RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS OF COMPETITIVE EXAMINATION FOR THE POST OF LECTURER (SCHOOL EDUCATION)
BIOLOGY

PAPER - II

Part – I Senior Secondary Level

1. **Biology in Ancient India:** Contribution of various Indian scientists.
2. **Taxonomy**:
    - Biological system of classification and branches of taxonomy. Concept of species and taxonomical hierarchy.
    - Binomial nomenclature.
    - Taxonomic keys, Flora, Monograph and Herbarium.
    - Classification of living organisms: Five Kingdom System and The Three Domain System.
3. **Structural Organisation in Animals and Plants**:
    - Animal tissues: Types, Origin, Location, Structure and Functions.
    - Plant tissues: Types and Functions Anatomy of Monocot and Dicot root, stem and leaves.
    - Structural organisation of higher plants, Modifications of Roots, Stems and Leaves, Types of fruits.
4. **Plant Physiology:**
    - Plant Water Relations, Phloem Transport and Ascent of Sap.
    - Photosynthesis.
    - Respiration and Photorespiration.
    - Mineral nutrition.
    - Plant movements.
    - Nitrogen and lipid metabolism.
    - Growth and development.
5. **Animal Physiology:**
    - Digestion and absorption.
    - Breathing and respiration.
    - Body fluids and circulation.
    - Excretory products and their elimination.
    - Locomotion and movement.
    - Neural control and coordination.

- Chemical coordination and regulation.
- Reproduction.

6. **Genetics:**
    - Mendelian Inheritance and its exceptions. Gene interactions.
    - Sex determination in Plants and Human beings
    - Linkage and crossing over
7. **Biology in Human Welfare:**
    - Economic importance of Protozoa, Helminths, Insects and Molluscs.
    - Plant Utilisation- Cereals and Millets, Fibre yielding plants, Vegetable oils, Spices and Medicinal plants with special reference to the state of Rajasthan.
    - Microbes in Human Welfare.
    - Basic Concepts of Immunology, Vaccines, Pathogens, Parasites.
8. **Ecology:**
    - Ecosystems - structure and functions, Energy flow, Ecological pyramids, Productivity, Decomposition, Ecological adaptations, Succession. Population and Community Ecology.

PART II - GRADUATION LEVEL

1. **Cell Structure and Functions:**
    - Concept of cell theory; Structure of Prokayotic and Eukaryotic cell; Plant and Animal cell.
    - Structure, properties and functions of Cell envelopes, Cell membrane and Cell wall.
    - Cell organelles- Structure and Functions
    - Chemical constituents of living cells: Biomolecules - Structure and functions of proteins, carbohydrates, lipids, nucleic acids. Enzymes
    - Cell division and cell cycle; Apoptosis (Programmed Cell Death).
2. **Taxonomy:**
    - Levels of Organization, Symmetry, Coelom and Metamerism in animals.
    - Salient features and classification of non chordata and chordata upto classes with examples.
    - Salient features and classification of plants (major groups upto class).
    - Semi Technical Description of a flower, floral formula and floral diagram.

3. **Structure (External and Internal), Reproduction and Life cycle of the following-**
    - *Amoeba, Obelia, Taenia, Ascaris, Pheretima, Periplanata, Rana* and *Rabbit*.

4. **Structure, Reproduction and Life cycle of the following:**
    - Algae, Fungi, Bryophytes, Pteridophytes, and Gymnosperms.

5. **Developmental Biology:**
    - Gametogenesis, Spermatogenesis and Oogenesis.
    - Fertilization, Cleavage, Blastula, Gastrula-Morphogenetic movement, Fate maps, Embryonic induction.
    - Metamorphosis in frog.
    - Regeneration.
    - Extra-embryonic membranes in chick.
    - Placenta in mammals.
    - Endocrine control of ovulation, pregnancy, parturition and lactation.

6. **Reproduction in Higher Plants:**
    - Vegetative Propagation in plants.
    - Structure and function of flower in reference to sexual reproduction.
    - Microsporogenesis, Megasporogenesis, male and female gametophyte, Pollination, Fertilisation, Embryogenesis, Endosperm formation. Seed. Apomixis and Polyembryony.
7. **Ethology:**
    - **Types of Animal Behavior:** Feeding, Learning, Social behaviour in Honey-bee, Termite, Monkeys and Lions, Parental care in animals (Amphibians, fishes and Primates).

8. **Biostatistics and Bioinformatics:**
    - Mean, Mode, Median, Standard deviation.
    - Basic Knowledge of Bioinformatic Web Portals.
    - Basic Knowledge of Biological and Sequence Database.

Part – III Post Graduation Level

1. **Environmental Biology:**
    - Environmental Issues: Pollution, Green House Gases, Global Warming, Ozone Depletion, Deforestation, Soil Degradation.
    - Bio remediation, Waste water treatment, Solid waste management, Disposal of Bio medical waste.

2. **Biotechnology and its Applications:**
    - Microbial Culture: Nutritional Requirements & Culture Media, Sterilisation methods & Pure Culture Techniques.
    - r DNA technology.
    - Application of r DNA technology: DNA Finger printing, transgenic organisms, Gene therapy, Therapeutic Agents/Molecules- Monoclonal, Anti Bodies, Insulin, Growth Hormones.
    - Tissue Culture and its application: Plant and Animals
3. **Molecular Biology:**
    - Central Dogma of molecular Biology.
    - Chromosome - Structure & Organisation.
    - Gene Regulation in Eukaryotes and Prokaryotes.
4. **Tools & Techniques: Basic Concepts:**
    - Microscopy-Light and Electron microscopy.
    - Centrifugation
    - Electrophoresis
    - ELISA
    - Chromatography
    - Spectroscopy
    - In situ Localisation Techniques: FISH, GISH
    - DNA Sequencing
5. **Biogeography and Wild Life Conservation**:
    - Major terrestrial Biomes. Biogeographical zones of India, Endemism, Hot spots, Plant distribution with special reference to Rajasthan. Wild life conservation/Management Strategies. Concept of Protected areas. Biosphere reserves of India. Wild life sanctuaries, National Parks, Wetlands and Sacred grooves with special reference to Rajasthan.

Part – IV (Pedagogy, Teaching Learning Material, Use of Computers and Information Technology in Teaching Learning)

I. Pedagogy and Teaching Learning Material (Instructional Strategies for Adolescent Learner)

- Communication skills and use of various verbal and non verbal classroom communication strategies.
- Teaching models- advance organizer and inquiry training (information processing) Group Investigation (Social Interaction) Non-Directive model (Personal development).

- Preparation and use of teaching-learning material during teaching.
- Cooperative learning.

II. Use of Computers and Information Technology in Teaching Learning

- Concept of ICT and Digital learning
- E-learning and Virtual Classroom.
- Technology integration in teaching-learning and assessment.

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For the competitive examination for the post of **School Lecturer: -**

The question paper will carry maximum **300 marks**.

1. Duration of question paper will be **Three Hours**.
2. The question paper will carry **150 questions** of multiple choices.
3. Negative marking shall be applicable in the evaluation of answers. For every wrong answer one third of the marks prescribed for that particular question shall be deducted.
4. Paper shall include following subjects: -
   (i) Knowledge of Subject Concerned: Senior Secondary Level
   (ii) Knowledge of Subject Concerned: Graduation Level.
   (iii) Knowledge of Subject Concerned: Post Graduation Level.
   (iv) Pedagogy, Teaching Learning Material, Use of Computers and Information Technology in Teaching Learning.

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