SYLLABUS FOR THE POST OF ASSISTANT TEACHER (L.T. GRADE)

PART- 1(A)

ACADEMIC APTITUDE (COMMON TO ALL SUBJECTS)

UNIT-01

Education and Philosophy, relationship between education and philosophy, contribution of various philosophies of education- Naturalism, Pragmatism, Idealism and Realism, educational thinkers and their pedagogical concepts- Rousseau, Plato, Aristotle, Dewey, Aurobindo, Gandhi, Vivekananda, Tagore, Gijju Bhai and Savitri Bai Phule, concept of education, training, teaching and indoctrination, functions and agencies of education, sources of education, issues and challenges of education in 21st century, opportunities and excellence in education, aculturization and multilingualism.

Role of teachers in emotional, social and national integration, Preamble of Indian Constitution, Constitutional provisions of Freedom, Justice, Equality and Fraternity, globalization, privatization, universalization and modernization of education, education and sociology, education as an investment, school as an agent of social change, teacher as a social reformer, Indian knowledge system, role of curriculum, teacher, school, family and community in value inculcation, environmental education.

UNIT-02

Child development, personality: types, theories, and role of teachers in personality development, intelligence: concept, theories, and measurement, measurement of aptitude, difference between aptitude and attitude, learning: concept, theories (Pavlov, Piaget, Skinner, Thorndike), and their educational implications, motivation: types and educational implications, mental health and hygiene, criteria of good mental health , role of teachers in maintaining good mental health of students, Yoga and Fit India Movement for better health, guidance and counseling: qualities of a good counselor, role of teachers as counselor and stress manager, creativity and its nurturing, educational measurement and its areas, test construction: teacher made and standardized tests, uses of tests, Continuous and Comprehensive Evaluation (CCE), adjustment and its areas, case study, drama and Art in education.

UNIT-03

Educational Technology and its types (Hardware, software, and system analysis), Teaching - Phases of teaching, levels of teaching, Theories of teaching, Models of teaching, teaching and learning: planning, organizing, leading and controlling.

Uses of Over Head Projector (OHP), Computer assisted learning, email, internet, websites, teleconferencing, e-library, e-reading and blogs.

Information and Communication Technology (ICT) for innovation in teaching, training and learning; effective teaching; creating conducive learning environment; modification of teacher behavior; micro-teaching; Simulated Social Skill Training (SSST), blended teaching; team teaching, and flander's classroom interaction analysis.

ICT in: lesson preparation or lesson planning, demonstration of learning points, online and offline teaching-learning process, online assessment and examination, appropriate use of human resources.
Preparation and uses of: PPT, MOOCs, e-content, e-assignment, social network for the class, e-record, open education resources, use of web 2.0 tools for learners, ICT tools for teaching, learning and assessment, Teaching Learning Material (TLM)--Audio, Visual and Audio-Visual: Role of Edusat, Gyan Darshan, PRAGYATA (Guidelines for digital education), DIKSHA in learning with the pace of learner, latest trends in technology in/for education, school internship and related aspects, action research, methods, skills, tactics, and strategies of teaching.

UNIT-04

Education of the gifted, delinquents, socially and economically disadvantaged children including Scheduled Castes (SCs), Scheduled Tribes (STs), minorities, backward classes, culturally and lingustically diverse, transgender, girls, etc., Gender issues- Gender equality, gender biasness, gender stereotypes, harassment and safety measures in schools , overview of girls education in Uttarakhand, educational provisions and pedagogical interventions for students with disabilities, concept, issues and practices in special education, integrated education and inclusive education, disabilities: types and causes, curriculum, classroom and infrastructural adaptations, community involvement, issue of equity, equality and quality, barriers and facilitators, provisions in National Education Policy (2020) for education of diverse group.

UNIT-05

School administration, its structure and schemes with special reference to Uttarakhand,
Role of principal and teacher in school administration and leadership, Decision making, Planning, Controlling, Organizing, Discipline, Supervision, Hurdles and their possible solutions in teaching learning process, Human Resource Management in Education.
Functions of the University Grants Commission (UGC), National Council for Teacher Education (NCTE), Rehabilitation Council of India (RCI),Central Advisory Board of Education (CABE), National Council of Educational Research

and Training (NCERT), State Council of Educational Research and Training (SCERT), Kendriya Vidyalaya Sangathan (KVS), Navodaya Vidyalaya Sangathan (NVS), Kasturba Gandhi Balika Vidyalayas (KGBVs), District Institutes of Education and Training (DIETs) in facilitating education, issues of: educational autonomy, accountability, and teacher absenteeism.

National Policy of Education (1968), National Policy on Education (1986), Revised NEP 1992, National Curriculum Framework for School Education: 2005 and 2023 respectively, National Education Policy (2020), National Curriculum Framework for Teacher Education (2009), National Skills Qualification Framework (NSQF), Right to Education Act (2009), Rights of Persons with Disability Act (2016).

Mudaliar Commission, Kothari Commission, National Knowledge Commission, Justice Verma Commission, Sarva Shiksha Abhiyan (SSA), Rashtriya Madhyamik Shiksha Abhiyan (RMSA), Samagra Shiksha, NISHTHA.

Part 1(B)

SYLLABUS FOR THE POST OF ASSISTANT TEACHER (L.T. GRADE) PART-1(B) (REASONING TEST AND GENERAL KNOWLEDGE---COMMON TO ALL SUBJECTS)

UNIT 1

NON VERBAL ABILITY TEST: Series, Counting of figures, Classification, Completion of figures, Odd figure out, Figure matrix

UNIT 2

VERBAL ABILITY TEST: Alphabetical test, Coding and decoding test, Odd one out, Series completion test, Order arrangement, Blood relation test, Problems based on age

UNIT 3

GENERAL KNOWLEDGE:

Uttarakhand: State profile and Historical background, Bio diversity, Population, Ancient, medieval and modern Uttarakhand

India: Indian states, Prominent books and their authors, Main scientific discoveries, Renowned scientists, Prominent awards, Education, national symbols, Famous religious places, Prominent sports and related terminology

सहायक अध्यापक हिन्दी (एल0टी0 ग्रेड) हेतु पाठ्यक्रम

विषय–हिन्दी

खण्ड : अ–भाषा

1. हिन्दी वर्णमाला–
   (क) स्वर, व्यंजन, अयोगवाह
   (ख) वर्ण, अक्षर, शब्द, पद, वाक्य
   (ग) वर्तनी, वर्तनी का मानकीकरण, वर्तनी विश्लेषण
2. हिन्दी शब्द रचना–
   संधि, समास, उपसर्ग, प्रत्यय।
3. शब्द भेद
   1. रचना की दृष्टि से–रूढ, यौगिक, योगरूढ़ ।
   2. इतिहास की दृष्टि से– तत्सम, तद्भव, देशज, विदेशी, संकर।
   3. व्याकरण की दृष्टि से–संज्ञा, सर्वनाम, क्रिया, क्रिया विशेषण।
   4. अर्थ की दृष्टि से– विलोम, पर्यायवाची, अनेकार्थी, वाक्यांश के लिए प्रयुक्त एक शब्द।
4. वाक्य–
   (क) रचना की दृष्टि से वाक्य भेद– सरल वाक्य, संयुक्त वाक्य, मिश्र वाक्य
   (ख) वाक्य शुद्धि
   (ग) मुहावरे एवं लोकोक्तियां
5. विराम चिन्ह
6. हिन्दी भाषा और देवनागरी लिपि :
   (क) हिन्दी भाषा का उद्भव और विकास
   (ख) हिन्दी की बोलियाँ
   (ग) देवनागरी लिपि का उद्भव और विकास
   (घ) देवनागरी लिपि की वैज्ञानिकता एवं मानकीकरण

(7) प्रयोजनमूलक हिन्दी :

(क) कार्यालयी हिन्दी : स्वरूप एवं पत्राचार

(ख) हिन्दी भाषा के विविध रूप

(ग) हिन्दी पत्रकारिता : प्रिंट एवं इलेक्ट्रॉनिक पत्रकारिता

(घ) हिन्दी भाषा कम्प्यूटिंग

खण्ड : ब–साहित्य

1. हिन्दी साहित्य का इतिहास–

(क) काल विभाजन एवं नामकरण : आदिकाल, भक्तिकाल, रीतिकाल, आधुनिककाल– प्रमुख प्रवृत्तियाँ, रचनाकार एवं रचनाएँ।

(ख) साहित्यिक विधाएँ : सामान्य परिचय।

1. पद्य साहित्य– प्रबन्ध काव्य, खण्ड काव्य, मुक्तक काव्य।
2. गद्य साहित्य– उपन्यास, कहानी, नाटक, एकांकी, निबंध, संस्मरण, रेखाचित्र, जीवनी, रिपोर्ताज, आत्मकथा, यात्रा साहित्य, डायरी, फीचर।

2. काव्यांग परिचय :

(क) रस–

1. रसावयव– स्थायीभाव, विभाव, अनुभाव, संचारीभाव
2. रसभेद– श्रृंगार, हास्य, वीर, अद्‌भुत, करुण, रौद्र, भयानक, वीभत्स, शान्त, भक्ति, वात्सल्य।

(ख) छन्द–

1. मात्रिक छन्द– दोहा, चौपाई, रोला, सोरठा, सवैया, बरवै।
2. वर्णिक छन्द– वसन्ततिलका, उपेन्द्रवज्रा, शिखरिणी, मालिनी

(ग) अलंकार –

अनुप्रास, यमक, श्लेष, उत्प्रेक्षा, उपमा, रूपक, अतिशयोक्ति, वक्रोक्ति, विशेषोक्ति, विभावना, समासोक्ति, अन्योक्ति, संदेह, भ्रान्तिमान।

(घ) शब्द शक्ति– अभिधा, लक्षणा, व्यंजना।

3. हिन्दी काव्य–1

(क) आदिकालीन एवं भक्तिकालीन काव्य– अमीर खुसरो, चन्दवरदाई, कबीर, जायसी, सूर, तुलसी, मीरा, ।

(ख) रीतिकालीन काव्य– केशव, बिहारी, भूषण, घनानन्द

4. हिन्दी काव्य–2 आधुनिक काव्य–

(क) भारतेन्दु युग से छायावाद तक– भारतेन्दु, हरिऔध, मैथिलीशरण गुप्त, श्रीधर पाठक, चंद्रकुँवर बर्त्वाल, जयशंकर प्रसाद, सुमित्रानंदन पंत, सूर्यकान्त त्रिपाठी निराला, महादेवी वर्मा।

(ख) छायावादोत्तर काव्य– हरिवंशराय बच्चन, रामधारी सिंह दिनकर, अज्ञेय, मुक्तिबोध, नागार्जुन, नरेश मेहता, केदारनाथ सिंह, अशोक बाजपेयी, लीलाधर जगूड़ी, मंगलेश डबराल, वीरेन डंगवाल, सर्वेश्वरदयाल सक्सेना, रघुवीर सहाय, केदारनाथ अग्रवाल।

5. हिन्दी गद्य–

कथा साहित्य– चन्द्रधर शर्मा गुलेरी, प्रेमचंद, जयशंकर प्रसाद, पाण्डेय बेचन शर्मा 'उग्र', हजारी प्रसाद द्विवेदी, इलाचन्द्र जोशी, जैनेन्द्र, यशपाल, मोहन राकेश, शैलेश मटियानी, राजेन्द्र यादव, कमलेश्वर, कृष्णा सोबती, मनोहर श्याम जोशी, फणीश्वर नाथ रेणु, भीष्म साहनी, मन्नू भण्डारी, उषा प्रियंवदा, वल्लभ डोभाल, सुभाष पंत, निर्मल वर्मा।

6. नाट्य साहित्य–

भारतेन्दु हरिश्चन्द्र, रामकुमार वर्मा, उपेन्द्रनाथ 'अश्क', भुवनेश्वर, सेठ गोविन्द दास, जगदीश चन्द्र माथुर, उदयशंकर भट्ट, गोविन्द बल्लभ पंत, जयशंकर प्रसाद, मोहन राकेश, विष्णु प्रभाकर, लक्ष्मीनारायण मिश्र।

7. कथेतर गद्य–

निबंध– चंद्रधर शर्मा गुलेरी, बालकृष्ण भट्ट, रामचन्द्र शुक्ल, हजारी प्रसाद द्विवेदी, रामधारी सिंह दिनकर, विद्यानिवास मिश्र, कुबेरनाथ राय, हरिशंकर परसाई।

रेखाचित्र एवं अन्य गद्य विधाएँ– पद्म सिंह शर्मा कमलेश, बनारसी दास चतुर्वेदी, महादेवी वर्मा, रामवृक्ष बेनीपुरी, कन्हैयालाल मिश्र, विष्णु प्रभाकर।

8. जनपदीय भाषा एवं साहित्य–

(क) उत्तराखण्ड की भाषाएँ एवं उनके लोकसाहित्य का परिचय।

(ख) तोताकृष्ण गैरोला, तारादत्त गैरोला, जीवानन्द श्रीयाल, अबोधबन्धु बहुगुणा, मोहनलाल नेगी, महावीर प्रसाद गैरोला, गौर्दा, शेरदा अनपढ़, चारुचन्द्र पाण्डे, देवकी मेहरा, चन्द्रलाल वर्मा।

Syllabus for the Post of Assistant Teacher (LT Grade)

English

UNIT 1: ENGLISH GRAMMAR

(a) Parts of Speech
(b) Tenses
(c) Articles
(d) Prepositions
(e) Subject/verb Agreement
(f) Transformation of Sentences

UNIT 2: ENGLISH USAGE

(a) One Word Substitution
(b) Antonyms
(c) Synonyms
(d) Spotting Errors in Sentences
(e) Figures of Speech
(f) Comprehension

UNIT 3: LITERARY FORMS AND MOVEMENTS

(a) Renaissance, Metaphysical Poets, Neo-classical Age, Romanticism, Victorianism, Modernism, Avant-garde
(b) Dramatic Irony, Climax, Chorus, Hamartia, Soliloquy, Aside, Conflict, Atmosphere, Catastrophe, Action, Plot,
(c) Ballad, Ode, Dramatic Monologue, Heroic Couplet, Lyric, Sonnet, Conceit, Elegy, Poetic Diction, Imagery, Allusion, Symbolism
(d) Fiction, Picaresque Novel, Regional Novel, Stream of Consciousness Technique, Caricature, Novella

UNIT 4: DRAMA

(a) Shakespearean Comedies: *Twelfth Night, As You Like It*
(b) Shakespearean Tragedies: *Othello, Macbeth*
(c) GB Shaw: *Arms and the Man*
(d) Girish Karnad: *Tughlaq*
(e) J M Synge- *Riders to the Sea*

UNIT 5: POETRY

(i) British Poetry

(a) John Donne
(b) Alexander Pope
(c) William Wordsworth
(d) John Keats
(e) Alfred Tennyson
(f) Robert Browning
(g) T S Eliot
(h) W B Yeats

(ii) American Poetry

(a) Walt Whitman
(b) Emily Dickenson
(c) Robert Frost

(d) Sylvia Plath

(iii) Indian English Poetry

(a) Nissim Ezekiel
(b) A K Ramanujan
(c) Sarojini Naidu
(d) Kamala Das

UNIT 6: FICTION & PROSE

(a) Thomas Hardy: *The Mayor of Casterbridge*
(b) Charles Dickens: *Oliver Twist*
(c) Virginia Woolf: *Mrs. Dalloway*
(d) Mulk Raj Anand: *Untouchable*
(e) R K Narayan: *The Guide*
(f) Francis Bacon: Of Studies, Of Truth
(g) Joseph Addison: Sir Roger at Home, On the Whim of Lottery Adventure
(h) Charles Lamb: Poor Relations, Dream Children: A Reverie
(i) William Hazlitt: On the Ignorance of the Learned
(j) Mahatma Gandhi: *The Story of My Experiments with Truth*
(k) Other Major Prose Writers- A G Gardiner, Bertrand Russell, S. Radhakrishnan, Amitav Ghosh, Arundhati Roy

UNIT 7: INDIAN WRITING IN TRANSLATION

(a) Saadat Hasan Manto: Toba Tek Singh
(b) Vijay Tendulkar: *Silence! The Court is in Session*
(c) Premchand: Deliverance
(d) Ismat Chugtai: Kallu
(e) Mahasweta Devi: *Mother of 1084*

सहायक अध्यापक (एल.टी. ग्रेड) हेतु पाठ्यक्रम

(विषय–संस्कृत)

इकाई–I वैदिक साहित्य

1. परिचय – ऋग्वेद, यजुर्वेद, सामवेद, अथर्ववेद
2. वेदांग
3. ब्राह्मण
4. आरण्यक
5. उपनिषद्

इकाई–II व्याकरण

1. संज्ञा
2. संधि
3. कृत् प्रत्यय–तव्यत्, अनीयर् ण्वुल् तृच्, क्त, क्तवतु, शतृ, शानच्, तुमुन्, तरप्, तमप्, तसिल्, क्त्वा,ल्यप्, क्तिन्, मतुप्, वतुप्, घञ्, ल्युट्।
4. शब्दरूप–राम, हरि, गुरु, पितृ, राजन्, रमा, मति, नदी, मातृ, फल, वारि, अस्मद्, युष्मद्, तत्, एतत्, किम्, अदस्।
5. धातुरूप–(पाँच लकारों में–लट्, लोट्, लङ्, लृट्, विधिलिङ्) अस्, भू, एध्, गम्, पठ्, लिख्, स्था, कथ्, भक्ष्, स्पृश्, चुर्, याच्, कृ।
6. समास–अव्ययीभाव, द्विगु, बहुव्रीहि, द्वन्द्व, तत्पुरुष, कर्मधारय।
7. कारक।

इकाई–III भारतीय दर्शन

I. भारतीय दर्शन का संक्षिप्त परिचय।

II. तर्कसंग्रहः।

इकाई–IV काव्य एवं काव्यशास्त्र

1. महाभारतम् (गीता प्रथमोऽध्याय)
2. रघुवंशम् (प्रथमः सर्गः)
3. कुमारसंभवम् (प्रथमः सर्गः)
4. अभिज्ञानशाकुन्तलम्
5. किरातार्जुनीयम् (प्रथमः सर्गः)
6. हितोपदेशः (मित्रलाभः)
7. नीतिशतकम्
8. कादम्बरी (शुकनासोपदेशः)
9. शिवराजविजयः (प्रथमो निःश्वासः)
10. संस्कृत साहित्य का इतिहास–वाल्मीकि, व्यास, कालिदास, भास, माघ, भारवि, भवभूति, शूद्रक, बाणभट्ट, दण्डी, जयदेव, विशाखदत्त, भट्टनारायण।
11. अलंकार– अनुप्रास, उपमा, श्लेष, यमक, रूपक, उत्प्रेक्षा, विभावना, विशेषोक्ति, अतिशयोक्ति, निदर्शना, व्यतिरेक, अर्थान्तरन्यास। (साहित्यदर्पण से)
12. छन्द–इन्द्रवज्रा, उपेन्द्रवज्रा, अनुष्टुप्, आर्या, वंशस्थ, वसन्ततिलका, शिखरिणी, मन्दाक्रान्ता, शार्दुलविक्रीडित, मालिनी, स्रग्धरा, भुजंगप्रयात, स्रिग्विणी। (छन्दोमंजरी से)
13. साहित्यदर्पणः (प्रथमः परिच्छेदः)।
14. काव्यप्रकाशः (प्रथमोल्लासः)।

इकाई–V अर्वाचीन संस्कृत साहित्य

I. अर्वाचीन संस्कृत साहित्यकारों का संक्षिप्त परिचय

1. अम्बिकादत्त व्यास
2. मथुरानाथ शास्त्री
3. क्षमा राव
4. जानकीवल्लभ शास्त्री
5. श्रीनिवास रथ
6. जगन्नाथ पाठक
7. रेवा प्रसाद द्विवेदी
8. रमाकान्त शुक्ल
9. भास्कराचार्य त्रिपाठी
10. अभिराज राजेन्द्र मिश्र
11. राधावल्लभ त्रिपाठी
12. इच्छाराम द्विवेदी

II. उत्तराखण्ड के अर्वाचीन संस्कृत साहित्यकारों का संक्षिप्त परिचय

1. सदानन्द डबराल
2. शिवप्रसाद भारद्वाज
3. मथुरादत्त पाण्डेय
4. हरिनारायण दीक्षित
5. अशोक कुमार डबराल
6. जगदीश प्रसाद सेमवाल
7. श्रीकृष्ण सेमवाल
8. कीर्तिवल्लभ शक्टा
9. राधेश्याम गंगवार
10. प्रमोद भारतीय
11. निरंजन मिश्र
12. रामविनय सिंह

SYLLABUS FOR THE POST OF ASSISTANT TEACHER (LT GRADE)- MATHEMATICS

Set Theory:
Sets,Type of sets, Operations on sets, Relation, Equaivalence relation, Function, Domain, Co-domain and range, Types of functions, Composition of functions.

Matrices and Determinants:
Types of matrices, Elementary operations, Inverse of matrix, Rank of matrix, Eigenvectors and Eigen values, Characteristic equation, Solution of system of linear equations, Determinant and its properties.

Trignometry:
Trignometric functions, Trignometric equations, Inverse trignometric functions, Exponential, circular and hyperbolic functions, Logarithmic functions and their inverse, Gregory series, Summation of trignometric series.

Vector Analysis:
Vector and scalar product, Differentiation and integration of vectors, Differential operator Del, Gradient and directional derivative, curl and divergence, Line, Surface and Volume integrals and their applications to the theorems of Green's , Stoke's and Gauss's.

Differential Calculus:
Limit, continuity and differentiability, Successive differentiation and Leibnitz theorem, Rolle's theorem, Mean value theorems, Expansion of functions, Indeterminate forms, Tangents and normals, Curvature, Asymptotes, Partial differentiation, Euler's theorem, Maxima/minima and saddle point.

Integral Calculus:
Definite integral and properties, Limit of a sum/product, Beta and gamma integrals with their properties, Multiple integrals, Application to find length, area and volume.

Coordinate Geometry:

2D: Cartesian coordinate system, Straight line, Circle and conic sections, Polar coordinate system.
3D: Cartesian coordinate system, Direction ratios and cosines, Projection, Plane, Straight line, Sphere, Cone and cylinder.

Algebra:
Descarte's rule of sign, Roots of polynomial equation up to degree 3 and their properties.
Binary operation, Group, Abelian group, Order of an element, Order of group, Subgroup, Cyclic group, Permutations and permutation group, Coset, Normal subgroup, Quotient group, Lagrange's theorem, Ring, Integral domain and field.

Differential Equations:
Order and degree of ODE, types of solutions of ODE, First order and first degree ODE and their solutions, ODE of first order and higher degree, Orthogonal trajectories, Linear ODE with constant coefficients, Cauchy-Euler homogeneous ODE, Simultaneous ODE's, Total differential equation.
Order and degree of PDE, Classification of first order PDE and their solutions.

Analysis:

Real number system, Countability of sets, Neighborhood of a point, Open and closed sets, bounded set, limit point, Completeness property of $\mathbb{R}$, Archimedean principle, Order axioms.
Complex numbers and their properties, Argand plane, Polar representation of complex numbers, Locus of a point on complex plane, Complex functions, Limit, continuity and differentiability of function of complex variables, Analytic function.

Linear Algebra:
Vector space, Subspace, Cosets, Quotient space, linear combination of vectors, Linear span, Linearly independent and dependent vectors, Basis and dimension, Linear transformation.

Numerical Analysis:

Finite difference operators, Interpolation, Lagrange's and Newton's interpolation formulae, Root finding methods for nonlinear equations, System of linear equations and its solution.

Mathematical Statistics:

Random experiment, Sample space, Events and their types, Axioms of probability, Addition and multiplication theorems, Conditional probability, Baye's theorem.

Measures of central tendency, Measures of dispersion, Correlation and regression.

Syllabus for the post of Assistant Teacher (LT. grade)

Maths

Subject- Physics

Mechanics

Vector Analysis:

Scalar and Vector product, scalar and vector field, Calculus of vectors, Application of vectors to linear and rotational quantities, Del operator, Gradient, Divergence and Curl of vectors, Gauss's, Stokes's theorem. (Example to be given from physical situations)

Gravitation Field and Potential:

Newton's law of gravitation, Orbital & Escape velocity, Gravitational field Intensity and potential due to a ring, a spherical shell, solid sphere and circular disc, gravitational self energy, Kepler's laws of planetary motion, artificial satellite.

Conservation of Energy:

Concept of inertial and non-inertial frames of references, Work energy theorem, Conservative & non-conservative forces, Linear restoring force, Gradient of potential, Conservation of energy for the particle; Energy Function, motion of a body near the surface of the earth, Law of conservation of total energy.

Conservation of Linear and Angular Momentum:

Conservation of Linear Momentum, Centre of mass, System of variable mass, the rocket, Angular momentum and torque, Areal velocity, Examples of Conservation of Angular momentum.

Dynamics of Rigid Body and Idea of Moment of Inertia:

Equation of motion for Rotating rigid body, angular momentum vector and moment of inertia, Translatory and Rotatory motion, theorem of parallel and perpendicular axes, Moment of inertia of a rod, lamina, ring, disc, spherical shell, solid sphere, kinetic energy of rotation, rolling along a slope, precession, Application to compound pendulum.

Fluids:

Surface Tension: Synclastic and anticlastic surface, Excess of pressure, Application to spherical and cylindrical drops and bubbles, variation of surface tension with temperature, Jaegar's method.

Viscosity:

Rate flow of liquid in a capillary tube, poiseuille's formula, Determination of coefficient of viscosity of a liquid, Variations of viscosity of a liquid with temperature, lubrication.

Elasticity:

Hooke's law, Stress-strain diagram, Elastic moduli, relation between elastic contants, poisson's Ratio, Expression for possion's ratio in terms of elastic constants, work done in stretching and work done in twisting a wire, Twisting couple on a cylinder, Determination of

Rigidity modulus by static torsion, Torsional pendulum- Determination on Rigidity modulus.

Basics of Special theory of Relativity:

Frames of reference, Galilean transformations, Ether hypothesis, Failure of Michelson Morley experiment, Postulates of Special theory of relativity, Lorentz Transformations.

Consequences of Lorentz Transformations:

Length contraction, Time dilation, Velocity transformations and law of velocity addition, Variation of mass with velocity, Relativistic energy and mass energy equivalence, concept of four vectors, Examples of position and momentum four vectors.

Current general knowledge and current scientific advancement with above topic.

Electricity & Magnetism

Electrostatics:

Electrostatics field, electric flux, Gauss's theorem of electrostatics. Applications of gauss theorem-Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor, Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere, Capacitance of an isolated conductor, Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatics field. Dielectric medium, polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

Electromagnetic Induction:

Faraday's laws of electromagnetic induction Lenz's law, self and mutual inductance, L (Self inductance) of single coil, M(Mutual inductance) of two coils. Energy stored in magnetic field.

Maxwell's Equations and Electromagnetic Wave Propagation:

Equation of continuity of current, Displacement current, Maxwell's equation, poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric/medium, transverse nature of EM waves, polarization.

Current general knowledge and current scientific advancement with above topic.

Thermal and Statistical Physics

Thermodynamic Description of System:

Zeroth law thermodynamics and temperature. First law and internal energy, conversion of heat into work. Various thermodynamic processes, Application of First law: General Relation between Cp& Cv, Work done during Isothermal and Adiabatic Processes. Second Law & Entorpy, Carnot's cycle & theorem, changes in reversible & irreversible processes, Entropy Temperature diagrams, Third law of thermodynamics, Unattainbility of absolute zero.

Thermodynamics Potentials:

Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations & application, Joule- Thompson Effect, Clausius- Clapeyron Equation, Expression for (Cp-Cv), Cp/Cv, TdS Equations.

Kinetic Theory of Gases:

Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and diffusion (for vertical case), Law of equipartition of energy and its application to specific heat of gases; mono-atomic and diatomic gases.

Theory of Radiation:

Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction Law and Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Plancks's Law.

Statistical Mechanics:

Basic Postulates of statistical physics, Macro & Micro States, phase space, μ-space, Ensembles; Entropy of mixing and Gibb's paradox, partition function, physical significance of various statistical qualities. Maxwell-Boltzmann law, distribution of velocity, Quantum statistics, phase space, Fermi-Dirac distribution law, electron gas, Bose-Einstein distribution law, photon gas, comparison of three statistics.

Current general knowledge and current scientific advancement with above topic.

Optics

Fermat's principle and Theory of Image formation:

Fermat's principle of extremum path and its application to deduce laws of reflection and refraction, Refraction at concave surface, Principal foci, Lateral and longitudinal magnifications, aplanatic points of spherical surface.

Gauss's general theory of image formation, Coaxial symmetrical system, Cardinal points of an optical system, General relationships, Thick and Thin lens, lens combinations, Newton's formula, Coaxial lens system, Lagrange's equation of magnification, Refraction through a thick lens.

Nodal slide, Eyepiece, Ramsden's, Huygen's and Gaussian eyepieces, their comparison Astronomical refraction telescope, Microscopes, Spectrometer and its uses, Oil immersion Objectives meniscus lens.

Optical aberrations and Dispersion:

Aberrations in images, Spherical aberration, Monochromatic and chromatic aberration, condition of achromatism, Achromatic combination of lenses in contact and separates lenses, Spherical mirrors and Schmidt corrector Plates, Theory of dispersion.

Wave Optics:

Electromagnetic nature of light, definition and properties of wave front, Huygen's principle.

Interference:

The principle of superposition, Two slit Interference, coherence, Division of wavefront and amplitude, Optical path retardations

Lateral shift of fringes, Fresnel biprism, Interference with multiple reflection, Thin film, Application for precision Measurements, Haidinger fringes, Fringes of equal thickness and equal inclination.

Michelson Interferometer and its application for precise measurement of wavelength, Wavelength difference and width of spectral lines, Twyman-Green interferometer, Tolansky fringes, Fabry-Perot interferometer and Etalon.

Diffraction:

Fraunhofer and Fresnel's diffraction: Diffraction of single slit, Diffraction due to 2- slit and N-slits, Diffraction grating, Zone Plates. Fresnel diffraction due to straight edge, Intensity distribution, resolution of image, Rayleigh criterion, resolving power of telescopes and microscopes, resolving power of grating and comparison with resolving power of prism.

Polarizations:

Plane polarized., Circularly polarized and elliptically polarized light, Malus law, Brewster's law, Double reflection and uniaxial crystals, Application of birefringence, Dichroism Optical rotation, Rotation, Rotation of plane of polarization, rotation in liquids and crystals, Polarimeter.

Current general knowledge and current scientific advancement with above topic.

Waves, Acoustics and Oscillations

Simple Harmonic Oscillations:

Periodic motion, SHM in mechanical systems, Energy of simple Harmonic oscillator, Superposition of SHM(s), Oscillations of two masses connected by a spring, Non- linear(An-harmonic) oscillator and its applications to simple pendulum.

Damped Harmonic Oscillations:

Damping force, Different cases for over, critical and under dapmping, Mechanical damped harmonic oscillators, Transient behaviour, Logarithmic decreament, Power Dissipation. Relaxation time & Quality Factor.

Forced Harmonic Oscillations:

Forced oscillations. Mechanical driven harmonic oscillators, Transient and Steady State behaviour, Power dissipation phenomenon of resonance, amplitude/ velocity resonance, sharpness of resonance fidelity, bandwidth and quality factors.

Analysis of wave motion:

Characteristics, Differential equation of a wave motion, principle of superposition, Interference, Beats, Stationary waves, energy of Stationary waves, Wave velocity and group velocity, Fourier theorem, fourier analysis of square, triangular and saw-tooth waves.

Ultrasonic:

Classification of sound waves, Ultrasonics, Quartz crystal and Piezo Electric effect, Magnetostriction effort, Properties of Ultrasonic,

Detection of Ultrasonic waves, Determination of velocity of ultrasonic waves in liquid(Acoustic grating method)

Acoustics:

Energy density of plane acoustic waves, Acoustic intensity, Measurement of acoustic intensity- the dB scale, Characteristics and loudness of Musical sound, Acoustic impendance, Reflection and transmission of acoustic waves.

Applications:

Applications of wave propagation in various physical cases, Applications of Ultrasonic Acoustics of buildings reverberation time, Sabin's formula Principle of sonar system.

Application of simple harmonic motion in compound pendulum, Torsional pendulum and LC circuit, Composition of two SHM(s) of different frequency ratio, Lissajous figures for equal frequencies ratio and 2:1 frequencies ratio, application of Damped Harmonic and Forced oscillations for moving coil galvanometer and LCR circuits.

Current general knowledge and current scientific advancement with above topic.

Modern physics

Origin of Quantum Mechanics and its Operator Formulation:

Origin of quantum theory, limitation of Classical Physics, Black body Radiation, Planck's radiation law and Einstein's explanation, The photo electric effect and Einstein correction, Compton effect.

De-Broglie's Hypothesis, wave-particle Duality, davission-Germer Experiment, G.P. Thomson experiment, Taylor's experiment, Wave description of Particles by Wave Packets, Group and Phase Velocities, Principle of Complimentary, Heisenberg uncertainty principle, Gamma ray Microscope, Single slit experiment.

Linear vector Space, Linear Operator, Definition of position, momentum, Energy and angular momentum operator, Eigen value and Eigen functions, Hermitian operators, Postulates and basic theorems of Quantum mechanics, Operator method for solving Eigen value, problem, Energy of Harmonic oscillator.

Schrodinger Equation and its Applications:

Origin of non relativistic Quantum Mechanics, Overview of wave mechanics, Simple one dimensional quantum system oscillator, Time independent one dimensional schrodinger equation, Steady state solution, Physical Interpretation of wave functions, probability current density, Ehrenfest's theorem, Particle in a box, Idea of Tunneling.

Atomic Models and Optical Spectra:

Thomson model, Rutherford model, Bohr model and spectra of hydrogen atom, fine structure, Bohr Magnetron, Larmor's precession, Somerfield model, Stern-Gerlach experiment, Vector atomic model, Space Quantization and Spinning of an Electron.

Optical Spectra, Spectral notations, L-S, J-J coupling, Selecton rules and intensity rules, Explanation of fine structure of Sodium D line, Zeeman effect, X-ray spectra (Characteristics and continuous) Moseley's law.

Theory of Lasers and Molecular Spectroscopy:

Einstein coefficients, Spatial and Temporal coherence, Optical pumping, Population inversion. Laser action, basic Idea of LASER and MASER, Ruby Laser and He-Ne laser, Some applications.

Franck-condon Principle, Molecular spectra, Rotational, Vibration and Electronic Spectra of diatomic molecules, General features of electronic spectra, Luminescence, Basics of Raman effect.

Basics of Subatomic particle Physics:

Structure of atomic nucleus, nuclear properties (charge, mass, spin, shape), Nuclear binding energy, liquid drop model and semi-empirical mass formula, elementary particles and their classification schemes.

Current general knowledge and current scientific advancement with above topic.

Basic Electronics

Network Theorems:

Kirchhoff's laws, Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer Theorem, Application of Network theorem, Four Terminal network and h-parameters.

Power Supplies:

Half and Full wave rectifiers, Bridge rectifiers, Ripple factor. Low pass and High pass filters, L and π filters, Zener Diode and Voltage Regulation V.R. tubes.

Solid State Devices:

Semiconductor diodes, Point contact diode, Varactor diode, Tunnel diode, Light emitting diode, Junction Transistor operation, Characteristics and amplifiers, Power amplifiers (Class-A, Push- pull class B, Class C), Decibels, Frequency response curve and Bandwidth.

Oscillators:

RC phase shift Oscillator, Tuned diode oscillator, Crystal Oscillator, Stability of Oscillator, Relaxation Oscillators,- Multivibrators (astable, monostable and bistable), Schmitt Trigger, Saw tooth generator, Blocking Oscillators.

Boolean algebra:

Decimal, Binary, Hexadecimal, Octal, BCD, conversion of one code to another, Complements (one's and two's), Inter-conversions. Laws of Boolean algebra, Demorgan's theorem and duals.

Logic Gates:

Truth Tables, OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Adder and Subtractor.

Current general knowledge and current scientific advancement with above topic.

Solid State Physics

Crystal Structure:

Solids, Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis- Central and Non- Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's law. Atomic and Geometrical Factor.

Elementary Lattice Dynamics:

Lattice Vibrations and Phonons: Phonons. Qualitative Description of the Phonon Spectrum in Solids, Dulong and petit's Law, Einstein and Debys theories of specific heat of solids. T^3 law

Magnetic Porperties of Matter:

Dia-, para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetic, Curie's Law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.

Dielectric properties of Materials:

Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Langevin- Debys equation. Complex Dielectric Constant.

Elementary Band Theory:

Kronig Penny model. Band Gaps. Conductors, Semiconductors and insulators. P-type and N-type Semiconductors. Conductivity of Semiconductors, mobility, Hall Effect, Hall coefficient.

Current general knowledge and current scientific advancement with above topic.

Syllabus for the Post of Assistant Teacher Graduate Level (LT Grade): Science

Chemistry

Unit: 1

Atomic Structure: Bohr's theory and its limitations. Dual behaviour of matter and radiation, de Broglie's relation. Heisenberg Uncertainty principle. Time independent Schrodinger equation and meaning of various terms in it, Significance of ψ and ψ^2. Schrodinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wave functions (atomic orbitals) and their variations. Radial and angular nodes and their significance, Radial distribution functions. Quantum numbers. Rules for filling electrons in various orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

Periodic Properties : Atomic and ionic radii, ionization potential, electron affinity, electronegativity-definition, methods of determination/evaluation, trends of variation in periodic table and their application in prediction and explaining the chemical behaviour of elements and compounds.

Chemical Bonding: Ionic Bonding- General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and salvation energy and their importance in the context of stability and solubility of ionic compounds. Born-Haber cycle and its applications, polarizing power and Polarizability. Fajan's rules, ionic character in covalent compounds, dipole moment and percentage ionic character. Weak interactions-hydrogen bonding and Van der Waals Forces.

Covalent bonding-VBT. Various types of hybridization and shapes of different inorganic molecules and ions. VSEPR theory and shapes of various molecules/ions. Concept of resonance and resonating structures in various inorganic and organic compounds/ions. MO Approach: Rules for the LCAO method, bonding and anti-bonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules. Comparison of VB and MO approaches.

s-Block Elements: General discussion with respect to all periodic and chemical properties, diagonal relationship, salient features of hydrides, oxides, halides, and hydroxides. Co-ordination complexes and Organometallic compounds of alkali metals. Roles of alkali and alkaline earth metal ions in bio-systems.

p-Block Elements: General discussion and comparative study (all periodic and chemical properties) including diagonal relationship, of groups 13 to 17 elements; chemistry of elements-hydrides, oxides, oxy-acids, and halides (including inter-halogen compounds). Diborane-properties and structure, borohydrides, carbides, fluorocarbons, basic properties of iodine and polyhalides. Inert-pair effect.

Chemistry of Noble gases: Chemical properties of noble gases. Chemistry of xenon, structure and bonding in xenon compounds.

Metallurgical Processes: Minerals & ores; general metallurgical processes-concentration of ores, calcinations, roasting, smelting, slag & flux. Extraction and refining of Lithium and Beryllium.

Chemistry of Transition Elements (First, Second and Third Series): Characteristic properties of the elements; ionic radii, oxidation states, complex compound formation and magnetic properties. Their binary compounds, illustrating relative stability of their oxidation states, coordination number and geometry.
Comparative treatment with their analogues in respect of ionic radii, oxidation state, magnetic behaviour and stereochemistry.

Redox Reactions: Redox reactions and determination of oxidation state. Balancing of redox reactions (ion-electron and oxidation state methods). Computation of equivalent weights and concept of equivalence.

Coordination Chemistry: Werner's theory for coordination compounds; its experimental verification, effective atomic number (EAN) concept. Ligands, chelates. Nomenclature of coordination compounds (IUPAC system), isomerism in coordination compounds, stability of complexes and factors contributing to the stability of complexes. Valence Bond Theory (VBT) for coordination compounds, magnetic properties of complexes.
Crystal field Theory, Crystal field effect, octahedral symmetry, Crystal field stabilization Energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of Dq. Spectrochemical series. Comparison of CFSE for O_h and T_d complexes. Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar complexes.

Chemistry of Lanthanides and Actinides: Electronic configuration, oxidation states, ionic radii, lanthanide contraction and its consequences, complex formation, methods of separation of lanthanides - fractional crystallization, fractional precipitation, change in oxidation state, solvent extraction and ion exchange methods.
General features of actinides-electronic configuration, atomic and ionic radii, ionization potential, oxidation states and complex formation.

Acids and Bases: Arrhenius concept, Bronsted-Lowry concept, and Lewis concept of acids and bases, role of the solvent and strength of acids and bases. Acid-base properties in non-aqueous media. Classification of acids and bases as hard and soft. Pearson's hard and soft acid base concept.

Non Aqueous Solvents: Classification of solvents, their general characteristics, physical properties of the solvents, reaction in non-aqueous solvents-liquid NH_3 and liquid SO_2 (auto-ionization, precipitation reactions, acid-base reaction, oxidation-reduction reactions, salvation and solvolysis, complex formation), merits and demerits.

Magnetic Properties of Transition Metal Complexes : Types of magnetic behaviour, methods of determining magnetic susceptibility; Gouy's and Quincke's methods, spin only formula, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Electronic Spectra of Transition Metal Complexes: Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. Orgel energy level diagram for d^1, d^4, d^6 and d^9 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

Organometallic chemistry: Definition, nomenclature and classification based on nature of metal-carbon bond. Metal carbonyls. Mononuclear carbonyls, nature of bonding, structure and preparation. EAN and 18-electron rule.

Unit: 2

Structure and Bonding : Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Van der Waals interactions, inclusion compounds, clatherates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions : Homolytic and heterolytic bond breaking. Types of reagents- electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates- carbocations, carbanions, free radicals and carbenes (with examples). Assigning formal charges on intermediates and other ionic species. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Stereochemistry of Organic Compounds :
Concepts of isomerism. Types of isomerism-optical isomerism- elements of symmetry, molecular chirality, enantiomers, stereogenic centers, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centre, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometrical isomerism: determination of configuration of geometrical isomers, E & Z system of nomenclature, geometrical isomerism in oximes and alicyclic compounds.
Conformational isomerism: conformational analysis of ethane and n- butane, conformations of cyclohexane, axial and equatorial bonds, conformations of monosubstituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer Projection and flying wedge formulae. Difference between configuration and conformation.

Alkanes and Cycloalkanes : IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and

decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes, orientation, reactivity and selectivity.
Cycloalkanes- nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring-bent or banana bonds.

Alkenes, Cycloalkenes, Dienes and Alkynes Nomenclature of alkenes , methods of formation, mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. The Saytzeff Rule, Hoffmann Elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's Rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$, Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Industrial applications of ethylene and propene.
Methods of formation, conformation and chemical reactions of cycloalkenes. Nomenclature and classification of dienes; isolated, conjugated and cumulative dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions- 1,2 and 1,4 additions, Diels - Alder reaction.
Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration- oxidation, metal- ammonia reduction, oxidation and polymerization.

Arenes and Aromaticity: Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon –carbon bond length of benzene, resonance structure, MO picture. Aromaticity –the Hückel rule, aromatic ions.
Aromatic electrophilic substitution –general pattern of the mechanism, role of σ and π complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel- Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction. Methods of formation and chemical reactions of alkylbenzenes, alkynylbenzenes and biphenyl.

Alkyl and Aryl Halides: Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides , S_N2 and S_N1 reactions with energy profile diagrams.
Polyhalogen compounds - Chloroform, carbon tetrachloride. Methods of formation of aryl halides, nuclear and side chain reaction. The addition-elimination mechanism and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivity of alkyl halides vs allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC.

Alcohols: Classification and nomenclature. Monohydric alcohols- methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols. Dihydric alcohols-methods of preparation, chemical reactions of vicinal

glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric alcohols-methods of formation, chemical reactions of glycerol.

Phenols : Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols-electrophilic aromatic substitution, nitration, halogenation, sulphonation, acylation and carboxylation. Mechanism of Fries rearrangement, Claisen condensation, Gatterman synthesis, Houben-Hoesch reaction, Lederer-Manasse reaction, Reimer-Tiemann reaction and Schotten-Baumann reaction.

Ethers and Epoxides: Nomenclature, methods of preparation. Physical properties. Chemical reactions-cleavage and auto-oxidation, Ziesel's method. Synthesis of epoxides. Acid and base catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organo-lithium reagents with epoxides.

Aldehydes and Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis from acid chlorides, synthesis using 1,3-dithianes, from nitriles and carboxylic acids. Physical properties. Mechanism of nucleophilc additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensation. Condensation with ammonia and its derivatives; Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro's reaction, MPV, Clemmensen, Wolff-Kishner, $LiAlH_4$ and $NaBH_4$ reductions. Halogenation of enolizable ketones. An introduction to α-, β-unsaturated aldehydes and ketones.

Carboxylic Acids: Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids, Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids, mechanism of decarboxylation. Methods of formation and chemical reactions of halo acids, hydroxy acids- malic, tartaric, and citric acids. Methods of preparation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids-methods of preparation and effect of heat and dehydrating agents.

Carboxylic acid derivatives: Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions. Mechanism of esterification and hydrolysis (acidic and basic).

Organic Synthesis via Enolates: Acidity of methylene hydrogen, alkylation of diethylmalonate and ethylacetoacetate. Synthesis of ethylacetoacetate, the Claisen condensation. Keto-enol tautomerism of ethylacetoacetate. Synthetic uses of ethylacetoacetate and diethylmalonate.

Carbohydrates: Classification and nomenclature. Monosaccharides, mechanism of osazone formation, inetrconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of

glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D(+)-glucose. Mechanism of mutarotation. Disaccharides, ribose, and deoxyribose.

Nitrogen Containing Organic Compounds: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium. Picric acid.
Halonitroarenes-reactivity, structure and nomenclature of amines. Physical properties. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Amine salts as phase-transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction. Reaction of amines, electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α -amino acids. Nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid-phase peptide synthesis. Levels of protein structure. Protein denaturation/renaturation. Nucleic acids: introduction, constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.

Hetrocyclic Compounds: Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction of condensed five- and six membered heterocycles. Preparation and reactions of quinolene and isoquinolene with special reference to Fischer-Indole synthesis, Skraups synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of quinolene and isoquinolene.

Organo-Metallic Compounds: Organomagnesium compounds; the Grignard reagent-formation, structure and chemical reactions. Organozinc compounds; formation and chemical reactions.
Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acid, sulphonamides and sulphaguanidine.

Spectroscopy of Organic Compounds: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers (UV-Vis, IR, and NMR spectrometers), statement of the Born-Oppenheimer approximation.

Electromagnetic Spectrum: Absorption Spectroscopy Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation, concept of chromophore and auxochrome.

Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infra Red (IR) absorption spectroscopy: Molecular vibrations, Hooke's Law, selection rules, intensity and position of IR bands, finger print region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

Nuclear magnetic resonance (NMR) spectroscopy: Proton magnetic resonance (^{1}H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of pmr spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone.

Unit: 3

Gaseous State: Postulates of kinetic theory of gases, deviation from ideal behavior, compressibility factor, van der Waal's equation of states, Boyle's temperature. Critical phenomena – PV isotherms of real gases, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state. Molecular velocities: Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities, collision cross-section, collision frequency, collision number, mean free path and collision diameter, liquefaction of gases. Viscosity of gases, effect of temperature and pressure on co-efficient of viscosity.

Liquid State: Intermolecular forces, structure of liquids. Structural differences between solids, liquids and gases. Physical properties of liquids including their methods of determination: surface tension, viscosity and refractive index. Effect of temperature on surface tension and coefficient of viscosity of a liquid. Liquid crystals, difference between liquid crystal, solids and liquids.

Solid State: Definition of space lattice, unit cell, crystal planes, Miller indices, Laws of crystallography – (i) law of constancy of interfacial angles (ii) law of rationality of indices (iii) law of symmetry. Bravias lattice types and identification of lattice planes. Miller's indices. Symmetry elements in crystals, X-ray diffraction by crystals. Derivation of Bragg's equation. Crystal structure of NaCl, KCl and CsCl. Defects in crystals.

Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): properties – kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions): types of emulsions, preparation, emulsifier. Liquids in solids (gels): classification, preparation and properties, inhibition, general application of colloids.

Chemical Equilibrium: General characteristics of chemical equilibrium, Van't Hoff reaction isotherm. The law of mass action, free energy and equilibrium constant, factors influencing equilibrium constant. Temperature dependence of equilibrium constant- Van't Hoff equation. Relationship between Kp and Kc. Thermodynamic derivation of the law of mass action, application

of law of mass action to some homogenous and heterogeneous equilibrium, Le-Chatelier's principle. Distinction between G and G^o.

Ionic Equilibrium: Strong, moderate and weak electrolytes, degree of ionization, factor affecting the degree of ionization. Ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Acid-Base indicator. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solution, Henderson's equation. Solubility and solubility product of sparingly soluble salts- applications of solubility product principle.

Phase Equilibrium: Statement and meaning of the terms: phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component systems- water, carbon dioxide and sulphur. Phase equilibria of two component systems: solid-liquid equilibra, simple eutectic; Bi-Cd, Pb-Ag, Na-K systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point ($NaCl-H_2O$, $FeCl_3-H_2O$ and $CuSO_4-H_2O$ systems). Freezing mixtures, acetone- dry ice. Liquid-liquid mixtures: ideal liquid mixtures, Raoult's and Henry's law. Non-ideal systems-azeotropes; $HCl-H_2O$ and ethanol-water systems. Partially miscible liquids; phenol-water, trimethylamine-water, nicotine-water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature; immiscible liquids, steam distillation. Nernst distribution law: its thermodynamic derivation and applications.

Chemical Kinetics and Catalysis: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction–concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates mathematical characteristics of simple reaction. Molecularity of reaction and reaction mechanism. Order of reaction-Zero order, first order, second order, pseudo order. Half life. Determination of the order of reaction – differential method, method of integration, method of half life period and isolation methods concept of activation energy. Radioactive decay a first order phenomenon. Catalysis, characteristics of catalyzed reactions, classification of catalysis (Homogeneous and Heterogeneous catalysis). Acid-Base catalysis and Enzyme catalysis.

Thermodynamics I: Definition of thermodynamic terms, system, surroundings etc. types of systems, intensive and extensive properties, state and path functions and their differentials, thermodynamic process, concept of heat and work, First law of thermodynamics, definition of internal energy and enthalpy. Heat capacity – heat capacities at constant volume and at constant pressure and their relationship, Joule – Thomson coefficient and inversion temperature, calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible processes, Thermochemistry; standard state, Standard enthalpy of formation, Integral and Differential enthalpies of solution and dilution. Hess's law of heat summation and its application, heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization, bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchoff's equation.

Thermodynamics II: Second law of thermodynamics, need of the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of entropy: entropy as a state function, entropy as a function of V and T, entropy as a function of P and T, entropy change in physical and chemical processes, entropy change in reversible and irreversible processes. Clausius inequality, entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Gibbs and Helmoltz functions. Gibbs function (G) and Helmoltz function (A) as thermodynamic quantities, A and G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T. Gibbs-Helmoltz equation, Clapeyron equation, Clausius-Clapeyron equation, reaction isotherm and reaction isochore.

Thermodynamics III: Nernst heat theorem, third law of thermodynamics, unattainability of absolute zero. Evaluation of absolute entropy from heat capacity data for gases, liquids and solids. Statement and concept of residual entropy.

Electrochemistry I: Electrical conduction in metals and electrolytic solutions, specific conductance, molar conductance and equivalent conductance, variation of molar, equivalent and specific conductance with dilution. Arrhenius theory of electrolytic dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Hückel theory, equation for strong electrolytes. Migration of ions, Transport number, definition and determination by Hittorf and moving boundary methods, Kohlrausch's law. Application of conductivity measurements-determination of degree of dissociation of weak electrolytes, K_a of acid, solubility product of sparingly soluble salts. Conductometric titrations.

Electrochemistry II: Types of reversible electrodes-gas-metal ion, metal-metal ion, metal-insoluble salt anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell EMF and single electrode potential, standard hydrogen electrode-reference electrode, standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K), polarization decomposition potentials, over potential and hydrogen over voltage. Definition of pH and pK_a, determination pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods. Potentiometric titration.

Surface Chemistry : Types of adsorption, Freundlich's and Langmuir's adsorption isotherms and their applications, charge on the colloidal particle, size of the colloidal particle, Perrin's method of determination of the Avogadro's number.

Elementary Quantum Mechanics: Planck's equation, de-Broglie hypothesis, Heisenberg's uncertainty principle, Schrödinger wave equation (time independent and time dependent forms), physical interpretation of the wave function. Postulates of Quantum Mechanics, Eigen function and Eigen values. Quantum mechanical operators. Quantum mechanical treatment of a particle in 1-D and 3-D Box, Rigid rotor and Harmonic Oscillator.

Photochemistry : Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry; Grothuss-Drapper law, Lambert's law, Lambert-Beer's law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).

Solutions and Colligative Properties: Methods of expressing concentrations of solutions. Ideal and non-ideal solutions, Vapour Pressure-Composition and Temperature-Composition curves of ideal and non-ideal solutions. Activity and activity coefficient. Distillation of solutions. Lever rule. Azeotropes. Partial miscibility of liquids- Critical solution temperature, effect of impurity on partial miscibility of liquids. Immiscibility of liquids-Principles of steam distillation. Nernst distribution las and its application. Solvent extraction.

Dilute solution- Raoult's law. Colligative properties, relative lowering of vapour pressure, molecular mass determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular mass from osmotic pressure. Elevation of boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

Unit: 4

Green Chemistry: Introduction: Definition of green chemistry. Twelve principles of green chemistry with examples. Atom economy. Reducing toxicity. Green solvents. Applications of green chemistry in catalysis and alternate sources of energy. Green energy and sustainability.

Fats, Oils and Detergents: Natural fats and common fatty acids, glycerides, hydrogenation of unsaturated oils. Saponification value, iodine value and acid value. Soaps, synthetic detergents, alkyl and aryl sulphonates.

Synthetic Polymers : Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensation or step-growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubber.

Synthetic Dyes : Colour and constitution (electronic concept), classification of dyes. Synthesis and uses of Methyl orange, Malachite green, Phenolphthalein, Fluorescein, Alizarin and Indigo.

Bioinorganic Chemistry: Role of metal ions in biology, essential and trace elements in biological systems, toxic elements, elementary idea of structure and oxygen binding mechanism in metallo-porphyrins with special reference to haemoglobin and myoglobin. Alkali and alkaline earth metal ions in biological system-mechanism of transport across cell membrane, biochemistry of magnesium and calcium.

Chromatography: Definition, principle of chromatography, types of chromatographic methods - paper, gas, coloumn, TLC, ion exchange chromatography.

Pharmaceutical compounds: Introduction to natural and synthetic medicinal compounds. Drug actions: Classification, structure and therapeutic uses of antipyretic, analgesics, antimalarials and antibiotic.

****Current general knowledge of scientific advancements in all the above units is deemed to be included.**

Syllabus for the post of Assistant Teacher graduate level (LT Grade): Science

Subject: Botany

Unit 1: Microbiology, Fungi, Lichens and Elementary Plant Pathology

1. Brief history of Mycology.
2. Viruses- Structure, transmission, multiplication, bacteriophages and economic importance.
3. Bacteria- Structure, reproduction and economic importance.
4. Fungi- Salient features; Broad classification: Reproduction, heterothallism, heterokaryosis and parasexual cycle. Economic importance. Life history of *Synchytrium*, *Rhizopus*, *Penicillium*, *Aspergillus, Ustilago*, *Puccinia*, *Agaricus* and *Alternaria.*
5. Lichens- Characteristics, general structure, symbiotic relationship, reproduction and economic importance.
6. Pathology of Fungal plant diseases- A brief idea about disease symptoms, establishment of diseases, categories of plant diseases on basis of their occurrence. Control of plant diseases- A brief idea about exclusion, eradication and protection by fungicides and by developing resistance.

Unit II: Algae, Bryophyta, Pteridophyta and Gymnosperms

1. Algae- Introduction and salient features. Classification. Range of vegetative structure, cell structure of prokaryotic and eukaryotic algae. Reproduction; types of life cycles (haplontic, diplontic , diplohaplontic , haplobiontic and diplobiontic) and alternation of generations. Life cycle of *Nostoc*, *Chlamydomonas*, *Vaucheria*, *Oedogonium*, *Ectocarpus*, *Batrachospermum*, *Polysiphonia*, Diatoms. Ecology and economic importance of algae.
2. Bryophyta - Salient features of Bryophytes; habitats, distribution and economic importance. Classification. A brief account of alternation of generations. Structure and life history of *Riccia*, *Marchantia*, *Anthoceros* and *Funaria.*
3. Pteridophyta- Salient features; habitat, distribution, classification and economic importance; alternation of generations. Telome theory. Stelar System. Apogamy and apospory, heterospory and seed habit. Life history and structure of *Rhynia*, *Selaginella*, *Equisetum*, *Pteris* and *Marsilea.*
4. Gymnosperms and Palaeobotany: General Characteristics, classification. Ecological and economic importance. Morphology, anatomy and reproduction of *Cycas, Pinus* and *Ephedra.* Types of fossils, process of fossilization; living fossils.

Unit III: Taxonomy of Angiosperms

1. A general account of origin and evolution of Angiosperms. Basic principles and broad outline of classifications proposed by Bentham & Hooker, Hutchinson and modern systems.
2. International Code of Nomenclature for Algae, Fungi and Plants (ICN-ICBN), Botanical Gardens and Herbaria, Botanical Survey of India.
3. Distinguishing features of the families- Ranunculaceae, Papaveraceae, Brassicaceae, Caryophyllaceae, Malvaceae, Meliaceae, Rutaceae, Fabaceae, Rosacesae, Cucurbitaceae,

Apiaceae, Rubiaceae, Solananceae, Convolvulaceae, Apocynaceae, Asclepiadaceae, Acanthaceae, Lamiaceae, Moraceae, Euphorbiaceae, Polygonaceae, Orchidaceae, Liliaceae and Poaceae.

Unit IV: Morphology, Anatomy and Embryology

1. Morphology of flowering plants: Kinds of roots, stems, leaves, inflorescence, flowers and fruits.
2. Meristems-Primary and secondary meristems, organization, characteristics and functions. Permanent tissues.
3. A brief account of root, shoot and leaf anatomy.
4. Secondary growth, secondary xylem, secondary phloem-structure- function, growth rings, sapwood, heartwood, periderm and anomalous secondary growth in dicot and monocot stems and, roots.
5. Structure of anther, microsporogenesis and development of male gametophyte.
6. Structure of ovule, megasporogenesis and development of female gametophyte.
7. Pollination: kinds and contrivances.
8. Fertilization and life history of typical angiosperms; endosperm and development of embryo; polyembryony and apomixis.

Unit V: Biodiversity, Ecology and Biostatistics

1. Biodiversity and Conservation. Levels of biodiversity- genetic, species and ecosystem diversity. Biodiversity patterns, hotspots, endangered and endemic species in India. Threats to biodiversity and Habitat loss. Conservation of biodiversity, *in-situ* and *ex-situ* conservation. Protected areas of Uttarakhand. Organizations associated with biodiversity conservation: IUCN, UNESCO, WWF, NBPGR, UNEP, etc.
2. Definition and Scope of ecology.
3. Population- Characters, growth curves, ecotypes and ecads.
4. Community- Characteristics, life-forms and biological spectrum, ecological succession.
5. Ecosystem- Types, abiotic and biotic components, energy flow, food chain, food web and ecological pyramids.
6. Biogeochemical cycles- brief discussion of concept by giving examples of carbon, nitrogen and phosphorus cycles.
7. Environmental pollution- air, water, soil, noise, radio-active pollution and remediation. Nuclear hazards and human health risks. Control measures of urban and industrial wastes.
8. Climate change, global warming, Ozone layer depletion, Acid rain.
   Impact on human communities and Agriculture. Environmental movements- Chipko; Environmental ethics. Role of Indian religion and culture in environmental conservation.
9. Definition, scope and importance of statistics. Representation of statistical data.
10. Measures of central tendency- mean, median and mode.
11. Measures of dispersion- range, mean deviation, standard deviation and standard error.
12. Coefficient of correlation.
13. Chi-Square test.

Unit VI: Cytology, Genetics, Molecular Biology and Biotechnology

1. Cell structure: cytoplasmic organelles, nucleus and chromosomes.
2. Cell division- mitosis and meiosis.
3. Laws of inheritance: Mendel's experiments, principle of segregation and independent assortment; incomplete dominance; sex-linked inheritance and sex determination.
4. Linkage and crossing over: complete and incomplete linkage, linkage groups.
5. Mutations: Kinds
6. DNA: structure and replication, RNA: structure and types.
7. Genetic Code and protein synthesis. Classical and modern concept of genes.
8. Introduction and scope of biotechnology. Recombinant DNA technology- tools and techniques, cloning vectors and plasmids.
9. Basic concept of plant tissue culture techniques; collection and storage of germplasm (Cryopreservation).
10. Industrial Biotechnology-Fermentation and alcohol production.
11. Agriculture Biotechnology- Biofertilizers and Biopesticides.
12. Nutritional Biotechnology- Mycotoxins and health hazards; control of mycotoxin production; single cell protein.
13. Elementary idea of Gene Bank, Nif and Nod genes, cDNA, Totipotency, Mycoproteins.

Unit VII Physiology, Biochemistry and Morphogenesis

1. Diffusion, osmosis, plasmolysis and Imbibition; Absorption of water, active and passive absorption.
2. Transpiration- Factors affecting the rate of transpiration, significance of transpiration, mechanism of stomatal opening and closing.
3. Mineral Nutrition- Macro and micronutrients, mineral deficiency symptoms; absorption of minerals.
4. Translocation of solutes and factors affecting translocation, mechanism of phloem transport.
5. Photosynthesis: - Historical background, concepts of two photosystems, Z-scheme, structure of choloroplast, pigments, photophosphorylations, Calvin cycle, factors affecting the rate of photosynthesis, C_4 cycle and CAM plants.
6. Respiration: glycolysis, Krebs cycle, electron transport system, redox potential, pentose phosphate pathway, ATP; aerobic and anaerobic respiration; oxidative phosphorylation, factors affecting the rate of respiration; Photorespiration.
7. Nitrogen metabolism; Nitrogen cycle.
8. Enzymes- Properties, classification, mechanism and mode of enzyme action; factors affecting enzyme activities.
9. Structure, classification and biological role of Carbohydrates, Proteins and Lipids.
10. General concept of morphogenesis, seed germination and dormancy.
11. Plant growth regulators- Auxins, Gibberellins, Cytokinins, Abscissic acid and Ethylene.
12. Physiology of flowering- Photoperiodism and Vernalization.
13. Plant movements.

Unit VIII: Economic Botany and Plant Breeding

1. Cereals and millets- Wheat, rice, maize, millets and pseudocereals.
2. Food plants- potato and sugarcane; fruits- mango, apple, banana, citrus, litchi and common fruits of Uttarakhand.
3. Fibres- Cotton, hemp, coir and local fibres.
4. Vegetables- root, stem, leaf and fruit vegetables.
5. Timbers- Teak, Shisham, Sal, Chir and Deodar.
6. Medicinal Plants- *Aconitum*, *Atropa*, *Cinchona*, *Rauwolfia* and *Ephedra*.
7. Oils- Linseed oil, mustard oil and groundnut oil.
8. Ethnobotany- Historical background; traditional knowledge of plant classification, cultivation and uses in human life. Ethnobotany in India
9. Plant breeding- aims and objectives, basic techniques of plant breeding.
10. Crop improvement methods- Selection, plant introduction and acclimatization, hybridization and mutational breeding. Crop improvement institutes of India.

****Current general knowledge of scientific advancements in all the above units is deemed to be included.**

Syllabus for the post of Assistant Teacher (LT Grade) Science

Subject : ZOOLOGY

UNIT-I: ORIGIN OF LIFE, EVOLUTION AND DISTRIBUTION

Origin of life. History of Evolutionary theories. Evidences in favour of organic evolution. Recapitulation hypothesis. Lamarckism. Variations. Darwin's theory of Natural Selection. Weismann's germplasm theory. Modern synthetic theory of evolution. Mutation theory of De Vries. Isolation and isolating mechanisms. Speciation. Gene pool. Gene frequency. Hardy-Weinberg Law. Genetic drift. Adaptation and adaptive radiation. Mimicry. Distribution and barriers. Zoogeographical regions. Fossils and fossilization. Geological time scale. Ancestry of man and Horse.

UNIT-II: CYTOLOGY AND MOLECULAR BIOLOGY

Protoplasm (physical basis of life). Cell theory. Prokaryotic and Eukaryotic cells *vs.* Bacteria, Archaea and Eukarya. Plasma Membrane (structure, function and models). Cytoplasm (Cytoplasmic matrix and cytoplasmic organelles). Cytoskeleton (Microtubules and Microfilaments). Centrioles. Endoplasmic reticulum. Golgi complex. Mitochondria. Lysosomes. Peroxisomes. Ribosomes. Nucleus and Nucleolus. Chromosomes (structure, size and shape). Modifications in chromosomes structure. Autosomes and Sex Chromosomes. Variations in chromosomes number (Euploidy and Aneuploidy). Polytene chromosomes. Lampbrush chromosomes. Chromosome banding patterns. Cell Cycle. Cell division. Cyclins and Cyclin-dependent kinases (CDKs). Cell transformation and Cancer.

Nucleosides and Nucleotides. Nucleic Acids (DNA and RNA). Forms of DNA. DNA replication. DNA Polymerases. Types of RNA. Ribozymes (RNA splicing and RNA amplification). Gene and gene concept. Split and overlapping genes. DNA is the genetic material. Gene action. Genetic code. Second Genetic Code. Gene expression or Protein synthesis (Prokaryotic and Eukaryotic). Teminism. Regulation of Gene expression or Protein sysnthesis (*lac* Operon model). Chromatin (Euchromatin and Heterochromatin). Mutations (Chromosomal and Genic).

UNIT-III: ANIMAL TISSUE SYSTEM

Epithelial tissue and classification of epithelia. Glandular issue. Connective tissue (connective tissue proper). Skeletal tissue (cartilage and bone). Vascular tissue (Blood and Lymph). Muscular tissue. Nervous tissue.

UNIT-IV: GENETICS

Mendel's Laws of inheritance. Back cross and Test cross. Genetic interaction. Linkage and Linkage Maps. Crossing-over. Multiple alleles. Sex-linked, sex-influenced and sex-limited traits. Sex determination (chromosomal, monogenic, polygenic). Genic balance theory. Hormone and environmentally controlled sex determination. Dosage compensation. Sex-linked inheritance. Inbreeding, outbreeding and heterosis. Cytoplasmic or Extranuclear Inheritance (*e.g.*, coiling of shell in snails and *Kappa*

particles in *Paramecium*). Human genetics (Pedigree analysis, Blood groups, Autosomal Syndromes, Sex syndromes, sex-linked characters and their inheritance, Eugenics, Euphenics and Euthenics).

UNIT-V: TAXONOMY AND DIVERSITY OF LIVING ORGANISMS

(A) TAXONOMY:

Stages (alpha, beta and gamma) in Taxonomy. Taxonomy and Systematics. Zoological Classification (kinds of classifications, phyletic lineages, components of classification, Linnean Hierarchy). Concept of Species (Typological, Nominalistic, Biological, Evolutionary species concepts). Kinds of species (Sibling, sympatric, allopatric, insular, parapatric, Agamo, polytypic species etc.). Subspecies. Deme. Cline. Taxonomic characters. Zoological Nomenclature. International Code of Nomenclature.

(B) DIVERSITY OF LIVING ORGANISMS:

Kingdom system of classification of the living world. Levels of body organization. Mesozoa, Parazoa and Eumetazoa. Radiata and Bilateria. Protostomia and Deuterostomia. True metamerism and pseudometamerism. Coelom and types of Coelom.

General characters, classification and common examples of major groups of **Non-chordata** (Protozoa to Echinodermata up to Classes) and **Chordata** (Protochordata to Mammalia up to Orders). Minor groups like Ctenophora, Rotifera and Onychophora.

1. **Non-Chordata:** Body organization and life cycle of various non-Chordates like *Amoeba, Euglena* and *Paramecium*; *Sycon*; *Hydra, Obelia* and *Aurelia; Fasciola* and *Taenia*; *Ascaris; Nereis, Pheretima; Hirudinaria; Periplanata, Palaemon, Pila, Unio, Sepia, Octopus* and *Asterias, Sea Urchin* and *Holothuria*.

   Comparative:

   Locomotion, Nutrition and Reproduction in Protozoa.
   Canal System and skeletal system in sponges.
   Nematocysts, Polymorphism, Corals and Coral Reefs and Metagenesis in Coelenterata.
   Nephridial system and locomotory organs in Annelida.
   Booklungs. Types of mouth parts, Tracheal system and Metamorphosis in Insects. Larval forms in Crustacea.
   Distribution, characteristics and affinities of *Peripatus*.
   Torsion in Gastropoda. Shell, foot and respiration in Mollusca.
   Water vascular system and Larval forms of Echinodermata.
2. **Chordata:** Body organization and life cycle of various Chordates like *Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Myxine, Scoliodon, Labeo,* Frog and Toad, Turtle, Lizard, Snake, Crocodile, Pigeon or Fowl, Rabbit, Squirrel and Man.

   Comparative:

   Protochordata: Endostyle and protonephridia in Protochordates. Affinities of Hemichordata. Organ of Neural complex of *Herdmania*. Wheel organ and Pharynx in *Branchiostoma*.
   Cyclostomata: Distinction between *Petromyzon* and *Myxine*. Affinities of Cyclostomata.
   Pisces: *Latimeria*, Dipnoi (Lungfishes), Types of caudal fins and tails, Scales, Air bladder, Respiration and Accessory respiratory organs. Electric Fishes.
   Amphibia: Limbless Amphibia and Neoteny.
   Reptilia: Chelonia, distinction between poisonous and non-poisonous snakes, biting mechanism in snakes, venom and antivenom. Rhynchocephalia. Crocodilia. Dinosaurs.

Aves: Typical feather and types of feathers. Air-sacs. Flight muscles. Perching mechanism. Flightless birds. Aerial adaptations in birds.
Mammalia: Prototheria, Metatheria, Flying mammals, Cetacea and Sirenia. Dentition.

Comparative Anatomy (inclusive of Histology) of various systems
(Cyclostomata to Mammalia)

Integumentary system. Basic knowledge of endoskeletal structures like Skull, Jaws and Jaw suspension, Limb bones, Vertebral column, Sternum and girdles. Joints. Alimentary canal, Liver and Pancreas. Larynx and Syrinx. Types of hearts. Types of Kidneys. Basic knowledge of the organization of brain (with reference to Frog and a typical Mammal). Cranial Nerves. Spinal cord and spinal Nerves. Sympathetic and Parasympathetic system. Testis and Ovary.

UNIT-VI: BIOCHEMISTRY, PHYSIOLOGY AND IMMUNOLOGY

(A) Balanced diet. Water, the solvent of life. pH and Buffers. Nutrient substances: Structure and classification of Proteins, Carbohydrates and Lipids. Mineral Nutrients. Vitamins. Enzymes (Nomenclature, classification and mechanism of enzyme action). Redox Potential. Biological Oxidations. Hydrogen Transfer (Electron Transport system), Oxidative Phophorylation. Aerobic and Anaerobic Hydrogen Transfer. Energy Transfer. Significance of ADP-ATP High Energy Cycle.

Metboilism: Proteins [Biosynthesis of Amino acids; Transamination, Deamination, Decarboxylation of Amino acids; Ornithine Cycle]. Carbohydrates [Glycogenesis, Glycogenolysis and Glycolysis]. Pyruvate oxidation and Citric Acid Cycle, Lipids [Beta Oxidation of Fatty Acids, Metabolism of Glycerol, Ketone Bodies and Ketosis].

(B) Acid-base balance and Homeostasis. Intra and Extracellular Digestion. **Digestion** and Absorption of Proteins, Carbohydrates and Lipids.

Respiration: Respiratory pigments. Oxygen requirement. External respiration [Breathing, Pulmonary Volumes, Regulation of breathing, Factors affecting Breathing], Gaseous exchange, O_2 and CO_2 Transport in blood and Internal Respiration. Cellular Respiration. Respiratory Quotient.

Circulation: Hemopoiesis (Erythropoies and Leucopoiesis). Clotting of Blood (Mechanism and factors). Origin and conduction of heart beat. Regulation of heart beat. Cardiac Cycle. Heart Sounds. Electrocardiogram.

Excretion: Nature of excretory products in various animals. Ammonotelic, Uricotelic and Ureotelic animals. Formation of Urine (Ultrafilteration, Selective reabsorption and secretion). Mechanism of Urine dilution and concentration. Micturition. Hormonal Control.

Muscle contraction: Chemical constitution of skeletal muscle. Biochemical events in muscle contraction. Sliding filament theory.

Receptor system: Exteroceprors, Proprioceptors and Interoceptors. Eye [Retina, formation of image and photochemical changes, accommodation, dark adaptation, common eye defects]. Ear and physiology of hearing.

Reflex actions and reflex arc.

Origin and conduction of Nerve impulse.

Endocrine Glands: Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal, Gonads, Thymus and Pineal body. Hormonal control of Testis and ovary. Effects of Hypo- and hypersecretion of various hormones. Mechanism Hormone action.

Pheromones and their role in insects and mammals.

Reproduction: The Estrous cycle and Menstrual cycle.

(C) History and overview of Immune System (Anatomical, Physiological and Inflammatory Barriers). Cell Immune system (NK cells, B-Lymphocytes, T-Lyphocytes, Granulocytic cells, Dentritic cells). Primary Lymphoid organs. Secondary Lymphoid Organs, Lymph Nodes, Spleen, Mucosal-Associated Lymphoid Tissue (MALT), Intraepithelial Lymphocytes (IEL), Cutaneous-Associated Lymphoid Tissue (CALT). Innate and Acquired Immunity. Antigen. Immunogen. Immunoglobulin and types. Major Histocompatibility Complex (MHC). Antibody. Monoclonal Antibodies. Antigen- Antibody interaction. Precipitation reaction and Agglutination Reaction.

Cytokines. Complement system. Allergy and Hypersenstivity [IgE-mediated, Antibody-mediated Cytotoxicity, Immune Complex-mediated and T_{DTH}-mediated].

UNIT-VII: DEVELOPMENTAL BIOLOGY

Gametes. Gametogenesis. Strucutre of sperm. Types of eggs. Fertilization. Patterns of cleavage. Embryonic induction and primary organizers. Blastulation and types of blastula. Fate Maps. Gastrulation (Frog and Chick). Foetal Membranes of chick. Implantation, Placenta and Placentation, Gestation and Parturition in mammals. Regeneration. Parthenogenesis.

Retrogressive metamorphosis of Ascidian Larva (*Herdmania*).

UNIT-VIII: ANIMAL BEHAVIOUR [ETHOLOGY]

Classification of behaviour, behaviour patterns and types. Fixed action patterns. Sign stimulus and releasers. Taxes and Kineses. Innate or Instinctive behaviour and Innate releasing mechanisms. Learning. Motivation. Aggressive behaviour. Communication (Tactile, Chemical, Visual, Auditory and Electric). Echolocation and language of bees. Social organization. Timing and Biological Clock. Drugs and behaviour. Parental care in Pisces and Amphibia. Migration in *Petromyzon*, Fishes and Birds. Hormonal control of behaviour.

UNIT-IX: ECONOMIC ZOOLOGY

Economic importance of Protozoa: Useful Protozoa, Parasitism, Protozoa and Human diseases [Life Cycle and pathogenesis of *Entamoeba histolytica, Trypanosoma gambiens, Plasmodium vivax* and other malaria causing species].

Sponge Industry.

Pathogenesis of *Taenia solium, Ascaris, Ancylostoma, Enterobius, Dracunculus* (The Guinea worm).

Life Cycle and Pathogenesis of Mosquito spp. (*Anapheles, Culex* and *Ades*).

Cockroach. Itch Mite. Fleas and Termite. House fly: health and hygiene.

Insect Pests: Household pests; Pests of crops, wheat flour, Rice, fruits and vegetables; Cloth Moth.

Integrated Pest Management.

Various Cultures: Vermiculture. Apiculture. Lac Culture. Sericulture. Aquaculture/Pisciculture (knowledge of Indian Major Carps; Induced Breeding).

Economic importance of Birds and Mammals.

Animal Husbandry and Dairy Technology. Poultry and Piggery.

UNIT-X: ENVIRONMENTAL BIOLOGY

Distinction between Ecology and Environment. Biogeographic Zones of India. Renewable Sources of Energy. Biogeochemical cycles (Water, Carbon, Nitrogen and Phosphorrus). Abiotic (Climate, Topographic and Edaphic) and Biotic factors. Limiting Factors. Ecological Succession. Ecosystem and types. Trophic levels and energy flow in ecosystem. Productivity (Primary and Secondary). Food web and food chains. Population (Biotic potential, Density, Natality, Mortality, Age Pyramids and Growth Curves). Species Interaction (Inter- and Intrspecific, Parasitic, Symbiotic).

Pollution (Types and control). Eutrophication. Biomagnification. Ozone Layer depletion. Green House effect and Acid Rain.

Environmental Toxicology (kinds and sources of Animal Toxins, Plant Toxins, Pesticides, Metals and food additives). Dose responses. TL_m and LC_{50} values. Threshold limits.

Solid Waste and Management. Environment Impact Assessment (EIA). Environmental Audit.

Biodiversity (definition and types, Keystone species; Alpha, Beta and Gamma diversity). Diversity Indices (Simson Index, Shanon Weiner Index etc.). Conservation and management strategy (Project Crocodile, Tiger and Elelephant). Biodiversity Conservation (Protected areas, *Ex-situ*, *In-situ* conservation; Biosphere Reserves, Wildlife Sanctuaries, National Parks).

Environment laws, Acts, Regulation and Conventions. The International Union for Conservation of Nature (IUCN)-Red Data Book. Threatened animal species of India. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Trade Record Analysis of Flora and Fauna in Commerce (TRAFFIC). General Agreement on Tariffs and Trade (GATT). World Trade Organization (WTO). Ramsar International Wetland Conservation Treaty (knowledge of Indian Wetlands, including those of Uttarakhand).

UNIT-XI: BIOTECHNOLOGY AND BIOINFORTICS

Biotechnology and Genetic Engineering or Recombinant DNA Technology. Cloning (Plasmid, Lambda phage, Cosmid, Phagemid and Transposons) and Expression Vectors (Promotors, Expression cassettes). Modifying Enzymes [Nucleases,-Restriction Endonucleases, Ligases, Polymerases, Reverse Transcriptase]. Chimeric DNA, Molecular Probes and Gene Libraries. Polymerase Chain Reaction (PCR). Isolation, sequencing and synthesis of genes. Extraction, Purification, Concentration of DNA samples. Southern Blotting. Synthesis of Complementary DNA (cDNA). cDNA library. Amplification of DNA. Gene Bank and Cryopreservation. Totipotency. Tissue culture. Single Cell Proteins. In *vitro* fertilization and embryo transfer in humans and livestock. Cloning of animals (methods and utility). Transgenic Animals. Vaccines. Gene Therapy. Biofertilizers. Biopestcides. Bioremediation. Intellectual Property Rights (IPR). World Intellectual Property Organization (WIPO). Trade Related Intellectual Property Rights (TRIPS).

Bioinformatics and Data Mining ('*In Silico* Biology'). Computer Fundamentals [Input and output devices, RAM and ROM]. Software. Hardware. Genome Projects. Web services as Bioinformatics tools [simple command-line tools to complex graphical programs and standalone *web services* like BOWS (Bioinformatics Open Web Services); SEED Genome Databases *via* Web Services like Application Programming Interface (API) ; Alignment tools]. Gene Finders. Bioinformatics Institutes and Databases or Databanks.

UNIT-XII: BIOSTATISTICS

Statistics and Biological Researches. Data. Types of Data. Data Collection, classification and presentation (Tabulation, Graphics etc.). Measures of central tendency (Mean, Mode and Median). Measures of Dispersion (Range, Mean and Standard Deviation and Standard Error). Coefficient of Variation. Moments, Skewness and Kurtosis. Basic Probability Concepts. Correlation Analysis. Regression Analysis.
Tests of significance (*Chi*-square and T-test).

NOTE: Current knowledge of Scientific Advancements related to all the above Units is deemed to be included.

(LT General)

Syllabus for the post of Assistant Teacher (L.T. General) Grade)

(एल० टी० सामान्य)

Sub- Geography

(Unit-1)

Geography of world

Earth and Solar System, Major Landforms, Weathering and Erosion, Rocks, Mountain Building Process, Volcano and Earthquake, Structure of Atmosphere, Atmospheric Pressure, Cyclone and Precipitation, winds, Climatic Classification, Resource Regions Climate Change and Global Warming. Ocean Currents, Tides, Temperature and Salinity, Soils, Natural Vegetation, Biodiversity and Biodiversity Hotspot, Agriculture and Agriculture Regions, Industry and Industrial Regions, Mineral and Energy Resources, Population, Races, Tribes, Migration, Transport and International Trade. Remote Sensing and GIS, GPS and DGPS.

Current general knowledge and current scientific advancement with above topic.

विश्व का भूगोल

पृथ्वी एवं सौर मण्डल, प्रमुख स्थलाकृतियां, अपक्षय एवं अपरदन, चट्टानें, पर्वत निर्माण प्रक्रिया, ज्वालामुखी एवं भूकम्प, वायुमण्डल की संरचना, वायुमण्डलीय दाब, चक्रवात एवं वर्षण, हवाएं, जलवायुविक वर्गीकरण, संसाधन प्रदेश, जलवायु परिवर्तन एवं वैश्विक तापन, समुद्री धारायें, ज्वार–भाटा, तापमान एवं लवणता, मिट्टियाँ, प्राकृतिक

वनस्पति, जैवविविधता एवं जैव विविधता हॉटस्पॉट, कृषि एवं कृषि प्रदेश, उद्योग एवं औद्योगिक प्रदेश, खनिज एवं ऊर्जा संसाधन, जनसंख्या, प्रजातियां, जनजातियां, प्रवास, परिवहन एवं अन्तर्राष्ट्रीय व्यापार, सुदूर सम्वेदन एवं भौगोलिक सूचना प्रणाली (जी0आई0एस0), वैश्विक स्थिति निर्धारण प्रणाली (जी0पी0एस0), विशेषात्मक वैश्विक स्थिति निर्धारण प्रणाली (डी0जी0पी0एस0),

उपरोक्त से संबन्धित समसामायिक सामान्य ज्ञान एवं वैज्ञानिक प्रगति।

(Unit-2)

Geography of India

Geographical Introduction, Physical Divisions, Drainage System, Climate and Climatic Regions, Indian Monsoon System, Soil and Vegetation, Biosphere Reserve, National Park and Sanctuaries, Agriculture and Agro-climatic Regions, Irrigation, Natural Resources, Industries and Industrial Regions, Population and Migration, Rural and Urban Settlements, Races and Tribes, Transport and Trade, Major Ports, Environmental Crisis and Policies, Major Disasters and Risk Reduction, Planning Regions. Remote Sensing and its Applications, Major Indian Satellites, Weather Forecasting.

Current general knowledge and current scientific advancement with above topic.

भारत का भूगोल

भौगोलिक परिचय, भौतिक विभाजन, अपवाह तंत्र, जलवायु एवं जलवायु प्रदेश, भारतीय मानसून प्रणाली, मृदा एवं प्राकृतिक वनस्पति, जैव संरक्षित क्षेत्र, राष्ट्रीय उद्यान एवं अभ्यारण्य, कृषि एवं कृषि जलवायु प्रदेश, सिंचाई, प्राकृतिक संसाधन, उद्योग एवं औद्योगिक प्रदेश, जनसंख्या एवं प्रवास, ग्रामीण एवं नगरीय अधिवास, प्रजाति एवं जनजातियां, परिवहन एवं व्यापार, प्रमुख बन्दरगाह, पर्यावरणीय संकट एवं नीतियां, प्रमुख आपदायें एवं जोखिम न्यूनीकरण, नियोजन प्रदेश, सुदूर सम्वेदन एवं उसका अनुप्रयोग, प्रमुख भारतीय उपग्रह, मौसम पूर्वानुमान।

उपरोक्त से संबन्धित समसामायिक सामान्य ज्ञान एवं वैज्ञानिक प्रगति।

(Unit-3)

Geography of Uttarakhand

Geographical Location, Physiography, Climate, Drainage System, Natural vegetation, Biosphere Reserve, National Park and Sanctuaries, Agriculture, Crop Diversity, Horticulture, Floriculture, Food and Nutritional Security, Irrigation, Natural Farming, Natural Resources: Soil, Water, Minerals, Medicinal & Aromatic Plants, Hydropower Projects, Population and Migration, Tribes, Tourism and Pilgrimage, Transportation, Industrial Development, Disaster and Risk Reduction, Environmental Degradation and Conservation. Sustainable Development Goals, Planning and Contemporary Issues.

Current general knowledge and current scientific advancement with above topic.

उत्तराखण्ड का भूगोल

भौगोलिक अवस्थिति, भ्वाकृति, जलवायु, अपवाह तंत्र, प्राकृतिक वनस्पति, जैव संरक्षित क्षेत्र, राष्ट्रीय उद्यान एवं अभ्यारण्य, कृषि, फसल विविधता, उद्यानिकी, पुष्प उत्पादन, खाद्य एवं पोषण सुरक्षा, सिंचाई, प्राकृतिक खेती, प्राकृतिक संसाधन : मृदा, जल, खनिज, औषधीय एवं सगन्ध पादप, जलविद्युत परियोजनायें, जनसंख्या एवं प्रवास, जनजातियाँ, पर्यटन एवं तीर्थाटन, परिवहन, औद्योगिक विकास, आपदायें एवं जोखिम न्यूनीकरण, पर्यावरण क्षरण एवं संरक्षण, सतत् विकास लक्ष्य, नियोजन एवं समसामयिक मुद्दे।

उपरोक्त से संबन्धित समसामायिक सामान्य ज्ञान एवं वैज्ञानिक प्रगति।

सहायक अध्यापक– सामान्य(एल.टी. ग्रेड) हेतु (LT General)

पाठ्यक्रम (एल॰टी॰ सामान्य)

विषय–अर्थशास्त्र

UNIT-01

व्यष्टि अर्थशास्त्र– अर्थ, क्षेत्र, स्वरूप एवं अर्थशास्त्र अध्ययन की विधियां (आगमन और निगमन विधि), उपभोक्ता व्यवहार, सीमांत उपयोगिता ह्रास नियम, उदासीनता वक्र विश्लेशण, उपभोक्ता सन्तुलन, उपभोक्ता बचत, माँग, उपयोगिता विश्लेषण, माँग की लोच, पूर्ति, पूर्ति का नियम और पूर्ति की लोच। उत्पादन, उत्पादन फलन, सम–उत्पाद वक्र, सम–लागत वक्र, उत्पत्ति के नियम, लागत– प्रकार और वक्र एवं संतुलन की शर्तें, बाजार– प्रकार, विशेषताएं (पूर्ण प्रतियोगिता, एकाधिकार, एकाधिकारात्मक, अल्पाधिकार), वितरण, साधन कीमत निर्धारण– श्रम, लगान, ब्याज तथा लाभ, कल्याणकारी अर्थशास्त्र– अर्थ एवं परिभाषाएं, अन्तर्राष्ट्रीय व्यापार, मुक्त व्यापार, संरक्षण, व्यापार की शर्तें, भुगतान शेष।

UNIT-02

समष्टि अर्थशास्त्र– अर्थ, क्षेत्र तथा समष्टि अर्थशास्त्र के प्रकार, राष्ट्रीय आय– अर्थ, अवधारणाएं तथा माप विधियाँ, हरित लेखांकन, क्लासिकी तथा केन्जियन रोजगार सिद्धान्त, उपभोग फलन, त्वरक और गुणक की अवधारणाएं, स्फीति; व्यापार चक्र; मुद्रा एवं बैंकिंग– अवधारणा, कार्य, माप, मुद्रा का परिणाम सिद्धान्त– लेन–देन तथा नकद शेष दृष्टिकोण, केन्द्रीय बैंक, व्यापारिक बैंक, बैंकिंग क्षेत्र सुधार, मौद्रिक नीति। लोक वित्त– अर्थ, राजकोषीय कार्य, अधिकतम सामाजिक लाभ का सिद्धांत, लोक व्यय– अर्थ, नियम एवं लोक व्यय के प्रभाव; लोक आय–स्त्रोत, कराघात एवं करापात तथा करारोपण के प्रभाव, वस्तु एवं सेवा कर (जी.एस.टी.); लोक ऋण– अर्थ, स्त्रोत और भुगतान की विधियां, सार्वजनिक वस्तु एवं वाह्यतायें राजकोषीय नीति।

UNIT-03

भारतीय अर्थव्यवस्था– भारतीय अर्थव्यस्था की विशेषतायें, जनसंख्या और आर्थिक विकास, भारत की जनांकिकीय प्रवृत्तियाँ, जनसंख्या विस्फोट, जीवन सारणी, प्रवास, आर्थिक प्रगति, भारत में आर्थिक प्रगति, प्रवृत्ति और संरचना, कृषि, उद्योग, भारतीय सेवा क्षेत्र, ग्रामीण विकास, शहरी विकास, गरीबी उन्मूलन कार्यक्रम, बेरोजगारी, भारत का विदेशी व्यापार– प्रवृत्तियाँ, संरचना, वित्तीय समावेशन– प्रधानमंत्री जन धन योजना, केन्द्रीय बैंक, डिजिटल बैंक। संघीय बजट (नवीनतम) विश्लेषण, सतत् विकास लक्ष्य एवं सूचकांक।

उत्तराखण्ड की अर्थव्यवस्था– मूलभूत विशेषतायें, प्राकृतिक संसाधन– खनिज, जल और वन; जनसंख्या, फसल चक्र, जैविक खेती और परम्परागत फसलें, सहकारी कृषि, राज्य की अधः संरचना, औद्योगीकरण, विपणन, प्रवास, पर्यटन, क्षेत्रीय असंतुलन, राज्य की कल्याणकारी योजनायें तथा औद्योगीकरण, आपदा प्रबंधन तंत्र, राज्य के बजट (नवीनतम) का विश्लेषण, राज्य के सूचकांक/संकेतक– सतत् विकास लक्ष्य।

UNIT-04

सांख्यिकी– अर्थ एवं स्वरूप, समंक–प्रकार, स्रोत एवं संकलन, केन्द्रीय प्रवृत्ति की माप–माध्य, गुणोत्तर माध्य, हरात्मक माध्य, माध्यिका, बहुलक; अपकिरण– विस्तार, चतुर्थक विचलन, माध्य विचलन, प्रमाप विचलन, प्रसरण, लारेन्ज वक्र, सह–सम्बन्ध – विक्षेप चित्र, कार्ल पियर्सन विधि, स्पियरमैन की कोटि अन्तर विधि, प्रतीपगमन (दो चर)– परिभाषा, न्यूनतम वर्ग विधि, प्रतीपगमन गुणांक, प्रतीपगमन समीकरण, सूचकांक– समय उत्क्राम्यता परीक्षण, तत्व उत्क्राम्यता परीक्षण, उपभोक्ता मूल्य सूचकांक।

सहायक अध्यापक– सामान्य(एल0टी0ग्रेड) के पद हेतु (LT General)
पाठ्यक्रम
विषय– इतिहास (LT सामान्य)

यूनिट–1

इतिहास, अर्थ, परिभाषा एवं क्षेत्र, भारतीय इतिहास के स्रोत(प्राचीन, मध्यकालीन एवं आधुनिक)– साहित्यिक एवं पुरातात्विक।

यूनिट–2

प्राक् एवं आद्य इतिहासः पुरापाषाण काल, मध्यपाषाण काल, नव पाषाणकाल, ताम्रपाषाणकाल एवं लौह संस्कृति, हड़प्पा संस्कृति।

यूनिट–3

वैदिक काल : पूर्व वैदिक एवं उत्तर वैदिक सभ्यता एवं संस्कृति

यूनिट–4

वैदिकोत्तर काल(300ई0पू0 तक): विभिन्न धार्मिक सम्प्रदायों का उद्भव यथा– बौद्ध, जैन,इत्यादि, प्रादशिक राज्यों का उदय एवं मगध का उत्कर्ष।

यूनिट–5

संगम कालीन दक्षिण भारतः चोल, चेर, पाण्डय।

यूनिट–6

मौर्य वंशः राजनैतिक, आर्थिक, प्रशासन, अशोक का धम्म एवं मौर्य कला।

यूनिट–7

200 ई0पू0 से 300ई0 के मध्य भारतः शुंग कण्व, सातवाहन एवं चेत वंश, नगरीकरण एवं आर्थिक स्थिति, शक, पार्थियन, कुषाणः– राजनीति, कला एवं स्थापत्य।

यूनिट–8

गुप्त कालः राजनैतिक, प्रशासनिक एवं आर्थिक स्थिति, कला एवं स्थापत्य।

यूनिट– 9

गुप्तोत्तर कालः हर्षवर्धन, पाल, प्रतिहार एवं राष्ट्रकूट वंश– राजनैतिक स्थिति, सामन्तवाद एवं राजपूतों का उद्भव, सामाजिक स्थिति।

यूनिट– 10

दक्षिण भारतः पल्लव एवं चालुक्य वंश– राजनैतिक एवं सांस्कृतिक स्थिति, चोल वंश– राजनैतिक, प्रशासनिक एवं सांस्कृतिक उपलब्धियाँ।

यूनिट– 11

तुर्कों का आक्रमण एवं दिल्ली सल्तनतः गजनवी एवं गौर वंश, गुलाम, खिलजी, तुगलक, सैयद एवं लोदी वंश– प्रशासनिक, आर्थिक स्थिति तथा कला एवं स्थापत्य।

यूनिट– 12

दक्षिण भारतः विजयनगर एवं बहमनी साम्राज्य का राजनैतिक अध्ययन एवं कला, स्थापत्य।

यूनिट– 13

भक्ति एवं सूफी आन्दोलनः उद्‌भव एवं विकास।

यूनिट– 14

मुगल कालः बाबर, हुमायूँ, अकबर, जहाँगीर, शाहजहाँ, औरंगजेब– राजनैतिक एवं प्रशासनिक विकास, धार्मिक नीति, राजपूत नीति, मनसबदारी, जागीरदारी व्यवस्था, मुगल साम्राज्य का विघटन, कला एवं स्थापत्य।

यूनिट– 15

मराठों का उदयः शिवाजी एवं मराठा प्रशासन, भारत में यूरोपियों का आगमन एवं ब्रिटिश साम्राज्य की स्थापनाः विभिन्न यूरोपीय कम्पनियों का आगमन एवं आपसी संघर्ष, अंग्रेजों का बंगाल, पंजाब, सिंध, मैसूर, मराठा साम्राज्य पर प्रभुत्व स्थापना।

यूनिट–16

प्रमुख गवर्नर जनरल एवं उनकी नीतियाँः वारेन हेस्टिंग्स, कार्नवालिस, वेलेजली, विलियम बैंटिंक, डलहौजी।

यूनिट–17

औपनिवेशिक अर्थव्यवस्थाः व्यापारिक, कृषि, औद्योगिक नीति और इनका भारत पर प्रभाव।

यूनिट–18

भारतीय प्रतिरोधः जनजातीय एवं कृषक विद्रोह, 1857 का विद्रोह।

यूनिट–19

उन्नीसवीं शताब्दी के सामाजिक एवं धार्मिक सुधार आन्दोलन।

यूनिट–20

स्वतन्त्रता आंदोलनः राष्ट्रवाद का उद्भव एवं भारतीय राष्ट्रीय कांग्रेस की स्थापना, उदारवाद काल, उग्रवाद काल, क्रान्तिकारी आन्दोलन।

यूनिट–21

गाँधी युगः महात्मा गाँधी का उद्भव, असहयोग, सविनय अवज्ञा, भारत छोड़ो आन्दोलन।

यूनिट– 22

स्वतन्त्रता एवं विभाजनः शिमला सम्मेलन, कैबिनेट मिशन, संविधान सभा, माउण्ट बेटन योजना, ऐटली की घोषणा, भारतीय गणतन्त्र की स्थापना, साम्प्रदायिकता का उद्भव एवं विभाजन।

यूनिट– 23

वायसराय एवं नीतियाँः लिटन, रिपन, डफरिन, कर्जन, इर्विन, लिनलिथगो, वेवेल एवं माउण्टबेटन

यूनिट– 24

आधुनिक शिक्षा का उद्भव एवं विकास, पत्रकारिता का विकास

यूनिट–25

संवैधानिक विकासः रेगुलेटिंग एक्ट से भारत सरकार अधिनियम 1935 तक

यूनिट–26

आधुनिक विश्व का इतिहासः पुनर्जागरण एवं धर्म सुधार आन्दोलन के कारण एवं प्रभाव, औद्योगिक एवं बौद्धिक क्रान्ति, अमेरिका की क्रान्ति, फ्रांसीसी क्रान्ति–1789, नैपोलियन युग, राष्ट्रवाद का उद्भव एवं जर्मनी तथा इटली का एकीकरण, जापान का उद्भव, बोल्सेविक क्रान्ति–1917, चीन–जापान संघर्ष, प्रथम विश्वयुद्ध कारण एवं परिणाम, तानाशाही का उद्भव–जर्मनी, जापान, इटली, आर्थिक मन्दी एवं विश्व राजनीति, द्वितीय विश्व युद्ध–कारण एवं परिणाम, संयुक्त राष्ट्र संघ की स्थापना।

(LT General)

सहायक अध्यापक सामान्य(एल0टी0–ग्रेड) हेतु पाठ्यक्रम (LT सामान्य)

विषय– राजनीति शास्त्र

SYLLABUS FOR THE POST OF ASSISTANT TEACHER(L.T. GENERAL)

SUBJECT- POLITICAL SCIENCE(GRADUATE LEVEL)

यूनिट–01: राजनीतिक सिद्धान्त

- राज्य, राष्ट्र और नागरिक समाजः परिभाषा और तत्व, व्यवहारवाद और उत्तरव्यवहारवाद।
- संप्रभुता, शक्ति सत्ता एवं औचित्यपूर्णताः परिभाषा एवं मुख्य विशेषताएँ।
- अवधारणाएँ– स्वतंत्रता, समानता, न्याय, अधिकार तथा प्रजातंत्र।

यूनिट–02:तुलनात्मक राजनीति

- शासन के प्रकार– संसदात्मक और अध्यक्षात्मक शासन, एकात्मक और संघात्मक, ब्रिटेन व अमेरिका के सन्दर्भ में।
- दलीय व्यवस्था तथा दबाब समूह।

यूनिट–03: राजनीतिक विचारक एवं विचारधाराएँ

- पाश्चात्य राजनीतिक विचारकः प्लेटो, अरस्तू और मैकियावली।
- भारतीय राजनीतिक विचारकः कौटिल्य, गाँधी और अम्बेडकर।
- राजनीतिक विचारधाराएँः उदारवाद, समाजवाद, मार्क्सवाद, नारीवाद और पर्यावरणवाद।

यूनिट–04: अन्तर्राष्ट्रीय राजनीति और संगठन

- संयुक्त राष्ट्र संघ– मुख्य अंग तथा उनके कार्य।
- मानवाधिकार, आतंकवाद, वैश्वीकरण, गुटनिरपेक्षता, निःशस्त्रीकरण।
- दक्षिण एशिया क्षेत्रीय सहयोग संगठन(सार्क), जी–20।

यूनिट–05: लोक प्रशासन

- लोकप्रशासन, नवीन लोकप्रशासन, विकास प्रशासन और लोकनीति।
- ई–प्रशासन, सुशासन एवं नागरिक अधिकार पत्र।
- भारत में नौकरशही, बजट एवं बजट प्रक्रिया।

यूनिट–06: भारतीय राजव्यवस्था

•भारतीय संविधान का निर्माण और स्रोत, भारतीय संविधान की मुख्य विशेषताएँ और प्रस्तावना।

•भारत में संघीय व्यवस्था स्वरूप और केन्द्र–राज्य संबंध।

•मौलिक अधिकार और मौलिक कर्त्तव्य, राज्य के नीति निर्देशक सिद्धान्त।

•संघीय व्यवस्था– राष्ट्रपति, प्रधानमंत्री, मन्त्रिमण्डल और मंत्रि–परिषद, राज्य सभा और लोकसभा, सर्वोच्च न्यायालय– संरचना तथा क्षेत्राधिकार, न्यायिक पुनरावलोकन, न्यायिक सक्रियता और लोक अदालत।

•राज्य व्यवस्था– राज्यपाल, मुख्यमंत्री, विधानमण्डल और उच्च न्यायालय।

•चुनाव आयोग– संगठन, कार्य तथा शक्तियाँ।

•उत्तराखण्ड के विशेष संदर्भ में पचायती राज, आपदा प्रबंधन नीति और पर्यावरण नीति।

PHYSICAL EDUCATION

History & Fundamentals of Physical Education:

UNIT-I Nature, Scope and Significance

- Physical Education – Meaning, Definition, Aims & Objectives, Need & Importance and Scope.
- History of Physical Education in India- Pre Independence and Post-Independence.
- Development of Physical Educational at world stage.
- Greece
- Rome
- Germany
- Sweden
- USA
- Denmark
- England
- Russia/USSR

Philosophy: Meaning, Definition & Types, Epistemology, Metaphysics, logic and axiology.

Philosophy of Physical Education- Idealism, Naturalism, Realism & Pragmatism, Olympic Movement

Olympic Games (Ancient & Modern), Commonwealth Games, Asian Games, National Games & SAF games.

Indian Olympic Association (Structure & Functions)

International Olympic Committee (Structure & Functions)

Prominent Physical Education & Sports Institution in India-

YMCA, HVPM, LNIPE, NSNIS Patiala & SAI LCC Lucknow.

Sports Coaching Schemes (functions & Objectives)-

Raj Kumari Amrit Kaur Sports coaching schemes, PYKKA, Khelo India, Fit India Movement.

Honors and Awards- Maj. Dhyan Chand Khel Ratna Award, Dhyan Chand Life Time Achievement Award, Arjuna Award, Dronacharya Award, MAKA Trophy, Tenzing Norgay National Adventure Award.

Khelo India Games.

UNIT-2 Anatomy and physiology in Physical Education

Structure, Types of Function of Human Body cell, Tissue and organs

Body Joints: Structure, Types and Movements.

- Human Systems:-
- Muscular system
- Respiratory System
- Nervous System
- Lymphatic System
- Circulatory System
- Digestive System
- Excretory System
- Blood (structure, Composition and different Types of Blood Groups)
- Sensory Organs
- Endocrine glands
- Effects of Exercise on various system (Muscular System, Respiratory System, Cardio-Vascular System)

UNIT 3 Health Education

Health : Meaning and concept

- Components, Spectrum and Dimension of Health.
- Hygiene(Personal & Environmental)
- Common communicable disease like Malaria, Cholera, Small Pox, Whooping Cough, Tuberculosis, AIDS and Leprosy.
- Balance diet, classification of food and role of various nutrients.
- International health agency- W.H.O., UNICEF.
- Public Health Administration.
- School health program
- Environmental Pollution (Air, water, soil & Noise)
- Management of Environment & government policy.

- Nature, Types, Prevention and Rehabilitation of Sports Injuries.
- Common sports Injuries- Sprain, Contusions, Fracture, Dislocation, Strain, Abrasion, Laceration.
- Therapeutic, Modalities.
- Body Posture & Types and remedies of poor posture- Kyphosis, Lordosis, Scoliosis, Flat Back, Round Shoulders, Knock Knees, Bow Legs, Flat Foot.
- First Aid: Types & Techniques.
- Quality & Qualification of First Aid Personnel.
- Drugs & Doping
- WADA and NADA (Structure & Functions)
- RICE, PRICE, Taping & Bandaging & CPR.

UNIT-4 Sports Training

- Meaning and Concept of Sports Training.
- Principles of Sports training.
- Training load (Components & Types) & Recovery process.
- Adaptation & Super Compensation in sports training.
- Overload – Causes and symptoms- tackling of overload.
- Physical fitness: Meaning and its components.
- Strength
- Endurance
- Speed
- Flexibility
- Coordinative abilities
- Training Plans (Short term & Long Term)
- Periodization in Sports Training (Types & Phases)
- Talent Identification process.

Unit-5 Kinesiology & Biomechanics

- Kinetics & Kinematics (Linear & Angular).
- Motion (Linear & Angular), Newton's Laws of Motion.
- Plans and Axis ; Fundamental movements .
- Classification of Muscles- Structural classification of Muscles, Muscles- Location, Origin, Insertion and action of Muscle at various joints of Upper

Extremity (Shoulder Girdle, Shoulder Joint, Elbow joint, Wrist joint); Lower Extremity (Hip, Knee, Ankle, Foot).

- Levers (Types and scope in sports performance).
- Balance and Equilibrium.
- Stability and its Principles.
- Types of Muscle contraction (Isometric, Isotonic & Isokinetic).
- Mechanical principles involved in Games and Sports- Distance, Displacement, Speed, Velocity, Acceleration, Momentum, Friction, Projectile.
- Elasticity (Types &its Role).

UNIT-6 Test, Measurement & Evaluation in Physical Education

- Test, Measurement & Evaluation
- Statistics: Meaning Definition and Importance in Sports.
- Measures of Central Tendency & Measures of variability.
- Data, Variables (Types & use)
- Concept of Parametric & Nonparametric tests.
- Fitness: Meaning & Types
- Fitness tests: AAHPER Youth Fitness Test, Cooper's 12 Minute run &Walk test, JCR Test, Mecloy's General Motor ability Test, Methany- Johnson Test, Kraus Weber test, Beep Test, Harward Step Test
- Skill Test: Lockhart McPherson Badminton Test, Harbans field Hockey Test, Brady Wall volley Test, Johnson Basketball Test, Knox Basketball test, Miller Wall volley Test, Dyer Tennis Test, McDonald Soccer Test
- Anthropometric Measurements: Weight, Height, Chest Circumference
- Skin Fold Measurements
- B.M.I. & Body Composition, BMR, Tools related to measurement

UNIT-7 Sports Psychology

- Sports Psychology (Meaning, Concept and Branches)
- Growth and Development
- Heredity and Environment
- Laws of Learning
- Personality: Types, Traits and Theories.
- Motivation: Types and Theories.
- Role of Psychological Variables in sports Performance; Anxiety, Aggression, Stress, Frustration and Emotional conflicts.

UNIT-8 Officiating & Coaching

- Officiating- Meaning and Definition
- Qualifications, Qualities, Duties and Responsibilities of an official.
- Qualifications and Qualities of A Coach.
- Conditioning : Methods & Exercises.
- Warm up & Cooling Down.
- Tournaments : Intramural & Extramural competitions.
- Fixture: round robin, knock out and combination types.
- Tournament Committees: structure and functions.
- General Rules and Regulation, Ground Dimensions, Marking and Standard Equipments of the following Games and Sports:
- Track & field Events,
- Football,
- Hockey,
- Volleyball,
- Basketball,
- Cricket,
- kabaddi,
- Tennis,
- Table Tennis,
- Gymnastics,
- Badminton,
- Kho-kho,
- Handball,
- Boxing,
- Judo,
- Wrestling,
- Chess,
- Swimming,
- Yoga.

UNIT-9 Teaching Methods & Education Technology.

- Teaching Methods, Techniques & Styles.
- Lesson- plan(structure, types and phases)
- Teaching Aids,

- Time table.
- Budget.
- Office records & Register.
- Public relation
- New teaching techniques & Innovation.
- ICT in Teaching-(Meaning, Need & Importance)
- Micro teaching (Meaning, Types and steps)
- Simulation Teaching.
- Computer & its components (Input & Output devices)
- MS Office (MS word, Excel & PowerPoint)

सहायक अध्यापक स्नातक वेतन क्रम (एल0टी0 ग्रेड) विषय गृह विज्ञान हेतु पाठ्यक्रम

(इकाई–01) गृह प्रबन्ध

गृहविज्ञान की अवधारणा तथा अध्ययन क्षेत्र- अर्थ, परिभाषा, अध्ययन क्षेत्र

- **गृह प्रबन्ध** - अर्थ, परिभाषा एवं उद्देश्य, प्रबन्ध प्रक्रिया, प्रबन्ध प्रक्रिया को प्रेरित करने वाले तत्व- मूल्य, लक्ष्य, स्तर /मानक, निर्णय प्रक्रिया।
- संसाधन- अर्थ, प्रकार, विशेषतायें एवं प्रबन्ध प्रक्रिया में संसाधनों का महत्व, संसाधनों के प्रकार मानवीय एवं अमानवीय, प्राकृतिक एवं मानवकृत, पारिवारिक संसाधनों का व्यवस्थापन।
- धन व्यवस्थापन- आय- परिभाषा, प्रकार एवं स्त्रोत, धन नियोजन, बजट पारिवारिक आय के परिप्रेक्ष्य में बजट निर्माण।
- कार्य सरलीकरण - अर्थ, परिभाषा, महत्व, समय एवं श्रम को सरलीकृत करने हेतु आधुनिक उपकरण।
- बचत - अर्थ, उद्देश्य एवं निवेश द्वारा बचत का उचित प्रबन्धन, विभिन्न निवेश माध्यम एवं योजनायें (संस्थान- बैंक, डाकघर, जीवन बीमा, बाँडस, शेयर इत्यादि।
- बैंक में खाता खोलते समय ध्यान रखने योग्य आवश्यक बातें।
- पारिवारिक आय संवर्धन हेतु उपाय।
- पारिवारिक आय, आर्थिक स्थिति संवर्धन हेतु उपाय।

- आवास एवं आतंरिक सज्जा–
- कला के सिद्धान्त एवं कला के तत्व, आन्तरिक सज्जा में परिप्रेक्ष्य में कला के सिद्धान्त एवं तत्वों का अनुप्रयोग, गृह वाह्य सज्जा।
- पुष्प सज्जा- अर्थ, उद्देश्य एवं प्रकार।
- गृह सज्जा में उपयोगी उपसाधन (अर्थ, प्रकार)।
- प्रकाश - अर्थ, गुण/विशेषतायें, प्रकार, गृह सज्जा में प्रकाश व्यवस्था/प्रकाश के अनुप्रयोग।
- रंग- अर्थ, गुण/विशेषतायें, वर्गीकरण एवं रंग योजना।

- **घर / आवास**– अर्थ, परिभाषा, कार्य एवं महत्व।
- परिवार, परिवार के प्रकार, परिवार के सदस्यों की गतिविधियाँ, परिवार का आकार, संगठन, घर (आवास) क्रय हेतु प्रभावी कारक।
- गृह स्थिति-(भूखण्ड का चुनाव करते समय ध्यान रखने योग्य बातें)।
- गृह नियोजन के सिद्धान्त।
- फर्नीचर - आवश्यकता तथा व्यवहारिकता तथ्य, रखरखाव।
- गृह निमार्ण के सिद्धान्त।
- विभिन्न आय समूहों हेतु आवास आयोजन।
- भवन निर्माण सामग्री, आवास आयोजन में प्रयुक्त चिन्ह।
- रसोईघर एवं रसोईघर के प्रकार।
- हाउसकीपिंग- अर्थ एवं आथित्य उद्योग में हाउस कीपिंग की भूमिका।
- उपभोक्ता- अर्थ, परिभाषा और उपभोक्ता के उत्तरदायित्व व अधिकार, उपभोक्ता संरक्षण एवं सहायता उपाय।

(2)

(इकाई–02) वस्त्र एवं परिधान

• **परिधान- परिचय-**

· तन्तु- गुण, उपयोग, वर्गीकरण (प्राप्ति स्त्रोत तथा लम्बाई के आधार पर) निर्माण, विशेषतायें।

· वस्त्र उपयोगी तन्तु/रेशों का उत्पादन, निर्माण प्रक्रिया, विशेषताएं एवं उपयोग– सूत/कपास, सन, ऊन ,रेशम, रेयॉन एवं नायलॉन।

· सामान्य तन्तुओं की पहचान / परीक्षण- सूक्ष्मदर्शीय परीक्षण, ज्वलन परीक्षण, भौतिक परीक्षण।

· सूत निर्माण प्रक्रिया एवं प्रकार।

· वस्त्र निर्माण– बुनाई एवं बुनाई के प्रकार।

• **वस्त्र परिसज्जा-**

· मूलभूत परिसज्जा- ब्लीचिंग, सीन्जींग, टैनटरिंग, कैलेन्डरिंग, मरसिराइजिंग, सैनफोराइजिंग, नैपिंग, साइजिंग, एवं डिगमिंग।

· कार्यात्मक परिसज्जा- रेजिन, क्रीज अवरोधक, अग्नि अवरोधक, जल अवरोधक, कवक अवरोधक।

· रंग एवं वस्त्र- साधारण रंगाई,रंगाई की विभिन्न अवस्थाऐं, बाटिक रंगाई, टाई एवं डाई (बाँधनी)।

· प्रिन्टिग (छपाई)- ब्लॉक प्रिन्टिंग, रोलर प्रिन्टिंग, स्प्रे प्रिन्टिंग एवं स्क्रीन प्रिटिंग।

•**वस्त्र निर्माण-** वस्त्र निर्माण के सामान्य सिद्धान्त, वस्त्र निर्माण में प्रयुक्त होने वाली शब्दावली, शरीर की माप।

· वस्त्र निर्माण पूर्व तैयारी- ड्राफ्टिंग, पैर्टन मेकिंग।

· सिलाई मशीन- सिलाई मशीन के भाग एवं कार्य, सिलाई में प्रयुक्त होने वाले उपकरण।

· वस्त्रों के चयन को प्रभावित करने वाले कारक-बजट, आयु, जलवायु, व्यवसाय, शारीरिक बनावट, फैशन, अवसर।

• **वस्त्र संग्रहण एवं सुरक्षा-** धुलाई कला (लॉण्ड्री), धुलाई कला के सामान्य सिंद्धान्त, धुलाई के प्रकार- सूखी एवं गीली, घर्षण, चूषण, नीडिंग एवं स्कीवजिंग, धुलाई कला में काम आने वाली सामग्री एवं उपकरण।

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(इकाई–03) आहार एवं पोषण

• **आहार एवं पोषण- एक परिचय-**

· भोजन, पोषण, पोषक तत्व - अर्थ एवं परिभाषा, भोजन के कार्य, भोजन का वर्गीकरण कार्य एवं प्राप्ति स्त्रोत के आधार पर, ऊर्जा- अर्थ/परिभाषा-(ऊर्जा आवश्यकता को प्रभावित करने वाले कारक), आधारीय उपापचय- परिभाषा एवं प्रभावित करने वाले कारक, संतुलित आहार- अर्थ, परिभाषा, महत्व।

• पोषक तत्व– (प्रोटीन, कार्बोहाड्रेट, वसा, विटामिन, खनिज लवण, जल एवं आहारीय रेशें)– स्त्रोत, कार्य, आवश्यकता, अवशोषण एवं इनकी न्यूनता से उत्पन्न रोग।

• **खाद्य समूहः-**

· आहार में मूलभूत खाद्य समूहों का महत्व।
· भारतीय आहार में अनाजों, मोटे अनाजों, दाल, तिलहन, मेवों, फलों, दुग्ध पदार्थों, अण्डे, मांस-मछली, मसालों, गुड़ एवं चीनी का पौष्टिक मान एवं योगदान।
· आई. सी. एम.आर. द्वारा प्रस्तावित निर्धारित आहार समूह, आहार की अनुशंसित आहार भत्ता (RDA)।

• **आहार नियोजन-** आहार नियोजन के मूलभूत सिद्धान्त, आहार नियोजन को प्रभावित करने वाले कारक।

· उपचारात्मक आहार– सामान्य आहार का उपचारात्मक संशोधन, निम्न रोगों हेतु आहार प्रबन्धन–उदर सम्बन्धी अतिसार, कब्ज एवं पेप्टिक अल्सर, ज्वर, मधुमेह, मोटापा, कुपोषण (प्रोटीन ऊर्जा कुपोषण), हृदय संबंधी रोग, पीलिया, हेपेटाइटिस, सिरोसिस।
· विशेष अवसरों हेतु आहार नियोजन।

• **जीवन चक्र की निम्नांकित अवस्थाओं में आहार / पोषण-**शैशवावस्था, बाल्यावस्थाए किशोरावस्था, वयस्कअवस्था /प्रौढ़ावस्था, वृद्धावस्था, गर्भावस्था, धात्री (स्तनपान) अवस्था।

• **आहार परिरक्षण-**

· परिभाषा, महत्व एवं सिद्धान्त। ऊष्मा द्वारा परिरक्षण, पाश्चुरीकरण, स्टेरलाइजेशन, ब्लाँचिंग, डिब्बाबंदी, रेफ्रिजरेशन, प्रशीतन द्वारा परिरक्षण, रासायनिक पदार्थों, नमक एवं चीनी द्वारा परिरक्षण, किण्वन- अर्थ एवं सूक्ष्म जीवों का महत्व, किण्वन के लाभ।
· विभिन्न प्रकार के पाक विधियाँ एवं भोजन की पौष्टिकता (पौष्टिक मान) पर उनका प्रभाव।
· खाद्य विषाक्तता- खाद्य मिलावट, खाद्य मिलावट- परीक्षण।

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(इकाई–04) बाल विकास

• **मातृत्व-** जैविक एवं शारीरिक आवश्यकतायें, शारीरिक, आर्थिक एवं मनोवैज्ञानिक तैयारियां,अभिभावक, स्कूल एवं शिक्षक, अभिभावक के प्रकार(Parenting Styles), बाल विकास में अभिभावक, शिक्षक, स्कूल की भूमिका।

• **वृद्धि एंव विकास-** अर्थ, परिभाषा, वृद्धि एवं विकास में अन्तर/भिन्नताएं।

• **विकास-** विकास को प्रभावित करने वाले कारक, विकास के प्रमुख क्षेत्र, विकास के सिद्धान्त, विकास में परिवर्तन के प्रकार, मील का पत्थर (विकास के सन्दर्भ में), विकास कार्य प्राप्त करने हेतु अवस्थाएं।

- **गर्भावस्था-** प्रसवपूर्व - गर्भाधान एवं गर्भावस्था के सूचक चिन्ह, जन्मपूर्व विकास की अवस्थायें, जन्मपूर्व विकास को प्रभावित करने वाले कारक, गर्भावस्था की समस्यायें एवं कठिनाईयां, पौष्टिक आहार की आवश्यकता, नवजात सुरक्षा, स्तनपान का महत्व, शिशु आहार / पूरक आहार, शिशु पालन-पोषण, शैशवावस्था में सामान्य बीमारियाँ एवं प्रतिरोधकता प्राप्त करने हेतु टीकाकरण, जन्म के प्रकार, जन्मोपरांत समन्वय, तापमान, श्वसन, पोषण, गर्भावस्था में स्वास्थ्य सुरक्षा का महत्व।
- **शैशवावस्था-** शिशु सुरक्षा, शिशु आवश्यकता, शारीरिक विकास– गत्यात्मक विकास, सूक्ष्म क्रियात्मक कौशल, भाषा एवं बोली विकास, सामाजिक विकास, संज्ञानात्मक विकास, संवेगात्मक विकास।
- **पूर्व बाल्यावस्था** - शारीरिक विकास– गत्यात्मक विकास, सूक्ष्म क्रियात्मक कौशल, भाषा एवं बोली विकास, सामाजिक विकास, संज्ञानात्मक विकास, संवेगात्मक विकास, बाल्यावस्था की सामान्य समस्यायें, नकारात्मकता, बिगड़ैल स्वभाव, ईर्ष्या, असामाजिक व्यवहार, शारीरिक समस्यायें, भावनात्मक समस्यायें, बाल्यावस्था की सम्भावित दुर्घटनायें।
- **उत्तर बाल्यावस्था** - शारीरिक विकास– गत्यात्मक विकास, सूक्ष्म क्रियात्मक कौशल, भाषा एवं बोली विकास, सामाजिक विकांस, संज्ञानात्मक विकास, संवेगात्मक विकास, बाल्यावस्था की सामान्य समस्यायें, नकारात्मकता, बिगड़ैल स्वभाव, ईर्ष्या, असामाजिक व्यवहार, शारीरिक समस्यायें, भावनात्मक समस्यायें, बाल्यावस्था की सम्भावित दुर्घटनायें।
- **यौवनोत्सुक अवस्था-** विशेषतायें, आयु, वृद्धि स्फुरण, शारीरिक परिवर्तन, प्यूबरटी (यौवनोत्सुक अवस्था) के हानिकारक प्रभाव।
- **किशोरावस्थाः-** अर्थ, शारीरिक विकास, मानसिक विकास, संज्ञानात्मक विकास, संवेगात्मक विकास व्यक्तित्व विकास, किशोरो की सामाजिक समस्यायें, किशोरावस्था की सामान्य समस्यायें, स्वयं परीक्षणः व्यक्तिगत भिन्नतायें एवं कारण।
- वयस्क अवस्था–व्यक्तिगत तथा सामाजिक सामंजस्य, विशेषतायें, सामाजिक गतिशीलता, सामाजिक रूचियां, एकाकीपन, इस अवस्था के हानिकारक प्रभाव, मानसिक परिवर्तन हेतु सामंजस्य, शारीरिक परिवर्तन हेतु सामंजस्य, जीवन साथी की मृत्युपर सामंजस्य, सेवानिवृत्ति सामंजस्य।
- **वृद्धावस्था-** व्यक्तिगत एवं सामाजिक सांमजस्या, इस अवस्था की विशेषतायें, शारीरिक परिवर्तन हेतु सांमजस्य, मानसिक परिवर्तन रूचियों में परिवर्तन, पारिवारिक सांमजस्य, जीवन साथी की मृत्यु पर सांमजस्य, वृद्धावस्था के नकारात्मक प्रभाव।
- **खेल–** अर्थ, परिभाषा, महत्व एवं खेल के प्रकार।

(इकाई–05) गृह विज्ञान प्रसार शिक्षा

- **गृह विज्ञान प्रसार शिक्षा** –अर्थ, महत्व एवं आवश्यकता, उद्देश्य, विशेषताएं, सिद्धान्त, औपचारिक एवं अनौपचारिक शिक्षा, गृहविज्ञान प्रसार शिक्षा का विकास में योगदान,
- **महिला सशक्तिकरण**-अर्थ, उद्देश्य, लिंग आधारीय भेदभाव, महिला एवं बाल अधिकार, कानून, महिला एव बाल कल्याण को समर्पित कार्यक्रम एवं संस्थाएं (राष्ट्रीय एवं अंतर्राष्ट्रीय) WHO, UNICEF, CARE, ICDS, ICCW and ILO, NIPCCD,
- **जनसंख्या शिक्षा**: अर्थ एवं परिभाषा, आवश्यकता एंव महत्व, अति जनसंख्या संबंधी समस्याएं

SYLLABUS FOR THE POST OF ASSISTANT TEACHER (LT GRADE)

SUBJECT: COMMERCE

Unit -I

Financial Accounting

Financial Accounting

Meaning and Scope of Accounting; Accounting Principles, Accounting Equations, Conventions and Postulates, Double Entry System of Accounting; Basic knowledge of Accounting Standards, Basic Accounting Terminologies, Concept of Capital and Revenue Expenditure, Accounting Process- Journal, Ledger, Subsidiary Books and Trial Balance; Bank Reconciliation Statement, Rectification of Errors, Depreciation Accounting, Preparation of Final Accounts of Sole Trader with Adjustments, Accounting for Non-Profit Organizations, Partnership Accounts: Admission, Retirement, Death and Dissolution; An Overview of Computerised Accounting System and Accounting usage in Data Base Management System; Contemporary issues in Accounting.

Advanced Financial Accounting

Royalty Accounts, Hire Purchase System and Installment Payment System, Accounting for Joint Venture and Consignment, Departmental and Branch Accounts, Accounting of Banking and Insurance Companies, Computation of Insurance Claims for loss of Stock and loss of Profits.

Issue, Forfeiture and Reissue of Shares, Issue and Redemption of Debentures, Issue of Bonus Shares, Stock Splits and Buy Back of Shares, Liquidation of Company, Valuation of Shares and Goodwill, Basics of Amalgamation, Absorption and Reconstruction, Accounting of Holding Company, Profit and Loss Prior and Post Incorporation of a Company

Unit II

Cost and Management Accounting

Cost Accounting: Meaning, Nature, Scope, Objective and Advantages of Cost Accounting, Cost Concepts and Classification, Elements of Cost- Material, Labour and Overheads, Methods of Costing-Unit, Job, Contract, Process and Operating Costing; Classification, Allocation, Appropriation and Absorption of Overheads; Methods of Wage Payment & Incentive Schemes of wages, Inventory Control, Reconciliation of Cost and Financial Accounts, Marginal Costing and Cost Volume Profit Analysis, Cost Control and Cost Reduction, Integral and Non-Integral System of Cost records.

Management Accounting: Meaning, Nature and Functions of Management Accounting, Role of Management Accounting in Decision Making. Accounting tools and techniques of Management Accounting, Budgeting and Budgetary Control; Relationship and Difference among Financial Accounting, Cost Accounting and Management Accounting; Standard Costing and Variance Analysis, Fund Flow Statement and Cash Flow Statement, Ratio Analysis, Capital Investment Decision Methods, Responsibility Accounting.

Unit -III

Financial Management and Taxation

Financial Management: Nature, Scope, Objectives and Significance of Financial Management, Finance Functions and Time Value of Money, Capitalization and Theories of Capital Structure, Cost of Capital, Investment Decisions, Financing Decisions and Dividend Decisions, Leverage Analysis and Dividend Policies, Working Capital Management, Computation of Risk & Return and Capital Asset Pricing Model.

Income Tax: Basic Concepts and Important Definitions, Residential Status and Tax Liability, Agriculture Income, Exempted Incomes, Different heads of Income, Set-off and Carry Forward of Losses, Clubbing of Incomes, Deductions from Gross Total Income and Rebates, Computation of Total Taxable Income and Tax Liability of an Individual and HUF, TDS and TCS, Online filing of return.

Goods and Services Tax: Meaning and Structure of GST including CGST, SGST, UTGST and IGST, Procedure of Registration, Taxable Event, Time and Place of Supply, Computation of GST, Input Tax Credit and E-way Bill, TDS/TCS and Returns; Contemporary issues in GST.

Unit IV

Money, Banking, Insurance, Auditing and Law

Money and Banking: Meaning, Functions, Importance and Kinds of Money, Various methods of Note Issue with particular reference to their working in India; Inflation and Deflation, Money Standards, Essentials of a good Currency System, Gold Standard, Bimetallism, Paper Standard, Plastic and Digital Money Standards, Value of Money, Quantity Theory of Money; Definition of Banking, Types and Functions of Commercial Banks; RBI- Functions, Instruments of Monetary and Fiscal Policy, Main features of Monetary Policy since Independence; Critical study of Credit Control; Meaning of Financial Market and its Significance in Financial System, Financial Market in Organized Sector, Meaning and Structure of Money Market and Capital Market in India.

Foreign Exchange, Mint Power and Purchasing Power Parity Theory, Balance of Payment. Exchange Control Regulation of Foreign Exchange. Functions of major Financial Institutions-IDBI, IFCI, SIDBI, SFCs, Development Banks and other Non-Banking Financial Institutions; Contemporary issues.

Insurance: Meaning, Origin and Development, Functions, Types, Principles and Advantages. Reinsurance & Double Insurance; Risk: Meaning, types, causes and methods of handling risks, Risk and return relationship; IRDA: Power, Functions and Role.

Auditing: Meaning, Objectives, Basic Principles and Techniques, Classification of Audit, Audit Planning, Internal Control: Internet Check and Internal Audit, Audit Procedure: Vouching and Verification of Assets and Liabilities; Qualification, Appointment, Disqualification, Removal, Remuneration, Rights and Duties of a Company Auditor; Types of Auditors Report; Special features of Cost Audit, Tax Audit and Management Audit; Recent trends in auditing.

Business Laws:

Indian Contract Act 1872

Sale of Goods Act 1930

The Partnership Act 1932

Negotiable Instrument Act 1881

Information Technology Act 2000

Companies Act 2013

Consumer Protection Act, 2019

*(All Acts with respect to latest amendments)

Unit V

Business Management, Marketing Management and Business Communication

Business Management: Meaning, nature and significance of Management, Schools of Management Thought, Process of Management: Concept and theories of Planning, Decision-Making, Organizing, Staffing, Organization Structure, Directing, Motivation and Leadership, Coordination and Controlling.

Marketing Management: Nature, scope and importance of marketing, Marketing concepts, Marketing Mix, Marketing Environment, Consumer Behaviour, Marketing Segmentation, Product Classification, Concept of product mix, Branding, Packaging, Labeling, Product life cycle, Pricing, Factors affecting price of a product, Pricing policies, Distribution channels, Promotion and its types, Contemporary issues in Marketing.

Business Communication: Meaning, Importance, Nature, Communication Process, Types and Barriers to Communication, Communication within the organization: Memo writing, Proposal writing, Report writing, Office orders, Circular, Writing notes; Resume writing and oral presentation.

Unit VI

Business Statistics and Economics

Business Statistics: Nature, Scope, Importance and Limitations of Statistics, Statistical Investigation: Planning a Statistical Investigation, Methods of Collecting Primary and Secondary Data, Principles and Methods of Sampling; Methods of Classification and Tabulation, Graphical Presentation of Data and its Interpretation, One and Two Dimensional Diagrams. Measures of Central Tendency- Uses, Limitation and Calculations of various Averages: Arithmetic Mean, Median, Mode, Harmonic Mean and Geometric Mean, Dispersion and Skewness: Various Measures; Correlation: Simple Correlation, Scatter Diagram, Karl Pearson's Correlation, Spearman's Rank Correlation, Standard error and Probable error; Index Numbers: Fixed Base and Chain Base, Base Shifting, Weighted Index numbers, Consumer Price Index number, Fisher's Index and Tests of Reversibility.

Economics: Definition and Nature of Economics, Scope and Methodology of Economics, Micro and Macro Economics. Measurements of Utility, Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, Demand Schedule and Curves, Elasticity of Demand, Methods of Measurement of Elasticity of Demand and Elasticity of Supply, Consumer Surplus, Study of Consumer Behavior through Indifference Curve Techniques. Factors of Production and their

characteristics, Theories of Population, Law of Returns, Different Concept of Cost of Production, SAC, LAC Curves, Theory of Exchange, Determination of Price under Condition of Perfect Competition, Imperfect Competition and Monopoly; Effect of Monopoly in economic life, Monopolistic Competition, Theories of Distribution, Concept of Economic Growth and Development; Meaning and Measurement of National and State Income, Contemporary Issues in Economics.

सहायक अध्यापक स्नातक वेतनक्रम (एल0टी0) संगीत विषय हेतु पाठ्यक्रम

विषय–संगीत

खण्ड–1

भारतीय शास्त्रीय संगीत का सामान्य अध्ययन–

(अ) ध्वनि, कम्पन, आन्दोलन, आवृति, नाद, नाद के प्रकार, संगीत, संगीत की उत्पति, मार्गी व देशी संगीत, संगीत के प्रकार,–शास्त्रीय, उपशास्त्रीय, सुगम, लोक संगीत, स्वर व स्वर के प्रकार, प्रमाण श्रुति, श्रुति, स्थान, सप्तक एवं सप्तक के प्रकार, ग्राम व ग्राम के प्रकार, मूर्च्छना, जाति, राग, थाट/मेल, राग वर्गीकरण पद्धतियाँ–ग्राम राग, देशी राग, शुद्ध–छायालग राग, संकीर्ण–मिश्र राग, दशविध राग वर्गीकरण, राग–रागिनी वर्गीकरण, मेल–राग/थाट राग वर्गीकरण, वीणा के तार पर शुद्ध–विकृत स्वरों की स्थापना।

(ब) वर्ण, वादी, संवादी, विवादी, अनुवादी, अलंकार, स्वर–प्रस्तार, न्यास स्वर, अपन्यास स्वर, आरोह, वर्जित स्वर, अंश स्वर, वक्र स्वर, कण, मीड़, खटका, मुर्की, गमक, आंदोलन, काकु एवं उसके भेद, कृन्तन, जमजमा, जोड़ झाला, रजाखानी गत, मसीतखानी गत, घसीट, सूत, मेजर टोन, मानइर टोन, सेमीटोन, हारमनी, मैलोडी, आश्रय राग, परमेल प्रवेशक राग, सन्धि प्रकाश राग, आलाप–तान की परिभाषा एवं प्रकार, समप्रकृतिक राग, लय एवं लय के प्रकार, ताल, मात्रा, सम, ताली, खाली, विभाग, आवर्तन, लयकारी–ठाह, दुगुन, तिगुन, चौगुन, आड़, मुखड़ा, मोहरा, कायदा, पेशकार, पल्टा, परन टुकड़ा, उठान, रेला, चक्करदार, लग्गी, लड़ी बांट, तिहाई, तानपूरा, सितार, तबला, हारमोनियम का सामान्य अध्ययन।

खण्ड–2

(अ) संगीत का ऐतिहासिक अध्ययन – सामगान, साम विकार, सामिक स्वर, सामिक व लौकिक स्वर की तुलना, वैदिक काल के वाद्य, गान्धर्व–गान, निबद्ध–गान, प्रबन्ध गान, प्रबन्ध के भेद, अनिबद्ध–गान, रागालाप, रूपकालाप, आलप्ति, पदाश्रितागीति, ध्रुवागीति, स्वराश्रितागीति, चतुःसारणा, स्वर–संवाद व उपसंवाद।

(ब) ग्रंथों व पुस्तकों का अध्ययन –

नारदीय शिक्षा, नाट्य शास्त्र, बृहद्देशी, संगीत रत्नाकर, संगीत पारिजात, राग तरंगिणी, स्वरमेल कलानिधि, चतुर्दण्डी प्रकाशिका, श्रीमल्लक्ष्यसंगीतम्, संगीत बोध, भरत का संगीत सिद्धांत, क्रमिक पुस्तक मालिका, प्रणव भारती, संगीतांजली, राग विज्ञान, हमारा आधुनिक संगीत।

(स) गायन शैलियां –

शास्त्रीय – ध्रुवपद, धमार, ख्याल, टप्पा, ठुमरी, दादरा, तराना, चतुरंग, त्रिवट, होरी, सादरा, स्वर मालिका/सरगम गीत, लक्षण गीत, पदम्, कृति, तिल्लाना, जावली, कीर्तिनम्, गीत, भजन, गजल, राग–सागर।

लोकगीत – कजरी, चैती, होरी लावणी, झोड़ा, चांचरी, न्योली, चौंफला, थड़या, हारूल, शगुनाखर/मांगल गीत, जागर, छपेली, गिद्दा बोली, हीर राँझा, घूमर, गरबागीत, यक्षगान, बिहू, बाऊल, बिरहा, सोहर।

खण्ड –3

(अ) घराना– ध्रुवपद की वाणियाँ, घराने की परिभाषा, ख्याल गायकी के घराने, ग्वालियर, आगरा, दिल्ली, किराना, जयपुर, पटियाला, रामपुर–सहसवान।
तबले के घराने – दिल्ली, अजराड़ा, फरूर्खाबाद, लखनऊ, बनारस, पंजाब
सितार के घराने – सेनिया।

(ब) संगीतज्ञ एवं संगीत में योगदान– उ0 अब्दुल करीम खां, पं0 विष्णु दिगम्बर पलुस्कर, पं0 विष्णु नारायण भातखण्डे, उ0 फैयाज खां, स्वामी हरिदास, तानसेन, गोपाल नायक, बड़े गुलाम अली खां, पं0 कृष्णराव शंकर पंडित, बैजू बावरा, जयदेव, अमीर खां, उस्ताद जाकिर हुसैन, किशन महाराज, सामता प्रसाद, पंडित अनोखे लाल, पं0 भीमसेन जोशी, पं0 जसराज, कुमार गन्धर्व, अहमद जान थिरकवा, पं0 शिवकुमार शर्मा, विश्वमोहन भट्ट, कंठे महाराज, पं0 श्यामा शास्त्री, मुत्तु स्वामी दीक्षित्तर, त्यागराज, पुण्डरीक विट्ठल, पंडित ओमकार नाथ ठाकुर, पं0 रविशंकर, नियामत खां, विसमिल्ला खां।

खण्ड–4

भारतीय संगीत के वाद्य एवं उनके प्रकार

तत्– सितार, तानपूरा, सरोद, वायलिन, सारंगी, रूद्रवीणा, सरस्वती वीणा, विचित्र वीणा, गुट्टु वीणा।
सुषिर– बांसुरी, शहनाई, रणसिंहा, मशकबीन, भकोरा, शंखश्रृंगी, नादस्वरम्, अलगोजा, तुरई।
अवनद्ध– तबला, मृदंगम, पखावज, हुड़का, ढोलक, ढोल, दमाऊ, डौंर।
घञ्– मंजीरा, घण्टा, थाली, घटम्, मोचंग, चिमटा, खड़ताल, घड़ियाल।

खण्ड–5

रागों एवं तालों का परिचय–

राग– यमन, बिलावल, काफी, देश, खमाज, भैरव, भैरवी, आसावरी, भूपाली, बागेश्री, मालकौसं, पूरिया, जौनपुरी, केदार, बिहाग, जैजैवन्ती, वृन्दावनी सारंग, पूरियाधनाश्री, देशकार, कामोद, गौड़ सारंग, छायानट, बंसत, परज, अड़ाना, दरबारी कान्हड़ा, दुर्गा, शंकरा, हिन्डोल, मियां मल्हार, बहार, गौड़ मल्हार, अल्हैया बिलावल।
ताल– तीनताल, तिलवाड़ा, रूपक, जततताल, एकताल, चारताल, धमार, दादरा, कहरवा, दीपचंदी, झपताल, सूलताल, आड़ा चौताल, उपर्युक्त तालों में लयकारी, ठेका, दुगुन, तिगुन, चौगुन, आड़।

खण्ड–6

सम्यक विषय–

पंडित विष्णु नारायण भातखण्डे एवं पंडित विष्णु दिम्बर पलुस्कर की स्वरलिपि पद्धति का अध्ययन, गायक/वादक(तबला एवं सितार) के गुण एवं अवगुण

रागों का समय सिद्धान्त– पूर्वांगवादी राग, उत्तरांगवादी राग, सन्धिप्रकाश राग, स्तवन–प्रातः स्तवन, मध्याह्न/मध्य दिन स्तवन, संध्या स्तवन।

Syllabus for the Post of Assistant Teacher
(LT Grade)-URDU

مشترک اردو نصاب برائے یو. کے. ایس. ایس. ایس. سی.

(Graduate Level)

یونٹ(1)۔ علم صرف

☆اسم ، ضمیر، فعل، صفت، حرف مع اقسام

یونٹ(2)۔ علم نحو اور انشا

☆حرف، کلمہ، مبتدا، خبر، مفرد، مرکب، فعل، فاعل، مفعول

☆جملہ مع اقسام

☆واحد- جمع، تذکیر و تانیث، مرکبات (مرکب اضافی، توصیفی)

☆لاحقہ، سابقہ، محاورہ، کہاوت

☆رموزِ اوقاف: ختمہ (-)، سکتہ (،)، سوالیہ (؟)، فجائیہ (!)، رابطہ (:)، قوسین ()، واوین (" ")

☆درخواست نویسی، خطوط نگاری، مضمون نگاری

یونٹ(3)۔ علم بیان و بدیع

☆شعری اصطلاحات ——— مصرع، شعر، قافیہ، ردیف، مطلع، مقطع، حسن مطلع، بند

☆شعری ہیئتیں ——— غزل، مثنوی، ترکیب بند، ترجیع بند، مستزاد

☆اقسام بند ——— مثلث، مربع، مخمس، مسدس

☆علم بیان ——— تشبیہ (مشبہ، مشبہ بہ، وجہ شبہ، حرف تشبیہ)، استعارہ (مستعار لہ، مستعار منہ)، کنایہ، مجاز مرسل

☆علم بدیع ——— تجنیس، لف و نشر (مرتب، غیر مرتب)، مراعات النظیر، تلمیح، حسن تعلیل، تضاد، مبالغہ، ایہام، تجاہل عارفانہ

یونٹ(4)۔ اردو زبان کی تشکیل

☆ہند آریائی، پراکرت، اپ بھرنش

☆مغربی ہندی کی بولیاں

☆اردو زبان کے آغاز کے متعلق مختلف نظریات

یونٹ(5)۔ تاریخ ادب اردو

☆شمالی ہند میں اردو کا ابتدائی عہد۔ دکن میں اردو۔ اٹھارہویں صدی میں اردو

☆فورٹ ولیم کالج، دلی کالج، دبستان دہلی، دبستان لکھنؤ

☆علی گڑھ تحریک، ترقی پسند تحریک، حلقۂ ارباب ذوق، معاصر ادبی رجحانات و رویے

(84)

یونٹ(6)۔افسانوی نثر

☆داستان: تعریف اور آغازوارتقا ــــــــ متن: میرامن (باغ وبہار: سیر پہلے درویش کی)، رجب علی بیگ سرور (فسانۂ عجائب: لکھنؤ)

☆ناول: تعریف اور آغازوارتقا ــــــــ متن: امراؤجان ادا (مرزاہادی رسوا)، گئودان (پریم چند)

☆افسانہ: تعریف اور آغازوارتقا ــــــــ متن: پریم چند (عید گاہ)، راجندر سنگھ بیدی (بھولا)، سعادت حسن منٹو (ٹوبہ ٹیک سنگھ)، عصمت چغتائی (بچھو پھوپھی)

☆ڈراما: تعریف اور آغازوارتقا ــــــــ متن: امتیاز علی تاج (انارکلی)، حبیب تنویر (آگرہ بازار)

یونٹ(7)۔غیر افسانوی نثر

☆خطوط: متن ــــــــ غالب کے تین خط: مرزاعلاء الدین خاں کے نام: 'سنو! عالم دوہیں۔۔۔۔۔'

میر مہدی مجروح کے نام: 'کیا پوچھتے ہو کیا لکھوں۔۔۔۔۔' اور 'آؤ میاں سید زادۂ آزادہ!۔۔۔'

☆انشائیہ: متن ــــــــ رشید احمد صدیقی (چارپائی)، پطرس بخاری (لاہور کا جغرافیہ)، سجاد حیدر یلدرم (مجھے میرے دوستوں سے بچاؤ)

☆سوانح: متن ــــــــ 'یادگار غالب' کا پہلا باب

☆خاکہ: متن ــــــــ عبدالحق (حالی)، مرزا فرحت اللہ بیگ (مولوی نذیر احمد کی کہانی: کچھ ان کی کچھ میری زبانی)

☆اردو سفر نامہ کا آغازوارتقا

یونٹ(8)۔قدیم شعری اصناف

غزل: تعریف اور آغازوارتقا

☆ولی (غزل نمبر:4,5)، سودا (غزل نمبر:5،8) درد (غزل نمبر:1,8)، میر (غزل نمبر:2,5)، آتش (4,9)، غالب (غزل نمبر:2,11)

جگر (غزل نمبر:1)، حسرت (غزل نمبر:4)، فراق (7)، عرفان صدیقی ('عشق نامہ' کی پہلی غزل)، فضاابن فیضی ('سبزۂ معنی بیگانہ' کی پہلی غزل)

☆قصیدہ: تعریف اور آغازوارتقا ــــــــ متن: سودا (شہر آشوب)

☆مرثیہ: تعریف اور آغازوارتقا ــــــــ متن: میر انیس (نمک خوان تکلم ہے کے ابتدائی 10 بند)

☆مثنوی: تعریف اور آغازوارتقا ــــــــ متن: میر حسن ('خدا کی خدائی سے معمور ہے' تا 'کہ پھر قہر تھا ماہ رخ کا عتاب')

☆رباعی: تعریف اور آغازوارتقا ــــــــ متن: جگت موہن لال رواں اور فراق کی رباعیاں (ابتدائی چار چار رباعیاں)

☆**انتخاب منظومات حصہ دوم: اترپردیش: اردو اکادمی، لکھنؤ میں درج غزلیں، قصیدہ، مرثیہ، مثنوی اور رباعی**

یونٹ(9)۔جدید شعری اصناف

☆جدید اردو نظم: تعریف اور آغازوارتقا

متن ــــــــ نظیر اکبر آبادی (بنجارہ نامہ)، حالی (مرثیہ دلی)، اقبال (شعاع امید، نیا شوالہ)، اکبر الہ آبادی (فرضی لطیفہ، مستقبل)، فیض (تنہائی) اختر الایمان (ایک لڑکا)، میراجی (کلرک کا نغمۂ محبت)، مجاز (نھی پجارن)، مخدوم (چارہ گر)، خلیل الرحمن اعظمی (میں گوتم نہیں ہوں)، شہریار (خواب کا در بند ہے)

یونٹ(10)۔ادبی تنقید

☆حالی، شبلی، کلیم الدین احمد، احتشام حسین

متن ـــــــ مقدمہ شعر وشاعری (شعر میں کیا خوبیاں ہونی چاہئیں)، شبلی: موازنہ انیس ودبیر (فصاحت، کلام کی فصاحت)

یونٹ(11)۔اردو صحافت اور ترجمہ

☆ترجمہ: معنی ومفہوم، اقسام، روایت

☆اردو کے اہم ترجمہ نگار (مولوی عبدالحق، نذیر احمد، عابد حسین)

☆اردو ترجمے کے اہم ادارے (دلی کالج، علی گڑھ سائنٹفک سوسائٹی، دارالترجمہ عثمانیہ، قومی کونسل برائے فروغ اردو زبان، نئی دہلی)

☆صحافت: معنی ومفہوم، اقسام، روایت

☆خبر نگاری، اداریہ نگاری، کالم نگاری، فیچر نگاری، اشتہار سازی

☆1857 کا انقلاب اور اردو صحافت (جام جہاں نما، دہلی اردو اخبار، صادق الاخبار، پیام آزادی)

☆بھارت کی تحریک آزادی اور اردو صحافت (اردوئے معلّٰی، ہمدرد، زمیندار، الہلال، البلاغ)

☆اردو صحافت آزادی کے بعد (قومی آواز، ملاپ، سیاست، انقلاب، راشٹریہ سہارا)

یونٹ(12) اردو زبان اور کمپیوٹر

☆کمپیوٹر: تعارف، تاریخ اور تجدید

☆ان پیج، اردو کی بورڈ، فونٹ اور فونٹ کی قسمیں، یونی کوڈ

☆اردو کی اہم ویب سائیں (انجمن ترقی اردو، قومی کونسل برائے فروغ اردو زبان، نئی دہلی، این۔ سی۔ ای۔ آر۔ ٹی۔ نئی دہلی، شبلی اکیڈمی، ریختہ وغیرہ)

☆کمپیوٹر اور جدید برقی ذرائع (گیان درشن، ای پاٹھ شالہ، شودھ گنگا، انٹرنیٹ آرکائیو وغیرہ)

☆انٹرنیٹ، سوشل نیٹ ورکنگ اور اردو (فیس بک، ایکس، ٹیلی گرام، یوٹیوب وغیرہ)

یونٹ(13) اردو طباعت اور پریس

☆اردو کی اہم کتب اور رسائل: ابتدا تا حال

SYLLABUS FOR THE POST OF ASSISTANT TEACHER (L.T. GRADE)
DRAWING & PAINTING

UNIT-1 FUNDAMENTALS OF ART

Introduction- Meaning of Art, Definition of Art, Classification of Art, Elements of Art-Line, Form, Color, Tone, Texture, Space.

Principles of Composition- Proportion, Rhythm, Dominance, Harmony, Unity, Balance.

Medium and Technique-

Medium, Techniques and Material- Pencil, Charcoal, Pastel, Water Color, Oil Color, Acrylic Color, Tempera, Gouache, Batik, Tie & Dye, Collage, Mural, Mixed Media, Ink, Relief.

UNIT-02 HISTORY OF INDIAN ART

A- INDIAN PAINTING & SCULPTURE:

Pre historic cave painting, Indus Valley, Sanchi, Maurya, Shung, Gandhar style, Ajanta, Bagh, Ellora, Elephanta, Sittanvasal, Pal and Jain Style, Rajasthani, Mughal, Pahari School, Company School, Bengal School of Painting.

B- MODERN & CONTEMPORARY INDIAN PAINTING:

Jamini Roy, Rabindranath Tagore, Abhinindra Nath Tagore Gagnendranath Tagore, Nandlal Bose, Raja Ravi Verma, Amrita Shergil, Calcutta Group, Progressive Artist Group (PAG), Delhi Shilpi Chakra.

C- CONTEMPORARY INDIAN PAINTERS:

Satish Gujral, M.F. Husain, K.S. Kulkarni, K.K. Hebbar, N.S. Bendre, Ram Kumar, Arpna Kaur, Anjoli Ela Menon, Anupam Sood, Nalani Malani, Arpita Singh, Gogi Sarojpal, Tayeb Mehta, A. Ramchandran.

UNIT-03 HISTORY OF WESTERN ART

A- WESTERN PAINTING & SCULPTURE:

Pre-historic Painting, Egyptian Painting, Greek Art, Roman Art, Early Christian and Byzantine Painting, Romansque Painting, Gothic Painting, Renaissance Painting, High Renaissance Painting.

UNIT-04 INDIAN AESTHETICS

An introduction to Indian Aesthetics with brief historical background. Definition and meaning of Art, six limbs of Indian Painting (Shadang), Rasa Types and Rasa Theory (Bharat muni, Abhinava Gupta) Dhvani, Bhava, Alankar, Concept of Beauty according to Indian Philosophers.

UNIT-05 FOLK ART (INDIA)

Origin, Definition, indroduction- Madhubani, Rangoli, Thapa, Mandana, Alpana, Sanjhi, Godana, Aipan, kalighat painting, Phulkari, Kalamkari, worli, Kolam, Gond, Phad, Kantha, Patchitra.