

SYLLABUS FOR SCREENING TEST (MCQ TYPE) FOR RECRUITMENT TO THE POSTS OF LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN BENGALI

Full Marks : 100

Time : 1 Hour 30 Minutes

১. পাঠ্য বই :
- ক) উপন্যাস : কুম্ভকারচন্দ্র কঙ্কণ - চক্রিচন্দ্র চর্যাপাত্রায়;
 আবর্তিত - বিষ্ণুপ্রিয়দর্শন চন্দ্রোপাধ্যায়;
 বনমগ্নাস - আমরপূর্ণ দেবী;
 - খ) কাব্য : * মেঘনাদ ঠাকুর কাব্য - কাঙ্ক্ষিতা ইন্দিরানন্দ দত্ত;
 কুতূহল, ময়ূর, নরম অঙ্গ।
 * দ্বীতনয়ন দাস : বনমগ্নাস জ্যেষ্ঠ কাব্যগ্রন্থ;
 - পুথক পঁচটি কবিতা;
 * সুপ্রসিদ্ধ সুখোপাধ্যায় - পদচক্রিত কাব্যগ্রন্থ;
 - পুথক পঁচটি কবিতা;
 - গ) নাটক : * বিমর্শন : বসুদেবনাথ চাকুর;
 * নরক সুলভার : মনোজ্য ডিগ্গ;
 - ঘ) পুস্তক : * নির্বচনিত পুস্তক : কবী জাকুল ওহদ;
 পুথক পঁচটি পুস্তক;
 * জ্যেষ্ঠ পুস্তক : অম্বদাচন্দ্র রায়;
 পুথক পঁচটি পুস্তক
 - ঙ) ছোটগল্প - বসুদেবনাথ চাকুর → মেঘ ও বর্ষা;
 চক্রিচন্দ্র চর্যাপাত্রায় → মরুভাষ;
 চর্যাপাত্রায় → টিচার;
 ইন্দিরানন্দ সুপ্রসিদ্ধ ইন্দির → গরুড়ী বনোদ্বিন;
 ছোটগল্প নন্দী → গিরগিড়ী;
২. প্রাচীন সাহিত্যের ইতিহাস -
- * ঠগলিকা (অম্বদাচন্দ্র, চক্রিচন্দ্র, বসুদেবনাথ)
 - * ইন্দির কাব্য (বিষ্ণুপ্রিয়দর্শন, চক্রিচন্দ্র, অম্বদাচন্দ্র, চর্যাপাত্রায়)
 - * মেঘনাদ উপন্যাস কলেব, বিদ্যাসাগর, দীপক, গিরিজা দেবী, চিত্রেন্দ্রনাথ রায়, পুথক জ্যেষ্ঠ, মাজন্দেবনাথ দত্ত;

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৩. প্রাচীন গ্রন্থসমূহ :
- * অঙ্গি, অম্বদা, পুত্রায়, কবিতা ও বিবরণ, পদ-পরিচয়, নিম্ন পরিচয়, অঙ্কিত-অঙ্কিত, দ্রকু রচনা পুস্তক;

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Full Marks : 100

Time : 1 Hour 30 Minutes

1. A knowledge of the history of English Literature from 1340 to 2000.
2. A close acquaintance with the following works which are prescribed for detailed study:-

a)	William Shakespeare	:	Macbeth, As You Like It
b)	Jane Austen	:	Pride and Prejudice
c)	John Milton	:	Paradise Lost (Book I)
d)	Alexander Pope	:	The Rape of the Lock
e)	R. K. Narayan	:	The Guide
f)	Amitav Ghosh	:	The Shadow Lines
g)	P. B. Shelley	:	Ode to the West Wind
h)	John Keats	:	Ode to a Nightingale
i)	Alfred Tennyson	:	Ulysses
j)	Robert Browning	:	My Last Duchess
k)	T. S. Eliot	:	Preludes

3. Grammar
4. Vocabulary
Antonym, Synonym, Idiomatic usage of Language, Figures of Speech etc.
5. Test of Comprehension

(Candidates will be given a passage of 250 to 300 words. They should read it carefully and answer the questions. The answers may be contained in the passage or may be inferred from the reading of the passage).

**SYLLABUS FOR SCREENING TEST (MCQ TYPE) FOR RECRUITMENT TO THE POSTS OF
LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN FOUNDATION COURSE**

Full Marks : 100

Time : 1 Hour 30 Minutes

Module – I : **PHILOSOPHICAL FOUNDATION OF EDUCATION AND CONTRIBUTION OF
GREAT EDUCATORS**

1. Relationships between education and philosophy
2. Child centric and Life centric education
3. Functions and scope of education – individual and social perspective. Education for Human Resource Development.
4. Education as propagation of values
5. Schools of philosophy and their influence on education: Idealism, Naturalism, Pragmatism and Existentialism.
6. Schools of Indian Philosophy
Basic Features and Influence on Education –
 - a) Vedic schools (Sankhya, Yoga, Nyaya)
 - b) Non-Vedic schools (Charvak, Buddhist, Jain and Islamic tradition)
7. Contribution of great Educators:
 - a) Rousseau
 - b) Froebel
 - c) Montessori
 - d) Bertrand Russell
 - e) Dewey
 - f) Rabindranath Tagore
 - g) Vivekananda
 - h) Aurobinda

Module – II : **PSYCHOLOGICAL FOUNDATION OF EDUCATION**

1. Introduction to Psychology, relation between education and Psychology. Different perspectives of psychology (Biological, Cognitive, Developmental, Associationist – A brief overview).
2. Personality development, Trait approach, Psychoanalytical theory of Personality, Erikson's stages of Psycho-social development.
3. Stages and types of Development and their Educational significance:
 - a) Physical and motor development, Factors affecting Physical and motor development.
 - b) Cognitive development, brief outline of Piaget's theory of Cognitive development.
 - c) Language development.
 - d) Emotional development and Emotional Quotient.
 - e) Moral development, Theories of Piaget and Kohlberg.
4. Neural basis of cognition: Neuron – structure and electrical potentials, synoptic transmission, structure and functions of human brain, Neuro-endocrinal system.
5. Perception: Factors influencing perception, role in cognition.
6. Attention: Selective and divided attention. Role of attention in the cognitive process. Factors of attention.
7. Memory: acquisition, storage and retrieval of information, sensory memory, short term and long term memory, forgetting.

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8. Motivation: types and factors.
9. Learning: Laws of learning, classical and operant conditioning, insight learning, concept learning, Bandura's social learning theory.
Transfer of learning: Concept and application.
10. Intelligence: Theories of intelligence – Spearman, Thurston, Guilford and Gardner, Measurement of Intelligence.

Module – III :

DEVELOPMENT OF EDUCATION IN INDIA

1. Synoptic study of Brahmanic, Buddhist and Islamic Education in Ancient and Medieval India with respect to
 - a) Aims and Objectives
 - b) Subject of study
 - c) Methods of teaching including teacher – pupil relationship
 - d) Evaluation
 - e) Centre of Learning
 - f) Education of woman
2. Brief outline of events relating education from 1757 to 1947
 - a) Missionaries activities (Srirampur trio)
 - b) Charter Act of 1813
 - c) Bengal Renaissance – Contribution of Rammohan Ray, H.L.V. Derozio and Vidyasagar
 - d) Adams Report
 - e) Anglicist – Orientalist controversy – Macaulay's Minute & Bentinck's resolution
 - f) Wood dispatch (Recommendations only)
3. Brief outline of –
 - a) Hunter Commission 1882-83 (Primary and Secondary Education)
 - b) Curzon Policy (Quantitative development of Primary Education)
 - c) National Education Movement (cause and effect)
 - d) Calcutta University Commission (1917-1919)
 - e) Basic Education (concept and development)
 - f) Sargent Plan
4. Constitutional provision for Education in India
5. Brief outline of the recommendations made by different Education Commission:
 - a) University Education Commission (1948-49)
(Aims of Higher Education & Rural University)
 - b) Secondary Education Commission (1952-53)
(Aims, Structure & Curriculum of Secondary Education)
 - c) Indian Education Commission (1964-66)
6. National Policy on Education (1986)
7. Current issues on Education:
 - a) Equalization of Education Opportunities
 - b) Programmes on Universal Elementary Education
 - c) Non-formal education and alternative schooling, Education of women
 - d) Education for children with special needs

Module –IV :

SOCIOLOGICAL FOUNDATION OF EDUCATION

1. Sociological Foundation of Education-Sociology of education, Nature, Scope, Method of Study.
2. Society and Education –
 - a) Society: Its origin and factors and their influences on education (population, location, religion, class, culture, technology, economy).
 - b) Impact of different political systems on education (capitalism and socialism).

3. Social groups and education –
 - a) Social groups (primary, secondary and tertiary)
 - b) Socialization: the role of the family and school
4. Education and culture
5. Social change and Education –
 - a) Social change: Its definition and role of education.
 - b) Social change in India (Sanskritization, Westernization, Modernization and Globalization).
6. Education and Social Communications –
Informal agencies of Social Communication.
7. Education and Contemporary Social Issues:
 - a) Unemployment
 - b) Poverty
 - c) National Disintegration
 - d) Population explosion

Module – V : **EDUCATIONAL ORGANIZATION AND MANAGEMENT**

- 1 Principles of Educational organization: Concept of School organization, it's principle.
2. Aspects of Institutional Organization—
 - a) Educational Plant, Building, Equipment, Sanitation, Play ground, Workshop, Library, Computer Room.
 - b) SSA, RMSA, RUSA.
 - c) Inclusive education.
3. Educational Management and Administration—
Primary, Secondary and Higher Education:
Board of Secondary Education, Council of H.S. Education, Council of Higher Education.
4. Concept of educational management—
Meaning, nature, need and scope, Role of Educational manager.
5. Types of Educational Management—
Autocratic, Democratic, Laissez Fair supervision.
6. Educational Planning—
Meaning, need and significance of educational planning.
Types and strategies of educational planning. Steps in Educational planning, Institutional Planning.
7. Leadership— Meaning, nature and styles.

Module – VI: **GUIDANCE & COUNSELING**

1. Psychology of adjustment:
Concept of adjustment – adjustment and adaptability, homeostasis, defence mechanisms: Criteria of good adjustment.
2. Maladjustment – meaning of maladjustment – Conflict and frustration,
Manifestation of maladjustment in Childhood and adolescence – a synoptic view of problem behaviours.
3. General causes of maladjustment – Biological and Environmental – role of parent and educational institution in promoting mental health.
4. Stress, stressors – personal and environmental stress, coping strategies and therapies – behaviour, cognitive and humanistic therapies.

5. Concept of guidance – meaning and nature of guidance – different forms of Guidance (group and individuals) Types of Guidance (educational, vocational).
6. Counseling - meaning- types and techniques – directive, non directive, eclectic – individual and group counseling.
7. Identification and guidance for special learners – gifted, slow learners, learner with learning disabilities, MR/mentally challenged.
8. Multi-axial classification of mental disorders – DSMIV Axis I & II category.

Module – VII :

EVALUATION IN EDUCATION

1. Educational Measurement and Evaluation—
Concept, Scope and Needs.
2. Tools and Techniques of Evaluation—
 - a) Test: Types, use of Norm – Referenced test and Criterion –
Referenced test, essay type and objective type tests.
 - b) Observation – Concept and Use
 - c) Inquiry – Concept and Use
 - d) Cumulative Record Card – Concept and Use
3. Scales of Measurement – Nominal, Ordinal, Interval, Ratio.
4. Criteria of Standardized test
 - a) Validity
 - b) Reliability
 - c) Objectivity
 - d) Usability
 - e) Norms
5. Construction of a Standardized Test
6. Statistics – Use in Education
7. Organization and Graphical Representation of data – Pie Chart, Bar diagram, Histogram, Frequency polygon, Ogive.
8. Measures of Central tendency – Mean, Median, Mode –
Calculation and application
9. Measures of Variability – Range, Quartile Deviation, Standard Deviation –
Calculation and application
10. Percentile and percentile rank – Calculation and application, including graphical Representation
11. Characteristics of Normal curve
12. Skewness and Kurtosis – Concept
13. Concept of Z – Score – Calculation and use
14. Linear Correlation – Concept and Use – Co-efficient of Linear Correlation:
Product – moment method and Rank difference
Method – calculation

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Module – VIII : **EDUCATIONAL TECHNOLOGY**

1. Concepts need and scope of educational technology.
2. Systems approach to education: Definition of systems, need for systems approach, classification of systems & components of a System.
3. Computer and its role in education.
4. Use of media in education: Audio (Radio & Tape), Visual (Projector), Audio-visual (T.V. & C.C.T.V.).
5. Models of teaching: Nature, Concepts and different families of Teaching Models, Advantages of the use of Models of Teaching.
6. Communication and educational technology: Components of communication process, Role of communication in effective teaching-learning process, Factors affecting classroom communication.
7. Instructional techniques: Mass instructional techniques (basic concepts only), Personalized techniques – Programmed learning, Mastery Learning, Microteaching.
8. Distance education: Concepts, types and usefulness – Application of technology in Distance education.

Module – IX : **CURRICULUM STUDIES**

1. Concept of curriculum: Explicit Curriculum, Hidden Curriculum, Nature of Curriculum. Bases of Curriculum: Philosophical, Sociological & Psychological.
2. Principles of Curriculum Construction.
3. Objectives of curriculum: Need to form objectives of curriculum. Sources of objectives of the curriculum: Society, Discipline, Needs of students.
4. Curriculum development – Content based, Process based, Product based and Systems based.
5. Determinants of content selection: Culture based, Knowledge based, Need based.
6. Curriculum evaluation: Meaning and Utility, Sources and means of curriculum evaluation. Formative and Summative evaluation.

Module – X : **COMPARATIVE EDUCATION**

Any one country from UK, USA, China.

1. Concept, meaning, scope of Comparative Education.
 2. Various issues of the Indian educational system with special reference to School Education in comparison among India and SAARC countries on –
 - a) Structure of education
 - b) Administration
 - c) Curriculum
 - d) Examination
 - e) Teacher Education
 - f) Education for all
 - g) Distance education and open learning
 3. Comparison between India and any one of the following countries, UK, USA and China in regard to Universalization of Elementary Education.
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SYLLABUS FOR SCREENING TEST (MCQ TYPE) FOR RECRUITMENT TO THE POSTS OF LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN GEOGRAPHY

Full Marks : 100

Time : 1 Hour 30 Minutes

S E C T I O N - I

A. PHYSICAL GEOGRAPHY

1. Origin of Continents and Ocean Basins; Continental Drifts and Plate Tectonics; Epirogenic and Orogenic movements; Different kinds of Landforms and their origin; Volcanoes and Volcanic features; Earthquakes.
2. Earth's Crust - general properties; Modes and origin of igneous, sedimentary and metamorphic rocks.
3. Weathering and Mass wasting.
4. Evolution of Landforms under different Cycles of Erosion - fluvial, glacial, Aeolian, marine and karst; Evolution of drainage system and its adjustment to structure.
5. Elements and factors of climate; Distribution of temperature and pressure belts over the Earth.
6. Airmass, Planetary Winds and Local Winds.
7. Precipitation - origin and types; Cyclones and Anti-Cyclones.
8. Classification of World Climates.

B. ENVIRONMENTAL GEOGRAPHY

9. Concepts of Environment, Ecology and Ecosystem; Natural and Man-made Ecosystems; Concepts of Bio-Diversity; Environmental Pollution, Degradation and Conservation; greenhouse effects and global Warming; Man-Environment relationships.

S E C T I O N - II

C. ECONOMIC GEOGRAPHY

10. Geographical factors favourable for the localization of the following major economic activities :
 - a) Lumbering,
 - b) Agriculture (Intensive Subsistence farming, Extensive Commercial farming and Plantation agriculture),
 - c) Fishing,
 - d) Mining (Coal, Petroleum and Iron ore - their distribution and utilization),
 - e) Power resources (conventional and Non-conventional),
 - f) Manufacturing (Iron & Steel, Aluminium, Cotton Textile and Jute industries).

D. HUMAN GEOGRAPHY

11. Concepts of Geographical Environment, Natural Regions of the Earth; - their characteristics; Role of Climate, Drainage and Relief in localizing human activities with particular reference to food gathering, pastoralism and subsistence agriculture.
12. Settlement Patters - Rural and Urban; Hierarchy of Urban Settlements; Growth and distribution of World Population.

E. GEOGRAPHY OF INDIA

13. Structure, Relief, Drainage, Climate, Soils and Natural Vegetation.
 14. Irrigation and River Valley Projects; Agriculture and Green Revolution.
 15. Mineral Resources and industrial Regions.
 16. Population - growth and distribution, age-sex composition, migration, urbanization and regional disparities.
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SYLLABUS FOR SCREENING TEST (MCQ TYPE) FOR RECRUITMENT TO THE POSTS OF LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN HISTORY

Full Marks : 100

Time : 1 Hour 30 Minutes

G R O U P - A

ANCIENT HISTORY

1. Ancient India (From rise of Magadhan imperialism to Harshavardhan).
2. Ancient China (Economic, Social and Cultural achievements under Tang & Sung Emperors).
3. Ancient Egypt (An outline of ancient Egypt with special reference to Pyramids, Mummies, Scripts, Trade & Commerce).
4. Ancient Greece (Cultural achievement under the Athenian Empire & Spartan constitution).
5. Ancient Rome (A general survey of ancient roman empire-building, Roman Law & System of Government).

G R O U P - B

MEDIEVAL HISTORY

1. Medieval Europe (Feudalism, Charlemagne, Empire vs Papacy & Crusades).
2. Medieval India (1206-1707 AD).

G R O U P - C

MODERN INDIA (1757-1947)

G R O U P - D

MODERN EUROPE & WORLD (1789-1945)

SYLLABUS FOR SCREENING TEST FOR RECRUITMENT TO THE POSTS OF LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN LIFE SCIENCE

Time : 1 Hour 30 Minutes

Full Marks : 100

SUBJECT : BOTANY - MARKS - 33

Module – 1 : The Gateway of Life Sciences :

1. The science of Life - Definition of Life; Origin and Evolution of Life on the Earth (overview).
2. Basic Technology associated with the study of Botany - Concept of simple, compound and electron microscopy; cell fractionation and centrifugation; colorimetry; tracer techniques.
3. Cell Structure and Function - Differences between prokaryotic and eukaryotic cells; ultra structural components and functions of the cell wall, plasma membrane, nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi bodies, ribosomes, lysosomes and peroxisomes.

Module – 2 : Cell Biology and Genetics :

1. Morphology of chromosome; autosomes and sex chromosomes; differences between euchromatin and heterochromatin; basic methods of chromosome study; concept of gene; physical structure and chemical properties of nucleic acids (DNA and RNA).
2. Cell cycle; cell division (mitosis and meiosis) in plants.
3. Mendel's laws and experiments of heredity; linkage and crossing over; concept of mutation and mutagens; polyploidy.

Module – 3 : pH, Buffer, Water and Biomolecules :

1. Concept of pH; pH scale; Justification for pH value (7.0) of pure water; concept of buffer.
2. Diversification in structures of different carbohydrates (monosaccharides, disaccharides and polysaccharides); differences between reducing and non-reducing sugars.
3. Concept of structural, functional aspects and basic classification of proteins and lipids; types and classification of vitamins.

Module – 4 : Plant Physiology :

1. Concept of cell physiology - imbibition, diffusion, osmosis and plasmolysis; ascent of sap; translocation of solutes; types of transpiration and mechanism of stomatal transpiration; types of micro and macro elements required by plants.
2. Phases and factors of plant growth; precursor(s), structure and physiological roles of auxins, gibberellins, cytokinins, ethylene and abscissic acid.
3. Concept of photoperiodism and vernalization; physical and chemical nature of phytochrome; mechanism of seed dormancy and germination.

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Module – 5 : Biochemistry :

1. Enzymes – Definition; basic architecture (holoenzyme, apoenzyme, coenzyme, cofactor); properties; nomenclature and classification (6 major classes with examples indicating name and reaction at least one for each class) according to IUBMB; concept of enzyme action.
2. Respiration - Definition; differences between aerobic & anaerobic respiration; metabolic pathways (by means of schematic presentation only) of glycolysis, oxidative decarboxylation of pyruvic acid, TCA cycle; concept of electron Transport System & Oxidative Phosphorylation; concept of RQ.
3. Photosynthesis - Definition; major photosynthetic pigments; concept of the spectrum of visible light; Hill reaction; concept of light-dependent & light-independent phases; Z-scheme of light reaction; biosynthetic reactions (by means of schematic presentation only) of CO₂ - fixation in C₂, C₃ and C₄ cycles/pathways.

Module – 6 : Molecular Biology and Plant Biotechnology :

1. Gene structure and function; genetic code; concept of DNA replication; concept of protein synthesis (outlines only).
2. Outlines of recombinant DNA technology (preliminary concept of vectors, plasmid, restriction enzymes, DNA and cDNA libraries, nucleic acid sequencing and PCR).
3. Definition and agricultural application of Plant Biotechnology; outlines of Plant tissue culture and its applications; concept of totipotency; basic concept and objectives of cloning and transgenic plants.

Module – 7 : Microbiology :

1. Concept of microbial world; structure of a typical phage virus; structure of a bacterial cell.
2. Basic types of bacterial on the basis of morphological features; concept and difference between Gram-positive and Gram-negative bacteria; reproduction of bacteria.
3. Concept of nitrogen-fixing bacteria; concept of pathogenic bacteria; concept of antibiotics.

Module – 8 : Plant morphology and Anatomy :

1. Root-Morphology and functions of tap and adventitious roots; different modified roots; Stems-Morphology and functions of stem different modified stems; Leaf-morphology and functions of leaf phyllotaxy, stipule, modified leaves.
2. Flower – Different parts of a typical flower, flower as a modified shoot, principal types of inflorescences, types of lower (regular irregular, actinomorphic and zygomorphic), morphology and androecium and gynoecium; Fruit – definitions and types; basic morphology of seed.
3. Plant Anatomy - Concept and types of meristematic and permanent tissues; epidermal, ground and vascular tissue systems; types of stele; primary anatomical structures of root (monocot and dicot), stem (monocot and dicot) and leaf (dorsiventral and isobilateral).

Module – 9 : Plant Taxonomy :

1. Taxonomy - Definition, importance, relations of taxonomy with classification of plant groups.
2. Rules of Binomial nomenclature; basic types of classification (artificial, natural and phylogenetic).
3. Classification of plant kingdom; salient features of different plant groups (algae, fungi, bryophyte, pteridophyta, gymnosperms and angiosperms).

Module – 10 : Plant groups :

1. Life cycle pattern with special reference to alteration of generations in thallophyta (algae and fungi) and Bryophyta.
2. Life cycle pattern with special reference to alternation of generations in Pteridophyta and Gymnosperms.
3. Morphological description pattern of any angiospermic plant for its taxonomic identification; economically important angiosperms - bamboo, jute, lemon and tea.

SUBJECT : ZOOLOGY - MARKS - 34

Section – I :

1. Classification of Protozoa up to Phyla.
2. Structural organization and reproduction in Paramoecium.
3. Classification upto subclass ; Porifera to Echinoderm.
4. Coral reef : Types and formation.
5. Locomotion in Protozoa.
6. Canal system in Porifera.
7. Nervous system in Mollusca
8. Respiration in Arthropoda.
9. Affinities in Onychophora, Balanoglossus.
10. Classification of Chordata upto order.
11. Structural organization of Lates.
12. Axolotl Larva and its importance.
13. Difference between poisonous and non-poisonous snakes.
14. Migration of birds.
15. Dentition in mammals.
16. Comparative anatomy of Heart, Aortic arches, and Kidney in Vertebrates.

Section – II :

1. Principles of optical and electron microscopes.
2. Ultra structure and functions of Plasma memberane, Mitrochondria, golgi complex, Endoplasmic reticulum and Lysosome.
3. Physico-chemical properties of DNA and RNA, Nucleosome concept.
4. Sex determination in Drosophila and Man.
5. Replication, Transcription and Translation.
6. 3-point gene mapping in diploid.
7. Inborn metabolic errors : Albinism, Haemophilla, thalassaemia.
8. Gametogenesis.
9. Fertilization.
10. Histological organization of Pituitary, Thyroid, Pancreas and Liver.

Section – III :

1. Geological time scale.
2. Origin of life.
3. Origin and Evolution of Horse.
4. Theories of Evolution : Darwinism & Neo Darwinism.
5. Hardy-Weinberg principles (application in autosomomal alleles).

Section – IV :

1. Taxonomy, Systematics and classification.
2. Mode of speciation.
3. Biological species concept.
4. Concept of Energy flow, Food chain and food Web.
5. Ecological succession.
6. Concept of biodiversity : Types of biodiversity, biodiversity and human welfare.
7. Life cycle, Pathogenecity, clinical features and control of : Taenia, Ascaris, Plasmodium, Leishmania and Wuchereria bancrofti.

Section –V :

1. Structure of mammalian nephron and mechanism of Urine formation.
2. Propagation of nerve impulse.
3. Transport of CO₂ and O₂ in mammals.
4. Structure of eye and mechanism of vision in mammals. Structure of ear and mechanism of hearing in mammals.
5. Aquaculture : Induced breeding in carp culture. Fresh water and brackish water prawn culture, Pearl culture.
6. Sericulture : Mulberry silk worm culture; diseases of silk worm and their control.
7. Apiculture : Apiculture technique; diseases of honey bees and their control.

SUBJECT : PHYSIOLOGY - MARKS - 33

1. Units of Hyman Systems : Structure – function relationship of cell and tissues.
2. Basic Biophysical Principles : pH, Osmosis, buffers, Gibb's Donnan equilibrium, electrophoresis.
3. Conservation of matter and energy in human systems : Digestion, Elementary Biochemistry and metabolism, vitamins and minerals principles of nutrition, nutritional deficiencies, nutrition and health, enzymes and isozymes, inborn errors of metabolism.
4. Blood and Body fluids : Functions of blood, Hemoglobin, Plasma proteins, Erythropoiesis, Coagulation of blood, Blood-groups, Blood transfusion - rational use and transfusion related diseases. Basic principles of immunology - auto immune diseases.
5. Heart & Circulation : Structure & functions of heart, properties of cardiac muscle, origin & spread of cardiac impulse, Cardiac cycle, Cardiac output - regulation & determination, innervation of heart, reflexes, regulation of circulation, Electrocardiography, Non invasive cardiac assessments.
6. Respiratory System : Basic physiology, carriage of oxygen & carbon dioxide, Lung volumes & capacities, regulation of respiration, High altitude and under water physiology.
7. Renal Physiology : Structure & functions of nephron, formation of urine, micturition, non excretory functions of Kidney, dialysis, artificial Kidney.
8. Nerve-Muscle Physiology : Structure & functions of muscles & nerve, classification of nerve fibres, different types of muscles, neuromuscular junction, N-M transmission, synaptic transmission, origin and propagation of nerve impulse, degeneration and regeneration in nerve fibres.
9. Nervous System : Gross organization, tracts - ascending and descending, reflex arc, classification of reflex - properties, autonomic nervous system, functions of sympathetic & para-sympathetic system, Higher functions of CNS – sleep, memory, learning.
10. Sensory physiology : vision - structure and functions - specially of retina, colour vision, accommodation, defects of vision. Olfaction, gustation and audition - noise and its effects.

11. Skin and Body temperature regulation : Basic physiology.
 12. The Endocrine System : Structure of endocrine glands, Hormone classification, different hormones - their functions : hypothalamus, pituitary, thyroid, parathyroids, pancreas, adrenal cortex and medulla Diseases associated with hypo and hyper secretion of hormones.
 13. Reproductive physiology : Histology of male and female reproductive system, menstrual cycle - hormonal regulation, ovarian and testicular hormones, Pregnancy, Placenta - formation and function, lactation, contraceptives.
 14. Basic principles of Work Physiology & Ergonomics : Static and dynamic work, PFI, doping, role of anthropometry, somatotyping, Role of ergonomics in industry and agriculture. Exercise and Health.
 15. Environmental Physiology : Pollutants and pollution, classification of pollutant according to physiological mechanism of action, Bio-transformation, dose-response curves/relationship, teratogens, mutagens, neurotoxins, corrosive agents, Heavy metal toxicity, Pesticidal Hazards.
 16. Social Physiology : Basic principles, mass immunizations, ORS, Safe drinking water, communicable and non-communicable diseases.
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SYLLABUS FOR SCREENING TEST (MCQ TYPE) FOR RECRUITMENT TO THE POSTS OF LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN MATHEMATICS

Full Marks : 100

Time : 1 Hour 30 Minutes

Algebra :

Complex Number : Demoiver's theorem, its applications.
Exponential, Sine, Cosine, Logarithm of a Complex Number.

Theory of Equations : Relation between roots and co-efficients, symmetric function of roots, transformation of equation, multiple root.

Determinant and matrix : Properties and applications.

Inequality : $AM \geq GM \geq HM$ and its applications.

Set Theory :

Basic concepts, mapping, group, ring, field.

Boolean Algebra :

Basic concepts. Boolean variables and functions and their truth tables. NOT, OR and AND gates. Binary systems.

Vector :

Vector addition, Scalar and vector product. Application of vector algebra in geometrical and trigonometrical problems.

Calculus :

Differential Calculus - Sequence, series, Limit, continuity, differentiability, Successive derivatives. Rolle's theorem, Mean value theorem.

Integral Calculus - Indefinite integral, definite integral and its properties, definite integral as limit of sum. Beta and Gama functions.

Application of Calculus :

Tangent & normal, curvature, pedal equation, curve-tracing, area, rectification.

Differential Equation :

Linear equation, Clairaut's equation, Complementary function, particular integral of higher order. Linear equations with constant Co-efficient.

Geometry :

Translation and rotation of axes. Reduction into Canonical form. Pair of straight lines. Circle, Parabola, ellipse, hyperbola – simple properties.

Equation of straight lines in space, equation of plane.

Numerical Analysis :

Errors in numerical computation – gross error, round off, truncation error, significant figure, absolute, relative, percentage error. Operators - $\Delta \nabla E$

Difference table, Newton's forward and backward interpolation formula.

Probability :

Basic concepts, addition and multiplication rule of probabilities. Conditional probability, Bay's theorem.

Dynamics :

Motion in a straight line under variable acceleration, motion under inverse square law, motion in resisting medium. Impact of elastic bodies, loss of KE in direct and oblique impact.

**SYLLABUS FOR SCREENING TEST (MCQ TYPE) FOR RECRUITMENT TO THE POSTS OF
LECTURER IN THE GOVT. PRIMARY TEACHERS' TRAINING INSTITUTES IN PHYSICAL SCIENCE**

Full Marks : 100

Time : 1 hour 30 minutes

SYLLABUS FOR PHYSICS (Marks : 50)

1. Classical Mechanics :

Newton's laws of motion; Mechanics of a single particle; Rotational Motion; Gravitation.

2. General Properties of matter :

Elasticity; Surface Tension; Viscosity.

3. Vibrations and Waves :

Simple Harmonic Motion; General Wave Equations; Vibrations of Strings.

4. Heat :

Kinetic theory of gases; Equations of state; Brownian Motion.

5. Thermodynamics :

First and second Laws Entropy, Thermodynamic Functions.

6. Optics :

Geometrical Optics; eye pieces; physical optics; Interference; Diffraction, resolving power, polarisation.

7. Electricity and Magnetism :

Magnetic effects of currents
Varying currents
Alternating currents.

8. Electronics :

P – n Junctions, transistors and uses.

9. Modern Physics :

Bohr's theory
Millikan's experiment
X-rays, Moseleys Laws, Bragg reflection
Radio-activity, alpha, beta, gamma rays.

SYLLABUS FOR CHEMISTRY (Marks : 50)

Group - A
Organic Chemistry

1. Bonding in organic molecules :

σ and π bonds, bond distance, bond angle, and bond energy. Dipole moment of organic molecules. Inductive, resonance and hyperconjugative effect. Hydrogen bond. Tautomerism, Aromaticity, Huckel's rule, aromatic, non aromatic and anti aromatic compounds. Effects of structure, substituents and solvent on acid and base strength.

2. Stereo Chemistry of carbon compounds :

Elements of symmetry. Chirality, Eanantiomerism and diastereo isomerism. Optical purity, racemization, resolution. Projection structure of stereoisomers – Fischer, Sawhorse, Newman, Flying – wedge DL, RS and EZ notations. Examples of enantiotopic and diastereotopic ligands and faces. Conformations of alkanes (upto 4 carbon), Cyclohexane, dimethylcyclohexanes and 1, 2 – glycols. Stereoisomerism in allenes and biphenyls (excluding RS notation).

3. Reaction mechanism :

General methods of study of mechanism of organic reactions illustrated by examples – use of isotopes, cross-over experiement, intermediate trapping, kinetic studies, stereochemistry. Energy profile diagrams of simple organic reactions, thermodynamic and kinetic control of reactions.

4. Reactive intermediates :

Generation, geometry, stability and reactions of carbocations, carbanions, free radicals, carbenes and benzyenes.

- 5.**
- a) **Substitution reaction** – S_N1 , S_N2 , S_Ni and NGP. Electrophilic and nucleophilic substitution of aromatic compounds.
 - b) **Elimination reaction** – E_1 , E_2 , E_1CB and Syn - elimination.
 - c) **Addition reaction** – electrophilic addition to $C=C$ and $C\equiv C$, nucleophilic addition to $C=O$, conjugated olefins and carbonyls.
 - d) **Rearrangement reaction** :
Pinacol-pinacolone, Hofmann, Beckmann, Claisen, Baeyar-Villiger, Favorskii.

6. Chemistry and mechanism of :

Aldol condensation, Claisen condensation, Perkin reaction, Knoevenagel reaction, Wittig reaction, Michael reaction Arndt Eistert reaction, Acyloin condensation, Friedel-Craft reaction and Von Richter reaction.

7. Synthetic uses of reagents :

OsO_4 , HIO_4 , $Pb(OAc)_4$, SeO_2 , $LiAlH_4$, $NaBH_4$, B_2H_6 , NBS, PCC, Na or Li in liq- NH_3 , Alkyl lithium, Lithium dialkylcuprate, Lithium diisopropylamide, Aluminium isopropoxide.

- 8.** IUPAC nomenclature. Synthesis and reactions of alkanes, alkenes, alkynes, alkyl halides, ethers, alkanols, alkanals, alkanones, alkanolic acids, esters, amides, nitriles and amines.

9. Pericyclic reaction :

Definition and classification. FMO approach of electrocyclic, cycloaddition reactions and sigmatropic H-shifts.

- 10.** Basic principles and applications of UV, IR, and NMR spectroscopy of simple organic molecules. Road-map problems related to spectroscopy and organic reactions.

Group - B Inorganic Chemistry

1. **Chemical bonding** :
 - a) **Ionic bonding** ;
polarizing power and polarizability, ionic potential, Fajan's rules.
 - b) **Covalent bonding** :
Lewis structures, VSEPR theory, Valence Bond theory (Heitler-London approach), Directional character of covalent bonds, hybridization, Bent's rule, concept of resonance. Molecular orbital theory (MO) elementary approach – sigma and pi bonds, multiple bonding, MO diagrams of simple homonuclear and heteronuclear diatomic molecule, simple triatomic molecules like BeH₂, CO₂, BF₃, bond order, bond energy. Shapes of the molecules and ions containing lone pairs and bond pair.
 - c) **Weak Chemical forces** :
Vander Waals forces; Hydrogen bonding, Effects of chemical forces on physical properties.
 - d) **Metallic bonding** :
Qualitative ideas of band theory, Conducting, Semiconducting and insulating properties.
2. **Chemical periodicity** :
 - a) **Periodic Table** :
Classification of elements on the basis of electronic configuration, Modern periodic Table (current IUPAC version).
 - b) **Atomic and ionic properties** :
Effective nuclear charge, screening effect, Slater rules, atomic radii, ionic radii, covalent radii, ionization energies, electron affinity, electro-negativity, inert pair effect.
3. **Acid-Base Concepts** :
Bronsted and Lowry's concept, Lewis concept, HSAB principle.
4. **Non-aqueous solvents** :
Liquid ammonia and liquid sulphur dioxide.
5. **Coordination Compounds** :
Double and complex salts, Werner's theory, Chelate complexes, nomenclature of complex compound, stereo chemistry and coordination number, isomerism of coordination compounds – geometrical and optical isomers in respect of coordination numbers 4 and 6.

Bonding in coordination compounds : valence bond descriptions and its limitations, crystal field theory (elementary). Crystal field stabilization energies in weak and strong field cases mainly of octahedral and tetrahedral complexes.
6. **Magnetism and Colour** :
Origin of magnetic moments, paramagnetism, diamagnetism, ferro and antiferromagnetism, orbital and spin contributions, spin only moments of 3dⁿ ions.

Theoretical aspects of d-d spectra (elementary idea) selection rules for spectral transitions.
7. **Organo metallic compounds** :
Definition and classification, Metal-Carbon bonded complexes of transition metals – their preparation, properties and stability. Application of 18 electron rule to carbonyl, nitrosyl and cyanides of transition metals.
8. **The Chemical elements and its compounds** :
 - (a) (i) Group trends and periodic trends of effective nuclear charge, atomic and ionic radii, ionisation energies, electron affinity and electronegativity with respect to s-, p-, d- block elements.
 - (ii) General trends of variation of electronic structures, elemental forms, oxidation states, catenation and properties of important class of compounds such as oxides, oxyacids, halides and formation of complex compounds with respect to the following groups of (i) Li, Na, K (ii) Be, Mg, Ca, Sr and Ba (iii) B, Al, Ga, In, Tl (iv) C, Si, Ge, Sn, Pb (v) N, P, As, Sb, Bi (vi) O, S, Se, Te (vii) F, Cl, Br, I. and (viii) Chemistry of noble gases.
9. **Extraction/Preparation/Isolation of the following elements** :
 - (i) Extraction and purification of Li, Mg, Sn, Pb.
 - (ii) Extraction and purification of Ti, V, Cr, Mn, Pt, Ag, Au, U.
 - (iii) Manufacture of Steel, Alloy Steels.

10. **Radioactivity and Atomic structure** :

(a) **Radioactivity** : Radioactive decay, half-life, Average life of radio elements, radioactive equilibrium Group displacement law, isotopes (uses of isotopes), isobars and isotones.

(b) **Atomic nucleus** : Fundamental particles of atomic nucleus, nuclear stability, neutron-proton ratio, nuclear binding energy. Nuclear forces.

Transmutation of elements, fission, fusion reactions.

(c) **Extra nuclear structure** : Bohr's theory and its limitations, Sommerfield's modification, spectrum of H-atom.

Group - C
Physical Chemistry

1. **Quantum Theory** :

Black-body radiation and Planck's Law, photo-electric effect and photon concept of light, wave particle duality, de Broglie hypothesis, Heisenberg uncertainty principle, Schrodinger's wave equation (time independent), Interpretation of wave function particle in one-dimensional box, quantum numbers, hydrogen atom wave functions separation of radial and angular part, shapes of s, p and d orbitals.

2. **The Gaseous State** :

Kinetic theory of gases, equation of state of real gases, intermolecular interactions, liquefaction of gases and critical phenomena, Maxwell's distribution of speeds, features of kinetic energy distribution, mean speed, root mean square speed, most probable speed, principle of equipartition of energy, specific heats of gases, intermolecular collisions, collision number and mean free-path, viscosity of gases and mean free-path.

3. **The Liquid State** :

Nature of liquid state, surface tension, capillary rise, spreading of liquid over other surface, temperature dependence of surface tension. Measurement of surface tension, viscosity of liquids, origin of viscosity of gases and liquids, determination of viscosity coefficient, Poiseuille's equation, temperature dependence of viscosity coefficients of gases and liquids.

4. **Solid State** :

Forms of solids, laws of crystallography, crystal lattices, crystal systems and crystal classes, Bragg's Law, X-ray diffraction by crystals, crystal structure of NaCl, KCl, structure of diamond and graphite, Lattice energy, Born-Haber Cycle, Einstein's equation for heat capacity of solids, Debye equation (elementary concept).

5. **Thermodynamics** :

a) Thermodynamic systems, states, processes, work, heat and internal energy, first law of thermodynamics, work done and heat absorbed in different types of processes. Reversible and irreversible process, energy and enthalpy changes in various processes and their temperature dependence.

b) Second law of thermodynamics, Carnot's cycle and Carnot's theorem, absolute scale of temperature, entropy as a state function, entropy change in various processes, entropy – reversibility and irreversibility, Free-energy functions, criteria for spontaneity and equilibrium, physical concept of entropy, entropy and probability.

c) Application thermochemistry, laws and their applications, Kirchoff's relation, Maxwell relation, $C_p - C_v$ relation Joule-Thomson expansion, thermodynamic equation of state, Gibbs-Helmholtz equation, Clausius-Clapeyron relation and phase transition, colligative properties of dilute solutions.

6. **Reaction equilibrium** :

a) Homogeneous equilibrium, relationship K_p, K_c, K_x . Van't Hoff's reaction isotherm (deduction using chemical potential). Temperature dependence of equilibrium constant, La-Chatelier's principle, response of equilibria to different conditions.

b) Ionic equilibrium, solubility product, dissociation constant of weak acids, ionic product of water, pH, buffer, indicators, hydrolysis of salt solutions.

7. **Electrochemistry** :

- a) Electrical conductance, weak and strong electrolytes, variation of equivalent conductance with dilution, Kohlrausch's law, transport number, determination of transport number by moving boundary method, theory of strong electrolytes, applications of conductance measurements.
- b) Galvanic cells, thermodynamic derivation of E.M.F. of chemical cells with examples, Transference cell, liquid junction potential and salt bridge, measurement of e.m.f. of cells and its applications, fuel cells and batteries.

8. **Chemical Kinetics** :

Concentration dependence of rate of reaction, differential and integral rate equations for zeroth, first, second order reactions, rate equations involving reverse, parallel, consecutive and chain reactions, effect of temperature and pressure on rate constant, collision and transition state theories of reaction rates.

9. **Photo Chemistry** :

Absorption of light, Lambert-Beer's law, laws of photochemistry, quantum yield, some typical photochemical reactions, HI-decomposition, CH₃CHO-decomposition, H₂ – Br₂ reaction, photosensitized reaction, Fluorescence and phosphorescence.

10. **Surface phenomenon and Catalysis** :

Adsorption from gases and solutions on solid adsorbents, adsorption isotherms – Langmuir and B.E.T. isotherms, determination of surface area. Gibbs adsorption isotherms, surfactants, micelle formation. Characteristics and mechanism of homogeneous and heterogeneous catalytic reactions Enzyme catalysis.
