Syllabus for Recruitment of Lecturers in

District Institute of Education and Training (DIET)

SYLLABUS FOR THE EXAMINATION OF APPOINTMENT OF LECTURERS IN DIETs UNDER HRDD, GOVERNMENT OF SIKKIM, 2014.

Paper I (Compulsory)

NB: (This paper is divided into two sections) M.M:100, Time: 3 Hours

Section A (50 marks)

- Principles of Education and Curriculum Development
- Educational Psychology.

Section B (50 marks)

- General English (Compulsory)

Paper II (Optional) M.M: 100, Time: - 3 Hours

NB: (This paper is divided into two sections Section A -50 Marks and Section B -50 Marks)

Section A (50 marks)

- Pedagogy /Methodology

Section B (50 marks)

- Content /subject

Education (Foundation Course) Compulsory paper for all

Principles of Education and Educational Psychology. M.M=50+50=100, Time: 3 Hours

Principles of Education.

Units I- Meaning, definition aims and Scope of Education

- Education as a process.
- Agencies of Education.

Unit II – An overview of salient features of the Philosophy and practice of education advocated by the following thinkers:-

- Rabindranath Tagore- Liberalization **of** Pedagogy
- M. K. Gandhi- Basic Education / Education for self sufficiency.
- Aurobindo Gosh- Integral Education.
- J. Krishna Murthi- Education for individual and Social Transformation.
- Rosseau, John Dewey and Herbert.

Unit III- Sociological bases of Education.

- Relationship between Sociology and Education and its educational implications.
- Education and social change.
- Socialisation of Child , School as a social institution, home and school , community and peer groups as informal agencies of education , mass media as an agency of education – Education for Cohesive society.

Unit IV- Contemporary Educational Problems and Issues.

- Meaning of universalisation of elementary education.
- Causes and problems for non-fulfilment of constitutional provisions regarding UEE.
- New initiatives in universalisation of elementary education. Inequality in schooling-Public, Private, Single teacher schools and many other forms of inequalities in school systems and the process leading to disparities.
- Idea of Common school system.
- Right to Education bill and its provisions.

Uint V – Examination System

- Issues related to the examination system
- Suggestions laid down by various Education Commissions and Committee.
- Innovations in Examination system with special reference to CCE, Kothari Commission (1964 – 66), New Policy on Education (1986), National Curriculum frame work (2005) and Right To Education (2009).

Unit I- Concept of Educational Psychology

- Meaning, scope, nature and aims of Educational Psychology.
- Relationship between Education and Psychology.
- Relevance of Educational Psychology to teacher learner and teaching – Learning process.

Unit VII – Growth and Development.

- Concept and Principles of Growth and Development, characteristics of various stages of development,.
- Piaget's cognitive Development theory, Erickson's Psychological Development Theory and Kohlberg's moral development theory.
- Adolescence in Indian Context – Characteristics and problems, their needs and aspirations.
- Guidance and counselling for adolescents, role of school and teacher.

Unit VIII- Psychology of Learning

- Meaning, Nature and Scope of Learning.
- Theories of Learning with Educational Implications.
- Laws of Learning.
- Factors affecting learning.
- Transfer of learning.

Unit IX- Intelligence and its theories – Meaning definition & types of intelligence.

- Measuring intelligence, aptitude and Interest.
- Nurturing Emotional Intelligence.

Unit- X – Psychology of adjustment.

- Adjustment as achievement, adjustment as process.
- Frustration - frustration of conflict, operations of frustrations, what is maladjustment, causes of maladjustment in school, role of the teacher.

Methods of studying learner's behavior- observations, experiment, case study, interview and survey.

Section B (50 Marks)

General English (Compulsory)

1. Reading Comprehension.
2. Nouns: Kinds, Number, Gender, Case.
3. Verbs: Main verbs, Auxiliaries, Transitive, Intransitive, Finite, Infinite.
4. Adverbs.

5. Adjectives : Kinds , Formation, degree of comparison
6. Pronouns: Personal, relative Pronoun, Reflective Pronoun & usage.
7. Preposition – Kinds, prepositions of time, place, position, direction.
8. Conjunctions- Co-coordinating, subordinating, co-relative conjunctions, sentence connectors.
9. Determiners – Articles, demonstrative, distributive.
10. Clauses – Adjective, adverb and noun clause.
11. Punctuations.
12. Synonyms antonyms, Idiomatic Expressions and miscellaneous idiomatic expression.
13. Time and Tenses
14. Transformation of Sentences.
15. Essay Writing: descriptive, narrative, Reflective and argumentative.
16. Miscellaneous topics: note making, summarizing abstracting, advertisement, notices, letters, circulars, report writing.

Paper II (Optional)

NB :(This paper is divided into two sections) M.M: 100, Time: 3 Hours

Section A & B (50+50= 100 Marks for Contents and Methodology)

ENGLISH

Unit: I Nature of Language: What is Language; first, second and foreign language- A historical view of English as a second language.

Unit: II Language Policy

- Language Policy with special reference to Three – Language Formula.
- Language Policy of Sikkim.

Unit III: Listening and Speaking Skills

- Types of Listening.
- Functions of Listening.
- Sound System of language – phonology and prosody.
- Stress – word stress, sentence stress in connected speech.
- Using dictionary for correct pronunciation and stress.

Unit IV: Reading Skill

- Reading with comprehension different types of texts (Levels of comprehension).
- Reading for global and local understanding.
- Reading strategies.
- Reading different Text types.

Unit V: Writing Skill

- Mechanics of writing
- Process of writing.
- Types of writing 1. Traditional (Essays, letters, applications, notices, invitation, paras composition, etc.), 2. Non-Traditional (Diaries, filling up forms, transformation of information, etc.)

Unit VI: Literature

- Role of Literature in Language learning.

Unit VII: Testing and Evaluation

- Testing Speaking and Listening.
- Testing Reading and Writing.

Unit VIII: Basic Grammar

Section B

Methodology

- Behaviorist and Cognitivist view of teaching language.
- Methods and Approaches of teaching language.
- Unit planning.
- Lesson planning – Prose, Poetry, Drama, Grammar.
- Importance and use of teaching aids.

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Section A (50 Marks) **Total (50+50=100), Time: 3 Hours**

Note: Candidates shall opt one of the options

Methodology: **Syllabus for Social Sciences - History, Geography, Economics, Sociology,**
Political Science/Education/Psychology (foundation course) and Nepali (For Nepali paper, the candidates shall have both contents and methodology in the same syllabus prescribed for Maximum 100 marks)

- Scope of Social Studies / Science and definition in the importance of studying social sciences, Concept of Social Studies.

Objectives, Purposes of Teaching Social Studies:-Objectives of Teaching Social Studies, General Objectives of Teaching Social Studies, Instructional Objectives of Teaching Social Studies and its Aims and Values.

Principles of Designing Social Studies Curriculum:-What is Curriculum, Importance of the Curriculum, Objectives of Social Studies Curriculum, Contents of Social Studies Curriculum, Syllabus.

Instructional Strategies:-Types of Teaching Strategies, Teaching Models, Chief Characteristics of Teaching Models, Utility of Teaching Model and Modern Teaching Models. **Strategies of Teaching Social Studies:**-Need of a Variety of Methods in Social Studies, Characteristics of a Good Teaching Method, Need of Different Method of Teaching Social Studies, The Lecture Method, Discussion Method, Conversation Method, Lecture -Cum-Discussion, Project Method, The Problem Method, Socialized Recitation Method, Source Method.

Planning of Instruction in Social Studies:-Importance of Lesson Planning, Steps in Lesson Plan, Yearly Plan or Semester Plan, Unit Plan, Unit Plan Table, Lesson Planning in India, Classification of Lesson Plans, Writing of Lesson Plans and Black Board summary. **Micro Teaching Lesson Plans for Developing Skills**:-Micro- Teaching, Teaching Skills, Developing the Skill of introduction, Observation and Evaluation Sheet for Introduction Skill, Pattern of Observation Sheet for Introduction Skill, Developing the Skill of Questioning and Developing Skill of Demonstration, Developing Skill of Providing Illustration,

Evaluation in Social Studies:-Formative and Summative Evaluation, Definition of Evaluation, Difference Between Examination And Evaluation, Techniques of Evaluation, Limitations, Hints for Improving Rating Scales, New Idea of Evaluation, Important Elements in Evaluation, Specific Objectives of Evaluation in Social Studies, Formative and Summative Evaluations, Formative and Summative Test. **Remedial Teaching:**-Meaning and Definition of Remedial Teaching, Functions of Remedial Teaching, objectives of Remedial Teaching.

Content Papers for Social Sciences

Section B (50 Marks)

GEOGRAPHY

Paper I Physical Geography (Geomorphology):

a. Landforms and their significance, formation and evolution of landforms
b. Weathering and Erosion-resultant physical features
c. River water erosion, Wind erosion, Glacial erosion, associated landforms
d. Rocks and Minerals their classification.

Paper II Social, Human and Economic Geography:

a. Human occupation, economic activities, Human settlements-rural/urban
b. Population Geography: Demography; Urbanization; Cultural and Political Geography
c. Natural resources-utilization and conservation; environmental degradation.

Paper III Population Geography:

a. Theories; Growth and distribution of population; composition
b. Migration; fertility/Mortality and population policies.

Paper IV Climatology:

a. Weather and climate
b. Air pressure belts
c. Heat budget
d. Wind circulation
e. Indian monsoon; mechanism of rainfall.

Paper V Biogeography:

a. Ecosystem and environment
b. Man's interaction with environment and sustainable development
c. Globalization and Environment.

Paper VI Geography of India:

a. Physical feature; Sub-division at micro-meso and micro level
b. Soil; climate; natural vegetation and wild life (fauna & flora)
c. Natural resources; agricultural and irrigation
d. Indian population and policies
e. Indian Urbanization
f. Trade, Commerce & Transportation

Paper VII Maps and Scales:

a. Representation of physical features, climatic data and statistical data
b. Map Projection; Thematic Maps and Diagrams
c. Cartographical techniques; interpretation of topo maps
d. Aerial photography; Remote sensing; field survey
e. Use of weather maps and climographs
f. Statistical Techniques; Mean, Media, Mode to study geographical phenomenon, Measurement of Central Tendency.

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HISTORY

HISTORY OF INDIA

1. History of Ancient India – Sources of Indian History. Indus Valley Civilization – Gangetic Civilization. Pre-Mauryan period – Mauryan period, Society, education, economy, trade during the period.
2. Evils of Hinduism and growth of Buddhism and Jainism. Reform movements in ancient Hinduism, Varna its evolution.
3. The Roman and the Greek civilization.
4. The Medieval India – Sociological and cultural evolution in medieval India, Tantrism, Languages in India – from Sanskrit to the modern Indian languages.
5. South India – The Vijaynagar Empire.
6. Advent of the Mongols and the Muslims, Muslim Rule in India, expansion of Muslim empire in India, expansion in the south Decan.
7. India under the Mughals – Sher Sah Suri and defeat of Humayun, Akbar and his successors, Advent of British, European expansion, Colonization, trade and India under the British, Dutch, French and British in India, Socio-economic condition of the country during the Guptas-Rajputs, Muslims, Mughals an the British.
8. (a) Indian trade and foreign relations in ancient, Modern India, India after Independence.
   (b) History of Freedom Movement in India.
9. Early History of Sikkim, advent of the Namgyal Dynasty, integration and after.
10. History could be more related to society, civilization, language, culture, economy.

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ECONOMICS

1. Concept of production: Factors of production, consumption, capital formation.
2. People as a resource: economic activities done by men and women, quality of human resource, role of health and education, unemployment, its sociopolitical implications.
3. Poverty as a challenge facing India: Who is poor, rural and urban indicators of poverty, absolute poverty, causes of poverty, unequal distribution of resources, comparison between countries; steps taken by Government for poverty alleviation.
4. Food Security: Source of food grains, variety across the nation, famines in the past, need for self sufficiency, role of Govt. in food security, procurement of food grains, public distribution system, role of cooperatives in food security.
5. The story of development: The traditional notion of development; National Income and percapita income; Growth of National Income; critical apprise of existing development indicators (PCI, HDI, IMR, SR and other income and health indicators). The need for health and educational development, Human Development indicators. (Can study of three states Kerala, Punjab and Bihar) or (Countries like India, China, Srilanka and one developed country).
6. Sectors of the Indian Economy: Sectors of Economic activities; Historical change in sectors; Rising importance of tertiary sector; Employment generation; Division of sectors – organized and unorganized; Protective measures for unorganized sector workers.
7. Money and Credit: Role of money in an economy; Historical origin; Formal and informal financial institutions for savings and credit – General introduction; Select one formal institution such a a Nationalized Commercial bank and a few informal institutions; Local money lenders, landlords, self-help groups, chit funds and private finance companies.
8. Globalization: What is globalization? (Simple examples); How is India being globalised and why? Development strategy prior to 1991. State Control of industries; Textile goods as an example for elaboration; Economic reforms 1991. Strategies adopted in reform measures (easing of capital flows, migration, investment flows); Different perspectives on globalization and its impact on different sectors; Political impact o globalization.
9. Consumer Awareness: How consumer is exploited (two simple case studies); Factors causing exploitation of consumers, rise of consumer awareness; How a consumer should be in a market; role of Govt. in consumer protection.

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POLITICAL SCIENCE

1. **Political Theory and Thought:-** Ancient Indian Political Thought: Kautilya and Shanti Parva, Greek Political Thought: Plato and Aristotle, Modern Indian Thought: Gandhi, Aurobindo Ghosh.

2. **Comparative Politics and Political Analysis:**-Evolution of Comparative Politics as a discipline; nature and scope, Approaches to the study of comparative politics: Traditional, Structural-Functional Systems and Marxist,

3. **Forms of Government**: Unitary-Federal, Parliamentary-Presidential,

4. **Organs of Government**: Executive, Legislature, Judiciary -Their inter-relationship in comparative perspective,

5. **Party Systems and Pressure Groups;** Electoral Systems, Bureaucracy-Types and roles.

6. **Indian Government and Politics:** Preamble, Fundamental Rights and Duties and Directive Principles, Constitution as Instrument of Socio-Economic Change, Constitutional Amendments and Review,

7. **Structure and Process-I:** President, Prime Minister, Council of Ministers, Working of the Parliamentary System,

8. **Structure and Process-II:** Governor, Chief Minister, Council of Ministers, State Legislature, Panchayati Raj Institutions:

9. **International Relations:**-Cold war, Alliance, Non-alignment, End of Cold war, Globalisation, Rights and Duties of states in international law, intervention, Treaty-law, prevention and abolition of war.

10. India's Nuclear Policy, India's Relations with Neighbours and USA, India's Role in the UN, India and Regional Organizations (SAARC, ASEAN) and Indian Ocean.) and relation between India and Pakistan, Bhutan and Nepal.

SOCIOLOGY

Sociological Concepts:-Nature of Sociology, Definition, Sociological Perspective.

Basic Concepts:-Community, Association, Norms and Values, Institution, Culture.

Social Structure:-Status and role, their inter-relationship.

Social Group:-Meaning, Types: Primary-Secondary, Formal-Informal.

Social Institutions:-Marriage, Education, Family.

Socialization:-Socialization, Agencies of Socialization.

Social Stratification:-Social differentiation, Forms of stratification: Caste, Class, Gender, Ethnicity, Social Mobility.

Social Change:-Concepts and Types: Evolution, Diffusion, Progress, Revolution and Transformation.

Conceptualizing Indian Society:-People of India; Unity in diversity, Cultural diversity: Regional, Linguistic, Religions and Tribals.

Issues Pertaining to Deviance:- Crime and delinquency, White collar crime and corruption, Drug addiction, Suicide.

Current Debates:-Tradition and Modernity in India, Problems of Nation Building, Secularism, Pluralism and Nation Building.

Rural Development and Change:-Trends of changes in rural society, Processes of change: Migration Rural to Urban and Rural to Rural Mobility: Social/ Economic.

Theories of Underdevelopment: Paths of Development:-Modernization, Globalization, Socialist, Mixed, Gandhian.

Population Control:-Population policy Problems and perspectives, Population education, Measures taken for population control.

Women and Development in India.:-Indicators of women's status: Demographic, social, economic and cultural, special schemes and strategies for women's development, Voluntary sector and women's development, Globalisation and women's development.

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नेपाली पाठ्यक्रम

१. भाषा - क) भाषाको अर्थ र परिभाषा
ख) शिक्षण क्षेत्रमा भाषाको महत्व र आवश्यकता
ग) नेपाली भाषा उत्पत्तिको संक्षिप्त इतिहास
घ) भाषा शिक्षणका उद्देश्य

२. मातृभाषा- क) मातृभाषाको अर्थ र परिभाषा
ख) शिक्षण क्षेत्रमा मातृभाषाको महत्व र आवश्यकता
ग) सिक्किमेली परिवेशमा मातृभाषाको स्थान

३. भाषा कौशल/भाषागत योग्यताका अपेक्षित स्तर-

क) श्रवण कौशल/सुन्ने कौशल - आवश्यकता र महत्व

प्रकार- १. सामान्य
२. मनोरञ्जनात्मक
३. विश्लेषणात्मक

- सुनाइ सम्बन्धी कमजोरीका कारण-
१. वक्तागत
२. भाषिक क्षमतागत
३. वातावरणगत
४. श्रोतागत

- सुनाइ शिक्षणका कार्यकलापहरू - विभिन्न प्रकारका कार्यक्रमहरू

ख) बोल्ने कौशल - आवश्यकता र महत्व
- बोलाइको विकासमा प्रभाव पार्ने तत्वहरू
जस्तै-वातावरण, संवेग, शारीरिक स्थिति, वेवास्ता (carelessness) भाषिक अनुभव

- बोलाइ शिक्षणका कार्यकलापहरू- जस्तै- कुराकानी, प्रश्नोत्तर, वस्तु तथा चित्र वर्णन, कथाकथन, घटना वर्णन, वाद-विवाद, छलफल, परिचर्चा, अभिनय/नाटकीकरण, तत्काल भाषण (extempore)

ग. पढ़ाइ कौशल
- महत्व र आवश्यकता
- पढ़ाइका प्रकार
- पढ़ाइका उद्देश्यहरू
- सस्वरवाचनका गुणहरू

घ) लेखन कौशल
- महत्व र आवश्यकता
- लेख्ने तरिका
- लेखाइका प्रकार
- सुन्दर हस्तलिपिका चिह्नहरू, जस्तै- प्रष्टना, अक्लिष्टना अन्तरता, समानता

४. साहित्य
- साहित्यको अर्थ
- भाषा शिक्षणमा साहित्यको स्थान

५. नेपाली पाठ्य पुस्तक - पहिलो श्रेणीदेखि आठौं श्रेणीसम्म

६. व्याकरण- व्याकरणका विभागहरू

७. एकाई योजना

८. पाठ योजना
- शिक्षण क्षेत्रमा पाठयोजनाको महत्व
- गद्य, पद्य, नाटक र व्याकरण पाठयोजनाका नमूनाहरू
- शिक्षण सामग्री

MATHEMATICS

Content Paper **M.M :-(50+50=100) , Time :- 3 Hours**

Unit – 1

1. **Complex Numbers and Quadratic Equation.-** Need for complex numbers, especially , 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. **Sequence and Series:-**Sequence and Series. Arithmetic progression (A.P.), arithmetic mean (A.M.) Geometric progression G. P., sum of a_n 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.

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 DIMENSIONAL GEOMETRY:- 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.

Unit – V

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.

Methodology

Nature of Mathematics: Human need as a basis of growth in Mathematical Thinking, Pure and Applied Mathematics, Intuition & logic in Mathematical thinking, Axiomatic nature of Mathematics, Language of Mathematics

Need and importance of teaching Mathematics in school curriculum: Social aspect, Mathematical aspect, Applications of Mathematics

Trends and Principles of formulating Mathematics Curriculum: Factors affecting change in Curriculum, Principles of formulating Mathematics Curriculum.

Contribution of Indian Mathematicians

Basic principles of Methods of teaching of Mathematics: Principles of child development and learning, Trends in organizing content, Problem solving approach to teaching.

Methods of teaching Mathematics: Induction and deduction, Analytic and synthetic methods, Heuristic/ Discovery method

Techniques in Teaching Mathematics: Drill and practice, Oral and written work, Play way Technique, Assignment and Home work, Teaching – Learning materials and teaching aids, Laboratory approach to teaching Mathematics

Planning for effective instruction of Mathematics

Evaluation in Mathematics

Teaching of Arithmetic and Commercial Mathematics, Algebra and Geometry.

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SCIENCE

Optional Papers (Biology/ Chemistry/ Physics)

Note: Candidates shall opt one of the options)

Section A (Contents)

BIOLOGY **M.M:- (50+50) = 100, Time: - 3 Hours**

UNIT 1 – STRUCTURAL ORGANIZATION IN PLANTS AND ANIMALS.

- Biological classification – animal kingdom and plant kingdom
- Structural organization in animals – Animal tissues (Epithelial tissues, connective tissues, muscle tissues, neural tissues), organ and organ system of earthworm, frog, and cockroach.

UNIT 2 – HUMAN PHYSIOLOGY

- Digestion and absorption – human digestive system, digestive glands, absorption of digested food, disorder of digestive system
- Breathing and exchange of gases – human respiratory system, mechanism of breathing, respiratory volumes and capacities, disorders of respiratory system.
- Excretory products and their elimination
- Locomotion and movement – human excretory system, disorders of excretory system.
- Neural control and co-ordination – neuron as structural and functional unit of neural system.

UNIT 3 – PLANT PHYSIOLOGY

- Morphology of flowering plants – modification of root, modification of shoot, modification of leaves, parts of flower, the fruit, structure of dicotyledons seed and monocotyledon seed, semi description of a typical flowering plant. (e.g. solanaceae, liliaceae)
- Anatomy of flowering plants – The tissue (Meristematic and Permanent tissue), The tissue system (Epidermal tissue system, Ground tissue system, vascular tissue system), Anatomy of Dicotyledonous and monocotyledonous plants, Secondary growth (vascular cambium and cork cambium)
- Transport and Mineral nutrition in plants – means of transport -diffusion, facilated diffusion, active transport, osmosis, plasmolysis, imbibitions, transpiration, uptake and transport of mineral nutrients.
- Mineral nutrition – role of macro and micro nutrients, metabolism of nitrogen cycle,
- Photosynthesis in higher plants – where does photosynthesis take place, light reaction, C3 and C4 pathway, photorespiration, factors affecting photosynthesis.

UNIT 4 – CELL STRUCTURE AND FUNCTION

- Cell –the unit of life- structure of Prokaryotic cells and Eukaryotic cells,
- Cell cycle and cell division – phases of cell cycle, significance of mitosis and meiosis.

UNIT 5 – ECOLOGY

- Ecosystem – structure and function, energy flow, Nutrient cycling (carbon cycle, phosphorous cycle)
- Biodiversity and conservation – patterns of biodiversity, how do we conserve biodiversity.

UNIT 6 – GENETICS AND EVOLUTION

- Principles of inheritance and variation – Mendel's law of inheritance, law of dominance and law of segregation, sex determination, genetic disorders, chromosomal disorders,
- Molecular basis of inheritance – the structure of DNA, properties of genetic material (DNA versus RNA), transcription.

CHEMISTRY

UNIT 1 – ATOMIC STRUCTURE, PERIODIC CLASSIFICATION AND CHEMICAL BONDING.

- Structure of atom
- Classification of elements
- Chemical bonding and molecular structure.

UNIT 2 – CHEMICAL REACTION

- Types of chemical reaction and representation of chemical reaction.

- Mole concept
- Energy changes during the chemical reaction.
- Chemical equilibrium.

UNIT 3 – EXTRACTION OF THE METALS AND THE NON-METALS

- Occurrence of metals
- Concentration of ores
- Reduction of concentrated ore
- Purification of metal
- Extraction of non-metal

UNIT 4 – STATES OF MATTER

- Three states of matter, intermolecular inheritance, types of bonding, melting and boiling points, role of gas law in elucidating the concept of the molecule, Charle's law, Gay lussac's law, avagadro's law, ideal behavior, empirical derivation of gas equation, avagadro's number, ideal gas equation, kinetic energy and liquefaction of gases, critical temperature.
- Liquid state – vapor pressure, viscosity and surface tension.

UNIT 5 – BIOMOLECULES

- Carbohydrates – classification (aldoses and ketoses), monosaccharide (glucose and fructose), D-L configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen), their importance.
- Proteins – elementary idea of amino acid, peptide bond, polypeptide, primary structure, secondary structure, tertiary structure and quaternary structure, denaturation of proteins, enzymes.
- Hormones – elementary idea
- Vitamin – classification and function
- Nucleic acid – DNA and RNA.

UNIT 6 – THERMODYNAMICS

- Concept of system, types of system, work, heat, energy, extensive and intensive properties, state function
- First law of thermodynamics – internal energy and enthalpy, heat capacity and specific heat. Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution.
- Introduction of entropy as a state function, second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium
- Third law of thermodynamics.

UNIT 7 - ELECTROCHEMISTRY

- Redox reaction, conductance in electrolytic solution, specific and molar conductivity variation of conductivity with concentration.
- Kohlarussch's law, electrolysis and law of electrolysis, dry cell – electrolytic cells and galvanic cells, lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cell.
- Relation between Gibbs energy change and EMF of a cell, fuel cells, corrosion.

PHYSICS

UNIT 1 – FORCE AND MOTION

- Relation of motion and force
- Newton's laws of motion
- Conservation of momentum
- Application of one's laws of motion in daily life

UNIT 2 – LIGHT – IMAGE FORMATION BY MIRRORS AND LENSES

- Image formation by spherical mirrors and concave mirror
- Reflection and refraction of light
- Image formation by spherical lenses
- Application of refraction of light in daily life

- Optics

UNIT 3 – ELECTROMAGNETISM

- Magnetic effects of current.
- Need for displacement current
- Electromagnetic wave and their characteristics, transverse nature of electromagnetic waves.
- Electromagnetic spectrum (radio waves, microwaves, infra red, ultra violet , x-rays, gamma rays) including elementary facts about their uses
- Electromagnetic induction

UNIT 4 – THERMODYNAMICS

- Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat work and internal energy.
- First law of thermodynamics, isothermal and adiabatic processes.
- Second law of thermodynamics, reversible and irreversible processes.

UNIT 5 – ELECTROSTATICS

- Electric charges and their conservation. Coulomb's law – force between two point's charges, forces between multiple charges, superposition principle and continuous charge distribution.
- Electric field – electric field due to a point charge, electric field lines, electric dipole, torque on a dipole in a uniform electric field.
- Electric flux – statement if Gauss's theorem and its application to find field due to infinitely long straight wire, uniformly charges infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).
- Electric potential due to a point charge, a dipole and system of charges, equipotential surfaces, electric potential energy of a system of two charges and of electric dipoles in an electrostatic field.

UNIT 6 – ATOMS AND NUCLEI

- Alpha particle scattering experiment, Rutherford's model of atom, Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars and 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.

UNIT 7 – ELECTRONIC DEVISES

- Energy bonds in solid conductors, insulators and semi-conductors.

- Semiconductors diode – I-V characteristics in forward and reverse bias, diode as a rectifier, I-V characteristics of LED, photodiode, solar cell and Zener regulator.
- Junction transistor, transistor action, characteristics of transistor, transistor as an amplifier and oscillator. Logic gates (OR, AND, NAND and NOR).

Section B. (M.M 50)

METHODS FOR TEACHING SCIENCE/METHODOLOGY FOR GENERAL SCIENCES.

UNIT 1 – AIMS AND OBJECTIVES OF TEACHING SCIENCE

- Taxonomy of educational objectives – cognitive, affective, psychomotor, specification of each objective in terms of pupil behavior.
- Relationship between the cognition and affective domain.
- Behavioral objectives – stating the condition, stating the criterion, Behavioral terms for stating specific objectives – knowledge, comprehension, application, analysis, synthesis, evaluation, and test items.

UNIT 2 – METHODS OF TEACHING SCIENCE

- Guiding principles for selecting teaching methods , lecture method, demonstration method, lecture cum demonstration method, laboratory method, project method, problem solving method, heuristic method, problem solving method, programmed instruction method, individualized instruction method.

- Constructivist approach of teaching-learning.

UNIT 3 – USE OF AUDIO-VISUAL AIDS IN TEACHING SCIENCE

- Importance of audio-visual aids.
- Different kinds of audio-visual aids – 1) Direct purposeful experience, 2) Contrived experiences – Objects and specimens, 3) Dramatic participation, 4) Demonstration, 5) Field trip or excursion, 6) Exhibits – museum, 7) Motion pictures and television, 8) Radio recordings and still pictures – bulletin boards ,projected pictures, opaque projector or episcope, slide cum film strip projector, 9) Visual symbols- chalk board, overhead projector, 10) verbal symbols
- Effective use of audio-visual aids
- Development of improvised teaching aids/apparatus – selection, preparation and use teaching aids.

UNIT 4 – MICROTEACHING

- Concept and definition of micro-teaching
- Identification of teaching skills
- Integration of teaching skills
- Comparison of conventional student teaching and microteaching based student teaching.

UNIT 5 – LESSON AND UNIT PLANNING

- Objectives, content, methods, evaluation, art of questioning, stimulating learning, steps involved in lesson planning – preparation, introduction, aim, method, application, recapitulation,
- Unit planning- characteristics of unit plan, steps involved in unit plan, Performa of a unit plan.

UNIT 6 – EDUCATIONAL TECHNOLOGY

- Concept of educational technology
- Educational technology and Instruction technology
- Educational technology and Teaching technology
- Types of educational technology – Educational technology I – Hardware approach

  Educational technology II – Software approach
  Educational technology III – System approach

UNIT 7 – EVALUATION

- Assessment – purpose of assessment, teachers' activities for assessment of pupil's abilities, aptitudes, and interests.

- Criteria of test – tools and techniques of evaluation, steps in test construction.
- Diagnostic testing and remedial teaching in science.

OPTIONAL PAPERS (Foundation course) **SYLLABUS**

EDUCATION/PSYCHOLOGY

Max. Marks-100(50+50)

Content + Methodology

Time-03 hours

N.B: For those candidates who want to opt for Education/ Psychology as one of the options.

UNIT-I

1. **RELATIONSHIP OF EDUCATION AND PHILOSOPY**

   Introduction:- Meaning of Philosophy ; Scope of Philosophy, Brief chronology of western philosophical thought; Concepts of Education; Function of Education; Various forms of Education; Scope of Education; Inter- relationship of Philosophy & Education; Philosophy and Various Dimensions of Education.

2. **WESTERN PHILOSOPHIES AND EDUCATION.**

   Introduction; Idealism; Naturalism; Realism; Humanism; Pragmatism; Reconstruction.

3. **WESTERN PHILOSOPHERS AND EDUCATION**

Jean Jacques Rousseau (1712-1778); John Dewey (1859-19520.

4. **INDIAN PHILOSOPHIES AND EDUCATION.**

   Introduction; Sources of Indian Philosophy; Darshan (Vedic Education); Heterodox or Vedic Philosophies; Nature of Education According to Advaite Vedana; Islamic Tradition & Buddhism.

5. **INDIAN PHILOSOPHERS**
   Mahatma Gandhi (1869-1948); Ravindra Nath Tagore(1861-1941)

UNIT- II

1. **AGENCIES OF EDUCATION**
   Introduction; Some Important Agencies of Education; Indian Schooling System; a critical appraisal; Reality (An active but informal Agency); Community (An Agency of Education); Church or Religion (An Active and Informal Agency of Education) State (An Active and Non Formal Agency of Education).
2. **MODERNISATION OF EDUCATION.**

   Modernization and Westernization of Education.

UNIT-III

1. **PSYCHOLOGY AND EDUCATIONAL PSYCHOLOGY.**
   Psychology; Scope of Psychology; Need of Education; Education Psychology.
2. **PSYCHOLOGY OF CHILD DEVELOPMENTS.**
   Stages of Development; Effects of emotions.
3. **LEARNING OF CONCEPTS, REASONING AND PROBLEM SOLVING.**
   Meaning of Concepts; Meaning of reasoning; Meaning of problem solving; Thinking process and role of the teacher.

UNIT-IV.

1. **INTELLIGENCE AND ITS MEASUREMENT.**
   Introduction; Definitions of Intelligence; Characteristics of Intelligence; Theories of Intelligence; Measurement of Intelligence; Binet-Simon Scale; Classification of intelligence Test.
2. **MEMORY AND FORGETING.**
   Meaning of memory; Theories of forgetting; Measurement of retention; types of memory.
3. **MOTIVATION AND LEARNING**

   Meaning of motivation; Technique of Motivation; Theories of Motivation.

4. **LEARNING THEORIES AND THEIR APPLICATIONS.**
   Meaning of learning; Types of Learning; Importance of learning for teachers; Theories of learning.

5. **TRANSFER OF TRAINING.**
   Definitions; Theories of Transfer.

UNITE-V

1. **PERSONALITY & ITS MEASUREMENT.**
   Meaning of personality; Definition of personality; Theories of personality; Basic Principle of Social Learning; Measurement of Personality; (E) Measurement of Attitude, Interest and Values.

UNIT-VI

1. **BACKWARD CHILDREN AND THEIR EDUCATION ADAPTATION.**
2. **EDUCATIONAL GUIDANCE AND CONSELING**

   Introduction; Techniques & Approach of guidance and counseling; Types of guidance and counseling services in the school.

UNITE-VII

1. **MEASURE OF CENTRAL TENDENCY.**
2. **UNIVERSALISATION OF EDUCAITON.**
3. **EDUCATIONAL ADMINISTRATION IN INDIA.**
4. **DISTANCE EDUCAITON IN INDIA**
   Introduction
5. **VOCATIONALIZATION OF EDUCATION IN INDIA**
   Introduction and meaning.

UNIT-VIII

DEVELOPMENT OF CURRUCULUM.

UNIT-IX

MEASUREMENT AND EVALUATION

1. **MEASUREMENT AND ITS RELATED CONCEPT.**
   Meaning of Measurement; Historical Perceptive; General Theory of Measurement.
2. **APTITUDE AND ACHIEVEMENT TESTS.**
   Meaning of Aptitude; Types of Aptitude Test; Meaning of Achievement.
3. **CONSTRUCTION OF OBJECTIVE TYPE TESTS AND ITS STANDARDIZATION.**
   Introduction; A. standardized tests. B. Teacher made tests; steps in construction of an objective type test (A) planning of a test(First step); (B) item Writing (Second step); (c) Experimental try out of the test(Third Step)(D) Proper try out and item analysis(Fourth Step); Steps in Item Analysis;(E) Final Try out (Fifth Step).
4. **MODERN TRENDS IN EVALUATION**

   (A)Grading System; (B) Semester System; (C) Continuous- Comprehensive/ summative Assessment; (D) Question Bank System; (E) Uses of Computer in evaluation.

UNIT-X

1. **EDUCATIONAL TECHNOLOGY: NATURE AND SCOPE.**

Meaning of Technology; Educational technology; Definitions of Technology; Characteristics of educational Technology; Use of Educational Technology for Teachers; Functions/ Objectives of Educational technology; Scope of Educational technology.

2. **MULTIMEDIA APPROACH IN EDUCATION.**
   Classification of audio-visuals; Important projected devices; Software aids; non-projected aids.
3. **PROGRAMMED INSTRUCTION.**
   Introduction; Types of programmed Instruction; (a) linear of extrinsic programming of Instruction; (b) Branching or Intrinsic programming of Instruction.
4. **MODELS OF TEACHING.**
   Introduction; Classifications of teaching models.