

## अध्याय-3

### PRE-NURSING SELECTION TEST – 2020 SYLLABUS

#### 1. PHYSICS

Unit and Dimensions, Dimensional Analysis, S.I, Units, Motion in two dimensions cases of uniform velocity and uniform acceleration, general relation among position and velocity, uniform circular motion, force and inertia. Newton's laws of motion, Conservation of momentum and energy.

Static and kinetic friction, work energy and power elastic collisions, potential energy, gravitational potential energy and its angular conservation to its kinetic energy, potential energy of spring. Rigid body rotation and conservation of its momentum, moment of inertia, theorems of parallel and perpendicular axis. (moment of inertia of uniform ring, disc, thin rod and cylinder only).

Acceleration due to gravity and its variation, universal law of gravitation, geostationary satellites escape velocity.

Hooke's law, young's modulus, shear and bulk modulus, surface energy and surface tension, kinetic theory of gases, gas laws, kinetic energy and temperature.

Specific heats and constant volume and constant pressure mechanical equivalent of heat, isothermal and adiabatic processes. Heat conduction in one dimension, convection and radiation, Stefan's law and Newton's law of cooling. Periodic motion, simple harmonic motion, Oscillations due to spring. Wave motion, principle of superposition, progressive and stationary waves, beats and Doppler effect.

Wave nature of light, interference, young's double slit experiment, velocity of light and Doppler effect in light.

Reflection, refraction, total internal reflection, curved mirrors, lenses, mirror and lens formulae.

Dispersion in prism, absorption and emission spectra. The human eye, defects of vision, magnification and resolving power of telescope and microscope.

"e" and "e/m" for and electron, Einstein's photoelectric equation, photocells.

Bohr model of the atom, Hydrogen spectrum, compositions of nucleus, atomic masses and isotopes, radioactivity, laws of radio active decay, decay constant, half life, mass energy relation,

fissions, X-ray, properties and uses.

Elementary ideas of conductor, semi conductor and insulator, intrinsic and extrinsic semiconductors, p-n junction as a rectifier. Bar magnet, lines of force, torque on a bar magnet due to magnetic field, earth's magnetic field, tangent galvanometer, vibration magnetometer.

Coulomb's law of electrostatic, dielectric constant, electric field and potential due to a point charge, dipole, dipole field, Gauss's law in simple geometrics.

Electrostatic potential, capacitance, parallel plate and spherical capacities in series and parallel, energy of a capacitor. Electric current, Ohm's law, Kirchhoff's laws, resistances in series and parallel temperature dependence of resistance, Wheatstone bridge, potentiometer. measurement of voltage as currents.

Electric power, heating effects of currents, chemical effects and law of electrolysis thermoelectricity

Biot-Savart law, magnetic fields due to a straight wire circular loop and solenoid.

Force on a moving charge in a magnetic field (Lorentz force), magnetic moment of current loop, effect of uniform magnetic field of current loop, forces between two currents, moving coil, galvanometer, ammeter and voltmeter.

Electromagnetic induction induced e.m.f., Faraday's law, Lenz's law, self and mutual inductance alternating currents, impedance and reactance, growth and decay of current in L-R circuit, elementary idea of dynamo and transformer.

## **2. CHEMISTRY:**

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### GENERAL AND PHYSICAL CHEMISTRY

Structure of atom: Constitutions of nucleus: Bohr's atom model: quantum numbers Aufbau principle, electronic configuration of elements (upto Kr): De-Broglie relation, shapes of orbitals.

Chemical bond: electrovalent, covalent and coordinate bonds, hybridization(sp): hydrogen bond: shapes of molecules (VSEPR theory): bond polarity, resonance, elements of VBT and MOT.

Solutions: models of expressing concentrations of solutions: types of solutions, Raoult's law of colligative properties, non-ideal solution, abnormal molecular weights.

Solid state: crystal lattices, unit cells, structure of ionic compounds: close packed structure ionic radii, imperfections(point defects): properties of solids.

Nuclear chemistry: radio active radiations: half-life, radioactive decay, group displacement law structure and properties of nucleus: nucleus reaction, disintegration series artificial transmutation: isotopes and their uses: radiocarbon dating.

Chemical equilibrium: chemical equilibrium, law of mass action:  $K_p$  and  $K_c$ : Le Chatelier principle and its applications. Ionic equilibrium in solutions, solubility product, common ion effect, theories of acids and base hydrolysis of salts: pH: buffers.

Thermochemistry and thermodynamics: energy changing due to chemical reaction: intrinsic energy enthalpy, first law of thermodynamics: Hess's law heats of reactions: second law of thermodynamics: energy free energy: spontaneity of a chemical reaction: free energy change and chemical equilibrium: free energy as energy available for useful work.

Chemical kinetic: rate of reaction, factors affecting the rates, rate constant rate expression, order of reaction, first order rate constant expression and characteristics, Arrhenous equation.

Electrochemistry: oxidation, oxidation number and ion-electron methods. Electrolytic conduction,

Faraday's law: voltaic cell, electrochemical theory of corrosion. Surface chemistry, colloids and catalysis: Adsorption, colloids (types preparation and properties), Emulsions, Micelles, catalysis types and characteristics.

### **INOGRANIC CHEMISTRY:**

principal and metallurgical operations: furnaces, ore concentration, extraction, purification metallurgies of Na, Al, Fe, Cu, Ag, Zn, and Pb and their properties. Chemical periodicity s.p.d and f-block elements, periodic table: periodicity: atomic and ionic radii valency, ionization energy, electron affinity electro negativity, metallic character.

Comparative study of elements: comparative study of following families of elements 1. Alkali metals 2. Alkaline earth metals 3. Nitrogen family 4. Oxygen family 5. Halogens 6. Noble gases. Transition

metals: electronic configuration of 3d metal ions, oxidation states, other general characteristics properties, potassium permanganate, potassium dichromate.

co-ordination compounds: simple nomenclature, bonding and stability, classification and bonding in

organometallics. chemical analysis: chemistry involved is simple inorganic qualitative analysis: calculations based on acid base titrimetry.

### **ORGANIC CHEMISTRY**

Calculation of empirical and molecular formula of organic compounds, nomenclature of organic compounds, common functional groups isomerism structure and shapes of alkanes, alkanes and benzene.

Preparation properties and uses of alkenes, alkynes, benzene petroleum, cracking octane number, gasoline additives.

Nomenclature, physical chemical properties, correlation of physical properties with structure properties and uses of haloalkanes, halobenzenes, alcohols and phenols: general

ideas of some polyhalogen compounds viz dichloroethanes dichloroethers, chloroform, carbon tetrachloride D.D.T benzene

hexachloride.

Nomenclature, methods of preparation, chemical properties correlations of physical properties with structures and uses of ethers aldehydes, ketones, carboxylic acids and their derivatives, brief account of the chemistry of cyanides isocyanides, amines and nitro compounds.

Polymers: classification: preparation and uses of common natural and synthetic polymers.

Bio-molecules: classification, structure and biological importance of carbohydrates amino acids, peptides, proteins and enzymes, nucleic acids and lipids.

## **BIOLOGY:**

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### **BOTANY**

Structure organization of cell, cell theory. Light and electron microscopic view of cells. structure and functions of cell organelles : nucleus mitochondria, Chloroplast, Endoplasmic reticulum, Golgi complex lysosome, micro bodies, microfilaments ribosomes. Centrioles and plasmids, Eukaryotic chromosome (morphology) cell and plasma membrane. Difference between cell and animal division, cell cycle significance of mitosis and meiosis.

Mendel's law of inheritance, monohybrid and dihybrid cross; linkage and crossing over of genetic material DNA replication, genetic code transcription, translation and gene regulation.

Difference between prokaryote and eukaryotes: structure reproduction and economic importance of viruses Mycoplasma, Bacteriophage, cyanobacteria (Nostoc) and bacteria.

Five kingdom classification binomial nomenclature: external morphology and life cycle of Spirogyra, Mucor, Funaria, Selaginella and Pinus.

Elementary knowledge of microsporogenesis, megasporogenesis. Fertilization endosperm and embryo development in angiosperms. Tissue and tissue systems, meristematic and permanent tissue, mineral nutrition essential elements and their function: uptake of minerals transport of water and solutes.

Transpiration photosynthesis and respiration: importance, mechanism and factors affecting these processes: photorespiration. Enzymes and growth hormones with reference to their classification, chemical nature, mode of action importance. Elementary idea of photoperiodism and phytochrome.

Ecosystem – structure and function, major ecosystems i.e lake and forest; food chain, food web and energy flow, ecological crises role of man in polluting environment – air water and soil.

Role of plants in human welfare: a general knowledge of plant products of economic value drugs, fibers, cereals.

Wheat and rice, pulses (gram), oil seeds (ground nut,) sugarcane, coal and petroleum, Food preservation methods and importance.

Principle of plant breeding and its role in improvement of crops, biotechnology, scope and importance in agriculture and industries manufacture of cheese. Yoghurt alcohol antibiotics.

## **ZOOLOGY:**

### **MULTICELLULARITY- STRUCTURE AND FUNCTION OF ANIMAL LIFE:**

- Structure and function of animal tissues epithelial, connective muscular, skeletal and nerve.
- Histology of mammalian organs –stomach, intestine, liver, kidney, lung testes and ovary.
- Structure and physiology of different organ systems of human body. Skin, digestive systems, respiratory system, circulatory system, excretory system, nervous system, reproductive system.
- Skeleton, joints, muscles on the basis of movement receptors.
- Endocrine system with special reference to various endocrine glands of man and hormonal coordination.
- Vitamins and minerals (Source and disorders due to deficiencies).

### **DEVELOPMENTAL BIOLOGY AND GENETICS:**

- Female reproductive cycle in mammals. Gametogenesis along with structure of sperm and ovum. Types of eggs, fertilization, types of cleavage and blastula, development of mammals up to three germinal layers. Foetal membrane structure and functions in mammals.
- Growth, repair, ageing, amniocentesis.
- Chromosomes, types of chromosome, human karyotype and chromosomal abnormalities and syndromes, hormonal, chromosomal and genic balance theory of sex determination, sex linkage and sex linked inheritance in man, blood group and their significance, blood bank.
- Tissue culture, genetic engineering (brief idea), mutation gene mutation.
- Human population natality mortality, sex ratio population, explosion, dynamics of human life with respect to food supply, housing health and standard of living impact of population problems and their control.

#### TAXONOMY EVOLUTION ECONOMIC ZOOLOGY:

- Classification- binominal and trinominal nomenclature, basic features of classification of different animal phyla upto classes with characters and suitable examples.
- Origin of life, theories of organic evolution- Darwin, Lamarck, synthetic evidence of organic evolution, human evolution.
- Economic zoology/sericulture, apiculture, lac culture, poultry, fishery and pearl industry.
- Protozoan disease in relation to man, insect carrying diseases in relation to man.
- Cancer types of cancer and cancer cell communicable diseases (Hepatitis, AIDS). STD, immune response, vaccines and antiseta allergies.
- Smoking, alcoholism and drug addition symptoms and control.
- Wild conservation.
- Pesticides- users, advantages and hazards.

#### **4. GENERAL ENGLISH**

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1. Reading Comprehension
2. Vocabulary items including synonyms and antonyms, word formation, Prefixes, Suffixes.
3. Grammar and usage:
  - (a) Articles and determiners.
  - (b) Agreement between the subject and the verb.
  - (c) Time and tenses.
  - (d) Prepositions and phrasal verbs
  - (e) Auxiliaries including modals.
4. Transformation of sentences.
  - (a) Voices : active and passive.
  - (b) Narration : direct and indirect.
  - (c) Degrees of comparison
  - (d) Sentences types : Affirmative, negative and interrogative