depletion and Amortisation; Method of recoding depreciation; Provisions, Reserves, Difference between Provisions and Reserves; Types of Reserves; Difference between capital and revenue reserve.

**Unit-IV: Final Accounts**

Trial Balance; Errors: Classification and their effect on Trial Balance, Detection and rectification of errors; Banks Reconciliation Statement; Final Accounts – Profit and Loss Account and Balance Sheet with adjustments.

**PAPER- II**

**Unit-I: Accounting of Joint Stock Companies**

Share Capital, Types of Shares, Accounting for share capital- issue and allotment of equity and preferences shares; Public subscription of shares- over subscription and under subscription of shares; Issue at par and at premium, Calls in advance and arrears (excluding interest); Issue of shares for consideration other than cash; Concept of Private Placement and Employee; Stock Option Plan (ESOP), Sweat Equity; Accounting treatment of forfeiture and re-issue of shares; Disclosure of share capital in the Balance Sheet of a company.

Debentures: Meaning, types, Issue of debentures at par, at a premium and at a discount; Issue of debentures for consideration other than cash; Issue of debentures with terms of redemption; Debentures as collateral security-concept, Interest on debentures (concept of TDS is excluded). Writing off discount / loss on issue of debentures.

**Unit-II: Accounting for Partnership firms**

Partnership: Features, Partnership Deed; Provisions of the Indian Partnership Act 1932 in the absence of partnership deed; Fixed v/s fluctuating capital accounts; Preparation of Profit and



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Loss Appropriation account- division of profit among partners, guarantee of profits; Past adjustments (relating to interest on capital, interest on drawing, salary and profit-sharing ratio); Goodwill: meaning, nature, factors affecting and methods of valuation - average profit, super profit and capitalization.

**Unit-III: Cost Accounting**

Nature and function of Cost Accounting, Types of Cost, Cost Sheet, Labour, Material and Overheads, EOQ, Job Costing, Process Costing, Marginal Costing, Cost- Volume-Profit relationship, cost control and cost reduction techniques.

**Unit-IV: Analysis of Financial Statements**

Financial Statement Analysis: Meaning, Significance Objectives, importance and limitations; Tools for Financial Statement Analysis: Comparative statements, common size statements, Ratio analysis, Cash flow analysis; Funds Flow Statement and cash flow statement.

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Annexure- F

# TRAINED GRADUATE TEACHER

## Subject: History

### PAPER-1

**Unit 1:- Sources of Ancient History**

(i) Archaeological Sources
(ii) Literacy Sources
(iii) Foreign Accounts

**Unit 2:- The Harapan Culture**

(i) Origin and Extent
(ii) Basic Features
(iii) Decline and Significance

**Unit 3:- Jainism and Buddhism**

(i) Causes of Origin.
(ii) Jainism: Doctrines, Spread and Contribution.
(iii) Buddhism: Doctrines, Spread and Contribution.

**Unit 4:- The Mauryan Empire**

(i) Foundation and Consolidation.
(ii) Chandragupta Maurya- Administration and Achievements.
(iii) Ashoka: Policy of Dhamma- His place in History.

**Unit 5:- The Imperial Guptas**

(i) Samudragupta: Conquests.
(ii) Chandragupta – II: Conquest and Administration.
(iii) Cultural Achievements.

### PAPER-II

**Unit 1:- The Delhi Sultanate**

(i) Foundation: Qutub-ud-din-Aibak and Iltutmish.
(ii) Conquest: Balban.
(iii) Administration: Alauddin Khalji and Muhammad-bin-Tughlaq.

**Unit 2:- The Mughal Empire**

(i) Foundation and Conquests: Babur and Akbar.
(ii) Administration: Akbar and Sher Shah Suri.



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(iii) Art and Architecture: Shah Jahan.

**Unit 3:- The Revolt of 1857**

(i) Causes
(ii) Nature
(iii) Significance

**Unit 4:- Indian National Movement (1857-1947)**

(i) Indian National Movement (up to 1919): Indian National Congress, Moderates, Extremists and Muslim League.
(ii) Indian National Movement (1919-1947): Emergence of Mahatma Gandhi and Mass Movements.
(iii) Partition and Independence.

**Unit 5:- The French Revolution**

(i) Causes
(ii) Impact

**Unit 6:- Russian Revolution (1917)**

(i) Causes
(ii) Impact

**Unit 7:-** (i) World War-I: Causes, Events and Effects.

(ii) World War-II: Causes, Events and Effects.

**Unit 8:- History of Arunachal Pradesh**

(i) Pre-Colonial Traditional Institutions.
(ii) Inner Line, Outer line and McMahon Line.
(iii) Resistance Movements in Arunachal Pradesh.

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## Subject: Horticulture

**PAPER – I**

1. **General Horticulture:** Horticulture - its definition and branches, importance and scope, problems of production and marketing and remedial measures. Importance of fruits and vegetables in human diet, crop diversification. Classification of horticultural crop plants and their edible parts.
2. **Basic Horticulture:** Plant Propagation, macro and micro propagation, rootstocks, propagation by seeds cuttings, budding, layering and grafting, physiology of rooting, Nursery raising and their management. Orchard management, pruning and training, soils management, essential elements and their functions and deficiency, role of micro nutrients and their deficiency problems, manures and fertilisers, weeds management, pests and diseases management, irrigation and drainage systems. Planting system, multistorey cropping and intercropping.
3. **Crop Physiology:** Plant growth and development, Photoperiodism and flowering, vernalization, seed and bud dormancy, bearing behaviour, fruit set, selflessness, fruit thinning and fruit drop, physiological disorders of horticulture l crops, hormones and plants growth regulators and their roles.
4. **Genetics and Plants breeding:** Importance of genetics and plant breeding, heredity and variation, Mendel's Laws of inheritance, origin and distribution of horticultural crops, principles and methods of plant breeding for improvement of major horticultural crops, hybridization, heterosis and its exploitation, male sterility and self-incompatibility and polyploidy.

   Seed technology, classes of seeds, production, processing and testing of seeds. Role of national and state seed agencies in production, processing and marketing of improved seeds.

5. **Pomology:** Origin, history and production technology of important fruits such as mango, banana, citrus, guava, papaya, grapes, pineapple, litchi, apple, pear, peach, almond, aonla, dragaon fruits persimmon and walnut etc. with special reference to climate, soil, propagation, cultivars, nutrition, irrigation, weeds control, pests and diseases, harvesting and marketing.

**PAPER – II**

6. **Olericulture:** Origin and production technology of important vegetables, spices and condiments like tomato, brinjal, chillies, cole crops, radish, carrot, turnip, beans, peas, potato, tapioca, okra, cucurbits, leafy vegetables, coriander, cumin, coriander, cumin, turmeric, ginger, onion, garlic etc. with special reference to climate, soil, seed rate, cultivars, nutrition, irrigation weeds control pests and diseases and other management practices.

7. **Plantation Crops, medicinal and aromatic plants:** Origin and production technology of important plantation crops like coconut, areca nut, pepper, cardamom, rubber, tea, coffee, cashew etc. with special reference to climate, soil, seed production, cultivars, nutrition, irrigation and other management practices. Production technology of important aromatic and medicinal crops like palmarosa, lemon grass, isabgol, vetiver,



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cinchona, belladonna, rauwolfia, discorea etc, with special reference to climate, soil, seed production, cultivars, nutrition, irrigation and other management.

8. **Landscape Gardening:** Landscaping and its importance, styles of gardening, their principles and practices with special reference to Mughal, Japanese and English gardens elements and features of landscape gardening. Classification and utilization of ornamental trees, shrubs, climbers, herbaceous plants, perennial, annuals bulbous and water loving plants, cactus, succulents and foliage plants, bonsai, home gardens, lawn and topiary.

9. **Floriculture:** Importance of floriculture, Origin and commercial production of important flower crops like rose, orchids, aster, marigold, chrysanthemum, gladiolus, carnation, gerbera, jasmine, methods, nutrition, irrigation, aftercare etc prolonging storage and vase life of cut flowers and their utilization.

10. **Post harvest technology and Valve-addition:** Post-harvest management, cold chain storage systems, physicochemical changes and quality of horticultural produces after harvesting, processing of horticultural produce. Important value-added products from fruits and vegetables. Principles and methods of fruits and vegetable preservation, methods for processing. Preparation, packaging and marketing of value-added products like jellies, jams, ketchup, pickles, squashes, marmalade etc.

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# TRAINED GRADUATE TEACHER

## Subject: Mathematics

**PAPER-I**

**Unit I:**

**1. Linear equation in two variables:**

Pairs of linear equation in two variables, condition for consistency and inconsistency, solution of pair of linear equations in two variables, algebraic method of solving a pair of linear equation, substitution method, elimination method, cross multiplication method.

**2. Principle of Mathematical Induction:**

Process of proof by induction, the principle of mathematical induction and its simple application.

**3. Complex number and quadratic equation:**

Need for complex number especially to motivate by inability to solve quadratic equation $x^2 + 1 = 0$, Brief description of Properties of complex numbers. Argand plane and polar representation of a complex number, solution of quadratic equation in the complex number system.

**4. Linear In equation:**

Linear inequation, solution of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of a system of linear inequalities in two variables.

**5. Permutations and Combinations:**

Fundamental Principle of counting, factorial n (n!). Permutations and combinations and their simple applications.

**6. Binomial Theorem:**

Statements and proof of the binomial theorem for positive integral indices. General and Middle terms in binomial expansion, simple application.

**7. Sequence and Series:**

Sequence and series, Arithmetic progression (A.P), Arithmetic Mean (A.M). Geometric Progression (G.P), Geometric Mean (G.M), sum of n terms of A.P and G.P, General terms of A.P & G.P, relation between A.M to G.M, sum of n terms of the special series $\sum n$ (sum of first n natural numbers), $\sum n^2$ (sum of square of first n natural numbers) and $\sum n^3$ (sum of cubes of first n natural numbers).

**8. Real numbers:**

Laws of exponent with integral powers, rational exponents with positive real bases, fundamental theorem arithmetic, LCM and HCF.



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**9. Polynomials:**

Definition of polynomial in one variable, coefficient of polynomial, zero of a polynomial, degree of polynomial. Constant, linear, quadratic and cubic polynomials, relation between zeros and coefficient of quadratic polynomials, factor theorem, remainder theorem. The algebraic expressions and identities.

**UNIT -II: Geometry**

**1. Triangles**

Triangle and its various kinds of centres, congruency of triangles, theorems related to congruent triangles, Similar triangles, properties of similar triangles, theorems related to similar triangles.

**2. Quadrilaterals**

Quadrilateral, parallelogram and its properties, rhombus and its properties, trapezium, square and rectangle.

**3. Circle**

Definition of circle, chord of circle and related theorems, angles subtended by chords of a circle, sector and segment of a circle, area of circle, tangent to a circle and related theorems, common tangents to two or more circles, point of contact.

**UNIT -III: AREAS AND VOLUME**

Area of a triangle using Heron's formula and its application in finding the area of a quadrilateral, surface area and volume of cubes, cuboids, cone, cylinder, spheres and hemisphere.

**UNIT -IV: STATISTICS**

Introduction of statistics, collection of data, presentation of data in tabular form, Mean, median, mode of ungrouped and grouped data, mean deviation and standard deviation of ungrouped and grouped data, variance.

**PAPER-II**

**Unit I:**

Matrices and Determinants: - Concept, notion order, equality, types of matrices, transpose of a matrix, symmetric and skews-symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication, Concept of elementary row and column transformation, Invertible matrices. Determinant of a square matrix (up to 3x3 order), properties of determinant, Minors and co-factors and application of determinants in finding the area of a triangle, Adjoint and inverse of a matrix, solving a system of linear equations in two or three variable (having unique solution) using inverse of a matrix.



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## UNIT-II: PROBABILITY

Multiplication theorem on probability, conditional probability independent events, total probability, Baye's theorem, Random variables and probability distribution, mean and variance of random variable, Bernoulli's trails and Binomial distribution.

## UNIT-III: VECTOR

Vector and scalars, Direction cosines and direction ratios of a vector, types of vectors, addition of vectors, multiplication of a vector by a scalar, section formula, scalar(dot) product and vector (cross) Product of two vectors, projection of a vector on another vector, scalar and vector product of three vectors.

## UNIT VI: CALCULUS

### 1. DIFFERENTIAL CALCULUS

Continuity and differentiability, derivative of composite function, chain rule, derivative of inverse trigonometric function, derivative of implicit function, Concept of exponential and logarithmic function and their derivatives. Logarithmic differentiation, derivative of function expressed in parametric forms. Second order derivative. Application of derivatives rate of change of quantities, increasing and decreasing functions, tangent and normal, maxima and minima, approximation.

### 2. INTEGRAL CALCULUS

Integration as inverse process of differentiation, integration of functions by substation, by partial fraction and by parts. Definite integrals, properties of definite integral, Application of integrals in finding the area under simple curves, especially lines / circles /parabolas /ellipses (in standard form only) and area between the two above said curves.

### 3. DIFFERENTIAL EQUATION

Definition, order and degree of differential equation, general and particular solution of a differential equation, Formation of differential equation, differential equation of first order and first degree, solution of differential equation by the method of separation of variables, homogenous differential equation, Solution of linear differential equations of first order and first degree.

## UNIT -V: ANALYTICAL GEOMETRY

Co- ordinate Geometry, the Cartesian plane, coordinates of a point in Cartesian plane, distance between two points, sections formula, area of a triangle, straight line, slope of a line, various forms of equation of a line, general equation of line distance of a point form a line, Conic section, eclipse, parabola, hyperbola, circle, pair of straight lines. Homogenous equation of $2^{nd}$ degree, angle between a pair of straight lines, Condition for general equation of $2^{nd}$ degree to represent a pair of straight lines, vector and Cartesian form of equation of straight lines in space. Shortest distance between two lines in space and equation of shortest distance, Vector and Cartesian equation of a plane, General equation of a sphere, intersection of plane and sphere, equation of a tangent plane.

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## UNIT-VI: TRIGONOMETRY

Trigonometric ratios of an acute angle of a right-angled triangle, relationship between the trigonometric ratios, trigonometric identities, trigonometric ratios of complementary angles, height and distances.

Positive and negative angles, measuring angles in radian and degree and their conversion from one measure to another measure. Identities related to $sin\ 2x, cos\ 2x, tan\ 2x, sin\ 3x, cos\ 3x,$ and $tan\ 3x$. General solution of trigonometric equations. Simple application of sine and cosine formula, Inverse trigonometric function: definition, domain, range and principle value branch. Elementary properties of inverse trigonometric function, De-moivre's theorem for rational indices, expansion of $sin\, nx$ and $cos\, nx$ in power of $x$, exponential expression for circular function and its arguments, Gregory's Series, hyperbolic function.

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# TRAINED GRADUATE TEACHER

## Subject: - Economics

**PAPER-I:**

### 1. Introduction

Economics: Meaning, scope, and importance; Economics as a science and an art; positive vs. normative economics; Microeconomics versus macroeconomics; Basic economic activities: consumption, production, distribution, and capital formation; Concepts of scarcity, choice, opportunity cost, and economic efficiency.

### 2. Human Resources and human Capital

Human resources and human capital: meaning and differences; Demographic features of India: population growth, age composition, sex ratio, literacy rate; Workforce participation rate and sectoral distribution of labour: primary, secondary, tertiary; Human Development Index (HDI): components and rankings; Other indicators: Gross Enrolment Ratio (GER), life expectancy at birth, per capita income; Skill development, demographic dividend, and employability challenges; Role of education, health, and vocational training in human capital formation.

### 3. Economic Challenges in India

Poverty: meaning, causes, and recent estimates; Unemployment: meaning and types; Inequality, inclusive growth, Government initiatives to reduce poverty and unemployment; Role of infrastructure, education, and entrepreneurship in solving these challenges.

### 4. Food Security and Economic Development

Meaning and significance; Green Revolution: achievements, limitations, and sustainability challenges; Present status of agriculture: crop diversification, horticulture, and allied activities; Minimum Support Price (MSP), procurement, and buffer stocks; Public Distribution System (PDS), One Nation One Ration Card (ONORC), and Direct Benefit Transfers (DBT); Role of technology and irrigation in improving productivity; Nutrition security and government schemes.

### 5. Basic Economic Systems and Policies

Capitalism, socialism, and mixed economy; Role of government in economic activities: regulation vs. market freedom; India's economic planning journey: from Planning Commission to NITI Aayog; Concept of welfare state.



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# TRAINED GRADUATE TEACHER

**PAPER-II:**

1. **Issues of Growth and development**

   Economic growth vs. economic development: concepts, indicators, and measurement; Development and underdevelopment: key characteristics and policy concerns; Sustainable development and SDGs: India's performance; Growth patterns in agriculture, industry, services, and foreign trade since 1991; Impact of development on natural resources and environment: need for green growth.

2. **Sectoral Distribution of Indian Economy**

   Classification of sector on the basis of ownership and nature; Performance of public sector and private sector in a mixed economy; Privatization and disinvestment; Growth of MSMEs, startups, and rural enterprises in employment generation.

3. **Money and Credit**

   Evolution of money: from barter to digital currency; Functions of money and modern payment systems; Role of RBI and commercial banks in monetary control and credit creation; Monetary and fiscal policy: objectives, tools, and recent trends; Financial markets: money market, capital market, and their instruments; SHGs, microfinance, and Jan Dhan–Aadhaar–Mobile (JAM) trinity for financial inclusion; GST, demonetization, and digital payment revolution in India; Public debt, fiscal deficit, and economic stability.

4. **Contemporary Issues in Indian Economy**

   Inflation: causes, types, and control measures; Climate change and global warming, Digital economy and gig/platform work; globalization and its impact; Economic impact of pandemics and global crises.

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# TRAINED GRADUATE TEACHER

## Subject: Political Science

### PAPER-I

**Unit I: Political Theory:**

Meaning, nature and scope of Political Science, relation with other Socia Science, approach to the study of Political Science, traditional (philosophical Historical) Modem (behaviourism, Post- Behaviouralism & Marxism). Key concepts: Rights, Liberty, Equality, Law and Justice. Democracy- Liberal, Pluralistic Elitist and Marxian Theories. Feminism: Concept, Theories of feminism (Liberal, Marxist and Feminist). State: Meaning and Elements of state. Forms of govt.: (Unitary and Federal, Parliamentary and Presidential)

**Unit 2: Indian Government and Politics:**

The making of the Indian Constitution and Constituent Assembly. The Amendments, ideological bases, preamble and the objectives of constitution, fundamental rights and duties, Directive Principle of State Policy, federalism, centre state relation, legislature, executive and judiciary in India, political parties and pressure groups, distinction between political parties and pressure group, national integration, regionalism, communalism casteism and terrorism.

### PAPER-II

**Unit 3: Indian Foreign Policy and International Relation**

Meaning and its determinants, elements of national power and basic principles of India and NAM, India and its neighbours: Relation with China, Pakistan, Nepal Bangladesh, Sri Lanka, Bhutan, Myanmar. India and Look East Policy, India and Indian Ocean, Nuclear policy (NPT & CTBT), India and SAARC. International organization, UNO -its origin, aims and objectives and its role in present day world. Cold War: Genesis and Phases of Cold War.

**Unit 4: Local Self Government with special reference to Arunachal Pradesh**

Local self-Government: its concept, nature and scope, Administration and control, financial administration, state control and supervision of local govt, and its problem and prospects. major traditional village council system of Arunachal Pradesh. Introduction of Panchayat Raj System, the Daying Ering Committee report, NEFA Panchayat Raj Regulation act 1967, Working of Panchayat, power and functions of Panchayat Raj Institutions, leadership, problems and prospects for implementation of 73th Constitution Amendments Act.

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# TRAINED GRADUATE TEACHER

## Subject – Geography

**PAPER-I**

**Unit: Geomorphology**

Origin of Earth; Interior of Earth; Formation of landforms; Theories of continental drift and plate tectonics; Volcanoes; Earthquake; Geomorphic process; Classification of rocks and their genesis.

**Unit II: Climatology**

Structure and composition of atmosphere; Insolation; Heat budget; Latitudinal heat balance; Atmospheric wind circulation: Planetary wind; Monsoon; Air mass and Fronts and their types; World climates; Precipitation, forms of precipitation, clouds and their types.

**Unit III: Oceanography**

Ocean bottom relief; Salinity and ocean movement; Tides, currents and waves; Causes; Major Ocean currents of the world.

**Unit-IV: Soil and Biogeography**

Soils formation; Factors of soils formation; Soils types; Global distribution of flora and fauna; Concept and types of Ecosystems; Conservation of forest and wildlife – WWF & IUCN.

**Unit V: Location settling of India**

Latitudinal and longitudinal extent of India; Indian neighbours; Indian subcontinent.

**Unit VI: Physiography of India**

Physical: Physiographic divisions, Drainage, Climate, Vegetation, Minerals and Energy resources; Geological perspective; Mechanism of monsoon.

Natural Vegetation: Types – main plant species of each type; Conservation of forests, Agriculture: Types, Major crops and productions; Green revolution; White revolution.

**PAPER-II**

**Unit VII: Human & Economic Geography**

Major Human races of the world and their distribution patter; Population distribution, density, and growth. Migration: Causes and Consequence; Human settlements – Types, patterns, and problems. Human adjustments/adaptation to natural environment; Daily economic activities of human beings. Resources: Meaning, classification, planning, and conservation; Agriculture types; Minerals- Iron, Copper, Manganese, Mica, Bauxite, Coal, Mineral oil, and Natural gas. Industry- Iron and steel, Electronic and Petro-chemical, Cotton textile; Mode of transport.



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**Unit VIII: Resources**

**Soil**: Classification of Indian soils, Physical and chemical properties of Indian soils.

**Agriculture:** Subsistence Agriculture – Primitive and intensive subsistence agriculture, Commercial, Major agricultural practices and their characteristic features.

Major crops: Wheat, Rice, Sugarcane, Tea, Coffee, Rubber; Problem of Indian agriculture; Strategies of development.

**Unit IX: Industry**

Locational factors, Classification of industries, Major industries: Iron & steel Plants, Cotton, Jute, Sugar, Petrochemicals and Cement industry; Industrial regions of Indian.

**Unit X: Transport & Communication**

Means of Transport: Road, Railway, Waterways, Airways and Pipelines. Indian Satellite Communication: Internet and cyber communication; Information revolution and its impact on Indian economy.

**Unit XI: Planning of India**:

Role of Planning Commission/NITI AAYOG; Five-Year Plans, Goals and achievement; Sectoral development planning: Agriculture, Industry, Panchayat Raj Planning, Region-specific and Group- specific planning programme.

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# TRAINED GRADUATE TEACHER

## Subject: Hindi

**प्रश्न-पत्र : I**

**व्याकरण एवं रचना तथा हिन्दी साहित्य का संक्षिप्त इतिहासः**

**1. शब्द विचार :-**

(क) शब्द-भेद, अर्थ, रचना, स्त्रोत, प्रयोग तथा व्याकरणिक प्रकार्य के आधार पर।

(ख) पर्यायवाची, विपरीतार्थक, एकार्थी, अनेकार्थी अनेक शब्दों के लिए एक शब्द, अर्थ-भेद वाले शब्द, काल।

(ग) शब्द निर्माण - उपसर्ग, प्रत्यय, समास, संधि, कारक, लिंग, वचन, अशुद्धधी-शोधन - वर्तनी।

(घ) कहावते, लोकोक्तियां एवं मुहावरे, विराम चिह्न।

(ड.) **पद विचार-**

(1) विकारी शब्द- संज्ञा, सर्वनाम, विशेषण, क्रिया।

(2) अविकारी शब्द- क्रिया विशेषण, समुच्चय बोधक, सम्बंध बोधक, विस्मयादि बोधक, निपात।

(च) पद परिचय, पदबंध।

(छ) वाच्यःकर्तृ, कर्म, भाव।

**2. वाक्य विचार :-**

(क) वाक्य - स्वारूप।

(ख) संरचना - उद्देश्य विधेय।

(ग) वाक्य परिवर्तन या रचनान्तरण (साधारण, संयुक्त, मिश्रित)

(घ) वाक्य अशुद्धि शोधन।

**3. शब्द शक्ति विवेचन तथा रस, छंद परिचय :-**

(क) शब्द शक्तियाँ - अभिधा, लक्षणा, व्यंजना।

(ख) शब्दगुण - प्रसाद, मादुर्य, ओज।

(ग) छंद - मात्रिक, वर्णिक छंद।

(घ) रस - सभी रसों के लक्षण एवं उदाहरण आदि का सामान्य ज्ञान।

(ड.) अलंकार।

**4. पत्र तथा लेखन कौशल**

(क) औपचारिक पत्र - व्यवसायिक आवेदन एवं कार्यालयी पत्र।

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(ख) अनौपचारिक पत्र - व्यक्तिगत पत्र, निमन्त्रण पत्र।
(ग) अनुच्छेद लेखन- किसी साहित्यिक, वर्णनात्मक एवं सम-सामयिक विषय पर अनुच्छेद।
(घ) अपठित बोध- गद्यांश और पद्यांश।
(ङ) सम्पादकीय।
(च) प्रतिवेदन।

**प्रश्न - पत्र : II**

**5. हिन्दी साहित्य का संक्षिप्त इतिहास :-**

(क) आदिकाल, भक्तिकाल, रीतिकाल, आधुनिक काल, काल विभाजन और नामकरण, काल विभाजन की समस्याएँ, काल विभाजन के आधार, हिन्दी साहित्य में प्रचलित काल विभाजन और नामकरण।
(ख) चारों कालों का सीमा निर्धारण, प्रमुख प्रवृत्तियाँ, रचनाकार और उनकी प्रतिनिधि कृतियाँ।
(ग) गद्य की अन्य विधाएँ- रेखाचित्र, संस्मरण, आत्मकथा, जीवनी, यात्रा वृतांत।

**6. पद्य साहित्य**

(क) कबीर - (साखी)
(ख) बिहारी (दोहे)
(ग) घनानंद - (सवैया)
(घ) भारतेंदु - (सवैया)
(ड.) मैथिलीशरण गुप्त - (यशोधरा, साकेत, जयद्रथ वध)
(च) तुलसीदास - (रामचरितमानस, विनय पत्रिका)
(छ) सूरदास - (भ्रमरगीतसार)
(ज) मलिक मुहम्मद जायसी - (पदमावत)
(झ) विद्यापति - (पदावली, कीर्तिलता)
(ञ) माखन लाल चतुर्वेदी- (पुष्प की अभिलाषा)
(ट) सुभद्रा कुमारी चौहान - (झाँसी की रानी)
(ठ) जयशंकर प्रसाद - (आँसू, ले चल वहाँ बुलावा देकर, कामायनी)
(ड) निराला - (संध्यासुंदरी, सरोज स्मृति, कुकुरमुत्ता, परिमल)
(ढ) सुमित्रानंदन पंत - (नौका विहार, परिवर्तन)
(ण) महादेवी वर्मा - (यह मंदिर का दीप इसे जलने दो, वसंत, रजनी)
(त) रामधारी सिंह दिनकर - (हिमालय)
(थ) भवानी प्रसाद मिश्र - (गीत फरोश)

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(द) अज्ञेय - (कितनी नावों में कितनी बार, भग्नदूत)

(घ) केशवदास - (रामचंद्रिका)

**7. गद्य साहित्य -**

(क) गद्य के विभिन्न विधाओं का सामान्य परिचय।

(ख) उपन्यास - प्रेमचंद (रंगभूमि, गोदान, निर्मला)

(ग) नाटक- जगदीश चंद्र माथुर (कोणार्क), जयशंकर प्रसाद (ध्रुवस्वामिनी)

(घ) कहानी - प्रेमचंद (कफन, पूस की रात, ईदगाह, जुर्माना), जयशंकर प्रसाद (आकाश, मधुआ), फणीश्वर नाथ रेणु (संवदिया, तीसरी कसम, ठुमरी)

(ड.) निबंध - रामधारी सिंह दिनकर (भारत की सांस्कृतिक एकता), महावीर प्रसाद द्विवेदी (कवियों की ऊर्मिला-विषयक-उदासीनता), हजारी प्रसाद द्विवेदी (नाखून कैसे बढ़ते हैं?)

**8. भारतीय एवं पाश्चात्य काव्य शास्त्र -**

(क) काव्य का लक्षण, काव्य प्रयोजन, काव्य हेतु, काव्य के गुण एवं दोष।

(ख) अरस्तु का विरेचन सिद्धान्त, प्लेटो की कला एवं काव्य, कोलरिज के कल्पना सिद्धान्त।

**9. भाषा विज्ञान- भाषा की परिभाषा, विशेषताएँ, भाषा और बोली में अंतर।**

**10. हिन्दी भाषा और देवनागरी लिपि-**

(क) हिन्दी भाषा का उत्भव और विकास।

(ख) आधुनिक भारतीय आर्य भाषाओं का वर्गीकरण, देवनागरी लिपि और उसकी विशेषताएँ।

**11. पौराणिक ग्रन्थों का सामान्य ज्ञान - संक्षिप्त रामायण, संक्षिप्त महाभारत।**

**12. भारत के संविधान में हिन्दी की स्थिति -**

(क) सम्पर्क भाषा हिन्दी।

(ख) राजभाषा हिन्दी।

(ग) मानक हिन्दी।

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## Subject: Physics

**PAPER-I**

**1. Mechanics and Properties of Mater:**

Unit & dimension, accuracy, precision, error, dimension analysis and its application, motion in one- and two-dimension, uniform and non-uniform motion, relative-velocity, circular motion, projectile motion, laws of motion, friction and example of circular motion. Work, energy, Power, Potential energy and K.E. potentials energy of a spring, conservative and non-conservative forces, Elastics and inelastic force in one dimension and two dimensions.

Centre of Mass: Application, moments of forces, Torque of parallel and perpendicular axes. Moment of Inertia (MI), determination of MI of ring, disk, sphere and cylinder.

Gravitation: Universal law, variation of "g" due to altitude and depth. Gravitational Potential energy, escape velocity and orbital velocity. Geostationary satellite and polar satellite and their uses. Kepler law of planetary motion

Viscosity: Poiseuille equation, Bernoulli's theorem and its application. Stoke's laws terminal velocity, surface tension and its application, excess pressure inside a liquid drop and bubble Capillary rise.

**2. Heat & Thermodynamics:**

Heat & temperature – thermal expansion, specific heats, calorimeter, Latent heat, modes of transmission of heats, thermal conductivity, Newton's Law's of cooling. Kinetic theory of gases, deduction of pressure, Maxwell law of "Velocity distribution, Equi-partition of energy, Specific heats of gases – Cp, Cv and their relation. Zeroth law, 1st and 2nd Laws of thermodynamics, heat engine and refrigerator, Carnot cycle, Carnot theorem, Black body radiation, Kirchhoff law, Stefan, Bollmann Law, Wien's displacement Law.

**3. Wave & Oscillation:**

Simple Harmonic Motion, velocity, acceleration and energy of SHM, simple pendulum and its time period. Second pendulum, Forces Oscillation, damped oscillation, Resonance Transverse and Longitudinal wave, Speed of sound, Progressive and standing wave, Beats and standing wave in string and organ pipe, Doppler's effects.

**PAPER -II**

**4. Optics:**

Reflection of light, Mirror equations, reflection of light, total internal reflection, refraction through spherical surfaces, Lens maker's formula and thin lens formula Refraction through spherical surfaces, Lens maker's formula and thin lens formula Refraction through prism, dispersion of light and scattering of light. Microscope and telescope and its magnifying power and resolving power. Wave front, Huygens Principle, Law of reflection & refraction, Interference of light, Young's Double slits Experiment and Diffraction due to single Slit and width of central maxima. Polarization of light, Brewster's law Nicol Prism.



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**5. Electricity & Magnetism:**

Coulomb's law, Superposition principle, Electric field. Electric field due to point charge and dipole, Torque on electric dipole, electric flux, Guess's theorem and its application, Electric potential due to point charge and electric dipole. Equipotential surface, Capacitance in series and parallel combination, Capacitance in case of dielectric constant, energy stored in parallel plate capacitor, dielectric a and polarization, Van de Graff generator.

**Current electricity**: Drift velocity, relaxation time, Ohm's Law, Resistivity, Colour code of Carbon Resistors cell, emf and potential differences, Kirchhoff's Law, Wheatstone Law and its application, Laplace theorem, Bio-Savart Law, Ampere's circuital Law and its application, forces on a moving charge, forces between parallel current carrying conductors. Maxwell electromagnetic equations. Cyclotron, Moving coil galvanometer and conversion of Ammeter into voltmeter. Magnetic field lines, declination angle of dip, concepts of dia, para and ferromagnetic materials.

**6. Modern Physics:**

Photo electric effects. Einstein's Photoelectric equation, Compton effect, photo cell, Bohr's Theory of Hydrogen atom, radius and energy of electron in orbit of hydrogen atom. Production of X-rays and its characteristics, Moseley's Law and its use. Wave nature of particle, De Broglie Law, Davisson and Germer experiment. Rutherford's Scattering experiment, size of nucleus, Mass defect Binding energy, magic number, nuclear force and its properties. Radioactivity-Decay Law, properties of $\alpha$, $\beta$ and $\gamma$ rays. Half-life, Mean life, Q-value of nuclear reaction. Nuclear Fission and Fusion. Amorphous and crystalline solid, Crystal lattice, primitive cell. Types of Crystal Lattice, Potential energy of electron in metal, energy band in solids.

**7. Electronics and Communication:**

Energy bands in solid, Semi-conductor. Intrinsic and extrinsic Semiconductors, *p*-types and *n*-types Semiconductor, Biasing of p-n junction, Diode as half wave and full rectifier, Zener diode as voltage regulator, Transistor, Biasing of Transistor (PNP and NPN). Characteristic of NPN Transistor as amplifier, common emitter amplifier current gain voltage gain, power gain. Transistor as oscillator, Logic gates, OR AND NOT, NAND and NOR gates. Principle of Photo diode, LED and Solar Cell.

**Communication System**: Elements of communication system, band width of signal, and width of transmission medium, Needs of modulation, amplitude modulation, phase modulation frequency modulation. Production & detection of modulated wave. Different modes of propagation of E.M wave. Concepts of Radio transmission and reception system.

P. Bhutia
Secretary
Arunachal Pradesh
Public Service Commission
Itanagar

# TRAINED GRADUATE TEACHER

## Subject: English



**PAPER – I**

### Section - A
### READING COMPREHENSION

Ability to comprehend, analyse and interpret unseen texts. Two unseen texts of varying lengths (250-400) words with a variety of objective type, multiple choice questions (including questions to test vocabulary – Synonyms, Antonyms etc.) for testing factual and global comprehension.

### Section – B
### GRAMMAR AND USAGE

Ability to apply the knowledge of English grammar and use the same properly in the context

The following grammatical items/structure will be tested:

1. Tense
2. Modals
3. Voice
4. Subject-verb concord
5. Connectors
6. Clauses
7. Parts of speech
8. Punctuation
9. Word formation
10. Structure of sentences
11. Transformation of Sentences

**PAPER-II**

### LITERATURE

To test the candidate's understanding of the works of writers of different genres and periods of English Literature.

1. Shakespeare: Julius Caesar, Othello, the Marchant of Venice, Hamlet, The Tempest.
2. The Romantic Period: Shelley, Wordsworth, Keats, Coleridge, Byron etc.
3. 19th to 20th Century America and English Literature: Robert Frost, Hemingway, Ted Hudges, Whitman, Hawthorne, Emily Dickinson, Bernard Shaw etc.

# TRAINED GRADUATE TEACHER

4. Modern Indian Writing in English: Anita Desai, Vikram Seth, Salman Rushdie, Nissim Ezekiel, Jayant Mahapatra, K.N. Daruwala, Kamla Das, Ruskin Bond, R.K. Narayan, Mulk Raj Anand, Khushwant Singh, Girish Karnad, Vijay Tendulkar etc.
5. Modern Writing in English from different parts of the world including World Literature in Translation into English

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