SYLLABUS FOR THE POST OF PRINCIPAL

Name of post	:	**PRINCIPAL**
Paper	:	OBJECTIVE TYPE
Duration	:	3 HOURS
Total No. of Questions	:	180
Total Marks	:	180

Subject/Topics

A. EXAMINATION:

PART I : (LANGUAGE PROFICIENCY TEST) : 40 Marks
1. General English (20)
2. Odia   (20)

PART II : (GENERAL AWARENESS & COMPUTER LITERACY): 40 marks

1. General knowledge & Contemporary issues (10)
2. Logical Reasoning   (10)
3. Computer Literacy   (10)
4. Quantitative Aptitude Test   (10)

PART III :

1. ACADEMIC(30)

a. Child Development and Pedagogy (10)

i)   Development of Child:

Development, Growth & Maturation concept & Nature, Principles of development, Factors influencing Development- Methods and Approaches of Child Development- observation, Interview, case study, Experimental, Cross sectional and longitudinal, Development tasks and Hazards.

ii)   Understanding Learning:

Concept, Nature of Learning – input-process-outcome, Factors of learning- Personal and Environmental, Approaches to Learning and their applicability – Behaviourism (Skinner, Pavlov, Thorndike) Constructivism (Piaget, Vygotsky), Gestalt (Kohler, Koffka) and Observational (Bandura), Dimensions of Learning- Cognitive, Affective and Performance, Motivation and Sustenance- its role in learning, Memory & Forgetting, Transfer of Learning.

iii)   Pedagogical Concerns:

Teaching and its relationship with learning and learner, Learners in Contexts: Situation learner in the socio-political and cultural context.

Managing behaviour problems, Guidance & Counselling, Punishment and its legal implications, Rights of a child, Time Management, Distinction between Assessment for Learning & Assessment of Learning, School based Assessment, Continuous & Comprehensive Evaluation: Perspective & Practice Understanding teaching & learning in the context of NCF, 2005 & Right to Education Act, 2009.

2. PERSPECTIVES IN EDUCATION AND SCHOOL ORGANIZATION (10)

i) Acts/Rights: Right of Children to free and Compulsory Education Act, 2009 and Child Rights.

ii) National Curriculum Framework, 2005: Perspective, Learning and knowledge, Curriculum Areas, School Stages and Assessment, School and Classroom Environment and Systemic Reforms.

iii) School Organization: Institutional Planning, principal as a leader, Teacher Quality, Linkages and Interface with other institutional and vice versa, Student Quality, Organization of Teaching, Co-curricular Activities, Office Management, Resources required for a good school, Organizational Climate, Evaluation, Job satisfaction of the staff.

3. TEACHING METHODOLOGY (10)

i) Curriculum: Meaning, Principles, types of curriculum organization, approaches.

ii) Planning: Instructional Plan- Year Plan, Unit Plan, Lesson Plan

iii) Instructional Material & Resources:Text Books, Work books, Supplementary materials AV aids, Laboratories, Library, Clubs- Museums- Community, Information and Communication Technology.

iv) Evaluation: Types, tools, Characteristics of a good test, Continuous and Comprehensive Evaluation, Analysis and Interpretation of Scholastic Achievement Test.

ADMINISTRATION AND FINANCE (70)

i) CCS (CCA) Rules.
ii) CCS (Conduct) Rules.
iii) Fundamental & Supplementary Rules.
iv) Travelling Allowance Rules.
v) Leave Travel Concession Rules.
vi) Medical Attendance Rules.
vii) Pension Rules & New Pension Scheme.
viii) General Financial Rules- Purchase procedure.
ix) Income Tax & Service Tax.

Syllabus for examination for PET

Physical Education Theory

Part – A

1. Concept of Physical Education

(Meaning and definition of Physical Education-its aim and objectives, Modern concept and scope of Physical Education, Need and importance of Physical Education, Place of Physical Education in the total education process

2. Physiological Aspects of Physical Education

   Effect of exercise on :

   Muscular System, Circulatory System, Respiratory System, Digestive System

3. Psychological Aspects of Physical Education

Definition of Psychology and Sports Psychology, Achievement and

Motivation in Sports, Sportsmanship and Sports Ethics

4. Physical Fitness and Wellness

Meaning and Importance of Physical Fitness and Wellness, Components of Physical Fitness and Wellness, Factors affecting Physical Fitness and Wellness, Principles of Physical Fitness development, Means of fitness development, Aerobic Activities- Jogging, Cycling Calisthenics and Rhythmic exercises, Participation in Games and Sports, Circuit Training

5. Training Methods

   Meaning and Concept of Training, warming up, Limbering down and their importance, Methods of Training, Methods of Strength Development-Isometric, and Isokinetic Exercises, Methods of Endurance Development-Continuous Method, Interval Training and Fartlek, Methods of Speed Development-Acceleration Runs and Pace Races.

6. Sociological Aspects of Physical Education

Meaning of Sociology and its importance in Physical Education and Sports. Games and Sports as man IS Cultural Heritage. Development of leadership qualities and group dynamics.

Part – B

History of the game/sport (Anyone game/ sport of student's choice), Latest general rules of the game/ sport (Anyone game/ sport of student's choice), Measurement of play fields and specifications of sports equipment, Fundamental skills of the game/ sport, Related sports terminologies, Important tournaments and venues, Sports personalities, Sports Awards.

Part – C

1. Health Education

Concept and objectives of Health Education, Importance of Health Education, Principles of Health Education, Importance of community participation for health promotion and welfare of individual, family and community

2. Communicable Diseases

Meaning of Communicable Diseases, Essential conditions for Communicable Diseases to occur and disease process, Common alert signals indicating on set of Communicable Diseases, Mode of transmission, common symptoms and prevention of spread (transmission) of AIDS, Hepatitis B and Hepatitis C

3. Contemporary Health Problems

Abuse of alcohol, tobacco and drugs and the effect of abuse on individual, family and community, Effect of alcohol, tobacco and drugs on sportsperson., Eating habits that cause obesity and its effect on health of individual

4. Healthful living

Concept of environment, Scope of environment – living environment, work place environment and envioment for leisure activites, Essential elements of healthful environment – safe water, low levels of noise, clean air, sanitary surrounding, low levels of radio active radiations and absence of hazards responsible for accidents in (i) home and neighborhood in rural and urban areas (ii) school and work place (iii) during leisure time activities recreation and sports, Role of individual in improvement of environment for health promotion and prevention of accidents related to transportation swimming and water sports, Disaster preparedness and heath care during disasters.

5. Family Health Education

Meaning and functions of family and its importance as a social institution, Needs and problems of adolescents and their management, Human reproduction – menstruation, conceptional and prenatal care, Problems associated with pre-marital sex and teenage pregnancies, Preparation of marriage, Role of parents in child care.

6. Prevention and first aid for common sports injuries

Soft Tissue injuries – sprain and strain, Bone Injuries, Joint Injuries

Syllabus for examination for Art Teacher

<u>DRAWING AND PAINTING</u>

HISTORY OF INDIAN ART

UNIT 1: Art of Indus Valley
(Harappan and Mohenjo-daro)

(2500 B.C. to 1500 B.C.)

(1) Introduction

    (i)   Period and Location.
    (ii)   Extension: In about 1500 miles
        (a)   Harappa & Mohenjo-daro (Now in Pakistan)
        (b)   Ropar, Lothal, Rangpur, Alamgirpur, Kali Bangan, Banawali and Dhaula Veera (in India)

(2) Study of following
    Sculptures and Terracottas:

    (i)   Dancing girl (Mohenjo-daro)
           Bronze, 10.5 x 5 x 2.5 cm.

           Circa 2500 B.C.

           (Collection : National Museum, New Delhi).

    (ii)   Male Torso (Harappa)
           Stone, 9.2 x 5.8 x 3 cms.

           Circa 2500 B. C.

           (Collection : National Museum, New Delhi).

    (iii)   Mother Goddess (Mohenjo-daro) terracotta, 22 x 8 x 5 cm.
           Circa 2500 B.C.

           (Collection : National Museum, New Delhi).

(3) Study of following
    Seal:

    (i)   Bull (Mohenjo-daro)
           Stone, 2.5 x 2.5 x 1.4 cm.

           Circa 2500 B.C.

           (Collection : National Museum, New Delhi).

(4) Study of following
Decoration on earthen wares:

(i) Painted earthen-ware(Jar)Mohenjo-daro)
(Collection : National Museum, New Delhi).

UNIT 2 : Buddishist, Jain and Hindu Art.

(3rd century B.C. to 8th century A.D.)

(1) General Introduction to Art, during Mauryan, Shunga, Kushana & Gupta Period:

(2) Study of following Sculptures:

(i) Lion Capital from Sarnath (Mauryan period) Polished sand stone,

Circa 3rd Century B.C.

(Collection: Sarnath Musseum, U.P.)

(ii) Chauri Bearer from Didar Ganj (Mauryan period) Polished sand – stone

Circa 3rd Century B.C.

(Collection: Patna Museum, Bihar)

(iii) Bodhisattva head from Taxila (Gandhara Period) Stone, 27.5 x 20 x 15 c.m.

Circa 2nd Century A.D.

(Collection: National Museum, New Delhi)

(iv) Seated Buddha from Katra Tila Mathura – (Kushan Period)

(Collection: Mathura Museum)

(v) Seated Buddha from Sarnath (Gupta Period)

Stone
Circa 5th Century AD

(Collection: Sarnath Musseum, U.P.)

(vi) Jain Tirathankara (Gupta period)

Stone
Circa 5th Century AD

(Collection at State Museum, Lucknow U.P.)

(3) Introduction to Ajanta
Location, period, No. of caves, Chaitya and Vihara, Paintings and Sculptures subject matters and techniques etc.

(4) Study of following
Painting & Sculpture:

    (i) Padmapani Bodhisattva (Ajanta Cave No. I)

       Mural Painting
Circa 5th Century A.D.

    (ii) Mara Vijay (Ajanta Cave No. 26)

       Sculpture in stone
Circa 5th Century A.D.

Unit 3: Temples Sculpture, Bronzes and Indo-Islamic Architecture

Artistic aspects of Indian Temples

(6th Century A.D. to 13th Century A.D.)

(1) Introduction to Temple Sculpture
(6th Century A.D. to 13th Century A.D.)

(2) Study of following Temple-Sculptures;
(i) Descent of Ganga (Pallava period, Mahabalipuram Tamilnadu), Stone Circa 7th Century A.D.
(ii) Ravana Shaking Mount Kailash (Rashtrakuta period, Ellora,
(iii) Trimurti (Elephanta, Maharashtra)

    Stone
Circa 9th Century A.D.

(iv) Lakshmi Narayana (Kandariya Mahadev Temple) (Chandela; Period, Khajuraho, M.P.)

    Circa 10th Century A.D.

(V) Cymbal Player Sun Temple (Ganga Dynesty, Konark, Orissa)
Circa 13th Century A.D.

(vi) Mother & Child (Vim la-Shah Temple, Solanki Dynesty, Dilwara, Mount Abu, rajastahn) White marble.

    Circa 13th Century A.D.

(3) Bronzes
(i) Introduction to Indian Bronzes
(ii) Method of casting (solid and hollow)

(4)   Study of following south Indian Bronzes:

   (i)   Nataraj (Thanjavur Distt., Tamilnadu)
          Chola period (12th Centry a.D.)

          (Collection: National Museum, New Delhi)

   (ii)   Devi (Uma)

          Chola Period(12th Centry a.D.)

          (Collection: National Museum, New Delhi)

(5)   Artistic Aspects of the Indo-Islamic Architecture

   (i)   Introduction
(6)   Study of following architectures:

   (i)   Qutab Minar, Delhi

   (ii)   Taj Mahal, Agra
   (iii) Gol Gumbaj of Bijapur

Unit 4:   The Rajasthani and Pahari Schools of Miniature painting (16th Century A.D to 19th Century A.D.)

   Introduction to Indian Miniature Schools: Western-Indian, Pala, Rajasthani, Mughal, Central India, Deccan and Pahari.

   (A)   The Rajasthan; Schools
          (1)   Original and Development
          (2)   Schools-Mewar, Bundi, Jodhpur, Bikaner, Kishangarh and Jaipur
          (3)   Main features of the Rajasthani Schools
          (4)   Study of the following Rajasthani Paintings:

Title	Painter	School
Maru-Ragini	Sahibdin	Mewar
Raja Ajniruddha Singh Heera	Utkal Ram	Bundi
Chaugan Players	Dana	Jodhpur
Krishna on swing	Nuruddin	Bikaner
Radha (Bani – Thani)	Nihal Chand	Kishangarh
Bharat meets Rama at Chitrakut	Guman	Jaipur

   (A)   The Pahari Schools:
          (1)   Origin and development
          (2)   Schools-Basohli and Kangra

(3)   Main features of the Pahari School
(4)   Study of the following pahari Paintings

Title	Painter	School
Krishna with Gopies		Basohli
Raga Megha		Kangra

Unit 5   The Mughal and Deccan Schools of Miniature Painting (16th Century AD to 19th Century A.D.)

(A)   The Mughal School
   (1) Origin and development
   (2) Main features of the Mughal School
   (3) Study of the following Mughal paintings

Title	Painter	School
Krishna lifting mount	Goverdhan	Miskin Akbar
Babur Crossing the river sone	Jaganath	Akbar
Jahangir holding the picture of Madona	Abul Hassan	Jahangir
Falcon on a bird rest	Ustafd Mansoor	Jahangir
Kabir and Raidas	Ustad Faquirullah Khan	Shahjahan
Marriage procession of Dara Shikoh	Haji Madni	Provincial Mughal (Oudh)

(A)   The Deccan School
   (1) Origin and development
   (2) Main features of the Deccan School
   (3) Study of the following Deccan paintings

Title	Painter	School
Raga Hindola		Ahmednagar
Chand Bibi Playing Polo (Chaugan)		Gol Konda

Unit 6 :   The Bengal school and the Modern trends in Indian Art

   (A)   (1)   A. New Era in Indian Art- an introduction

          B. Study of the following painting

(i)   Rama Vanquishing the pride of the ocean-Raja Ravi
                Verma
    (2)   Evolution of the Indian national Flag (First – 1906, Middle – 1921
            and Final 1947 stages): Study of the form and the colour scheme

(B)   (1)   Introduction to the Bengal School of painting

                (i)   Origin and development of the Bengal School
                (ii)   Main Features of the Bengal school

        (2)   Contribution of Indian artists in the struggle for National Freedom
                Movement

        (3)   Study of the follwing paintings of the Bengal School

                (i)   Jouney's End – Rabindranath Tagore
                (ii)   Parthasarthi – nandlal Bose
                (iii)   Radhika – M.a.R. Chughtai

(C)   The Modern Trends in Indian Art

        Introduction

(1)   Study of the following Paintings:
        (i)   Magician-Gaganendranath Tagore
        (ii)   Mother and child-Jamini Roy
        (iii)   Woman face-Rabindranath Tagore
        (iv)   Tree Girls-Amrita Sher gill
(2)   Study of the following pieces of Sculpture:

        (i)   Triumph of labour- D.P. Roychowdhury
        (ii)   Santhal Family-Ramkinker Vaij
(3)   Study of the following work of contemporary Indian Art'

A   *Paintings*
        (i)   Mother Teresa-M.F. Hussain.
        (ii)   Birth of Poetry- K.K. Hebbar
        (iii)   Gossip-N.S. Bendre
        (iv)   Untitled G.R. Santosh
        (v)   Diagonal – Tyeb Mehta

(4)   Graphic Prints
        (i)   Whirl Pool-Krishna Reddy
        (ii)   Children-Somnath Hore
        (iii)   Devi-Jyoti Bhatt
        (iv)   Of Walls-Anupam Sud
        (v)   Man, Woman and Tree K. Laxman Goud
(5)   Sculptures

        (i)   Standing Woman-Dhanraj Bhagat
        (ii)   Cries Un-heard-Amar nath Sehgal
        (iii)   Ganesha-P.V. Jankiram

(iv)   Figure- sankho Chaudhuri
(v)   Chatturmukhi – Aekka Yada Giri Rao

Note: The names of artists and their art work as listed above are only suggestive and in no way exhaustive.

<div align="center">Practical</div>

Unit 1:   *Nature and Object Study*
Study of two or three natural and geometric forms in pencil with light and shade from a fixed point of view. Natural forms life plants, Vegetables, fruits and flowers etc., are to be used. Geometrical forms of objects based on geometrical forms like cubes, cones, prisms, cylinders and sphere should be used.

Unit 2:   Painting composition

(i)   Simple exercises of basic design in variation of linear geometric and Rhythmetic shapes in primary and secondary colours to understand designs as organized visual arrangements.

(ii)   Sketches from Life and nature
Imaginative painting based on subject from Life and or Nature in water and poster coulurs with colour values.

(iii)   Imaginative painting based on subject from Life and or Nature in water and poster colours with colour values.

Syllabus for examination for Music Teacher

Science of Music and Studies of Shruties

Vibration and frequency; pitch and its relation with Vibrator, Vocal and Instrumental ranges of sound; Amplitude, Timber, Qualities and musical and unmusical overtones (Swayambhu Swar); consonance and Dissonance; Main types of chords; Absorption, Echo; Reverberation and Resonance of sound, concept of Shruti (different opinions on it). Placement of suddha and Vikrit Swars on different shruties according to Lochan, Ahobal, Pundarik, Ramamatya, Somnath etc. Comparative study of Vyankat-Mukhi's 72 melas, Bhatkhade's Ten That's and Modern thirty-two That's.

Study of Ragas and Tals

Critical, detailed and comparative study of the following Ragas:- SUDHAKALYAN, DESHKAR, KAMOD, CHHAYANAT, GOUDSARANG, JAIJAIWANTI, RAMKALI, POORIYA, MARWA, SOHANI and SHANKARA illustrations of Nyas, Alpatva, Bahutva, Avirbhava and Tirobhava in the above Ragas by means of notes. Critical detailed and comparative study of the following SANKARA BHARANA, KAPHI, MUKHARI, MOHANA, KALYAN, SABERI, KEDARA, GOUDA, BHAIRABI, BARADI, PATTA MANJARI & SARANGA

Knowledge of the following Tals with different types of Layakaries and writing of the Tals in Dugun, Tigun, Chougun and Ada:- Trital, Ekatali, Rupak, Teevra, Sooltal, Jhoomra, Dhamar, Tripata, Jhumpa, Kuduka, Jati, Adatali, Aditala and Jat tal.

Writing the songs in notation in the above ragas with Alaps. Tans, Boltans in Khayals and Dugun, Tigun etc., in dhruvapad and Dhamar. Identification of Ragas from given notes.

Writing the notation of the Prabandhas set to above ragas with Alaps, Pada Binyasa, Bibadha Alap, Swara Vinyasa and Tan etc. identification of Ragas from given notes.

Instrumental Music

Science of Music and Studies of Shruties

Vibration and frequency, pitch and its relation with vibrator Vocal and

Instrumental ranges of sound. Amplitude, Timber, qualities of musical, unmusical overtones (Swaymbhu-Swar) consonance and Dissonance. Main types of chords, Absorption, Echo, Reverberation and resonance of sound, concept of shruti (different opinions on it) placement of sudh and vikrit swara according to lochan, Ahobal, Pundarik Rammamatya, somnath etc. Comparative study of Swaras of Northern and Southern saptak, critical study of Vyankatmukhu's 72 Melas. Bhatkhande's Ten Thats and Modern thirty two thats.

Study of Ragas and Tals

Critical, detailed and comparative study of the following Ragas:- SUDHAKALYAN, DESHKAR, KAMOD, CHHAYANAT, GOUDSARANG, JAIJAIWANTI, RAMKALI, POORIYA, MARWA, SOHANI and SHANKARA.

Illustrations of Nyas, Alpatva, Bahutva, Tirobhav and Avirbhava in the above Ragas by means of notes. Knowledge of the following Tals with different types of Layakaries and writing of the Tals in Dugun, Tigun, Chougun and Ada:-
Trital, Jhaptal, Choutal, Keharwa, Dadra, Tilwada, Rupak, Teevra, sool - Tal, Dhamar and Jat-Tal.

Writing the Gats in notation in the above ragas with Alaps, Todas, Jhalas, Identification of Ragas from the given notes.

Candidates offering percussion Instruments must have critical detailed and comparative study of the following Tals:-
TEENTAL, JHAPTAL, RUPAK, CHOUTAL, SOOLTAL, TEEVRA, TILWADA, DADRA, KAHARWA, PANJABI, JATTAL.

They should also know the different types of Laykaries, Tukaras, paranas, Peshkara, Quada, Avartan, Bant, Kisim, Palta, Rela, Laggi, Ladi, etc. where applicable in the abovementioned talas, writing in notation of all the matter in above talas and identified - for given Bols.

Vocal Music

Notation system, scales and study of Bio-graphics of Musicians.

Notation system of Bhatkhande and vishnudigambar and western Music, writing of simple songs in these notations. Western Note, various types of intervals of notes. Time signature, different Musical scales, Dia-tonic scale, comparative study of scales of Bhatkhande and western Music. Harmony and Melody, placement of notes on veena according to Pt.

Srinivas, comparative study of Northern, Southern and Odissi Tal paddhaties, contribution of various scholars and musicians to the Indian Music.

Biographies of Bhatkhande, Vishnudigamber, Tansen, Ameer Khusroo, Faiyyaz Khan, Pt. Ravi Shankar, Pt. Ram Sahay, Ahmadjan Thirakwas, Kudau Singh, Nana Sahib panse, Kabiraj Jayadev, Kabisurya Baladev Ratha, Kabi Samrat Upendra Bhanja, Kabi Banamali, Kabi ChandraKali Charan Pattnaik and Sangeet Sudhakar Balakrushna Dash.

Study of Musical Styles and Ragas

Geet, Gandharva, Gan, Deshi Sangeet, Sthaya, Mukhachalan, akshiptika, Nibadha and Anibadh Gan, Raglakshan, Ragalap, Alapti swasthan Niyam, prachalit Alap, Tan; Meend.

Critical detail and comparative study of the following Ragas with illustration of Nyas, Alapatva, Bahutva, Tirobhav and Avirbhav in them.

Lalit, Darbari, Adana, Mia-Malhar, Goudmalhar, Bahar, Todi, Multani, Deshi, Jogiya ,Vibhas, Bageshri, Kamodi, Sudhadeshi, Shokabaradi, Jamuna- Kalyan, Rhamaj, Nata, Lalit, Malhar and Malaba Kausik etc.

Knowledge of the following Tals with different types of Layakaries and writing of the Talas in Dugun, Tigun, Chougun and Ada:
Trital, Ektal, Jhaptal, Choutal, Kaharwa, Dadra, Tilwada, Rupak, Teevra, Sooltal, Jhoomra, Dhamar and Jattal and pancham Sawari, Ekatali, Khemata, Rupak, Tripata, Matha, Jhampa, Jati, Adatali and Aditala.

Comparative and detail study with the descriptions of different styles of Indian Music viz. Dhrupad, Dhamar, Khayal, Thumri, Tappa, Chaturang, Taranas, Trivat, etc. and their evolution, writing of notation of songs in the above Ragas with alaps, Tans Boltans etc. and with different Layakaries in Dhruvapad and Dhamar, Identification of Ragas from given notes. A short essay on any musical subject. Odissi Raganga, Bhabanga, Natyanga, Dhrubapadanga, Champu, Chhanda, Geeta Gobinda, Bhajana and Janana etc.

Instrumental Music

Notation system of Bhatkhande, Vishnudigamber and western Music. Writing of simple gats in these notations. Western notes. Various types of intervals of notes. Time signature, different Musical scales Dia-tonic scale, pythagorain scale, Tempered scale, Major scale, Minor scale etc. Comparative study of scales of Bhatkhande and Western Music. Harmony and Melody, placement of notes on Veena according to Pt. Srinivas.

Comparative study of Northern and southern Tal paddhaties contribution of various scholars and Musicians to the Indian Music.

Biographies of Bhatkhande, Vishnudigamber, Tansen, Ameer Khusro Faiyyaz Khan, Onkarnath Thakur, Allauddin Khan, Pt. Ravishankar, Pt. Ram Sahai, Ahmad Jan Thirakwa, Kudau Singh, Nana Saheb Panse.

Study of Styles, Baj, Ragas and Tals

Geet, Gandharv, Gan, Deshi Sangeet, Sthaya Mukhchalan, Akshiptika Nibadha and Anibadha gan, Raglakshan, Raga-Alap, Rupakalap, Alpati Swasthan-Niyam, Prachalit Alap and Tan, Zamzama, Meend, Sootghaseet, Jor Alap, Toda.

Critical detailed and comparative study of the following Ragas with illustrations of nyas, Alpatva, Bahutva, Tirobhava and Avirbhav in them.

Vibhas, Lalit, Darbari Kanhda, Adana, Miyan Malhar, Goud Malhar, Bahar, Todi, Multani,Deshi and Jogiya.

Identification of Raga from given notes. Knowledge of following tals: Ada chartal, Ektal, Deepchandi, Dhamar, Farodast, Pancham Sawari, Kumbh, Sikhar.

Candidates offering percussion instruments must have critical detailed and comparative study of the following tals: Adachartal, Ektal, Pancham Sawari, Farodast, Dhamar, Kumbh, Shikhar, Matt Tal, Dhumali, Deepchandi, Addha tal.

They must also know, Tukras, parans, Tihai, Kayadas, Paltas, Relas, Peshkaras, Mukharas, Tipallis, chaupalli, Chakkardar bols, Farmaishi, Paranas, Lom - Bilom, Charbagh, Stuti ke bol, Jhulna ke bol. Dhamar and Bedamdar tihais in the above mentioned tals.

Ability to recognize tals by given bols, writing of all the matters in notations.

A short essay on any Musical subject. Knowledge of Baithaks, styles of playing and Gharanas. Ability to writ tals in different layakaries knowledge of different types of Musical instruments and their system of classification.
Vocal Music

History of Music and Classification of Rags and Tals

Short history of Music of Ancient periods up to 13th century A.D. with classification of Rags and Tals. Evolution of jatis Ragas, short history of

Music of Medieval and Modern periods, prabandh. Revival of Indian Classical Music, comparison of the Hindustani Odissi and Karnataka Music systems. Impact of Modern Science in the development and propagation of Music. Essay on any general topic of Music.

Study of Musical Styles and Ragas

Critical, detailed and comparative study of the following Ragas with illustrations of Nyas, Alpatva, Bahutva, Avirbhava and Tirobhav.

Shree, Pooria-Dhanashree, Basant, Paraj, Hindol, Chandrakauns, Suddhasarang, Madhuwanti, Bageswari, Jaunpuri, Malgunji.

Critical study of different styles of Music of North, South and Odissi, various Gharanas of Music, Gram, Moorchana, various kinds of Gamak, writing of notation of songs. Ability to compose any song in any Raga.

Knowledge of the following Tals with different types of Layakaries Ada - Choutal, Brahma, Lakshmi, Rudra, Shikhar, Pancham Sawari, Rupak, Tripata, Jhampa, Matha, Kuduka, Jati, Adatali and Aditala etc.

Practical (Stage Demonstration)

One Drut Khayal in each raga and at least five Vilambit Khayals in the following Ragas:
Shree, Basant, Paraj, Puriya-Dhanashri, Hindol, Chandra Kauns,Suddhasarang, Madhuwanti, Bageshwari, Jaunpuri, Malgunji, Shankarabharan, Kaphi, Kalyan, Mohana, Bageshree, Baradi, Kirabani, Saberi, Bhairabi, Saranga and Mukhari etc.

The candidates will have to give stage performance of his or her own choice of Raga of the Courses for half an hour. They will have to sing a Thumri composition too.

Instrumental Music

History of Music and Classification of Ragas and Tals

Short history of Music of ancient period up to 13th century A.D. with particular reference to Natyasashtra, Brihaddesi, Sangeet Ratnakar. Classification of Ragas and Tals. Evolution of jatis, Ragas. Short History of Music in Medieval period. Revival of Indian classical Music. Comparison of the Hindustani and Karnataka Music system. Impact of Modern science in

the development and propagation of Music. Essay on any general topic of Music.

Critical, comparative and detailed study of Musical styles and the following Ragas with illustration of Nyas, Alpatva, Bahutva, Avirbhav and Tirobhav:
Shree, Pooria - dhanashree, Basant, Paraj, Hindol, Chandrakauns, Suddh Sarang, Madhuwanti, Bageshree, Jaunpuri, Malgunji.

Mohana Kalyan, Rageshri, Basanta, Bajrakanti, Dhanyasi, Bhairab, Desh, Kirabani and Arabi etc.

Critical study of the different styles of Music of North, South and Odissi, various Gharanas of Music, Gram, Moorchana, various kinds of Gamaks, Writing of Notation of gats. Ability to compose any gat in any Ragas.

Knowledge of the following Tals with different types of layakaries and writing of Tals in Dugun, Tigun, Chougun, Ada. and Kuad, and Biyad.

Basant, Rudra, Laxmi, Gajjhampa, Pashto, Brahma. Candidates offering percussion instruments should also know the various kinds of Baj and styles of Table and Pakhawaj and should also know Peskhkaras, Paran, Tihais, Tukaras, Kishime, Kyadas, Paltas, Relas, Mukhras, Tripalli, Choupallies, Chakkardar, Bols, Farmaishi paran, Kamali paran, Lom-Bilom, Charbagh, Stuti ke bole, Jhulan ke bole, Jababi Paran, Navahakka, Damdar and Bedam ki tihai where applicable in the following Talas, along with their critical, detailed and comparative study:
Rudra, Badi swari, Jattal, Basant, Laxmi, Gaj Jhampa, Brahma tal, Asth Mangal, Ganesh Tal, Mani Tal, Pashto.

Various kinds of chands in the Tals where applicable and writing of different layakaries, Dugun, Tigun, Chougun, Ada, Kuad and Biyad.

[================]

SYLLABUS FOR WRITTEN EXAMINATION FOR PGT (ENGLISH)

Section A

READING COMPREHENSION
Ability to comprehend, analyze and interpret unseen texts.
Three/four unseen reading passages may be set.

Section B

WRITING ABILITY
Ability to express views/opinions in a coherent & logical manner.
B1. One out of two tasks such as factual description of any event or incident, a report or a process.

B2. Writing one formal letter. Letter types include
a) Business or official letters(for making enquiries, registering complaints, asking for and giving information, placing orders and sending replies)
b) Letter to the editors(giving facts/figures suggestions / opinions on an issue of public interest) on contemporary / current issues.
c) Application for a job with cv.
B3. Writing personal opinion /views/stand in an article/debate/speech etc on a given socio – cultural issue –in a style/register suitable to the task set. Issues could relate to
(a) environment
(b) education
(c) gender discrimination
(d) economic disparity etc..

Section C

GRAMMAR AND USAGE
Ability to apply the knowledge of syntax and grammatical items & use them accurately in the context provided .
The following grammatical structures will be tested through error correction / editing/ gap filling / sentence completion / multiple choice questions :
1. Determiners
2. Tenses
3. Clauses
4. Modals
5. Voice

Section D

LITERATURE
☐ Shakespeare's works.
☐ Romantic period (e.g. Shelley, Wordsworth, Keats, Coleridge etc)
☐ 19th and 20th Century American and English Literature (e.g. Robert Frost, Hemmingway, Whitman, Hawthorne, Emily Dickinson , Bernard Shaw, Arthur Miller etc.)
☐ Modern Indian Writing in English (e.g. Anita Desai, Vikram Seth, Nissin Ezekiel, K N Daruwala, Ruskin Bond, R K Narayan, Mulk Raj Anand, Khushwant Singh etc)
☐ Modern writing in English from other parts of the world e.g. Latin America / Africa / Australia / South Asia.

Syllabus for written examination for PGT (Physics)

Unit I: Physical World and Measurement
Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures.
dimensional analysis and its applications.

Unit II: Kinematics
Frame of reference. Motion in a one ,two and three dimension: Position-time graph, speed and velocity.
Uniform and non-uniform motion, average speed and instantaneous velocity.
Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion .Vectors :Position and displacement vectors .addition and subtraction of vectors. Relative velocity.scalar product of vectors,Vector product of vectors.
Unit vector; Resolution of a vector in a plane - rectangular components. Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion.

Unit III: Laws of Motion
Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications.
Equilibrium of concurrent forces. Types of friction, laws of friction, .Dynamics of uniform circular motion .

Unit IV: Work, Energy and Power
Work done by a constant force and a variable force; kinetic
energy, work-energy theorem, power.
Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: elastic and inelastic collisions in one and two dimensions.

Unit V: Motion of System of Particles and Rigid Body
Centre of mass of a two-particle system, momentum conversation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod.
; moment of a force, torque, angular momentum, conservation
of angular momentum with some examples.
Dynamics of rigid bodies, comparison of linear and rotational motions; moment of inertia, radius of gyration.
Values of moments of inertia for geometrical objects. Parallel and perpendicular axis theorems and their applications.

Unit VI: Gravitation
Keplar's laws of planetary motion. The universal law of gravitation.
Variation of Acceleration due to gravity and with altitude,latitude and depth.
Gravitational potential energy; gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

Unit VII: Properties of Bulk Matter
Elastic behaviour, Stress-strain relationship, Hooke's law,modulus of elasticity .
Pressure due to a fluid column; Pascal's law and its applications

Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow. Bernoulli's theorem and its applications.
Surface energy and surface tension, application of surface tension ideas to drops, bubbles and capillary rise.
Heat, temperature, thermal expansion; specific heat - calorimetry; change of state - latent heat.
Heat transfer-conduction, convection and radiation, thermal conductivity, Newton's law of cooling.

Unit VIII: Thermodynamics
Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat, work and internal energy. First law of thermodynamics.
Second law of thermodynamics: reversible and irreversible processes. Heat engines and refrigerators.carnot cycle and carnot's theorem.
Equation of state of a perfect gas, work done on compressing a gas.
Kinetic theory of gases ,degrees of freedom, law of equipartition of energy and application to specific heats of gases; concept of mean free path, Avogadro's number.

Unit IX: Oscillations and Waves
Periodic motion - period, frequency, displacement as a function of time. Periodic functions.Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring–restoring force and force constant; energy in S.H.M.-kinetic and potential energies; simple pendulum–derivation of expression for its time period; free, forced and damped oscillations, resonance.
Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

Unit X: Electrostatics
Electric Charges; Conservation of charge, Coulomb's law and its application,force between two point charges,
forces between multiple charges; superposition principle and continuous charge distribution.
Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in uniform electric field.
Gauss's theorem and its applications
Electric potential, potential difference, electric potential due to a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.
Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor. Van de Graaff generator.

Unit XI: Current Electricity
Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity.
Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance.
Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel.

Kirchhoff's laws and its applications..
Potentiometer - principle and its applications
Thermal and chemical effect of current.

Unit XII: Magnetic Effects of Current and Magnetism
Biot - Savart law and its application
Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids.
Lorentz's force. Cyclotron,synchrotron.
Interaction of a current-carrying conductor with magnetic field. Force between two parallel current-carrying conductors. Torque experienced by a current loop in uniform magnetic field and its application;
Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole momentof a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths. Permanent magnets.

Unit XIII: Electromagnetic Induction and Alternating Currents
Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance.
Need for displacement current.
Alternating currents and its measurement reactance and impedance; LC oscillations, LCR series circuit, resonance; power in AC circuits,.
generator , motors and transformer.

UnitXIV: Optics
Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, combination of thin lenses in contact. Refraction and dispersion of light through a prism.
Scattering of light and its application.
Optical instruments: Human eye-eye defects and its correction. Microscopes and astronomical telescopes and their magnifying powers.
Wave optics: wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens' principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes. Polarisation, plane polarised light; Brewster's law, uses of plane polarised light and Polaroids.

Unit XV: Modern Physics
Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light. Compton effect, deffraction of X- rays ,Bragg's law ,Hall effect.
Matter waves-wave nature of particles, de Broglie relation. Davisson-Germer experiment.
Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.
Composition and size of nucleus, packing fraction and magnetic moment, atomic masses, isotopes, isobars; isotones. Radioactivity-alpha,
beta and gamma particles/rays and their properties; radioactive decay law.

Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; liquid drop model of nucleus, nuclear fission and fusion.,critical mass ,chain reaction and fission reaction, ionization chamber,Geiger counter and scinitillation counter,linear accelerator.

Unit XVI: Electronic Devices
Semiconductors; semiconductor diode – I-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates and its combination. Transistor as a switch.

Syllabus for written examination for PGT(CHEMISTRY)

1. **Some Basic concepts of Chemistry:** Scope of chemistry-
Historical approach to nature of matter - states of matter, properties of matter and its measurement, S. I system of units, Uncertainty in measurements, dimensional analysis, Laws of chemical combination, atomic and molecular masses, Mole concept and molar masses, percentage composition, empirical and molecular masses, equivalent weight, concept of limiting reagent

2 **States of Matter:** Gases, liquids and solids, three states of matter, types of intermolecular forces.
The laws governing ideal gas behaviour, Dalton's law of partial pressure, Kinetic molecular theory of ideal gases, Maxwell Boltzmann distribution law on molecular motion, real gases – deviation from ideal behaviour, vander Waals equation.
Liquid and their properties.
Solids: Classification of solids, fundamental types of lattices, two and three dimensional lattice types, Simple crystal structures, Transformation of crystal structure on varying temperature, Bragg's law, density in solids, energy band, band gaps, semiconductors, magnetic and dielectric properties, stoichiometric and non- stoichiometric defects in solids.

3 **Structure of Atom:***Structure of Atom (Classical Theory),* Dalton's atomic theory, Bohr's model of atom, *Structure of atom (modern theory),* de Broglie's relationship, Heisenberg's uncertainty principal, Classical wave equation, Schrödinger's wave equation, Probability distribution curve, Quantum numbers, Pauli's exclusion principle, Aufbau principle, Hund's rule of maximum multiplicity.

4 **Equilibrium:** Reversible reactions, criteria of equilibrium, Law of mass action, equilibrium constant, Kc and Kp , Le Chatelier principle, Ionic equilibrium, Ostwald's dilution Law, solution of acids, bases, ionic equilibria in solution, Common ion effect – its application to qualitative analysis, acids and bases, Bronsted- Lowry theory of acids and bases, Lewis concept of acid and bases, relative strengths of acids and bases, their quantitative estimation, buffer solution and its use, determination of pH, theories of indicators, conductometric titration, Solubility product, hydrolysis.

5. **Surface Chemistry:**Adsorption, absorption, sorption, Physical adsorption, Chemisorption adsorption, isotherms (Freundlich, Langmuir), application of adsorption, types of Catalysis theories of catalysis, classification of colloids, preparation of Colloidal Solution (lyophobic and lyophilic), Special characteristics of colloidal solutions , electrophoresis, Precipitation of

colloids – Hardy Schulze law, multimolecular and macromolecular colloids, Emulsion and Gels.

6 **Chemical Kinetics:** Theories of reaction rates, rate of reaction , molecularity and order of reaction, Fast reactions- Luminescence and energy transfer process, reaction mechanisms(Simple and complex reactions).

7 **Redox Reaction and Electrochemistry:** Oxidation and reduction, redox reaction and its application, oxidation number, Strong and weak electrolytes, activity coefficient, conductance and conductivity, Kohlrausch law, resistance and resistivity molar conductivity, equivalent conductivity, Qualitative and quantitative aspect of electrolysis, electrochemical cell and electrolytic cell, Electrode and electrode potential and standard electrode potential, Electrochemical series and its applications, Nernst equation and its application, Equilibrium constant and EMF of the cell.

8 **Solutions:**Solution and its types, expression of concentration of solution, solubility and factors affecting the solubility of a solid in a liquid (temperature and pressure), Vapour pressure of a liquid, Raoult's law for both volatile and non volatile solute,Ideal and non ideal solution, Colligative properties, abnormal molecular masses and Van't Hoff factor.

9 **Chemical bonding and Molecular Structure:** Valence electrons and Lewis structures, Ionic bond, Covalent bond, Bond parameters ,Co-ordinate bond, polarity and dipole moment, Quantitative idea of – valence bond theory, molecular orbital theory (LCAO), Concept of hybridization involving s, p, d orbitals, Hydrogen bond, Resonance.

10. **Thermodynamics:**Macroscopic properties of the system, modes of transfer of energy between system and surrounding, Phase transition, phase rule and phase diagram, First Law, second law and third law, of thermodynamics. Internal energy and enthalpy of the reaction, their measurement and application, spontaneity of process, Entropy and spontaneity, Helmholtz and Gibb's free energy, Thermodynamics of electrochemical cells.

11. **Classification of elements and periodicity in properties:** Significance of classification, brief history of the development of periodic table, periodic laws, name of the elements with Z>100 according to IUPAC system, classification of elements into s, p, d, f –block elements and their characteristics,
Periodic trends in the properties of elements – Ionization enthalpy, Electron gain enthalpy, electronegativity, atomic radii, ionic radii, periodicity of valency or oxidation state.

12. **Hydrogen:**Position of Hydrogen in periodic table, occurrence, isotopes, Preparation of hydrogen, on small and commercial scale, hydrides, water, hard and soft water, heavy water, hydrogen peroxide, hydrogen economy, hydrogen as a fuel.

13. **General principles and processes of isolation of elements and s – block elements:**
Principles and methods of extraction, oxidation and reduction as applied to the extraction procedures of Al, Cu, Zn and Fe.
s – block elements, general introduction – Electronic configuration, occurrence,
Anomalous properties of the first element of each group, diagonal relationship,
Trends in variation of the properties, reaction of alkali and alkaline earth metals.
Preparation and properties and uses of some important compounds: - sodium carbonate, sodium bicarbonate, sodium chloride, sodium hydroxide, calcium hydroxide and calcium carbonate, industrial uses of lime and lime stone, biological importance of sodium, potassium, magnesium and calcium.

14. **p – Block Elements:** Electronic configuration, variation in physical and chemical properties of groups 13 to 18, physical and chemical properties of borax, boric acid, boron hydride, silicones, preparation and uses, preparation, properties and uses of nitrogen, ammonia, nitric acid and oxides of nitrogen, phosphorus – allotropic forms, preparation and properties of phosphine, phosphorus pentachloride and phosphorus trichloride, preparation, properties and uses of oxygen and ozone, hydrides and halides of 16 group elements, their structure and nature, allotropic forms of sulphur- their preparation, preparation, properties and uses of sulphur dioxide, industrial preparation of oxo-acids of sulphur, preparation and properties of halogen and halogen acids, inter halogen compounds, pseudohalide ions. Oxo-acids of halogens, their structure and nature, preparation, properties and uses of xenon fluorides, oxides of xenon and xenon oxo fluorides.

15. **The d – and f- Block Elements:** General introduction, electronic configuration and general trend in the properties of first row transition metals like metallic character, ionization enthalpy, oxidation states, ionic radii, coloured ion formation, catalytic properties, magnetic properties, oxides, halides and sulphides of first row transition metals, complex compound formation etc. Preparation, properties and structures of $KMnO_4$ and $K_2Cr_2O_7$, lanthanoids and actinoids.

16. **Co-ordination Compounds and organometallics:** Meaning of co-ordination compounds, Werner's theory, ligands – their types, IUPAC nomenclature of co- ordination compounds, isomerism, bonding in co-ordination compounds, colour, magnetic properties and, stabilities of co-ordination compounds. Chemical and biological importance of coordination compounds, metal carbonyls: preparation, properties and bonding, organometallic compounds and their classification.

17. **Organic Chemistry : Some Basic Principles and Techniques:** General Classification of organic compounds, Shapes of organic compounds-Hybridisation(sp, sp2,sp3), Structural representation of organic molecules, Functional groups, Homologous, series. Common or trivial names, nomenclature of aliphatic, aromatic and substituted aromatic compounds.
Isomerism : Structural and Stereo isomerism **Fundamental Concepts in Reaction Mechanism:** Cleavage of covalent bond, Types of attacking species, electron movement in organic reactions, electronic displacement in a covalent bond and types of organic reactions.
Methods of purification of organic compounds: Qualitative analysis, Quantitative analysis., estimation of the elements and determination of empirical and molecular formula.

18. **Hydrocarbons:** Classification of hydrocarbons.
Alkanes: Conformations (Newmann and Sawhorse formulae), Physical properties, Chemical reactions
Cycloalkanes: Preparation, physical and chemical properties, stability of cycloalkanes(Bayer strain theory), chair and boat forms of cyclohexane.
Alkenes:, structure of double bond, geometrical isomerism, physical properties, methods of preparation, chemical reactions**.**
Alkadienes: Classification of dienes, Preparation of conjugated dienes, Chemical properties(1,2 and 1,4- addition to conjugated dienes).
Alkynes:, structure of triple bond, physical properties, methods of preparation Chemical properties, Acidic nature of alkynes
Aromatic Hydrocarbons:, Structure of benzene, resonance, aromaticity (Huckel's rule) Chemical properties, mechanism of electrophilic substitution direct influence of substituents in monosubustituted benzene.

19. **Environmental Chemistry:** Environmental pollution, Atmospheric pollution, Tropospheric pollution(Air pollution), Major air pollutants, Control of air pollution, Smog(Chemical and Photochemical smog), Stratospheric pollution: Ozone layer and its depletion, Acid rain, Green House Effect and Global warming, Water pollution, Soil pollution and Industrial waste.

20. **Haloalkanes and Haloarenes:** Classification, methods of preparation of haloalkanes and haloarenes, their physical properties, tests to distinguish between alkyl and aryl halides, **mechanism of SN1 and SN2 reactions**, elimination reactions (**Saytzeff Rule, E1 & E2 mechanism**).**Poly halogen compounds:** Preparation and properties.

21. **Alcohols, Phenols and Ethers:** Classification, preparation, properties and uses, tests to distinguish between primary, secondary and tertiary alcohols**.** Distinctions between alcohols and phenols. Preparation of ethers , physical and chemical properties.

22. **Aldehydes, Ketones and Carboxylic Acids:** Structure of carbonyl group, preparation of aldehydes and ketones, physical , Chemical properties and uses, tests to distinguish between aldehydes and ketones .Preparations of carboxylic acids preparation properties and uses.

23. **Amines (Organic compounds containing nitrogen):** Classification, Structure of amino group, preparation, Physical, Chemical properties, tests to distinguish between primary, secondary and tertiary amines

24. **Polymers:** Polymerization, Classification of polymers based on : origin, structure, molecular forces, mode of polymerization. **Addition polymerization Condensation polymerization(Step-growth polymerization)** Preparation of condensation polymers Synthetic and natural rubber and vulcanization, Determination of molecular mass of polymers:. Poly dispersity index(PDI). **Bio-degradable polymers like PHBV.**

25. **Biomolecules(Biochemistry):Carbohydrates:** Classification of carbohydrates , Structural determination of glucose and fructose on the basis of their chemical properties, Open chain (Fischer) structure, cyclic structure(**Haworth form**), $\square$ **and** $\square$ **forms of glucose, Mutarotation, anomers and epimers**, Chemical reactions of glucose, Reducing and non-reducing sugars, Configuration of glucose and fructose. Disaccharides Sucrose, **Haworth representation of disaccharides**, Polysaccharides, Starch, Cellulose, and amylopectin structures, Functions of Carbohydrates in living organisms. Carbohydrate metabolism, glycolysis, electron-transport chain,
Proteins: Amino acids, Zwitter ion, Iso-electric point, peptides and peptide bond, Fibrous proteins, Globular proteins and their functions, Primary, Secondary(Helix and pleated sheet structures) and tertiary structure of proteins, denaturation and renaturation, Enzymes, specificity and mechanism of enzyme activity , coenzymes, applications of enzymes.
Nucleic acids : Nucleosides, Nucleotides, Structure of ATP, Photosynthesis(Light and dark reactions) Primary and Secondary structure of DNA(Double Helix structure) , biological functions of nucleic acids, Replication, Protein synthesis (Transcription, Translation, mutation), genetic code, genetic errors, Vitamins, classification, diseases caused by the deficiency of vitamins, Hormones (steroid hormones and non-steroid hormones) and their functions.

26. **Chemistry in Everyday life: Drugs and medicines -** designing a drug, drug metabolism, classification of drugs, enzymes as drug targets, action of drug through drug receptor interaction, types of drugs: Antipyretics, Analgesics, antiseptics, disinfectants,

tranquilizers, antimicrobials, antibiotics(Narrow spectrum and broad spectrum antibiotics), antifertility drugs, antihistmmines, antacids. Chemicals in food, Food preservatives, artificial sweetening agents, Soaps and detergents, Preparation soaps(Saponification) and detergents, cleansing action of soaps, advantages of detergents over soaps, Deodorants, Edible colours, antioxidants.
[==========]

Syllabus for written examination for PGT (Biology)

Diversity of living world
Taxonomic aids, keys, specimen management ; Systematic and binomial system of nomenclature; Classification of living organisms(five kingdom classification, major groups and principles of classification within each group) ; General description of monera, protozoa, fungi, algae, bryophytes, pteridophyes, gymnosperms, angiosperms (major groups of angiosperms upto sub class) ; Botanical gardens ,herbaria, zoological parks and museums .Salient features of animal (nonchordates up to phylum level and chordates up to class level).

Structural organisation in plants and animals
Morphology, Anatomy and histology of angiosperms: Root , stem , leaf, flower , inflorescence, fruits and seeds, Tissues : Meristamatic and permanent (epidermal, ground, vascular). Cambial activity, secondary growth, type of wood. Animal tissues ; Morphology, Anatomy and histology of annelids , insects , amphibians.

Structural and functional organization of cell
Cell cycle , detailed study of Cell division (mitosis , meiosis) ; Cell death ; Structure and function(metabolism) of carbohydrates, proteins, lipids and nucleic acids ; Enzymology : Classification and nomenclature of enzymes ; Structure ; Mechanism of action, single substrate and bisubstrate enzyme ; Activators and inhibitors of enzymes ; Factors affecting the activity of enzymes.

Plant physiology
Water relations: Properties of water, water in tissues and cells, Transport of water and solutes(food, nutrients, gases) : Transport across cell membrane ; soil-plant-atmosphere continuum ; Minerals required by plant, their absorbable form, functions, deficiency symptoms, essentiality of mineral, N_2 metabolism, biological fixation ; Cellular Metabolism: Gluconeogenesis, Glycogenesis and glycogenolysis, hormonal regulation ; Oxidation of food, respiratory efficiency of various food components ; transport and detoxification of ammonia , Lipid Metabolism ; Photosynthesis: Basic principles of light absorption, excitation energy transfer, electron transports, cycles (C_2 , C_3, C_4, CAM), plant productivity, measurement of photosynthetic parameters ; Physiological responses to abiotic stresses ; Sensory photobiology ; Plant growth regulators : Growth ,differentiation / de-differentiation and re-differentiation, development ; Physiological affects and mechanism of action of plant growth hormones, Flowering : Photoperiodism and its significance, endogenous clock and its regulation, floral induction and development, vernalisation ; Plant movements.

Human biology
Morphology, Anatomy, Histology, Physiology, Control and Disorders of Digestion, Respiration, Body fluids and Circulation**,** Excretion, Skeleton system & muscle, Nervous; Physiology of high altitude.

Sexual Reproduction
Plants**:** Structural details of angiospermic flower, development of gametophytes, pollination and its types, agencies of pollination, pollen- pistil interaction, fertilization, Artificial hybridization (emasculation and bagging) development of seed and fruit ; Apomixis and Polyembryony ; Self incompatibility: Structural and biochemical aspects; methods to overcome incompatibility; Experimental Embryology; Human Reproduction**:** Morphology, Anatomy, Histology and Physiology of reproduction ; Neuro-endocrine control **;** Sexual behavior in infancy, pre-adolescence, adolescence and of adult ; Implantation, Pregnancy and Parturition ; Mammary gland and Lactation ; Infantile mammary gland, pubertal changes in mammary gland; Structure of adult mammary gland, galactopoiesis, milk let down ; Menopause. Senescence – Impact of age on reproduction.Foetal and Embryonic Gonads and Genital ducts ;Hormonal basis of sex differentiation ; Disorders of sexual differentiation development ;Reproductive Health**:** Problems and strategies, Population explosion –causes and effects, birth control measures- natural methods, physical / barrier, bio-chemical, hormonal, immunological, surgical methods, IUD's , amniocentesis, female feticide, MMR, IMR, MTP, STD's, infertility Disorders of female and female reproductive systems – Sexual dysfunction; Infertility – Causes and curative measures ; Reproductive toxicology of environmental and industrial chemicals, drug and alcohol ;Medically assisted human reproductive technologies, GIFT, IUT, ZIFT, TET ; Embryo culture.

Genetics
Principles of Inheritance and Variation: Mendelian genetics, Inheritance of one gene, two genes, post mendelian inheritance; Recombination frequency, chromosomal theory of inheritance ; Drosophila genetics, linkage and recombinations ; Mutation :General properties of mutations ; Adaptation versus mutation ; molecular basis of gene mutation : DNA repair mechanisms ; Pedigree analysis ; Human karyotype-banding ; genetic and environmental basis of sex determination, Y- and X-linked genes; Numerical and Structural abnormalities of human chromosomes and related syndromes ; Human metabolic disorders.;Molecular Basis of Inheritance**:** Chemical nature of DNA and RNA, Biological functions of nucleic acids ; Search for genetic material, RNA world ; Replication ; Transcription and processing of RNA, Genetic code ; Translation, post-translational modifications ; Ribosomes and Proteins ; Regulation of Gene expression ; DNA Fingerprinting ; Gene mapping ; Chromosome banding; Restriction enzyme, nucleotide sequence comparisons and homologies ; Molecular clocks ; Genetics in modern agriculture ,animal breeding, medicine, human behaviour ; Misuse of genetics ; Genetic Counseling ; Gene therapy ; HGP ; Gene Activity in prokaryotes and eukaryotes ; Signals for gene control – Hormones and growth factors ; Totipotency & Pleuripotency ; Stem cell and Gene therapy ; Bacterial transformation, transduction and conjugation, Bacterial chromosome ; Bacteriophages : Types, structure and morphology ;Evolutionary biology: Cosmic evolution – Physical basis of life ; Theories of origin of life ; Origin of life through biochemical evolution ; Experimental evidences for origin of life ; The origin of natural selection ; Extraterrestrial life ; Evolution of the eukaryotic cell : Evolution of the Metazoa ; Evolution of chordata and the evolution of the major vertebrate classes; Origin and evolution of man : Population Genetics; Genetic variations ; Polymorphism ; Gene frequency; Hardy Weinberg equilibrium ; Genetic drift, founder effect ; adaptive radiations, ecological significance of molecular variations.

Biology in Human welfare
Health and disease ; types of diseases, common diseases in humans ; Immunology – Innate and Acquired immunity ; Passive and active immunization ; Organization and structure of lymphoid organ ; Cells of the immune system and their differentiation ; Lymphocyte traffic ; Nature of immune response ; Structure and Functions of antibodies : Antigen-Antibody interactions ; Humoral immune response ; Cell mediated immunity ; Immunological memory **;** Auto-immunity **;** Allergies; HLA system in human :MHC haplotypes ; Transplantation types and problems ; Immunodeficiency disorders ;etiology of HIV ; types, genetics and biochemistry of

cancer ; Drugs and alcohol abuse, Addiction , drug dependence, ill effects, prevention, its abuse in adolescents and its management;Strategies for food production and enhancement: Animal husbandry, management of farm animals, breeding strategies (natural and artificial) and their types, economic importance of each ; Plant breeding, method of release of new variety, HYV of common cereals and pulses, bio-fortification, SCP ; Tissue culturing, somatic hybridization;Microbes in Human Welfare**:** Technology associated and use of Microbes in household, industries, medicine, bio-active molecules, sewage treatment and STP, Ganga and Yamuna action plan, biogas production, biocontrol agents, biofertilizers.

Principles of Biotechnology
Genetic engineering tools and technique, technique of separation and isolation of DNA, cloning vectors ,electrophoresis, bio reactors, processing of its products. Tissue engineering ; Cryopreservation ; Fusion methods, detection and applications of monoclonal antibodies, DNA vaccines, Edible vaccines.;Application in agriculture : GMO for pest resistance, RNAi and dsRNA technology,Application in Medicine, genetically engineered products, gene therapy. Molecular diagnosis : serum and urine analysis, PCR, ELISA ; Transgenic animals : their physiology, biological products and their use for testing the safety of vaccine and chemicals ; Bioethics issues ; biopyracy.

Ecology
Organism and its environment, distribution of biomes, major physical factors and the physiological responses shown by organisms ; Physical adaptation of plants and animals, rules governing adaptations ; Population attributes and growth, logistic curves, Darwinian fitness ; Population interactions and their theories ; Ecosystem structure and functions, ecosystem productivity and standing crop, decomposition in nature, energy flow in GFC / DFC, ecological pyramids, succession of community ; Nutrient cycle ; ecosystem services ; Biodiversity types and its patterns, importance of diversity, its loss and their causes, conservation strategies ; Environmental issues : Types of pollution, their indicators, causes, effects, prevention and treatment ; Deforestation, recommended forestation, reforestation, case studies of people's participation in conservation.

Syllabus for written examination for PGT(Mathematics)

Sets :
Sets and their representations. Empty set. Finite & Infinite sets. Equal sets. Subsets. Subsets of the set of real numbers. Power set. Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set.

Relations & Functions:
Ordered pairs, Cartesian product of sets. Number of elements in the cartesian product of two finite sets. Cartesian product of the reals with itself (upto R x R x R). Definition of relation, pictorial diagrams, domain. co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation a function, domain, co-domain & range of a function. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions. Sets and their Representations. Union, intersection and complements of sets, and their algebraic properties, Relations, equivalence relations, mappings, one-one, into and onto mappings, composition of mappings.

Principle of Mathematical Induction:
Processes of the proof by induction. The principle of mathematical induction.

Permutations & Combinations:
Fundamental principle of counting. Factorial *n.* Permutations and combinations, derivation of formulae and their connections, simple applications.

Complex Numbers:
Complex numbers, Algebraic properties of complex numbers, Argand plane and polar representation of complex numbers, Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Modulus and Argument of a complex number, square root of a complex number. Cube roots of unity, triangle inequality.

Linear Inequalities:
Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables- graphically. Absolute value, Inequality of means, Cauchy-Schwarz Inequality, Tchebychef's Inequality.

Binomial Theorem:
Statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, general and middle term in binomial expansion, simple applications. Binomial Theorem for any index. Properties of Binomial Co-efficients. Simple applications for approximations.

Sequence and Series:
Sequence and Series. Arithmetic, Geometric and Harmonic progressions (G.P.), General terms and sum to *n* terms of A.P., G.P. and H.P. Arithmetic Mean (A.M.), Geometric Mean (G.M.), and Harmonic Mean (H.M.), Relation between A.M., G.M. and H.M. Insertion of Arithmetic, Geometric and Harmonic means between two given numbers. Special series, Sum to *n* terms of the special series. . Arithmetico-Geometric Series, Exponential and Logarithmic series.

Elementary Number Theory:
Peano's Axioms, Principle of Induction; First Principle, Second Principle, Third Principle, Basis Representation Theorem, Greatest Integer Function Test of Divisibility, Euclid's algorithm, The Unique Factorisation Theorem, Congruence, Sum of divisors of a number . Euler's totient function, Theorems of Fermat and Wilson.

Quadratic Equations:
Quadratic equations in real and complex number system and their solutions. Relation between roots and co-efficients, nature of roots, formation of quadratic equations with given roots; Symmetric functions of roots, equations reducible to quadratic equations – application to practical problems.
Polynomial functions, Remainder & Factor Theorems and their converse, Relation between roots and coefficients, Symmetric functions of the roots of an equation. Common roots.

Matrices and Determinants:
Determinants and matrices of order two and three, properties of determinants, Evaluation of determinants. Area of triangles using determinants, Addition and multiplication of matrices, adjoint and inverse of matrix. Test of consistency and solution of simultaneous linear equations using determinants and matrices.

Two dimensional Geometry:
Cartesian system of rectangular co-ordinates in a plane, distance formula, section formula, area of a triangle, condition for the collinearity of three points, centroid and in-centre of a triangle, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.
Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, distance of a point from a line, Equations of internal and external bisectors of angles between two lines, coordinates of centroid, orthocentre and circumcentre of a triangle, equation of family of lines passing through the point of intersection of two lines, homogeneous equation of second degree in x and y, angle between pair of lines through the origin, combined equation of the bisectors of the angles between a pair of lines, condition for the general second degree equation to represent a pair of lines, point of intersection and angle between two lines.
Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle in the parametric form, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to the circle, length of the tangent, equation of the tangent, equation of a family of circles through the intersection of two circles, condition for two intersecting circles to be orthogonal.
Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, condition for $y = mx + c$ to be a tangent and point(s) of tangency.

Trigonometric Functions:
Positive and negative angles. Measuring angles in radians & in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Graphs of trigonometric functions. Expressing sin ($x+y$) and cos ($x+y$) in terms of sin$x$, sin$y$, cos$x$ & cos$y$. Identities related to sin2x, cos2x, tan 2x, sin3x, cos3x and tan3x. Solution of trigonometric equations, Proofs and simple applications of sine and cosine formulae. Solution of triangles. Heights and Distances.

Inverse Trigonometric Functions:
Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

Differential Calculus:
Polynomials, rational, trigonometric, logarithmic and exponential functions, Inverse functions. Graphs of simple functions. Limits, Continuity and differentiability; Derivative, Geometrical interpretation of the derivative, Derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions, Derivative of composite functions; chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Exponential and logarithmic functions and their derivatives. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems and their geometric interpretations.

Applications of Derivatives:
Applications of derivatives: rate of change, increasing / decreasing functions, tangents & normals, approximation, maxima and minima.

Integral Calculus:
Integral as an anti-derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities. Definite integrals as a limit of a sum, Fundamental Theorem of Calculus. Basic Properties of definite integrals and evaluation of definite integrals; Applications of definite integrals in finding the area under simple curves, especially lines, areas of circles / Parabolas / ellipses, area between the two curves.

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

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

Three dimensional Geometry:
Coordinates of a point in space, distance between two points; Section formula, Direction cosines / ratios of a line joining two points. Cartesian and vector equationof a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes. (iii) a line and a plane. Distance of a point from a plane. Scalar and vector triple product. Application of vectors to plane geometry. Equation of a sphere, its centre and radius. Diameter form of the equation of a sphere.

Statistics:
Calculation of Mean, median and mode of grouped and ungrouped data. Measures of dispersion; mean deviation, variance and standard deviation of ungrouped / grouped data. Analysis of frequency distributions with equal means but different variances.

Probability:
Random experiments: outcomes, sample spaces. Events: occurrence of events, exhaustive events, mutually exclusive events, Probability of an event, probability of 'not', 'and' & 'or' events., Multiplication theorem on probability. Conditional probability, independent events,,

Baye's theorem, Random variable and its probability distribution, Binomial and Poisson distributions and their properties.

Linear Algebra
Examples of vector spaces, vector spaces and subspace, independence in vector spaces, existence of a Basis, the row and column spaces of a matrix, sum and intersection of subspaces. Linear Transformations and Matrices, Kernel, Image, and Isomorphism, change of bases, Similarity, Rank and Nullity. Inner Product spaces, orthonormal sets and the Gram-Schmidt Process, the Method of Least Squares. Basic theory of Eigenvectors and Eigenvalues, algebraic and geometric multiplicity of eigen value, diagonalization of matrices, application to system of linear differential equations. Generalized Inverses of matrices, Moore-Penrose generalized inverse.
Real quadratic forms, reduction and classification of quadratic forms, index and signature, triangular reduction of a pair of forms, singular value decomposition, extrema of quadratic forms. Jordan canonical form, vector and matrix decomposition.

Analysis
Monotone functions and functions of bounded variation. Real valued functions, continuous functions, Absolute continuity of functions, standard properties. Uniform continuity, sequence of functions, uniform convergence, power series and radius of convergence. Riemann-Stieltjes integration, standard properties, multiple integrals and their evaluation by repeated integration, change of variable in multiple integration. Uniform convergence in improper integrals, differentiation under the sign of integral - Leibnitz rule.
Dirichlet integral, Liouville's extension. Introduction to n-dimensional Euclidean space, open and closed intervals (rectangles), compact sets, Bolzano-Weierstrass theorem, Heine-Borel theorem. Maxima-minima of functions of several variables, constrained maxima-minima of functions. Analytic function, Cauchy-Riemann equations, singularities, Statement of Cauchy theorem and of Cauchy integral formula with applications, Residue and contour integration. Fourier and Laplace transforms, Mellin's inversion theorem.

ଓଡ଼ିଆ

ନିମ୍ନୋକ୍ତ ବିଷୟ ପାଠ୍ୟକ୍ରମ ପରୀକ୍ଷା ନିମନ୍ତେ ଉଦ୍ଧିଷ୍ଟ

କାବ୍ୟ

୧) କୋଟି ବ୍ରହ୍ମାଣ୍ଡ ସୁନ୍ଦରୀ   କବି ସମ୍ରାଟ ଉପେନ୍ଦ୍ର ଭଞ୍ଜ   (ପ୍ରଥମ ଛାନ୍ଦ)

୨) ମଥୁରା ମଙ୍ଗଳ   ଭକ୍ତ ଚରଣ ଦାସ   (ପ୍ରଥମ ଓ ଶେଷ ଛାନ୍ଦ)

୩) ଦରବାର   ରାଧାନାଥ ରାୟ

କବିତା

୪) ବଳି ଉପାଖ୍ୟାନ   ବଳରାମ ଦାସ

୫) ସ୍ତୁତି ଚିନ୍ତାମଣି   ଭୀମ ଭୋଇ
    (ସପ୍ତବିଂଶ ବୋଲ)

୬) ମଧୁମୟ   ଗଙ୍ଗାଧର ମେହେର

୭) କବିର ବ୍ୟଥା   ଚିନ୍ତାମଣି ବେହେରା

୮) ଚହ୍ନମାର ରୂଢ଼ି   ଉମାକାନ୍ତ ରଥ

ନାଟକ ଓ ଏକାଙ୍କିକା

୯) ଭରସା   ଗୋପାଳ ଛୋଟରାୟ

୧୦) ଅବରୋଧ   ମନୋରଞ୍ଜନ ରାୟ

୧୧) ଅଦୃଶ୍ୟ ନଟ   ହରିହର ମିଶ୍ର

ଏକାଙ୍କିକା ସଙ୍କଳନ

୧୨) ଉତ୍ତୱ୍ରା ପାହାଡ଼ର ଦର୍ଜ଼ା   ରମେଶ ପାଣିଗ୍ରାହୀ

ଗଳ୍ପ

୧୩) ବୁଢ଼ା ଶଙ୍ଖାରି   ଲକ୍ଷ୍ମୀକାନ୍ତ ମହାପାତ୍ର

୧୪) ବିଶ୍ୱାସ   ଗୋପିନାଥ ମହାନ୍ତି

୧୫) ଘାସ   ରାଜକିଶୋର ପଟ୍ଟନାୟକ

ପ୍ରବନ୍ଧ

୧୬) ସାହିତ୍ୟ ଓ ଜୀବନ   ବିଶ୍ୱନାଥ କର

୧୭) ମାନବିକତାର ମାନଦଣ୍ଡ   ରତ୍ନାକର ପତି

୧୮) ଏକଲବ୍ୟର କଥା   ନିରଞ୍ଜନ ଦାସ

୨୦) ସୀମାନ୍ତଙ୍କର ଆତ୍ମଲିପି   ଡ. ଶରତ ଚନ୍ଦ୍ର ରଥ
ସତ୍ୟବାଦୀ ସ୍କୁଲର ମଧ୍ୟାହ୍ନ, ରାଜନୀତିରୁ ସାହିତ୍ୟ ଓ ସାମ୍ବାଦିକତା ।

୨୧) ତାରେ ତାରେ ତୀର୍ଥ   ଡ. ବିଭୂତି ପଟ୍ଟନାୟକ

ପ୍ରାଚ୍ୟ ଓ ପାଶ୍ଚାତ୍ୟ ସାହିତ୍ୟ ତତ୍ତ୍ୱ

୨୨) ରସ, ରୀତି ଓ ଗୁଣର ସଂଜ୍ଞା,
    ସ୍ୱରୂପ ଓ ପ୍ରୟୋଗ ବିଧି   ଗୋପାଳ ଛୋଟରାୟ

୨୩) ଅଳଙ୍କାର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ବିକାଶ ଧାରା
ନିମ୍ନଲିଖିତ ଅଳଙ୍କାର ସମ୍ପର୍କରେ ବିଶେଷ ଅଧ୍ୟନ
ଅନୁପ୍ରାସ, ଯମକ, ଶ୍ଳେଷ, ଉପମା, ବ୍ୟତିରେକେ, ବିଭାବନା ଇତ୍ୟାଦି ।

କ୍ଲାସିସିଜିମ ରୋମାଣ୍ଟାରିଜିମ ଚିତ୍ରକଳ୍ପ, ପ୍ରତୀକ

ସାହିତ୍ୟର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ

କାବ୍ୟ, କବିତା, ନାଟକ, ଗଳ୍ପ, ଉପନ୍ୟାସ ଓ ପ୍ରବନ୍ଧର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ବୈଶିଷ୍ଟ୍ୟ

୨୪) ଭାଷା ଓ ଭାଷା ବିଜ୍ଞାନ

କ) ଭାଷାର ସଂଜ୍ଞା, ସ୍ୱରୂପ, ଲକ୍ଷଣ ଓ ଉତ୍ପତ୍ତି ସମ୍ପର୍କୀୟ ସିଦ୍ଧାନ୍ତ

ଖ) ଓଡ଼ିଶା ଭାଷାର ଉତ୍ପତ୍ତି ଓ କ୍ରମବିକାଶର ଧାରା (ଷୋଡଶ ଶତାବ୍ଦୀ ପର୍ଯ୍ୟନ୍ତ)

ଗ) ଓଡ଼ିଆ ଶବ୍ଦ ଭଣ୍ଡାର ଓ ବିଭିନ୍ନ ଶବ୍ଦର ପରିଚୟ

ଘ) ଓଡ଼ିଆ ଭାଷା ଉପରେ ଦ୍ରାବିଡ, ଯାବନିକ ଓ ଇଂରେଜ ଭାଷାର ପ୍ରଭାବ ।

ବାକ୍ୟର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ରୂପାନ୍ତର

କ) ଶବ୍ଦୟ ବିଗ୍ରହ (ଉପସର୍ଗ, କୃଦନ୍ତ, ତଦ୍ଧିତ, ରୂଢ଼ି, ସମାସ)

ଲୋକ ସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ

ଲୋକ ସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ

ଖ) ଲୋକଗୀତ-ପ୍ରବାଦ ଓ ପ୍ରବଚନର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ ।

ଗ) ଲୋକନାଟକର ସଂଜ୍ଞା, ପ୍ରକାର ଭେଦ ଓ ଲୋକପ୍ରିୟତା

ଘ) ଲୋକକଥା- ସ୍ୱରୂପ ଓ ବୈଶିଷ୍ଟ୍ୟ

୨୮) ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟ ଉନ୍ମେଷ ଓ ବିକାଶ (୧୮୦୧-୧୯୪୭ ପର୍ଯ୍ୟନ୍ତ)

METHODOLOGY OF TEACHING ODIA

· Psychology of language learning and acquisition with reference to Odia as mother tongue.

· Problems and issues related to acquisition of Odia language in multi-lingual context

· Traditional versus modern methods of teaching-learning Odia.

Different approaches and strategies to the teaching-learning of :

Odia prose (detailed and non-detailed)

- Odia poetry

- Odia composition (through Rubric)

- Odia grammar

- Strategies for enrichment of Odia vocabulary (word formation and spelling)

- Strategies for developing creative writing skills

· Preparation of Unit Plan

· Preparation of Lesson Plan following constructivist approach (5E and ICON Models)

· Learning resources and planning learning activities

· Learning assessment in Odia : Assessing comprehension and expression skills; preparation of objective-based and objective-type test items

· Portfolio Assessment in Odia

· Comprehensive Assessment of Learning in Odia

· Planning remedial measures

Examination Syllabus For TGT (English)

Reading Comprehension (Section - A)

Ability to comprehend, analyze and interpret an unseen text: Three/four unseen texts of varying lengths (150-250 words) with a variety of objective type, multiple choice questions (including questions to test vocabulary) testing factual and global comprehension.

Writing ability (Section – B)

Testing ability to express facts views / opinions in a coherent and logical manner in a style suitable to the task set.

B.1 One short writing task such as: notice, message or a postcard.
B.2 Writing a report of an event, process, or place.
B.3 Writing an article / debate / speech based on visual / verbal input on a given concurrent topic for e.g. environment, education, child labour, gender bias, drug- abuse etc presenting own views fluently.
B.4 Writing a letter (formal/informal) on the basis of verbal / visual input. Letter types include: (a) letter to the editor; (b) letter of complaint ; (c) letter of request ; (d) descriptive , personal letters.

Grammar and Usage (Section – C)

Ability to apply the knowledge of syntax, language/ grammatical items and to use them accurately in context. The following grammatical structures will be tested :

- Tenses
- Modals
- Voice
- Subject- verb concord
- Connectors
- Clauses
- Parts of speech
- Punctuation
- Sequencing to form a coherent sentence or a paragraph.
- Tense and time
- Article and Determiners
- Preposition
- Adjective & Adverbs
- Type of sentences

Literature (Section – D)

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

The candidate should have a thorough knowledge of :-

- Shakespeare's works.

- Romantic Period (e.g. Shelley, Wordsworth , Keats, Coleridge, Byron etc.)
- 19th & 20th Century American and English Literature (e.g. Robert Frost Hemingway, Ted Hudges, Whitman, Hawthorne, Emily Dickinson, Bernard Shaw etc)
- Modern Indian Writing in English (e.g. Anita Desai, Vikram Seth , Nissim Ezekiel, K.N. Daruwala, Ruskin Bond, R.K. Narayan, Mulk Raj Anand, Khushwant Singh etc.)
- Modern Writings in English from different parts of the world.

Teaching Methodology(Section-E)

- Aspects of English language-Hist, nature & importance of English
- Problem and Principle of teaching English
- Objective of teaching English
- Approaches, methods and techniques of teaching English
- Developing Language skill – listening, speaking, reading and writing
- Teaching-learning materials-Development, preparation and use(including use of ICT)
- Developing study and reference skills
- Remedial teaching
- Evaluation in teaching/learning process
- Lesson planning
- Curriculum and text book-development and use

Examination Syllabus For TGT (Math)

Real Numbers: Representation of natural numbers, integers, rational numbers on the number line. Representation of terminating / non-terminating recurring decimals, on the number line through successive magnification. Rational numbers as recurring / terminating decimals. Examples of non-recurring / non terminating decimals. Existence of non-rational numbers (irrational numbers) and their representation on the number line. Explaining that every real number is represented by a unique point on the number line and conversely, every point on the number line represents a unique real number. Laws of exponents with integral powers. Rational exponents with positive real bases. Rationalization of real numbers. Euclid's division lemma, Fundamental Theorem of Arithmetic. Expansions of rational numbers in terms of terminating / non-terminating recurring decimals.

Elementary Number Theory: Peano's Axioms, Principle of Induction; First Principle, Second Principle, Third Principle, Basis Representation Theorem, Greatest Integer Function, Test of Divisibility, Euclid's algorithm, The Unique Factorisation Theorem, Congruence, Chinese Remainder Theorem, Sum of divisors of a number . Euler's totient function, Theorems of Fermat and Wilson.

Matrices: R, R2, R3 as vector spaces over R and concept of Rn. Standard basis for each of them. Linear Independence and examples of different bases. Subspaces of R2, R3. Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigenvalues and eigenvectors for such transformations and eigenspaces as invariant subspaces. Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices.

Polynomials: Definition of a polynomial in one variable, its coefficients, with examples and counter examples, its terms, zero polynomial. Degree of a polynomial. Constant, linear, quadratic, cubic polynomials; monomials, binomials, trinomials. Factors and multiples. Zeros / roots of a polynomial / equation. Remainder Theorem with examples and analogy to integers. Statement and proof of the Factor Theorem. Factorization of quadratic and of cubic polynomials using the Factor Theorem. Algebraic expressions and identities and their use in factorization of polymonials. Simple expressions reducible to these polynomials.

Linear Equations in two variables: Introduction to the equation in two variables. Proof that a linear equation in two variables has infinitely many solutions and justify their being as ordered pairs of real numbers, Algebraic and graphical solutions.

Pair of Linear Equations in two variables: Pair of linear equations in two variables. Geometric representation of different possibilities of solutions / inconsistency. Algebraic conditions for number of solutions. Solution of pair of

linear equations in two variables algebraically - by substitution, by elimination and by cross multiplication.

Quadratic Equations: Standard form of a quadratic equation. Solution of the quadratic equations (only real roots) by factorization and by completing the square, i.e. by using quadratic formula. Relationship between discriminant and nature of roots. Relation between roots and coefficients, Symmetric functions of the roots of an equation. Common roots.

Arithmetic Progressions: Derivation of standard results of finding the nth term and sum of first n terms.

Inequalities: Elementary Inequalities, Absolute value, Inequality of means, Cauchy-Schwarz Inequality, Tchebychef's Inequality.

Combinatorics: Principle of Inclusion and Exclusion, Pigeon Hole Principle, Recurrence Relations, Binomial Coefficients.

Calculus: Sets. Functions and their graphs: polynomial, sine, cosine, exponential and logarithmic functions. Step function. Limits and continuity. Differentiation. Methods of differentiation like Chain rule, Product rule and Quotient rule. Second order derivatives of above functions. Integration as reverse process of differentiation. Integrals of the functions introduced above.

Euclidean Geometry: Axioms / postulates and theorems. The five postulates of Euclid. Equivalent versions of the fifth postulate. Relationship between axiom and theorem. Theorems on lines and angles, triangles and quadrilaterals, Theorems on areas of parallelograms and triangles, Circles, theorems on circles, Similar triangles, Theorem on similar triangles. Constructions. Ceva's Theorem, Menalus Theorem, Nine Point Circle, Simson's Line, Centres of Similitude of Two Circles, Lehmus Steiner Theorem, Ptolemy's Theorem.

Coordinate Geometry: The Cartesian plane, coordinates of a point, Distance between two points and section formula, Area of a triangle.

Areas and Volumes: Area of a triangle using Hero's formula and its application in finding the area of a quadrilateral. Surface areas and volumes of cubes, cuboids, spheres (including hemispheres) and right circular cylinders / cones. Frustum of a cone. Area of a circle; area of sectors and segments of a circle.

Trigonometry: Trigonometric ratios of an acute angle of a right-angled triangle. Relationships between the ratios. Trigonometric identities. Trigonometric ratios of complementary angles. Heights and distances.

Statistics: Introduction to Statistics: Collection of data, presentation of data, tabular form, ungrouped / grouped, bar graphs, histograms, frequency polygons, qualitative analysis of data to choose the correct form of presentation for the collected data. Mean, median, mode of ungrouped data. Mean, median and mode of grouped data. Cumulative frequency graph.

Probability: Elementary Probability and basic laws. Discrete and Continuous Random variable, Mathematical Expectation, Mean and Variance of Binomial, Poisson and Normal distribution. Sample mean and Sampling Variance. Hypothesis testing using standard normal variety. Curve Fitting. Correlation and Regression.

Teaching Methodology:

· *Learning by Discovery:* Nature and purpose of learning by discovery; guided discovery strategies in teaching Mathematical concepts.

Teaching for Understanding Proof: Proof by induction and deduction; proof by analysis and synthesis,

· *Problem Solving in Mathematics*: Importance of problem solving in Mathematics, Steps of problem solving in Mathematics, Problem Posing, Generating and solving real life problems using Mathematical principles, Situation model for solving word problems.

· *Constructivist approaches:* Self-learning and peer learning strategies, Collaborative strategies; 5E and ICON Models,

· Preparation of Lesson Plans (Traditional, Activity and Constructivist Approaches),

· Activities in Mathematics: Mathematics Quiz, Mathematics Club activities, Mathematics Exhibition, Planning and organizing Mathematics laboratory activities, Mathematics outside the classroom.

· Learning Materials in Mathematics: Types, functions, preparation and utilization of learning materials - Textbook, Models, Calculators and computers, Graphic calculators, Maintaining portfolio in Mathematics

· Key Learning Resources in Mathematics: Assessing progress and performances, Monitoring and giving feedback, Local and community resources, Using pair work, Using group work, Using questioning (both by teacher and learners) to promote thinking, Talk for learning and Involving all

Examination Syllabus For TGT (Science)

Effect of Current: Potential; potential difference ohms law; series combination of resistors, parallel combination of resistors; Power dissipation due to current; Inter relation between P,V,I and R. Magnetic field & magnetic lines, Magnetic field due to current carrying conductor; Fleming left hand rule, Electromagnetic Induction; Induced Potential Difference, Induced current; Direct current, Alternating current; Frequency of AC, Advantage of Electronic Motor & Electronic Generator.

Light: Convergence and Divergence of light; Images formed by a Concave Mirror; related concepts, centre of curvature; principles axis, optic centre, focus, focal length, Refraction & laws of refraction. Images formed by a convex lens; functioning of vision and remedies. Applications of spherical mirrors and lenses. Appreciation of concept of refraction index; Twinkling of stars; Dispersion of light; Scattering of light.

Source of Energy: Different forms of Energy, Leading to different sources for human use: Fossil Fuels, solar energy; Biogas; Wind; Water and Tidal Energy; Nuclear Energy. Renewable versus non-renewable sources.

Motion ; Force and Newton's Laws: Displacement, Velocity, uniform & Non-Uniform motion along a straight line, acceleration distance-time and velocity, Time graphs for uniform and uniformly accelerated motion; Equations of motion by graphical method Equations of motion by graphical method; Elementary idea of uniform circular motion. Force and Motion; Newton's laws of motion Inertia of a body; Inertia and Mass, Momentum Force and acceleration, Elementary idea of conservation of momentum, Action and Reaction forces.

Gravitation; Work, Energy and Power: Gravitation; Universal Law Of Gravitation, Force of gravitation of the earth(gravity, acceleration due to gravity; mass and weight; free fall. Work done by a force energy, power ; Kinetic and Potential energy; law of conservation of energy.

Floatation: Thrust and Pressure, Archimedes Principle ,Buoyancy, Elementary idea of relative density.

Sound: Nature of Sound and its Propagation in various media, Speed of Sound, Range of hearing in Humans; Ultra Sound, Reflection of sound; Echo and SONAR; Structure of the Human Ear (Auditory aspect only)

Matter-Nature and Behavior: States of Matter: Gases, liquids, solids, plasma and Bose- Enstein condenstate, types of intermolecular forces. Classification of matter into mixtures and pure substances. Henry's Law. Concentration of solutions.

Colloids- phases of colloids, Tyndall effect, Brownian movement. suspension. Properties of matter. Measurement of properties of matter- S.I. system of units, physical and chemical changes.

Laws of chemical combination: Gay Lassa's law, Avogadro law, atomic and molecular masses, average atomic mass, mole concept and molar masses, percentage composition.

STRUCTURE OF ATOM: Dalton's atomic theory, Discharge tube experiments, J J Thomson's model of atom, Rutherford's model, Bohr's model of atom, electronic configuration, formation of ions, Characterization of elements as

metals, metalloids, or non-metals, isotopes (their applications), isobars and isotones.

PERIODIC CLASSIFICATION OF ELEMENTS

Mendeleev's periodic law, Periodic properties of elements, - trends in the periods and groups: Importance of the periodic table, position of hydrogen in the periodic table.
CHEMICAL SUBSTANCES: Nature and behaviour Acid, Bases and Salts: Classical definition of acids and bases, Bronsted- Lowry theory, Lewis concept of acid and bases, relative strengths of acids and bases, logarithmic or p scale- pH, pOH and pkw, ionic equilibria in a solution Action of indicators on acids and bases, sources of acid and bases, Salt-Classification of salts and their pH
CHEMICAL REACTIONS: Formulation of chemical equations, balancing chemical equations, Types of chemical equations with examples.

METALS AND NON- METALS:
Characters of metals and non-metals including all properties and applications: Occurrence of metals in nature : ores and minerals, enrichment of ores metallurgical operations.
Corrosion: rusting of iron - prevention of corrosion
CARBON COMPOUNDS: Position of carbon in the periodic table. Concept of hybridization and shapes of molecules structural formula and molecular models, types of reactions undergone by organic compounds, homologous series of compounds having different functional groups, isomerism, IUPAC nomenclature of organic compounds.
Hydrocarbons — their classification formation of coal and petroleum. Industrial source, preparation and properties of alkanes
Alcohols: Preparation and properties. Qualitative analysis of alcohols, iodoform test, effect of alcohols on living beings. Carboxylic acids: Preparation and properties. Functional group analysis of carboxylic acid. Soaps , detergents , biodegradable detergents. Carbon fibres.
CONSERVATION OF NATURAL RESOURCES: Pollution of river water, Ganga action plan for improving quality of water, Need for sustainable management of natural resources. Development of non- conventional energy resources to prevent pollution and atmospheric conservation.
MAN MADE MATERIAL:
Ceramics, cement, porcelain, glass, carbon fibres, soaps and detergents, polymers, fibres and plastics.
Life Processes:

- What are life Processes.
- Need for Nutrition.
- Different modes of Nutrition in animals.
- What is Photosynthesis .
- Various steps of holozoic nutrition.
- Aerobic and anaerobic respiration.
- Transportation in Human beings.
- Transportation in Plants.
- Transportation in animals.
- Excretion in animals including Human beings.

- Excretion in Plants.

Control & Co-Ordination:

- Animals – nervous system.
- Basic unit of Nervous System in animals.
- Reflexaction.
- Human Brain.
- Co- Ordination in plants.
- Geotropism – Positive, Negative
- Hormones in animals.
- Endocrine & Exocrine glands.

Reproduction:

- Importance of variation.
- Modes of Reproduction used by single organisms.
- Sexual Reproduction in plants and animals.
- Reproduction in Human beings.
- What happens when egg is not fertiliszed.
- Modes of avoiding pregnancy(family planning)

Heredity and Evolution:

- What is heredity?
- Medals Law of inheritance.
- How is sex determined.
- Evolution & Classification.
- Acquired and inherited traits.
- Homologus and Analogous organs.
- What are fossils?
- Human Evolution.

The Human eye and the colorful world:

- Structure of eye
- Defects of eye and their correction

Natural resources: The fundamental unit of Life:

- What are living organisms made of?
- Structure organization of cell

Tissues:

- Define tissue
- Types of plants tissue and animals tissues

Diversity of living organisms:
- Basis of Classification.
- Classification & Evolution.

- Hierarchy of classification – groups.
- Plantae, Animalia.
- Nomenclature.

Why do we fall ill:

- Health & its failure.
- Diseases and their causes
- Types of diseases- Infectious, Noninfectious.
- Prevention of diseases.
- Communization

NATURAL RESOURCES:

1. Our Environment :
Atmosphere, roll of atmosphere in climate control, wind, rain, environmental pollution: Global warming and green house effect , acid rain, particulate pollutants, smog, formation of photochemical smog. Formation of ozone and its break down ozone hole, causes of ozone hole formation, polar vortex, effects of depletion of ozone hole. Water pollution-oxygen demand, chemical oxygen demand, international standard of drinking water, processing of drinking water. Soil pollution: waste recycling, Strategies to control environmental pollution, its collection and proper methods of disposal.
Biogeochemical cycles: water cycle, nitrogen cycle, carbon cycle, and oxygen cycle.

- Breath of life: Air, Air pollution
- Water a wonderful liquid.
- Water pollution.
- Biochemical cycles. Nitrogen cycle. Carbon cycle. Oxygen cycle.
- The green house effect.
- What is ozone layer. How does it protect the earth. What are the causes of depletion of ozone layer. How can it affect day to day life of living organisms.

Improvement in Food Resources:

- Improvement in crop yield.
- Animal Husbandry.
- Need for Intercropping.
- Cross Breeding.

TEACHING METHODOLOGY

1. The Nature & Scope of Science: A brief introduction of Oriental and Western Sciences, Nature of Science, Scope of Science, Substantive and Syntactic Structure of Science.
2. Aims and Values of Teaching Science: Aims of teaching Science, Values of teaching Science.

3. Objectives of Teaching Science: Importance of Objectives of Teaching Science, Bloom's Taxonomy of Educational Objectives and limitations, Instructional Objectives and Specifications.

4. Approaches and Methods of Teaching Science: Inductive and Deductive Approaches, Methods of Teaching 1. Lecture Method, 2. Lecture cum Demonstration Method, 3. Heuristic Method, 4. Project Method, 5. Experimental Method, 6. Laboratory Method.

5. Planning for effective Instruction: Year Plan, Unit Plan, Lesson Plan – Herbartian and Bloom's Approach, Criteria for Evaluation of Lesson Plan. Self Evaluation and Peer Evaluation, Learning experiences – Characteristics, Classification, Sources and Relevance, Teaching – Learning Material and Resources, Use of Computers.

6. Science Laboratories: Science Laboratory - Planning, Procurement, Care and Maintenance. Safety and First aid, Development of Improvised Apparatus

7. Science Curriculum: Principles of Curriculum Construction, Defects in the existing School Science Curriculum, Correlation of Science with other School Subjects, Qualities of a good Science Text-book.

8. Science Teacher: Qualifications, Qualities, Roles and Responsibilities of a good Science Teacher.

9. Non-formal Science Education: Science club, Eco-club, Science fairs – Objectives, levels of organizations, importance, Role of NGOs and the Government in popularizing science education.

10. Evaluation: Concept and process of Measurement and Evaluation, Continuous and Comprehensive Evaluation, Tools of Evaluation, Scholastic Achievement Test (SAT) – Preparation, Analysis and interpretation.

Examination Syllabus For TGT (Social Studies)

HISTORY

Contemporary World:

- Industrial Revolution
- Economic Depression
- Labour &Peasant class issues
- Growth of industries in India in twentieth Century
- Features of colonial society in India

French Revolution:

- Causes
- Events
- Impact
- Consequences

The Revolt of 1857
Indian Freedom Struggle – 1885 to 1947
Russian Revolution-1917, Causes, Events, Impact on Russia and the World, Consequences
Rise of Socialism

- Philosophy of Karl Marx
- Socialism in Europe
- Impact of Socialism

Rise of Fascist Forces in Germany & Italy
The Two World Wars and the establishment of UN

GEOGRAPHY

Introduction to solar system; origin of earth:

Motions of the Earth: Rotation, Revolution, Occurrence of Day and Night; change of seasons; Latitudes and Longitudes; Finding time. Earth's Interior: Origin of continents and ocean basins Wagener's Continental drift theory, Theory of Plate Tectonics, Earthquakes and Volcanoes, Folding and faulting
Rocks and minerals: Types of rocks; soil formation; major types and characteristics.
Agents of gradation: Weathering, mass wasting, running water, wind, glaciers, sea waves and Karsat topography

Climate:
Atmosphere - Composition and structure, elements of weather and climate Insulation -Heat Budget, Heating and cooling of atmosphere, Conduction, Convection, Solar Radiation, Terrestrial raditiation, Advection, Temperature,

Factors controlling temperature, distribution of temperature-horizontal and vertical

- **Pressure -**Pressure belts, winds, cyclones and anti-cyclone, Evaporation, condensation and precipitation and their forms: Humidity, rainfall and its types.
- **World climates-** Classification, greenhouse effect, global worming and global climate change. Water (Oceans): Distribution of water bodies on the Earth's surface; hydrological cycle.
- **Ocean-** Submarine relief, distribution of temperature and salinity; movement of ocean water's-waves, tides currents of Atlantic, Pacific and Indian Ocean Maps and Scales- Definition and classification Finding directions, conventional signs Techniques of representing relief features on map; contours, Hachures, Hill shading, layer tinting. Representation of climatic data; line and Bar Graph, (Climograph) Isotherms, isobars and isohyets
- **Biosphere:** Ecology, type of Eco-System, structure and functions of Eco-system-Food Chain, Food Web, World Biomes, Ecological Balance , Biodiversity and its conservation.

India (Size and Location) Physical features of India: Geological Structure, Physiographic divisions, drainage system and its evolution.

Climate: origin and mechanism of Indian monsoon, Seasons of India, Classification of Climate of India (Coeppen's) Soil: Types and distribution: Natural vegetation: types and distribution.

Population: Growth and Distribution of population: Causes & Factors Migration-Causes and consequences Population theories & their relevance-Malthus, Demographic transition - theory Population composition and its Attributes: Population and sustainable development; Population as a resource; Population problems and polices with reference to India.

Resources and Development: Meaning, nature and Components of resources and environment; Resources, environment and technology interface: classification of resources. Distribution, utilization, economic and environmental significance and conservation of water, Minerals, Forests and fisheries; production and distribution of major crops, wild life resource and energy resources.

Agriculture: Wet and dry agriculture, Intensive, Extensive, shifting, commercial and plantation agricultural development and problems, crop intensity, major crops.

Manufacturing Industries: Classification, locational factors, types and distribution, industrial clusters of India, Production and distribution of sugar, Cotton Textile Iron and steel, chemicals and electronic industries.

Life lines of National Economy: Means of transportation and communication, Roads, Railways, waterways and airways, oil and gas pipelines, National electric grid, radio, television satellite and computers International trade - Changing pattern of India's foreign trade, sea ports and airports: Tourism as trade.

Understanding Disaster and Hazards:

Type of Disasters- Natural & Manmade.

1. Disaster Management : Becoming a Disaster manager. Components of Disaster management.
2. Disaster risk reduction: Disaster risk management. Understanding Disaster mitigation. Specific Hazards and mitigation.
3. Common manmade Disasters and their prevention
4. Community based Disaster Management and social planning for Disasters.
5. Tsunami: The killer sea waves.
6. Survival skills: During and After Disaster.
7. Alternative Communication system.
8. Safe construction Practices
9. Sharing Responsibilities
10. Planning Ahead

Components of production:

People as Resource:

- o Economic activities/ non economic activities
- o Population
- o Education
- o Health
- o Unemployment/Employment

Poverty as a challenge

- o Poverty line
- o Poverty & inequality
- o Policies for poverty reduction
- o Poverty estimates

Food security in India:

- o Food security
- o Green revolution
- o Buffer stock
- o Issue Price/Support price
- o Role of co-operative societies in food security

Development Growth/Development and structural development:

- o Growth and distribution, sustainable agricultural growth
- o Growth structural changes
- o Population and human resource development
- o Purchasing power parity (PPP)
- o Main features of Indian Economy at the time of Independence
- o Economic development
- o Gross enrolment ratio
- o Foreign trade & Economic development
- o Development & under development
- o Distribution of Income/factors of development

Sectors of the Economy:

- o Classification of Sectors like- Primary/Secondary/ Organized/unorganized/Public/Private sector
- o Small and Large Industry
- o Performance of the Public Sector
- o Privatization
- o Employment growth in the Industrial sector

Money & Credit:

- o Indian Monetary System
- o Function of money
- o **Banks :**
  Central Bank function
  Commercial Banks
- o Self help Groups (SHGs)
- o Debt trap
- o Demand of money & supply of money
- o Financial markets
- o Money and capital market
- o Monetary aggregates in India.

CIVICS:

- o Power sharing
- o Federalism
- o Democracy and Diversity
- o Political parties
- o Elections
- o Challenges to Democracy
- o Popular struggle and movements –like in Nepal, Bolivia
- o **Democracy**
  Concept
  Salient Features
  Local Self Government
  Elections
  Democracy in India & the World
- o **Indian Constitution**
  Framing of the constitution
  Adoption of the constitution
  Working of Institutions –Parliament ,
  Judiciary
  Fundamental Rights

TEACHING METHODOLOGY

- Social Studies – Meaning, Nature and Scope: Defining Social Studies, Main features of Social Studies, Social Studies and Social Sciences differentiated, Scope of Social Studies – Types of Subject

material and learning experiences included in the study of Social Studies, Need and importance of Social Studies

- Values, Aims and Objectives of Teaching Social Studies: Values of teaching Social Studies, Aims of teaching Social Studies at Secondary Level, Instructional Objectives of teaching Social Studies, Relationship of instructional objectives with general aims and objectives of Social Studies, Taxonomy of Educational and instructional objectives, Writing objectives in behavioural terms

- Social Studies Curriculum: Social Studies as a Core subject, Principles of Curriculum Construction in Social Studies, Organization of subject matter –different approaches correlated, integrated, topical, concentric, unit and chronological .

- Instructional Strategies in Social Studies: Techniques, devices and maxims, Different methods of teaching Social Studies - Story telling, lecture, source, discussion, project, problem, inductive, deductive, observation, assignment –socialized recitation, Team teaching, Supervised study

- Planning for Instruction: Developing teaching skills through Micro-teaching, Year Planning, Unit Planning, Lesson Planning

- Instructional Material and Resources: Text books, work books, supplementary material syllabus, curriculum guides, hand books, Audio visual, Social Studies laboratory, library, clubs and museum, Utilizing community resources

- Evaluation in Social Studies: Concept and purpose, Types of Evaluation, Evaluation as a continuous and comprehensive process, Different techniques of Evaluation, Preparation for Scholastic Achievement test.

- Preparation, collection, procurement and use of teaching-learning materials like Maps, Globe, Charts, Graphs, Bulletin board, Models § ICT in Learning of Geography – Film strips, Slides , transparencies T.V., Video, computer, internet, Map reading and map preparation

Syllabus for examination for Computer Teacher

Fundamentals of Information Technology

Computer :
Block Diagram of elements of digital computer-their functions.
Memory, CPU, I-O devices, Secondary storages, Magnetic Tape, Disk, CD-ROM.
Other recent developments-Scanners, Digitizer, Plotters.
Hardware and Software. Micro, Mini and Main-frame computers-their features.

Representation of Data:
Binary, Octal, Hexadecimal, BCD, EBCDIC, ASCII Conversions. Simple Additions, Subtractions, Multiplications, Divisions (in Octal and Hexadecimals).

Boolean Algebra:
Algebra Rules and DeMorgans rules. Simplification of equations-simple equations. Logic Circuits-AND, OR, NAND, NOR, Exclusive OR and NOR Truth tables. Gated flip-flops, Registers, Accumulators.

Introduction to 8086/8088 microprocessors-architecture
Base-Data, Address, Control. Introduction to 80286, 80386 and Pentium chips.

Software:
Introduction to Programming, Flowcharts and Algorithms. System software, application software, firmware machine, Assembly, and Higher
Level Languages, Stored program Concept. MS Office Packages

Operating System-Introduction:
Process management-FCFS, Round Robbin, Priority based. Memory management-segmentation, paging, virtual memory. I-O management-concept of I-O port. File management-FAT, file handling functions. Software and hardware interrupts, I/O and Memory based Addresses,
DMA channels.

File:
Concept of file. File organization and accessing techniques-Indexed, Line sequential, Hashed. File handling functions : Sorting, Merging, Indexing, Updating

Instructions and Addressing Techniques:
Instruction execution cycle. Direct, Indirect, Relative, Paging, Indexed

Broad view of Operating Systems:
MS-DOS, UNIX, MS-WINDOWS

Basic Concept of Networking and Data Communications:
Introduction to LAN and basic communication concepts.
OSI 7 layers, Topologies, Protocols, Ethernet, Arcnet, TCP/IP

Introduction to Virus and Vaccines, Applications, DTP, E-Mail and Internet.

'C' PROGRAMMING

C Fundamentals
C Character Set, Identifiers and Keywords under ANSI C. Data Types, Constants: int, float, double, char. Qualifiers: long, short, unsigned and signed. Escape sequences (like \n,\b etc.). Arithmetic Expressions and different built-in Operators. Pre-processor directives (like #include, #define), concept of header files, Symbolic constants,Comments, sizeof., steps involved in translation of C Program.

Built-in operators and function
Console based I/O and related built-in I/O functions: printf(), scanf();getch(), getchar(), putchar(), gets(), puts().

Decision and Case Control Structure
Iif statement; if-else construct; use of logical operators and
Compound Relational Tests; Nested if statements; The else if
construct; the relational operators; the conditional expression
(ternary) operator. The Switch Statement with or without break,
concept of a case label

Loop Control Structure
Concept of Loop, loops supported by 'C', concept of top tested and bottom tested loops, the for loop statement; Nested for Loop ; for loop variants; the while loop statement; simple and nested while loop, Increment/decrement operators; Use of Break and Continue;the do-while loop, comparison between for, while and do while loops.

Storage Classes
Automatic, Register, Static (local and global), External. Scope rules.

Arrays
Concept of a collection, types of collections supported by 'C', Array collection and its features, concept of indexing, index variable, index type, positional value of a member of array collection, concept of dimension and size of an array, 'C' syntax for declaration of array,name of the array and its type, Referring individual elements, Entering data into an array, reading data from an array concept of Array initialization and list of initializers, size option, Bounds checking, the concept of two dimension arrays and related syntax,similarities between dimension and nesting.

Character Strings
What are strings, standard library string functions like strlen(),strcat(), strcpy(), strcmp() etc.,similarity between string and 1-D array of char.

Functions
Concept of a subprogram, the interface of a subprogram, role of a interface, Arguments of a subprogram, kinds of subprograms supported by C, return statement as an interface, local variables;Default Return type and the type void; Passing values between functions through interfaces; Declaration of function type; iterative and recursive subprograms, Recursion; concept of call by value, call by reference, return and their underlying implementation should be explained, similarities.

Pointers

Concept of Pointers, Pointer as an address variable, concept of a pointer data type and its syntax, built-in address operator, Pointers to existing variables of different data types and their uses, use of indirection operator, the name of the array as a pointer variable,Pointers and Arrays, Pointers arithmetic, use of unary operators (++,--), One Dimension Arrays and Pointer, concept of array of pointers and simple use, command line arguments for the main.

Structures

Structure as a homogeneous and heterogeneous collection, possible applications, syntax of declaring structure, Initializing structures,structure variables, accessing structure elements using member operator, Arrays of Structures, and array as member of structure,conceptual difference between array and structure collection,Functions and Structures, nested structures, concept of anonymous structures and their use, Concept of self referential structure, pointer as member of structure and pointer to structure use of member selector operator(->), comparison between indirection (*) operator and member selector operator (->), structure as an argument to function and return type of a function.

Unions

Concept of Union collection, Syntax of declaration and its use, comparison of Array, Structure and Union, array of unions and union as a member of structure, structure as a member of union and array as member of union, concept of memory saving and union, union as a generic data type, concept of anonymous union.

File based I/O

Concept of a file, text files in 'C', concept of a predefined FILE pointer and its definition as given in header file stdio.h, meanings of different members of the structure representing FILE, Disk I/O Functions: High level file I/O or standard functions- fopen(), putc(),getc(), fclose(), fgets(),fputs(),feof(), simple file based programs showing the working of different members of FILE structure.

Dynamic Memory Allocation and Memory functions

Concept of dynamic environment as run time environment, concept of dynamic memory management, use of built-in dynamic memory management tools of 'C' viz. malloc(), free(), simple programs using malloc() and free()

Bitwise Operators

Concept of modifying the value using bit shifting, built-in bit shift operators left bit shift operator(<<) and right bit shift operator (>>) their uses, limitations of bitwise operators, use of bitwise relational operators.

Other features and Miscellaneous functions

Use of atof(), atoi(), atol(), toupper(), tolower(), isalnum(), isalpha(), isdigit(),exit().

Visual Basic 6.0

INTRODUCTION TO VB 6.0
a. VB Environment
i. Menu Bar, Toolbars, Tool Box ii. Project explorer iii. Properties Window
iv. Form Designer v. From Layout

b. VB The language
i. Variable, Constants, Datatypes, User defined Datatypes
ii. Scope of variable(Global, Local, Modular, static)
iii. Control Flow Statements(IF, IIF, Select Case)
iv. Looping , nesting(Do While, Do until, For, for Each, Exit)
v. Arrays
vi. User defined Procedure, Functions
vii. VB Functions:1.Date 2.Mathematical 3.String 4.Conversion

c. Visual Basic Controls from Toolbox
i. Properties
ii. Methods
iii. Events
iv. Other Controls:1. Microsoft Windows Common Controls (6.0)
2. Microsoft windows Common controls-3(6.0)
3. Control Arrays (adding controls at runtime& design time)

d. Managing Menus
i. Creating and modifying menu at Design time
ii. Programming menu commands
iii. Shortcuts keys & menus at runtime

VALIDATING AND PROCESSING USER INPUTS
Overview , Importance , Types of validation, Implementing Form level and field
level validations, Text box Properties, Using Events, validate Event

USING DEBUGGING TOOLS

a Types of errors & debug menu
        i Types of errors
        ii Debug menu
b Testing the application
        i Immediate window
        ii Using debug and local window
        iii Setting watch expression
c Implementing error handler
        i How VB Handles the runtime error
        ii VB error handler
d VB error handling options
        i How VB handles the runtime error
        ii Disabling the error handler

e Inline error handling

DATABASE CONNECTIVITY
a How VB access data
        i Data access interface
        ii Relational database concepts
b Introduction to OLE DB & ADO
        i What is OLE DB
        ii How OLE DB relates to ADO
        iii SQL Statements
        iv ADO Data Control
            · Using ADO
            · Connecting to data source
            · Binding controls (DataCombo, DataList, DataGrid
        v Coding ADO
        · Creating record set
        · Adding records in record set
        · Modify, Delete, Search
        vi Data Environment
        vii Introduction to crystal Report (7.0 or above)

BASIC JAVA

Introduction to JAVA
· History of Java · Features of Java · JDK Environment · The Java Virtual Machine · Garbage Collection

Programming Concepts of Basic Java
· Identifiers and Keywords · Data Types in Java · Java coding Conventions · Expressions in Java · Control structures, decision making statements · Arrays and its methods

Objects and Classes
· Object Fundamentals · Pass by value · 'this' reference
· Data hiding and encapsulation · Overloading · Overriding
· Constructors · Finalization · Subclasses (Inheritance)
· Relationship between super class object and subclass object
· implicit subclass object to super class object Conversion
· Dynamic method dispatch

Language Features
· scope rules · static data, static methods, static blocks
· all modifiers of class, method, data members and variable
· Abstract Classes· Interfaces· Inner classes · Wrapper Classes
· packages · Package access · importing packages and classes
· user define packages

Exception Handling
· Types of Exceptions · try, catch, finally, throws keywords
· creating your own exception · exceptions and Inheritance

Multithreading
· Multithreading Concept · Thread Life Cycle

Abstract Window Toolkit
Components and Graphics   Containers, Frames and Panels

Layout Managers   Border Layout   Flow Layout   Grid Layout
Card Layout   AWT all Components   Event Delegation Model
Event Source and Handlers   Event Categories, Listeners, adapters
Anonymous Classes
        -Applets
        -Applet Life Cycle
        -Applet Context
        -Inter applet communication

Java utility Packages , classes, Interfaces
        HashTable Vector   Math Random   System   String StringBuffer
Streams and File IO
        -Files and Stream
-Stream classes
        -Reader Writer classes
        -File class Tests and Utilities
        -Serialization and de serialization

DATA BASE MANAGEMENT SYSTEM

Introduction
1.1 History : Advantages and limitations of DBMS; Users of DBMS,
1.2 Software Modules in DBMS; Architecture of DBMS.

2 Modeling Techniques
2.1 Different Types of Models, Introduction to ERD.

3 Hierarchical Database
3.1 Introduction.

4 Network Database
4.1 Introduction

5 Relational Algebra
5.1 Select, Project, Union, Intersection, Difference, Cartesian Product,
Simple Join. Queries to be solved based on the above.

6 Relational Database
6.1 Introduction; Codd's 12 Rules; Concept of Domain, Tuple,
cardinality; Comparison between HDB-NDB-RDB

7 Normalisation
7.1Advantages & disadvantages of Normalisation; 1NF-2NF-3NFrules
with examples; Anomalies.

8 Integrity Constraints
8.1 Entity-Domain-Referential integrity rules; Assertion and
Triggers concept.

9 Recovery Mechanisms
9.1 Recovery from various problems of volatile and non-volatile

storage devices; Concept-properties-states of Transaction;
Introduction to mechanisms such as - Log, Checkpoint and
Shadow Paging.

Concurrency Controls
10.1 Problems of concurrent Transactions; Control Mechanisms such
as - Locks, Time-Stamps, Optimistic Scheduling and MVT.

11 Distributed Databases
11.1 Concepts, Data Distributions Techniques.

12 Data Warehousing and Data Mining
12.1 Concept, Architecture, Various tools in Data Warehousing, Tools in
Data Mining, Difference between Data mining and normal query.

SQL commands.
List of SQL commands to be covered   Create/drop a Database
Create /Modify/Alter/Drop Table   DML Commands
Insert,Update, Delete, Select Aggregate Function
Max, Min, Avg, Count, Sum
GROUP BY
ORDER BY
HAVING