

## ANNEXURE-II

QUESTION PAPER - 02  
SCIENCE, TECHNOLOGY AND ENVIRONMENT**- 01 : CHEMISTRY**

Rate of chemical reaction and chemical equilibrium - Preliminary knowledge of rate of chemical reaction. Fast and slow chemical reactions. Reversible and irreversible chemical reactions. Reversible reaction and dynamic nature of equilibrium. Acids and bases. pH scale [simple numerical questions. Exothermic and endothermic reactions. Some important chemical compounds - properties and uses. Method of production manufacture [water, washing soda, baking soda bleaching powder and plaster of Paris.] preparation of building material-lime cement glass and steel. Metals - Position of metals in the periodic table and general properties. Metal, mineral ore. Difference between mineral and ore. Metallurgy-concentration, roasting, smelting, refining of ores. Metallurgy of copper and Iron. corrosion of metals. Alloys. Nonmetals - Position of nonmetals in the periodic table. Preparation properties and uses of Hydrogen oxygen and nitrogen. Some important organic compounds - laboratory method of preparing alcohol and acetic acid, properties and uses some general artificial polymers, polythene, polyvinyl chloride. Teflon soap and detergents.

**- 02 : PHYSICS**

Source of Energy - Conventional and new sources of energy, source of solar energy, causes of origin of energy in the Sun, solar heating devices, solar cooker solar cell, wind energy, biogas, fossil fuels, ideal fuel properties of ideal fuel. Nuclear energy, nuclear Fission, Fusion, chain reaction, nuclear reactor, uses and harms of nuclear energy. General information about CREDA. Light - nature of light reflection of light, laws of reflection, reflection from plane and curved surface, image formation by plane convex and concave mirror, relation between focal length and radius of curvature, determination of focal length of concave mirror by single pin method. [Relation between  $u-v-f$ ] [numerical examples. Refraction of light - laws of refraction, refraction by glass slab, critical angle, total internal reflection, use of total internal reflection in daily life. lens [converging and diverging lens. Definition focal length optical centre image formation by lens. Human eye, its defects and remedies. Comparison between photographic camera and human eye. Simple telescope and astronomical telescope. Construction working, uses, ray diagram [no formula derivation]. Electricity and its effects - electric intensity, potential, potential difference, electric current Ohm's law. Resistance specific resistance, influencing factors, combination of resistance and related numerical examples thermal effect of current its use, calculation of power and electrical energy spent. (numerical) precautions observed in electric experiments. Chemical effects of electric current. Primary and secondary cells their properties and drawback. Leclanche cell, dry cell, lead accumulator cell, construction. Magnetic effect of current - Magnetic effect of current, Oersted experiment, electro magnetic induction, electric motor, working principle and use of generator, general studies of alternating current and direct current, electric discharge in gases, discharge tube, cathode rays, X-rays and their properties. Magnetism - Magnet and its types artificial magnet, methods of preparing magnets, molecular theory of magnetism, demagnetization, magnetic keepers, magnetic lines of force and their properties. Plotting the lines of force Terrestrial magnetism, magnetic storm. magnetic meridian geographical meridian, relation between VHI and  $\theta$ .

**- 03 : BIOLOGY**

Animal nutrition - Types of nutrition, Autotrophic Nutrition, heterotrophic Nutrition, Holozoic, Parasitic, Saphrophytic, symbiotic, Insectivorous. Important terms of nutrition process. Digestion in unicellular cell animal [amoeba] and multicellular animal grass hopper. Human digestive system and digestive process. Photosynthesis, main steps of the process. light reaction and dark reaction. Factors influencing

Photosynthesis. Experiments related to photo synthesis. Respiration - Definition, respiratory organs of animals breathing and respiration, Types of respiration, Aerobic and anaerobic respiration, respiratory system of human being and mechanism of respiration [general information], respiratory quotient [RQ] of carbohydrate, fat and protein. Transport of mineral and water in plants and animals [in context of human being] Composition and function of blood, structure and working of heart, structure and function of blood vessels [preliminary knowledge] coagulation of blood, blood group, blood transfusion, blood bank, function of lymph system. diseases related to heart. Excretion - excretion in plants and excretory product. Excretion in animal and excretory organs. Excretion system of man and excretion process [general information] artificial kidney dialysis. Osmoregulation. Diseases related to kidney. Control and coordination - coordination in plants and animal. Phytohormones. Nervous system of human being. Structure and function of human Brain and spinal cord, reflex action, endocrine glands hormone and their function. Reproduction and growth - type of reproduction Asexual reproduction fission, budding, regeneration, vegetative reproduction, layering, cutting, grafting, Porthenogenesis, sexual reproduction in plants, structure of flower and reproduction process [general information] pollination fertilization. Human reproductive system and reproduction process. Heredity and evolution - heredity and variation. basis of heredity chromosome and DNA [preliminary information] gene. sex determination preliminary knowledge of organic evolution [Oparin's theory only].

**- 04 : TECHNOLOGY**

National policy of science and technology and changes in the policy from time to time, purpose of technology. Space programme in India and its applications with special reference to industrial, agricultural and other rural developmental activities, INSAT and IRS systems. Role of Information Technology in Rural India, basic knowledge of computers, computers in communication and broadcasting, software development for economic growth. Broad applications of IT. Energy Resources : Energy demands, renewable and nonrenewable energy resources, nuclear energy, the development and its utilization in the country. Current Science & Technology developments in India, origin of agriculture. Progress of Agricultural Science and its impacts. Crop science in India, Fertilizers, Control of pests and disease scenario in India.

**- 05 : ENVIRONMENT**

Bio-diversity and its conservation - General introduction - definition, species and genetic diversity, Bio-geographic classification of India. Importance of Bio-Diversity - Constructive and Destructive application, Importance of social, moral and alternative vision, Global, National and Local level Bio-diversity, India as a wide diversity nation, Hotspots of Biodiversity, threats to biodiversity, Residential damage, damage to wildlife, humans and wild animals struggle, India's threatened (endangered) and local species, Conservation of bio-diversity, Topological and Nontopological conservation. Environmental pollution - Reason effect and conservation - Air pollution, water pollution, soil pollution, sound/noise pollution, thermal pollution, nuclear pollution. Solid waste management - Urban and Industrial solid waste management: reason, effect and control, Human role in pollution control. Disaster Management, Floods, Earthquake, Cyclones and Landslide. Human Population and Environment, Population growth, Variation in the population in various countries. Population explosion and Family Welfare Programme. Environment and Human health.

24/5/16  
राजस्थान शासन  
उच्च शिक्षण विभाग  
जयपुर, राजस्थान