

**ANNEXURE-II**

**Scheme of Examination for the post of Trained Graduate Teacher in  
Residential Educational Institutions Societies as per  
G.O.Ms.No.31 SCD (RS) Dept, dt:08.06.2018.**

**Scheme of Examination**

<b>Written Examination (Objective Type)</b>		<b>No. of Questions</b>	<b>Duration (Minutes)</b>	<b>Marks</b>
<b>Paper-I</b>	General Studies, General Abilities and Basic Proficiency in English	100	120	100
<b>Paper-II</b>	Pedagogy of concerned subject	100	120	100
<b>Paper-III</b>	Subject Discipline Knowledge/ Concerned Subject	100	120	100
		<b>Total</b>		<b>300</b>

**Written Examination Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies**

**Syllabus**

**Paper - I**

**General Studies, General Abilities and Basic Proficiency in English**

**Section-I: General Studies**

1. Current Affairs - Regional, National & International.
2. Indian Constitution: Indian Political System; Governance and Public Policy.
3. Social Exclusion: Rights issues such as Gender, Caste, Tribe, Disability etc. and inclusive policies.
4. Society Culture, Civilization Heritage, Arts and Literature of India and Telangana
5. General Science: India's Achievements in Science and Technology
6. Environmental Issues: Disaster Management - Prevention and Mitigation Strategies and Sustainable Development.
7. Economic and Social Development of India and Telangana.
8. Socio-economic, Political and Cultural History of Telangana with special emphasis on Telangana Statehood Movement and formation of Telangana state.

**Section-II: General Abilities**

9. Analytical Abilities: Logical Reasoning and Data Interpretation.
10. Moral Values and Professional Ethics in Education.
11. Teaching Aptitude

**Section - III: Basic Proficiency in English**

**i) School Level English Grammar:**

Articles; Tense; Noun & Pronouns; Adjectives; Adverbs; Verbs; Modals; Subject-Verb Agreement; Non-Finites; reported speech; Degrees of Comparison; Active and Passive Voice; Prepositions; Conjunctions; Conditionals.

**ii) Vocabulary:**

Synonyms and Antonyms; Phrasal Verbs; Related Pair of Words; Idioms and Phrases; Proverbs.

**iii) Words and Sentences :**

Use of Words ; Choosing Appropriate words and Words often Confused; Sentence Arrangement, Completion, Fillers and Improvement; Transformation of Sentences ; Comprehension; Punctuation; Spelling Test; Spotting of Errors.

## Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies

### PAPER-II : భాషాభోధన శాస్త్రం - తెలుగు

1. భాష : స్వభావం - ఉత్పత్తి ప్రథమ భాష, ద్వితీయ భాష, తృతీయ భాష; మాతృభాష; వివిధ వర్గాలు, వృత్తులవారి భాష.
2. భాషా భోధన మరియు అభ్యసనం : ఉద్దేశాలు, లక్ష్యాలు, అభ్యసన ప్రమాణాలు (సామర్థ్యాలు), విలువలు.
3. బాలబాలికల వికాసము : భాషాభోధన అభ్యసన మనో విజ్ఞానము - ముఖ్యభావనలు; పిల్లల భాషా సంపాదనా సిద్ధాంతాలు; భాష - ఆలోచన, సృజనాత్మకత.
4. భాషా విద్యా ప్రణాళిక : నిర్మాణం, వ్యవస్థీకరణము, అభివృద్ధి, పాఠ్యపుస్తకాల కూర్పు.
5. భాషా నైపుణ్యాలు మరియు భోధన నైపుణ్యాలు : తరగతిలో ప్రతిభాయుత భోధన అభ్యసన ప్రణాళిక రచన, నిర్వహణ; అభ్యసనానుభవాల కల్పన.
6. భాషా భోధన : పద్ధతులు, వ్యూహాలు (పాఠశాల స్థాయి పాఠ్యాంశాలను దృష్టియందుంచుకొని) గద్యం - పద్యం - నాటిక (సంభాషణ), కథ - వ్యాసం మొదలగు ప్రక్రియల భోధన.
7. భోధన మరియు అభ్యసన వనరులు : భాషా భోధన సామగ్రి ఆకృతీకరణ; భాషా ప్రయోగశాల; భోధనోపకరణాలు; ఒక వనరుగా పాఠ్యపుస్తకం; భాష భోధన అభ్యసనాల్లో కంప్యూటర్ సాంకేతికత (ICT) వినియోగం; సహపాఠ్య కార్యక్రమాలు.
8. భాషా విషయక మాపనము - మూల్యాంకనము : నిరంతర సమగ్ర మూల్యాంకనము - మూల్యాంకనా సాధనాలు - వ్యూహాలు, ఉపలబ్ధి మరియు లోప నిర్ధారణనికషలు.
9. అభ్యసన వైకల్యాలు - ప్రత్యేక అవసరాలు గల పిల్లల భాషాభ్యసనం.
10. నిత్య జీవితంలో భాషా వినియోగం - భాష సమస్యలు, భాషావిధానాలు మరియు జాతీయ, రాష్ట్రస్థాయి విద్యా ప్రణాళికా చట్టాలు (పాఠశాల స్థాయి).

**Paper -III: తెలుగు భాషా సాహిత్యాలు**  
(Telugu Language & Literature)

విషయ ప్రణాళిక

- 1 కవులు, రచయితలు, రచనలు: బిరుదులు - పురస్కారాలు: ఇతివృత్తాలు, సందర్భ నేపథ్యాలు - పాత్రలు, విశేషాంశాలు
- 2 సాహిత్య ప్రక్రియలు - నిర్వచనాలు - లక్షణాలు  
A. పద్య ప్రక్రియలు :- ఇతివోసం - పురాణం - ప్రబంధం, కావ్యం (ఖండకావ్యం ) శతకం - గేయం - ఆశువు (అవధానం) మొదలైనవి  
B. రూపక ప్రక్రియలు- నాటకం /నాటిక, యక్షగానం, బుర్రకథ %--% సంభాషణ, మొదలైనవి
3. సాహిత్య ప్రక్రియలు - నిర్వచనాలు - లక్షణాలు, వచన (గద్య ) ప్రక్రియలు -కథ /కథానిక/ గల్పిక, నవల /నవలిక, లేఖ, వ్యాసం, జీవితచరిత్ర, ఆత్మకథ (స్వీయచరిత్ర ), యాత్రాచరిత్ర,పీఠిక - విమర్శ - సమీక్ష- వచన కవిత - నిబద్ధ కవిత (ఉదా:నానీలు, గజకృ - రుణాయిలు)అనిబద్ధ వచన కవిత సంపాదకీయం, వార్త, వ్యాఖ్య, మొదలైనవి.
4. ఆధునిక సాహిత్యం - ధోరణులు - ఉద్యమాలు: భావ కవిత్వం, అభ్యుదయ కవిత్వం, విప్లవ కవిత్వం, దిగంబర కవిత్వం, స్త్రీవాద కవిత్వం, మైనారిటీ వాద కవిత్వం అనుభూతివాద కవిత్వం, జాతీయోద్యమ కవిత్వం, ఆంధ్రోద్యమ కవిత్వం, తెలంగాణ ఉద్యమ కవిత్వం.
5. తెలుగు భాషా సాహిత్యాలపై ఇతర భాషల ప్రభావం  
అ). సంస్కృతం, ఆంగ్లం - ఉర్దూ - పారశీకం మొదలైనవి  
ఆ). భాషా శాస్త్రం ఆవిర్భావ వికాసాలు మౌళిక భావనలు
6. భాషా రూపాలు :  
శాసన భాష, గ్రాంథికభాష, వ్యవహారిక భాష, మాండలిక భాష, ప్రామాణిక భాష, ప్రసారమాధ్యమాల భాష, వైయక్తిక భాష , ఇంటి (కుటుంబ ) భాష, పరిసరాల భాష, భాషా వినియోగ సందర్భాలు, భాషా ప్రాధాన్యత, తెలుగు భాషా ప్రాచీనత, భాషా పరి రక్షణ, అభివృద్ధి చర్యలు, భాషా పరి రక్షణ , అభివృద్ధి సంస్థలు.
7. భాషాంశాలు భాషోచ్చారణ, ధ్వని, ధ్వన్యత్పత్తి స్థానాలు, అక్షరం, లిపి, లిపిపరిణామం: పదం, ప్రాతిపదిక, ప్రత్యయం: అర్థం - అర్థ విపరిణామం, తత్పమం, తద్భవం, దేశ్యం, గ్రామ్యం -అన్యదేశ్యం నానార్థాలు, పర్యాయ పదాలు, వ్యుత్పత్త్యర్థాలు, ప్రకృతి, వికృతులు, వాక్యం వాక్యభేదాలు- తెలుగు వాక్యం ప్రత్యేకతలు, సంధులు, సమాసాలు, ఛందస్సు అలంకారాలు, వ్యాకరణ పరిభాష.
8. జానపద సాహిత్యం
9. పఠానాపగాహనం (గద్యం)
10. పఠానాపగాహనం (పద్యం)

## **Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies**

### **Paper-II: Pedagogy of English Language**

1. The Nature of language and its Historical Development ; First Language; Second Language and Third Language ; Different Types of Languages; Mother Tongue; Languages of Different Professions; Importance of languages across School Curriculum; Contributions of Creative Writers.
2. Values, Aims and Objectives of Teaching Languages
3. Child Development; Psychology of Teaching and Learning Languages; Language, Thinking and Creativity.
4. Language Curriculum : Construction ,Organization and Development
5. Language Skills; Planning for Effective Instruction in Language Classrooms: Different Plans and Designing Learning Experiences.
6. Approaches, Methods and Techniques of Teaching Languages with special reference to School Content (Prose/Fiction /Poetry/Drama/Essay)
7. Teaching and Learning Resources and Designing Instructional Material for Languages; Language Labs; Teaching Aids ; Textbooks; ICT in Language Teaching and Learning
8. Measurement and Evaluation in Languages: Continuous and Comprehensive Evaluation (CCE); Tools and Techniques of Evaluation; Achievement and Diagnostic Tests.
9. Learning Disabilities/Difficulties and Education of Exceptional/ Disabled Children in Languages
10. Language and Everyday Life; Language Issues and Policies. National and State Curriculum frameworks.

### Paper -III: English Language & Literature

#### Part-A

I. Reading Comprehension of unseen passage.

II. Grammar and Vocabulary.

1) Parts of Speech; 2) Subject and predicate; 3) Types of sentences - Transformations; 4) Conjunctions (Linkers; connectors; cohesive devices) ; 5) Verbs (Regular and Irregular) and modals; 6) Tense and Time; 7) Prepositions; 8) Adverbs - types and their order in sentences; 9) Adjectives including Degrees of Comparison and also Quantifiers; 10) Articles - Determiners. 11) Clauses; (Noun Clauses - Adjective clauses; adverbial clauses); 12) Voice; 13) Direct and Indirect Speech; 14) Infinitives; gerunds; participles ; 15) Phrasal verbs ; Idioms ; prepositional phrases ; (Noun phrases; verb phrases; adverbial phrases); 16) Forming Questions and Question Tags.; 17) Correction of Sentences.; 18) Figures of Speech; 19) Antonyms; 20) Synonyms; 21) Homophones; 22) Homonyms ; 23) Affixation; 24) Spelling; 25) Vocabulary in context; 26) Proverbs ; 27) One word substitutes; 28) Composition: Paragraph, essay, expansion, précis, Letter writing, message, notice, article and report writing.

III. Aspects of pronunciation:

1. Vowel and consonant Sounds and phonemes
2. Stress: word and sentence stress.
3. Intonation: Four basic patterns of intonation.

IV. Punctuation.

#### PART-B

##### Literature:

I) Comprehension of

- 1) Literary prose passage and
- 2) A poem

II) Study of Literary forms:

- 1) Poetry: Sonnet, ode, elegy, Ballad, Lyric, Dramatic Monologue
- 2) Prose:
  - a) Drama (Structure, Characters, dialogues, Soliloquy, tragedy, comedy, Tragi-comedy)
  - b) Fiction: - (point of view, setting atmosphere; style; Technique of Narration.)
  - c) Essay Detailed study of English Literature from 1798 to 1900 with special reference to Wordsworth, S.T. Coleridge, John Keats, Shelly, Lord Byron, Charles Lamb, Charles Dickens, William Hazlitt, Alfred Lord Tennyson, Robert Browning, Mathew Arnold, George Eliot, Thomas Carlyle and John Ruskin.

#### III. Poetry

Name of the Poet	Title
Sarojini Naidu	In The Bazaars of Hyderabad
Rw Emerson	A Nation's Strength
RL.Stevenson	My Shadow
Alfred Tennyson	Home They Brought Her Warrior Dead
Elizabeth Barrett Browning	The Cry of Children
Rabindranath Tagore	My Mother; Freedom.
C A Bowels	The River
Gabriel Okara	Once Upon A Time
Medora Chevalier	Or Will The Dreamer Awake?

Name of the Poet	Title
Dr. SurayaNasim	Abandoned
Khalil Gibran	On Friendship
Shiv K.Kumar	Mother's Day
William Wordsworth	Anecdote For Fathers
Edwar Lear	The Duck And The Kangaroo
Harry Behn	Trees
Lily Usher	Grabbing Everything On The Land
HarindranathChatopadhyaya	The Earthen Goblet
Don Marquis	A Spider And A Fly

### Prose

Name of the Essayist/ Writer/Novelist	Title
APJ Kalam	Wings Of Fire
RK.Narayan	Swami And Friends
Charles Dickens	Oliver Twist
Jonathan Swift	Gulliver Travels
Sudha Murthy	1. Gender Bias 2. How I Taught My Grandmother ToRead And Other Stories
Isaac Asimov	Robots And People
O.Henry	After Twenty Years
R.K. Laxman	The Gold Frame
E.V.Lucas	The Face On The Wall
Oscar Wilde	The Nightingale And The Rose
Satyajit Ray	BepinChoudhury's Lapse of Memory
A.G. Gardiner	On Umbrella Morals
Stephen Leacock	How To Live To Be 200
George Orwell	Animal Farm

### Drama / Play

Name of the Writer	Title
J.B. Priestley	Mother's Day
William Stanley Houghton	The Dear Departed
Cedric Mount	The Never Never Nest
Fritz Karinthy	The Refund
G.B.Shaw	Saint Joan
Shakespeare	Julius Caesar

The Candidates are expected to have a thorough knowledge of the above mentioned poets, essayists, novelists and dramatists and their respective works mentioned at the level that is expected of a student of literature.

**Paper -II: संस्कृतम् - भाषाबोधनशास्त्रम्  
(Pedagogy of Sanskrit Language)**

1. संस्कृतभाषायाः स्वरूपस्वभावाः—ऐतिहासिकविकासः- संस्कृते वैदिक-लौकिकभाषयोः भेदः - मातृभाषा-माध्यमभाषा-प्रथमभाषा-द्वितीयभाषा-तृतीयभाषात्वेन गृहभाषा-राज्यभाषा-राष्ट्रभाषात्वेन च संस्कृतम् , संविधाने संस्कृतभाषायाः प्राधान्यम् , शिक्षाक्षेत्रात् भिन्नक्षेत्रेषु संस्कृतम्, पाठशाला-पाठ्यक्रमे भाषाणां प्राधान्यम्-संस्कृतस्य पाठ्यम्, गर्जनात्मक-कवीनां संस्कृतं प्रति योगदानम्
2. संस्कृतभाषायाः बोधनस्य अभ्यसनस्य च उद्देश्यानि लक्ष्यानि मौल्यानि भाषा-कौशलानि च
3. संस्कृतभाषायाः बोधन-अभ्यसनयोः मनोवैज्ञानिकता - बालानां प्रगतिः - भाषामम्पादने सिद्धान्ताः भाषायां चिन्तनम् - गर्जनशीलता च
4. भाषा-विद्या-योजना(प्रणालिका)-निर्माणम्-निर्वहणम् - विकासः
5. भाषानैपुण्यानि बोधनानैपुण्यानि--भाषा-कक्ष्यायां प्रभावयुतबोधनाय अभ्यसन-पद्धतीनां विभिन्नयोजनाः-निर्वहणम् , अभ्यसनानुभवानां रचना च
6. पाठशालास्तरे पद्य-गद्य-कथा-रूपक(नाटक)-काव्यादीनां प्रक्रियाणां पाठने भाषाबोधनपद्धतयः
7. संस्कृतभाषायाः बोधनाभ्यसनयोः संसाधनानि, बोधनासामाग्री-निर्माणम् , भाषाप्रयोगशाला, पाठ्योपकरणानि , भाषाध्ययने संसाधनत्वेन पाठ्यपुस्तकानि , भाषायाः बोधना-अभ्यसनयोः सङ्गणक-तन्त्रज्ञानविनियोगः च
8. भाषायाः प्रमाणानि (मौल्यमापनम्) मूल्याङ्कनम् च , निरन्तर-समग्र-मूल्याङ्कनम् , मूल्याङ्कनस्य साधनानि व्याहाराः(कौशलानि) च , लक्ष्यसाधना-लोपनिर्धारणनिकाषाः
9. भाषाभ्यासे क्लेशाः - अभ्यसने विभिन्नकारणैः(वैकल्यादि)अममर्थच्छात्राणां भाषाभ्यासकरणस्य प्रक्रियाणाम् अध्ययनम्
10. नित्यजीवने संस्कृतभाषायाः उपयोगः - संस्कृतभाषाविकासे समस्याः - विविधभाषाविधानानि (त्रिभाषामूत्रम्...) - संस्कृतसंवर्धनाय विविध-आयोगाः(कमिपन्स) - पाठशालास्तरे संस्कृतस्य विक्रामाय राज्यस्तरीय रष्ट्रिय विद्यायोजना चट्टाणि



### Paper-III: Sanskrit

1. वैदिक साहित्यस्य परिचयः – संहिताः – ब्राह्मणानि- आरण्यकानि – उपनिषदः – वेदाङ्गाः च ।
2. रामायणमहाभारतयोः रचनाकालः –साहित्यिक शासकीय परिस्थितयः – आन्तरिक-संस्कृतसाहित्ये तयोः प्रभावः
3. भास-कालिदास-भारवि-श्रीहर्ष-भवभूति-हर्षवर्धन-विशाखदत्त-भट्टनारायण-दाण्डि-बाणभद्र-शूद्रकादीनां कवीनां तेषां काव्यानां च परिचयः
4. संस्कृतसाहित्येतिहासः-महाकाव्य-लघुकाव्य-चारिभ्रमककाव्य-गीतकाव्य-चम्पूकाव्य-गद्य-रूपक-कथाकाव्यादीनाम् उत्पत्तिः विकासः परिचयः
5. अलङ्काराणां लक्षणानि –उदाहरणानि च । रूपक-उत्प्रेक्ष-अतिशयोक्ति-सन्देह-भ्रान्तिमान् –समासोक्ति-अप्रस्तुतप्रशंसा-दीपक-तुल्ययोगिता-अर्थान्तरन्यास-दृष्टान्त-काव्यलिङ्ग-अनन्वय-स्वभावोक्ति-अलङ्काराः
6. व्याकरणम् –
  - अ) शब्दाः-अजन्त-हलन्त-सर्वनामशब्दाः त्रिषुलिङ्गेषु
  - आ) धातवः(लकाराः)-लट्-लिट्-लृट्-लोट्-लङ्-विधिलिङ् (परस्मैपदि-आत्मनेपदिषु)
  - इ) पदानां प्रातिपदिकम्-लिङ्गज्ञानं-अर्थः-व्युत्पत्तिः-विवरणम्-विरुद्धपदानि-समानार्थकपदानि-पर्यायपदानि-नानार्थाः
  - ई) वाक्यानां निर्माणम् – क्रमलेखनम् –पदानाम् आधारेण स्वीयवाक्यलेखनम् – वाक्यशुद्धीकरणम् – वाक्यानुवादः – वाक्यपरिवर्तनम् – कालपरिवर्तनम् – वचनपरिवर्तनम् – विशेषणविशेष्यौ च ।
  - उ) उपसर्गाः – धातूनां प्रकृति प्रत्यय चिन्तनम्
  - ऊ) कारकाणि तेषां नियमाः
  - ऋ) प्रत्ययाः
  - ॠ) प्रयोगपरिवर्तनम् (वाच्यपरिवर्तनम्)
  - ॡ) अपरिचित-पद्य-गद्ययोः अन्वयसामर्थ्यम्
7. सन्धिः – अच् सन्धयः, हल् सन्धयः, विसर्गसन्धिः
8. समासाः – अव्ययीभाव-तत्पुरुष-द्वन्द्व-बहुव्रीहि-समासाः (अन्तर्गतप्रभेदैः सह)
9. छन्दः – वृत्तानि – वंशस्थम् – इन्द्रवज्रा – उपेन्द्रवज्रा – भुजङ्गप्रयातम् – मन्दाक्रान्ता – शिखरिणी-शार्दूलविक्रीडितम् – सन्धस – वसन्ततिलकम् – अनुष्टुप् ।
10. भाषाशास्त्रम् – भाषायाः उत्पत्तिः – धन्युत्पत्तिः – धन्युत्पत्तिस्थानम् – भाषाणां वर्गीकरणं – इण्डोयूरोपियन् वर्गः – सतम् काण्टम् वर्गो – धन्युत्पत्तिपरिणामः – अर्थविपरिणामः – तेषां कारणानि

## **Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies**

### **Paper-II: Pedagogy of Mathematics**

1. The Nature of Mathematics and its Historical Development including the contributions of important Mathematicians given in the school textbooks. Importance of Mathematics in School Curriculum
2. Values, Aims and Objectives of Teaching Mathematics
3. Child Development; Psychology of Teaching and Learning Mathematics
4. Mathematics Curriculum: Construction ,Organization and Development
5. Approaches, Methods and Techniques of Teaching Mathematics with special reference to Arithmetic, Algebra, Geometry and Trigonometry
6. Planning for Effective Instruction in Mathematics: Different Plans and Designing Learning Experiences.
7. Learning Resources and Designing Instructional Material in Mathematics; Mathematics Labs; Teaching Aids; Textbooks; ICT in Mathematics.
8. Measurement and Evaluation in Mathematics: Continuous and Comprehensive Evaluation (CCE); Tools and Techniques of Evaluation; Achievement and Diagnostic Tests.
9. Learning Disabilities/Difficulties and Education of Exceptional/ Disabled Children in Mathematics.
10. Mathematics and Everyday Life; Non-formal Mathematics Education.

### Paper-III: Mathematics

1. Number System-I: Counting of Numbers; Fundamental Operations; Types of Numbers; Real Numbers; Mathematical Units and Conversions; Utility of Euclid division lemma, Problems on surds; Divisibility rules their possible remainders, Pythagorean triplets; Using alphabet in place of digit in divisibility rules, missing numbers; Prime and composite, even and odd numbers, need and applications of fundamental theorem of arithmetic, difference between factors and multiples and prime factors-LCM and HCF; Characteristics and importance in finding solutions to daily life situations (e.g.p).
2. Number System-II: Patterns of numbers; Progressions- A.P. and G.P- relating to daily life situations; Building the relation between numbers and graphical representations; Squares - Square root, Cube-Cube root; Ratio, Golden Ratio, Compound Ratio, Inverse Ratio, Addition and Subtraction of equal Ratios; Proportion - Direct and inverse; Fractions (Numerator and denominator); Applications on the above.
3. Percentages in daily life situations and SETS :Profit and loss, Discount ; Simple interest and Compound interest, VAT and their applications ; Sets-Concept in building a set and rationale; types of sets; Operations on sets Venn Diagrams and related daily life problems.  
Sets- Compliment, properties on operations and cardinalitySeries; Complex numbers and its fundamental operations; Conjugates;Fundamental principle of counting (Linear and Circular) Combinations and related to daily life problems.Modulus of a Real Number and absolute value.Types of statements and proofs, quantifiers; Tautology and contradictions.
4. Fundamentals of Algebra; Linear expressions and equations in one & two variables Pairs linear equations in two variables; Basic Operations on Algebraic expressions -Laws and properties of exponents; Factorization; Special products; Operations on Polynomials and Factorization; Quadratic expressions and equations. Logarithms and their use.  
Graphical Representations /Mathematical Induction/ Quadratic Expressions/ Linear Programming / Determinants/ Matrices :Relation between two variables and there graphical representation, basic ideas related to function and respective theorems, types of functions ; Mathematical induction, problems on divisibility using principle of Mathematical Induction; Quadratic expressions - change in sign, maxima and minima values; Basis concepts of linear programming problems; Binomial theorem and approximations. Order of Matrix; Properties of Determinants of Matrices and solving of equations.
5. Geometry: Fundamental concepts; Contextual situations, basic ideas like point , line, ray, lines segment, angle, plane , curve, circle etc., and related terminology; Relations between lines and angles; Lines of a plane and their properties; Axioms , postulates, Euclid axioms, historical back ground, non-Euclidean geometry; Types and Properties of Geometrical figures; Types and Properties of triangle, quadrilateral, Polygon etc.,; Properties of Circle and Parts of Circles; Comparison of Geometrical figures - Congruency, Similarity etc.,; BPT, Pythagoras, Theorems applications; Relations between Circles and Lines; Areas of Geometrical Figures - Related theorems; Practical Geometry; Basic constructions, Constructions of Triangles, Quadrilaterals, Circles, Similar triangles, Tangents to Circles and related problems.

6. Co-ordinate Geometry: Basic concepts, dividing a line segment in the given ratio and its usage in different situations, slope of a line, distance between two points, area of triangles, Quadrilaterals and Collinearity of points.
7. Concept of locus; Straight line - different forms of straight line and conversions; Angle between two lines; Length of perpendicular from a point to a line; Distance between two parallel lines; Circle Equation - standard form, center and radius; Position of a point in plane of circle; Relative positions of two circles -Transformation of Axes- 3-D Geometry- DR's and DC's and Cartesian equation of a plane. Conic Section.
8. Mensuration: Plane figures; Need and importance of Area and Perimeter of different triangles, quadrilaterals, polygons, circles, ring etc., in daily life; Solid figures; Need and importance of CSA, TSA and volume of prism, cube, cuboids, pyramid, cylinder, cone, sphere, hemisphere; Conversions from one solid to another; Problems with combination of solids (not more than three) in daily life; Conversions- 3-D figures and 2-D figures.
9. Statistics and Probability :Data handling : Types and representation of data; Measure of central tendency of ungrouped and grouped data specific usages; Presentation of data - different graphs and related problems ; Probability Basic concepts, outcomes and chances; Events - mutually exclusive, possible and impossible, complementary; Applications of probability Measures of dispersions - Range, Q.D, M.D, S.D. ; Coefficient of variation; Probability- Random experiments and events (Independent and Dependent); Addition and multiplication theorems of probability; Random variables. Axiomatic approach.
10. Trigonometry :Basic concepts; Trigonometric ratios; Trigonometric values for specific angles; Complementary angles; Trigonometric Identities; Conversions of Trigonometric ratios - Trigonometric transformations - Heights and distances; Trigonometric ratios of compound angles; Properties of triangles - relation between sides and angles of a triangles - Inverse trigonometric functions. Multiples and submultiples -Trigonometric expansions.

## **Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies**

### **Paper-II: Pedagogy of Physical Sciences**

1. The Nature of Physical Sciences and its Historical Development including the contributions of important Physicists and Chemists given in the school textbooks. Importance of Physical Sciences in School Curriculum
2. Values, Aims and Objectives of Teaching Physical Sciences
3. Child Development; Psychology of Teaching and Learning Physical Sciences
4. Physical Sciences Curriculum : Construction ,Organization and Development
5. Approaches, Methods and Techniques of Teaching Physical Sciences with special reference to Measurement, units and dimensions; Natural Resources, Our Universe; Natural Phenomenon (Light; Heat; and Sound); Mechanics; Magnetism; Electricity and Electro Magnetism ;Modern Physics; Electronics and Communication; Matter; Chemical Reactions; Acids and Bases; Atomic Structure; Periodic Classification of Elements; Chemical Bonding; Carbon and its Compounds; and Metallurgy; Environmental Chemistry
6. Planning for Effective Instruction in Physical Sciences: Different Plans and Designing Learning Experiences.
7. Learning Resources and Designing Instructional Material in Physical Sciences; Physical Science Labs; Teaching Aids ; Textbooks; ICT in Physical Sciences
8. Measurement and Evaluation in Physical Sciences : Continuous and Comprehensive Evaluation (CCE) ; Tools and Techniques of Evaluation; Achievement and Diagnostic Tests.
9. Learning Disabilities/Difficulties and Education of Exceptional/ Disabled Children in Physical Sciences
10. Physical Sciences and Everyday Life; Non-formal Physical Sciences Education.

## Paper-III: Physical Sciences

### I. Measurements, Units and Dimensions:

Need of measurement in daily life. systems of units. Units and dimensions, Significance of accuracy in measurement. Measuring instruments; Types of errors in measurements - mean absolute relative percentage errors; Fundamental and derived physical quantities. Rules for writing units in SI, derived units SI, Multiples and submultiples of SI units; Dimensional formulae and dimensional equations, dimensionless quantities; principle of homogeneity of dimensions. Application of dimensional analysis.

### II. Natural Resources - Air and Water:

Composition of air, atmospheric pressure, the consequences of air pollution, ways to reduce air pollution. Winds, cyclones, natural calamities and management of their bad consequences, Composition of water, water cycle, change of phase, Latent Heat. Forms of water in atmosphere, boiling, melting, water pollution and hardness of water. How to handle the shortage of drinking water? Methods of increasing ground water levels.

### III. Our Universe:

Need to develop the Habit of Night sky observation, How to differentiate constellations with zodiac signs, study of solar system, different laws pertaining to the motion of celestial bodies and ways of measuring the distances in space. Principles of launching of satellites and their applications in day to day life.

### IV Natural Phenomenon:

i. Light: Nature of light, Theories of light, Fermat principle, Reflection - its laws. Image formation in plane and spherical mirrors. Rules for Ray diagrams and Formula for spherical mirrors - focal length and sign convention. Application of mirrors. Properties of Light and Laws; Electro Magnetic spectra,

ii. Heat: Heat as energy- sources of heat, Transmission of heat, Expansion of solids, liquids and gases. Temperature (based on thermal equilibrium), Different Scales of Temperature- measurement Different type of Thermometers and their construction. Calorimetry, Applications of Specific heat, Latent heat. Anomalous expansion of water and its significance in nature. Combustion, Calorific value, specific heat of gases.

iii. Sound: Sources of sound. Noise and music. Musical instruments. Propagation of sound. Velocity of sound in different media / substances. Characteristics of sound. Structure of human ear - in Auditory aspect. Reflection of sound, echo, Resonance, Sonar and Doppler effect. Simple Harmonic Motion.

### V. Mechanics:

Application of Simple Machines in daily life situations. Scalars and Vectors. Free Body Diagram. All types of motion. Different types of Forces. Different types of frictions and effects of friction. Newton's laws of motion. Momentum. Equations of motion (under gravity and freely falling), projectile. Range. Laws of Floatation. Different laws of fluids. Different types of Energies. Conservation of energy, Work and Power. Work energy theorem. Center of mass. Centre of gravity for regular and irregular objects. Stability and Equilibrium. Universal law of Gravitation. Relation between 'g' and 'G'. Circular motion, Frame of reference, Kepler's Laws. Elasticity and Hooke's Law

### VI. Magnetism:

Types of Magnets, Identification of Magnetic and Non-magnetic substances, magnetic field, Uniform and non uniform magnetic fields. Magnetic induction. Magnetic lines of force. Terrestrial magnetism-Terrestrial magnetic field. Geo magnetism. Uses of Magnetism; Dip, Declination Magnetic pole strength, Magnetic moment. Inverse square law of magnetism. Magnetic properties of materials and their classification. Domine theory.

### VII. Electricity & Electro Magnetism:

Electric charge, field, electric intensity, electric potential, potential difference. Simple Electric Circuits and precautionary measures. House hold circuits. Conductors, Non conductors / Insulators, Coulomb's inverse square law. Primary and secondary Cells. Ohm's

Law - its limitations. Resistances in series and parallel, Emf of a circuit; Specific resistance. Kirchhoff's laws. Relation between electric potential and Electric energy, electric Power (wattage), House hold and Industrial power saving. Heating effect of electric current, and Joule's law. Lighting and Working of lightning conductor, Prevention and control of damage due to lightning. Earthing in electrical appliances. Magnetic field due to currents carrying wire, Ampere's law, circular loop and Solenoid. Magnetic force on moving charged particle and long straight conductors. Fleming's left hand rule, Electric motor. Electromagnetic induction - Faraday's law Electromagnetic flux. Lenz law, Generators and Alternating Currents. Inductance - self, mutual inductance and principles of transformer.

### **VIII. Modern Physics:**

Discharge of Electricity through gases, Discharge tube phenomena, Cathode rays, Properties of Cathode rays, Anode rays and their properties; X-rays; Atomic models: JJ Thomson, Rutherford and Bohr's models. Atomic nucleus and its structure. Atomic models: Mass defect; Radio Activity- Discovery, properties of alpha, beta, and gamma radiations. Applications of alpha, beta, and gamma radiations, Radioactive transformations, alpha, beta decays, Half life period, Isotopes, Isobars, and Isotones.

Radioactive transmutation-artificial radioactivity; radio isotopes and their uses in different fields; radioactive series; Chain and controlled nuclear reactions; Fission and fusion of nuclei - atomic bomb and hydrogen bomb.

### **IX. Electronics and Communications:**

Semi conductors - intrinsic and extrinsic; band theory; diode, p-n junction characteristics. Transistor - pnp & npn characteristics and uses. Zener Diode characteristics. Simple electronic circuits, Logic gates - applications. Importance of ICT Block diagram of computer and its parts Input devices, process and output devices, applications of computers Communication: components of Communication. Basic terminology used in electronic communication system. Band width of transmission medium, propagation, modulation and demodulation.

### **X. Matter:**

States of matter. Elements, Compounds and Mixtures. Methods of separation of mixtures. Chromatography. Behavior of gases; measurable properties of gases; gas laws. Mole concept. Dalton, Avogadro, Berzelius laws.

### **XI. Chemical Reactions:**

Physical and chemical changes. Types of Chemical reactions; daily applications. Laboratory preparation of different gases. Physical and Chemical properties various compounds. Chemical calculations. Sources of common salt. Common salt - as a raw material for other chemicals (NaOH, Bleaching powder, baking soda, washing soda, and their uses, Plaster of Paris)

### **XII. Acids and Bases, Salts:**

Preparation, properties, Strength and uses of Acids & Bases. Neutralization. Preparation, properties, nature and uses of different Salts. Water of crystallization. Complex, Neutral and double salts. Oxidation and Reduction, Rancidity. Identification of Acids, Bases-Indicators: Natural, Chemical. pH Scale - Role of PH in daily life-agriculture, medicine. Classification of salts based on affinity to water Examples of Acidic, Basic, Mixed, Complex, Neutral and double salts. Solutions - Types of solutions; solubility, ionization, Concentration; Oxidation number concept. Balancing of Redox reactions, Calculation of Concentrations. Titration and volumetric analysis. Stoichiometry.

### **XIII. Atomic Structure:**

Electromagnetic spectrum, Atomic spectrum, Characteristics of electron, proton and neutron, Rutherford's model of an atom, nature of electromagnetic radiation, Plank's quantum mechanics, explanation of photo electric effect, features of atomic spectra, characteristics of hydrogen spectrum, Bohr's theory of structure of atom, Bohr's explanation of spectral lines, failure of Bohr's theory, wave particle nature of electrons, de Broglie's hypothesis, Heisenberg's uncertainty principle, important features of the Quantum mechanical model of an atom, Quantum numbers, concept of orbitals, define an atomic orbital in terms of quantum numbers-shapes of s, p and d orbitals, n l x rule, Energies of electronic energy levels (n+l) rule state Aufbau principle, Pauli's exclusive principle and Hund's rule of maximum

multiplicity, electronic configuration of atom, explanation of stability of half filled and completely filled orbital.

#### **XIV. Periodic Classification of Elements:**

Need for arrangement of elements in an organized manner. Historical background of classification of elements Doberniener's Triads, Newland's law of Octaves. Mendeleev's Periodic Table (Achievements & Limitations). Mosley periodic table - based on electronic configuration. Characteristics of elements in groups and periods. The concept of grouping elements in accordance to their properties; the periodic law the signification of atomic number and electronic configuration as the basis per periodic classification. Classification of elements into s-block, p-block, d-block, f-block. and their main characteristics. Periodic trends in physical and chemical properties of elements. Study of different Groups of periodic table.

#### **XV. Chemical Bonding:**

Why do atoms combine? Electronic theory of Valence by Lewis and Kossel Octet Rule, Ionic and Covalent bonds: examples with Lewis Dot formulae Introduction of chemical bonding. Electronic Configuration of Noble gases. sigma, pi bond with examples. Shapes of molecules bond lengths and bond angles in molecules. Hybridization and explanation of H<sub>2</sub>O, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub> etc. molecules. Hydrogen bonding and types of H-bonds.

#### **XVI. Carbon and its Compounds:**

Need to study of carbon compounds separately. Classification of Organic compounds Hydrocarbons - Alkanes, alkenes, alkynes aromatic and aliphatic compounds with examples. Bonding in Carbon including Hybridization. Allotropes of Carbon. Versatile nature of carbon. Tetravalency, Chains, branches and rings. Catenation, Multiple bonding, Isomerism. Saturated and Unsaturated carbon compounds. Bonding of carbon with other elements. Functional groups in carbon compounds. Homologous series. Chemical properties of carbon compounds Combustion and Oxidation. Addition reactions. Substitution reaction. Important carbon compounds. Nomenclature organic compounds. Carbohydrates and their classification. Proteins-examples, Oils and fats examples Polythene - Nylon, PVC, Polyvinyl alcohol; Rubber - uses in daily life. Polymers, and other important organic compounds.

#### **XVII. Environmental Chemistry and Metallurgy**

Different types of pollutions, acid rains, green chemistry, strategies to control environmental pollution. Occurrence of Metals. Minerals, Ores - Examples. Metallurgy - Processes involved in metallurgy. Extractions of metals - activity series and related metallurgy, flow chart of steps involved in the extraction of metals from ore. Refining metals, Electrolytic refining, Corrosion - Prevention of Corrosion. Alloys and their uses.



## **Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies**

### **Paper-II: Pedagogy of Biological Sciences**

1. The Nature of Biological Sciences and its Historical Development including the contributions of important Biologists given in the school textbooks. Importance of Biological Sciences in School Curriculum
2. Values, Aims and Objectives of Teaching Biological Sciences
3. Child Development; Psychology of Teaching and Learning Biological Sciences
4. Biological Sciences Curriculum : Construction ,Organization and Development
5. Approaches, Methods and Techniques of Teaching Biological Sciences with special reference to Living World; Cell &Tissues; Plant World; Animal World; Our Environment ; Heredity &Genetics ; Evolution and Applied Biology
6. Planning for Effective Instruction in Biological Sciences: Different Plans and Designing Learning Experiences.
7. Learning Resources and Designing Instructional Material in Biological Sciences; Biological Science Labs; Teaching Aids ; Textbooks; ICT in Biological Sciences
8. Measurement and Evaluation in Biological Sciences: Continuous and Comprehensive Evaluation (CCE); Tools and Techniques of Evaluation; Achievement and Diagnostic Tests.
9. Learning Disabilities/Difficulties and Education of Exceptional/ Disabled Children in Biological Sciences
10. Biological Sciences and Everyday Life; Non-formal Biological Sciences Education.

### Paper-III: Biological Sciences

1. Biological Sciences: Its importance and human welfare, Branches of Biology, Biologists, Reputed Biological Institutions in India.
2. Living World: Life and its Characteristics, Classification of Living Organisms Microbial World : Virus, Bacteria, Algae, Fungi and Protozoan, Useful and Harmful Micro-organisms.
3. Cell & Tissues: Cell - Structural and Functional unit of life. Prokaryotic and Eukaryotic Cell, Structure of Eukaryotic Cell, Cell Organelles, Biomolecules, Differences between Plant Cell and Animal Cell, Cell Division - Mitosis and Meiosis, Tissues - Structure, Functions and Types of Plant and Animal tissues.
4. Plant World: Morphology of a Typical Plant - Root, Stem, Leaf, Flower, Inflorescence, Fruit - their Structure, Types and Functions, Parts of a Flower, Modifications of Root, Stem and Leaf, Photosynthesis, Transpiration, Transportation (Ascent of Sap), Respiration, Excretion and Reproduction in Plants, Plant Hormones, Economic importance of Plants, Wild and Cultivated Plants, Agricultural Operations, Crop diseases and Control measures, Improvement in Crop yield, Storage, Preservation and Protection of Food and Plant Products.
5. Animal World: Organs and Organ Systems including man - Their Structure and Functions Digestive, Respiratory, Circulatory, Excretory, Nervous, Control and Co-ordination, Sensory perception and Reproduction, Need for reproductive health and prevention of STD, birth control- Need and methods of contraception and MTP, Amniocentesis, infertility and assisted reproductive technologies - IVF -ET - ZIFT, GIFT.
6. Sense Organs: Structure and Functions of Eye, Ear, Nose, Tongue and Skin. Nutrition in man - Digestion and absorption - Breathing and Respiration in humans - Nutrients and their functions, Balanced Diet, Deficiency diseases, Tropical diseases, Skin diseases, Blindness in man: Causes, Prevention and Control, Health agencies, First Aid - Bites: Insect, Scorpion and Snakes. Wild and Domesticated Animals.
7. Our Environment: Abiotic and Biotic factors and Ecosystems, Natural Resources - Classification, Judicial use of Renewable, Non-renewable and Alternative Resources, Forests, Wild Life - Conservation, Sanctuaries, National Parks in India, Bio-Geochemical Cycles, Pollution - Air, Water, Soil and Sound, Global Environmental issues - Global Warming (Green House Effect), Acid Rains, Depletion of Ozone layer and scarcity of water.
8. Heredity and Genetics:- Mendel's laws of inheritance, Pleiotropy, Multiple alleles: Inheritance of blood groups and Rh-factor, dominance (Blood groups as example), Elementary idea of polygenic inheritance; Skin colour in humans (refer Sinnott, Dunn and Dobzhansky); Sex determination - in humans - Sex linked inheritance - Haemophilia, Color blindness; Mendelian disorders in humans: Thalassaemia, Haemophilia, Sick cell anemia, cystic fibrosis PKU, Alkaptonuria; Chromosomal disorders - Down's syndrome, Turner's syndrome and Klinefelter syndrome; Genome, Human Genome Project and DNA Finger Printing. Gene Bank, Gene flow and genetic drift; Variations (mutations and genetic recombination).
9. Evolution: Origin of Life, Biological evolution and Evidences for biological evolution (paleontological, comparative anatomical, embryological and molecular evidences); Theories of evolution: Lamarckism, Darwin's theory of Evolution - Natural Selection, Mutation Theory of Hugo De Vries; Modern synthetic theory of Evolution - Hardy-Weinberg Law; Types of Natural Selection; Adaptive radiation - Human evolution; Speciation - Allopatric, sympatric; Reproductive isolation.
10. Applied Biology: Animal Husbandry: Apiculture, Pisciculture, Poultry management, Dairy management; Animal breeding; Bio-medical Technology: Diagnostic Imaging (X-ray, CT scan, MRI), ECG, EEG; Biotechnology - its importance for human welfare - Human insulin and vaccine production; Gene Therapy; Transgenic animals; ELISA: vaccines, MABs, Cancer biology, Stem Cells.

**PAPER-II : Pedagogy of Science**

- I. The Nature of Science and its Historical Development including the contributions of important Scientists given in the school textbooks. Importance of Sciences in School Curriculum; NCF-2005.
- II. Values, Aims and Objectives of Teaching Science
- III. Child Development; Psychology of Teaching and Learning Science
- IV. Science Curriculum : Construction ,Organization and Development
- V. Approaches, Methods and Techniques of Teaching Sciences with special reference to the topics given in the school textbooks
- VI. Planning for Effective Instruction in Sciences: Different Plans and Designing Learning Experiences.
- VII. Learning Resources and Designing Instructional Material in Sciences; Science Labs; Teaching Aids ; Textbooks; ICT in Sciences
- VIII. Measurement and Evaluation in Sciences : Continuous and Comprehensive Evaluation (CCE) ; Tools and Techniques of Evaluation; Achievement and Diagnostic Tests.
- IX. Learning Disabilities/Difficulties and Education of Exceptional/ Disabled Children in Sciences
- X. Sciences and Everyday Life; Non-formal Sciences Education.

### Paper-III - Disciplinary Knowledge in Science

- I. **Measurements, Units and Dimensions:** Need of measurement in daily life. Systems of units. Units and dimensions, Significance of accuracy in measurement.
  - II. **Natural Resources - Air and Water:** Composition of air, atmospheric pressure, the consequences of air pollution, ways to reduce air pollution. Winds, cyclones, natural calamities and management of their bad consequences, Composition of water, water cycle, change of phase, Latent Heat. Forms of water in atmosphere, boiling, melting, water pollution and hardness of water. How to handle the shortage of drinking water? Methods of increasing ground water levels.
  - III. **Our Universe :**Need to develop the Habit of Night sky observation, How to differentiate constellations with zodiac signs, study of solar system, different laws pertaining to the motion of celestial bodies and ways of measuring the distances in space.
- IV. Natural Phenomenon:**
- i. **Light:** Nature of light, Theories of light, Fermat principle, Reflection - its laws. Image formation in plane and spherical mirrors. Rules for Ray diagrams and Formula for spherical mirrors - focal length and sign convention. Application of mirrors. Refraction and its laws, Refraction at curved surface and prism. Rules for Ray diagram. Images formed by the lenses. Refractive index. Total internal reflection and its applications. Formula for thin lenses and lens maker formula. Defects of vision and remedies. Dispersion, Scattering of light. Electro Magnetic spectra (elementary treatment)
  - ii. **Heat:** Heat as energy- sources of heat, Transmission of heat, Expansion of solids, liquids and gases. Temperature (based on thermal equilibrium), Different Scales of Temperature-measurement Different type of Thermometers and their construction. Calorimetry, Applications of Specific heat, Latent heat. Anomalous expansion of water and its significance in nature. Combustion, Calorific value, iii. **Sound:** Sources of sound. Noise and music. Musical instruments. Propagation of sound. Velocity of sound in different media / substances. Characteristics of sound. Structure of human ear - in Auditory aspect. Reflection of sound, echo, Resonance, Sonar and Doppler Effect.
- V. Mechanics:** Application of Simple Machines in daily life situations. Scalars and Vectors. Free Body Diagram. All types of motion. Different types of Forces. Different types of frictions and effects of friction. Newton's laws of motion. Momentum. Equations of motion (under gravity and freely falling), projectile. Laws of Floatation. Different laws of fluids. Different types of Energies. Conservation of energy, Work and Power. Center of mass. Centre of gravity for regular and irregular objects. Stability and Equilibrium. Universal law of Gravitation. Relation between 'g' and 'G'. Circular motion.
- VI. Magnetism:** Types of Magnets, Identification of Magnetic and Non-magnetic substances, magnetic field, Uniform and non uniform magnetic fields. Magnetic induction. Magnetic lines of force. Terrestrial magnetism-Terrestrial magnetic field. Geo magnetism. Uses of Magnetism; Dip, Declination Magnetic pole strength.
- VII. Electricity & Electro Magnetism:** Electric charge, field, electric intensity, electric potential, potential difference. Simple Electric Circuits and precautionary measures. House hold circuits. Conductors, Non conductors / Insulators, Coulomb's inverse square law. Primary and secondary Cells. Ohm's Law - its limitations. Resistances in series and parallel, Emf of a circuit; Specific resistance. Kirchhoff's laws. Relation between electric potential and Electric energy, electric Power (wattage), House hold and Industrial power saving. Heating effect of electric current, and Joule's law. Lighting and Working of lightning conductor, Prevention and control of damage due to lightning. Earthing in electrical appliances. Magnetic field due to currents carrying wire, Ampere's law, circular loop and Solenoid. Magnetic force on moving charged particle and long straight conductors. Fleming's left hand rule, Electric motor. Electromagnetic induction - Faraday's law Electromagnetic flux. Lenz law, Generators and Alternating Currents. Inductance - self, mutual inductance and principles of transformer.
- VIII. Modern Physics:** Discharge of Electricity through gases, Discharge tube phenomena, Cathode rays, Properties of Cathode rays, Anode rays and their properties; X-rays; Atomic

models: JJ Thomson, Rutherford and Bohr's models. Atomic nucleus and its structure. Atomic models: Mass defect; Radio Activity- Discovery, properties of alpha, beta, and gamma radiations. Applications of alpha, beta, and gamma radiations, Radioactive transformations, alpha, beta decays, Half life period, Isotopes, Isobars, and Isotones.

- IX. Matter:** States of matter. Elements, Compounds and Mixtures. Methods of separation of mixtures. Chromatography. Behavior of gases; measurable properties of gases; gas laws. Mole concept. Dalton, Avogadro, Berzelius laws.
- X. Chemical Reactions:** Physical and chemical changes. Types of Chemical reactions; daily applications. Laboratory preparation of different gases. Physical and Chemical properties various compounds. Chemical calculations. Sources of common salt. Common salt - as a raw material for other chemicals (NaOH, Bleaching powder, baking soda, washing soda, and their uses, Plaster of Paris)
- XI. Acids and Bases, Salts:** Preparation, properties, Strength and uses of Acids & Bases. Neutralization. Preparation, properties, nature and uses of different Salts. Water of crystallization. Complex, Neutral and double salts. Oxidation and Reduction, Rancidity. Identification of Acids, Bases-Indicators: Natural, Chemical. PH Scale - Role of PH in daily life-agriculture, medicine. Classification of salts based on affinity to water Solutions - Types of solutions; solubility, ionization, Concentration; Oxidation number concept.
- XII. Atomic Structure:** Electromagnetic spectrum, Atomic spectrum, Characteristics of electron, proton and neutron, Rutherford's model of an atom, nature of electromagnetic radiation, Plank's quantum mechanics, explanation of photo electric effect, features of atomic spectra, characteristics of hydrogen spectrum, Bohr's theory of structure of atom, Bohr's explanation of spectral lines, failure of Bohr's theory, wave particle nature of electrons, de Broglie's hypothesis, Heisenberg's uncertainty principle, important features of the Quantum mechanical model of an atom, Quantum numbers, concept of orbitals, define an atomic orbital in terms of quantum numbers-shapes of s, p and d orbitals,  $n + l$  rule, Energies of electronic energy levels ( $n+l$ ) rule state Aufbau principle, Pauli's exclusive principle and Hund's rule of maximum multiplicity, electronic configuration of atom, explanation of stability of half filled and completely filled orbital.
- XIII. Periodic Classification of Elements:** Need for arrangement of elements in an organized manner. Historical background of classification of elements Doberiner's Triads, Newland's law of Octaves. Mendeleev's Periodic Table (Achievements & Limitations). Mosley periodic table - based on electronic configuration.Characteristics of elements in groups and periods. The concept of grouping elements in accordance to their properties; the periodic law the signification of atomic number and electronic configuration as the basis per periodic classification. Classification of elements into s-block, p-block, d-block, f-block. and their main characteristics. Periodic trends in physical and chemical properties of elements.
- XIV. Chemical Bonding:** Why do atoms combine? Electronic theory of Valence by Lewis and Kossel Octet Rule, Ionic and Covalent bonds: examples with Lewis Dot formulae Introduction of chemical bonding. Electronic Configuration of Noble gases. sigma, pi bond with examples. Shapes of molecules. bond lengths and bond angles in molecules. Hybridization and explanation of H<sub>2</sub>O, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub> etc. molecules.
- XV. Carbon and its compounds:** Need to study of carbon compounds separately. Classification of Organic compounds Hydro carbons - Alkanes, alkenes, alkynes aromatic and aliphatic compounds with examples. Bonding in Carbon including Hybridization. Allotropes of Carbon. Versatile nature of carbon. Tetravalency, Chains, branches and rings. Catenation, Multiple bonding, Isomerism. Saturated and Unsaturated carbon compounds. Bonding of carbon with other elements. Functional groups in carbon compounds. Homologous series. Chemical properties of carbon compounds Combustion and Oxidation. Addition reactions. Substitution reaction. Important carbon compounds. Nomenclature organic compounds. Carbohydrates and their classification. Proteins-examples, Esterification reaction, Soaps Saponification, Micelles.
- XVI. Metallurgy:** Occurrence of Metals. Minerals, Ores - Examples. Metallurgy - Processes involved in metallurgy. Occurrence and extraction of various metals . Extractions of metals - activity series and related metallurgy, flow chart of steps involved in the

extraction of metals from ore. Refining metals, Electrolytic refining, Corrosion - Prevention of Corrosion. Alloys and their uses.

**XVII. Biological Sciences:** Its importance and human welfare, Branches of Biology, Biologists, Reputed Biological Institutions in India.

**XVIII. Living World:** Life and its Characteristics, Classification of Living Organisms

Microbial World : Virus, Bacteria, Algae, Fungi and Protozoan, Useful and Harmful Micro-organisms.

**XIX. Cell & Tissues:** Cell - Structural and Functional unit of life. Prokaryotic and Eukaryotic Cell, Structure of Eukaryotic Cell, Cell Organelles, Biomolecules, Differences between Plant Cell and Animal Cell, Cell Division - Mitosis and Meiosis, Tissues - Structure, Functions and Types of Plant and Animal tissues.

**XX. Plant World:** Morphology of a Typical Plant - Root, Stem, Leaf, Flower, Inflorescence, Fruit - their Structure, Types and Functions, Parts of a Flower, Modifications of Root, Stem and Leaf, Photosynthesis, Transpiration, Transportation (Ascent of Sap), Respiration, Excretion and Reproduction in Plants, Plant Hormones, Economic importance of Plants, Wild and Cultivated Plants, Agricultural Operations, Crop diseases and Control measures, Improvement in Crop yield, Storage, Preservation and Protection of Food and Plant Products.

**XXI. Animal World:** Organs and Organ Systems including man - Their Structure and Functions Digestive, Respiratory, Circulatory, Excretory, Nervous, Control and Co-ordination, Sensory perception and Reproduction, Need for reproductive health and prevention of STD, birth control- Need and methods of contraception and MTP, Amniocentesis, infertility and assisted reproductive technologies - IVF - ET - ZIFT, GIFT.

**XXII. Sense Organs:** Structure and Functions of Eye, Ear, Nose, Tongue and Skin. Nutrition in man - Digestion and absorption - Breathing and Respiration in humans - Nutrients and their functions, Balanced Diet, Deficiency diseases, Tropical diseases, Skin diseases, Blindness in man: Causes, Prevention and Control, Health agencies, First Aid - Bites: Insect, Scorpion and Snakes. Wild and Domesticated Animals.

**XXIII. Our Environment:** Abiotic and Biotic factors and Ecosystems, Natural Resources - Classification, Judicial use of Renewable, Non-renewable and Alternative Resources, Forests, Wild Life - Conservation, Sanctuaries, National Parks in India, Bio-Geochemical Cycles, Pollution - Air, Water, Soil and Sound, Global Environmental issues - Global Warming (Green House Effect), Acid Rains, Depletion of Ozone layer and scarcity of water.

**XXIV. Heredity and Genetics:-** Mendel's laws of inheritance, Pleiotropy, Multiple alleles: Inheritance of blood groups and Rh-factor, dominance (Blood groups as example), Elementary idea of polygenic inheritance; Skin colour in humans (refer Sinnott, Dunn and Dobzhansky); Sex determination - in humans - Sex linked inheritance - Haemophilia, Color blindness; Mendelian disorders in humans: Thalassaemia, Haemophilia, Sickle celled anemia, cystic fibrosis PKU, Alkaptonuria; Chromosomal disorders - Down's syndrome, Turner's syndrome and Klinefelter syndrome; Genome, Human Genome Project and DNA Finger Printing. Gene Bank, Gene flow and genetic drift; Variations (mutations and genetic recombination).

**XXV. Evolution:** Origin of Life, Biological evolution and Evidences for biological evolution (paleontological, comparative anatomical, embryological and molecular evidences); Theories of evolution: Lamarckism, Darwin's theory of Evolution - Natural Selection, Mutation Theory of Hugo De Vries; Modern synthetic theory of Evolution - Hardy-Weinberg Law; Types of Natural Selection; Adaptive radiation - Human evolution; Speciation - Allopatric, sympatric; Reproductive isolation.

## **Syllabus for the post of Trained Graduate Teacher in Residential Educational Institutions Societies**

### **Paper-II: Pedagogy of Social Studies**

1. The Nature of Social Sciences and its Historical Development including the contributions of important Social Scientists and thinkers given in the school textbooks. Importance of Social Sciences in School Curriculum
2. Values, Aims and Objectives of Teaching Social Sciences
3. Psychology of Teaching and Learning Social Sciences
4. Social Sciences Curriculum : Construction ,Organization and Development
5. Approaches, Methods and Techniques of Teaching Social Sciences with special reference to the topics in the School Curriculum
6. Planning for Effective Instruction in Social Sciences: Different Plans and Designing Learning Experiences.
7. Learning Resources and Designing Instructional Material in Social Sciences ; Social Sciences Labs; Teaching Aids ; Textbooks; ICT in Social Sciences
8. Measurement and Evaluation in Social Sciences : Continuous and Comprehensive Evaluation (CCE); Tools and Techniques of Evaluation; Achievement and Diagnostic Tests.
9. Learning Disabilities/Difficulties and Education of Exceptional/ Disabled Children in Social Sciences
10. Social Sciences and Everyday Life ; Non-formal Social Sciences Education.

### **Paper-III: Social Studies**

- I. **Diversity of the Earth-** Lands, Climates, Environment, Rivers & Settlements, Agriculture and Forests. Irrigation, Power, Minerals and Energy resources with special reference to Telangana.
- II. **Economic features of India and Telangana:** Agricultural economy, Handicrafts and Handlooms, Industrial Economy. Credit and the Financial System, Money & Banking - Income and Debts, Expenditure. Inflation and poverty, Impact of Globalization and Technologies on Livelihood.
- III. **Empires and World wars:** The Kakatiyas, Vijayanagaras, Delhi sultanate & Mughals - British and the Nizams Rule in Telangana. Indian National Movement - Telangana Movement and State Formation-Nationalist, Democratic Social and Religious Reforms - and movements. Making of Laws at the Central and State levels.
- IV. **Service and welfare programmes in India and Telangana.** Programmes for Disaster Management. Public Health Programs. The People: Settlement & Migration - Traffic education; Film and Print Media- Fine Arts, Folklore, Traditions and Festivals with reference to Telangana. Telangana Heritage, Monuments and historical sites.
- V. **The Indian constitution - Democracy and Secularism.** Post Independent India Caste Discrimination and Struggle for Equalities, Understanding the Indian Political System - Self Governments.