CUCET-2015

Syllabus for UG01

This paper will comprise of two parts, Part-A and Part-B

Part-A

Language, general awareness, mathematical aptitude and analytical skills – comprising of 25 MCQs

Part-B (It will have 4 sections I to IV. Each section will comprise of 25 MCQs. The candidate has to answer any three sections)

Section-I : PHYSICS

Measurement, Motion in one dimension, Laws of Motion, Motion in two dimensions, Work, Power and Energy, Linear Momentum & collisions, Rotation of a rigid body about a fixed axis, Gravitation, Oscillatory motion, Mechanics of solids and fluids, Heat and thermodynamics, Wave, Electrostatics, Current Electricity, Magnetic Effect of Current, Magnetism in Matter, Electromagnetic induction, Ray Optics and optical instruments, Wave Optics, Modern Physics

Section-II : CHEMISTRY

Atomic Structure, Chemical Bonding, Redox Reactions, Chemical Equilibrium and Kinetics, Acid-Base concepts, Electrochemistry, Catalysis, Colloids, Colligative Properties of Solution, Periodic Table, Preparation and Properties of the following: Hydrogen peroxide. copper sulphate, silver nitrate, plaster of paris, borax, Mohr's salt, alums, white and red lead, microcosmic salt and bleaching powder, sodium thiosulphate. **Thermochemistry, General Organic Chemistry, Reaction intermediates, Isomerism, Polymers, Carbohydrates, Preparation and Properties of the Followings:** Hydrocarbons, monohydric alcohols, aldehydes, ketones, monocarboxylic acids, primary amines, benzene, nitrobenzene, aniline, phenol, benzaldehyde, benzoic acid, Grignard Reagent. **Solid State:** Structure of simple ionic compounds, Crystal imperfections (point defects only), Born-Haber cycle, **Petroleum:** Important industrial fractions, cracking, octane number, anti knocking compounds.

Section-III : MATHEMATICS

Algebra: Sets relations & functions, De-Morgan's Law, Mapping Inverse relations, Equivalence relations, Peano's axioms, Definition of rationals and integers through equivalence relation, Indices and surds, Solutions of simultaneous and quadratic equations, A.P., G.P. and H.P., Special sums i.e. ∑n2 and ∑n3 (n∑N), Partial fraction, Binomial theorem for any index, exponential series, Logarithm and Logarithmic series. Determinants and their use in solving simultaneous linear

equations, Matrices, Algebra of matrices, Inverse of a matrix, Use of matrix for solving equations.

Probability: Definition, Dependent and independent events, Numerical problem on addition and multiplication, theorem of probability.

Trigonometry: Identities, Trigonometric equations, properties of triangles, solution of triangles, heights and distances, Inverse function, Complex numbers and their properties, Cube roots of unity, De-Moivre's theorem.

Co-ordinate Geometry: Pair of straight lines, Circles, General equation of second degree, parabola, ellipse and hyperbola, tracing of conics.

Calculus: Limits & continuity of functions, Differentiation of function of function, tangents & normal, Simple examples of Maxima & Minima, Indeterminate forms, Integration of function by parts, by substitution and by partial fraction, definite integral, application to volumes and surfaces of frustums of sphere, cone and cylinder. Differential equations of first order and of first degree.

Vectors : Algebra of vectors, scalar and vector products of two and three vectors and their applications.

Dynamics : Velocity, composition of velocity, relative velocity, acceleration, composition of accelerations, Motion under gravity, Projectiles, Laws of motion, Principles of conservation of momentum and energy, direct impact of smooth bodies.

Statics: Composition of coplanar, concurrent and parallel forces moments and couples resultant of set of coplanar forces and condition of equilibrium, determination of centroid in simple cases, Problems involving friction.

Section-IV : BIOLOGY

Zoology

Origin of Life: Oparin's theory, Miller's Experiment, Viruses - structure, properties, distribution, classification and pathogenesis (Eg. AIDS, CANCER), Viroids & Prions, Biotic balance.

Organic Evolution: Relationship among organisms and Evidences of organic Evolution - Principles of Evolution - Lamarkism, Darwinism and Speciation.

Mechanism of Organic Evolution: Variations - Definition, causes and types, Mutations (Principles of Hugo de'veries), Role of mutations in speciation. Evolution through ages and human evolution

Human Genetics and Eugenics: Human hereditary traits, study of Twins, A.B.O. blood groups and their inheritance, Rh-factor, Sex determination. Chromosomal aberrations, Important human syndromes, Sex linked characters and their inheritance, Applied Genetics - eugenics, euthenics, euphenics & I.Q. Test.

Applied Biology: Wild life of India - Endangered species: Biosphere Reserves, National Parks and sanctuaries, Project Tiger, Conservation of wild life, Bio-energy, Poultry, Fisheries (edible fishes), Human Population, Population explosion, problems & control. Test - Tube babies, & Amniocentasis, Application of Biotechnology in human welfare. Human Aging.

Mammalian Anatomy (Eg. Rabbit): Reproductive system (excluding embryonic development) Osteology, structure and organization of different systems.

Animal Physiology:

(A) Animal Nutrition: Food, Balanced diet, Nutritional imbalances and deficiency diseases, Digestion, Absorption, Assimilation of food, (comparison between human and Rabbit).

(B) Animal Excretion and Osmoregulation: Chemical nature of excretory products in various animals, Physiology of excretion, Function of liver and kidney (Homeostatic regulatory functions of kidneys), Formation of urine, Osmoregulation by kidneys.

(C) Respiratory system: Exchange and transport of gases (O2 and Co2) factors affecting O2 and Co2 transport, Cellular respiration, different lung volumes, breathing and sound production.

(D) Nervous systems: Central, autonomic and peripheral nervous system, Receptors, Effectors, Reflexaction. Nature and conduction of Nerve- impulses, Synapse, Sense organs - Structure & working of Eye & Ear, Biochemistry of vision and taste buds.

(E) Endocrine System: Different endocrine glands and Hormones - definition, types, characteristics and their functions, (in relation to human beings), Hormonal disorders and pheromones.

(F) Circulatory System: Circulation of body fluids- Blood and lymph, Open and closed vascular systems, Structure and working physiology of Heart, Comparison between arteries and veins, Lymphatic system.

(G) Animal Diversity: Classification of Animal kingdom (Based on Storar & Eusinger), Chracteristic feature of different phyla and classes with examples.

Detailed studies of followings:

(a) Protozoa

(i) Amoeba- Habit & Habitat, structure, locomotion, reproduction, Osmoregulation, Parastic amoebae - Entamoeba histolytica and Entamoeba gengivalis, structure, diseases caused by them and their control measures.

(ii) Plasmodium vivax-life-cycle, malaria therapy and control.

(iii) Protozoan and diseases

(b) Porifera: A simple sponge (Leucosolenia); Detailed study of structure & physiology, Sponge industry.

(c) Coelenterata: Hydra - Habit and Habitat, morphology, tissue differentiation in relation to physiological division of labour and regeneration.

(d) Aschelminthes: Ascaris- morphology, life-cycle, therapy and control.

(e) Annelida: Pheretima posthuma - Bionomics and economic importance.

(f) Arthropoda: (Periplanata): Structure- external and internal.

Comparison between Periplanata and Blatta.

(i) Housefly & Mosquito: structure and life – cycle

(ii) Economic importance of insets & their control.

Botany

Plant Cell: Structure & functions electron microscopic structured mitochondria, Plastids centrosomes. Lysosomes, microsomes, endoplasmic reticulum, Nucleus, Golgibodes, D.N.A & R.N.A. Cytoplasm, membranes and cell wall.

Protoplasm: structure, components physical and chemical properties. Cell divison (formation) - free cell formation, Amitosis & Meosis, Duplication of D.N.A.

Ecology: Ecological factors (atmospheric, edaphic, climatic, geological & biotic factors). **Ecosystem:** Structure, components of ecosystem eg. Water soluble minerals and gases, producers consumers, decomposers, Pond and forest ecosystem. Atmospheric pollution-causes and control, Types of pollution - Detergents, chemicals automobile exhaust, Radioactive matter, Smog, sound, Pesticides.

Genetics: Mendalism, Mendals experiment and law of inheritance. Modern Classification of plant kingdom- (according to Ostwald & Tippo) (outline).

Seeds in angiospermic plants: description of development of angiospermic plants (life history of angiospermic plants).

Fruits: Dispersal of fruits and seeds

Cell differentiation Plant Tissue: Meristimatic classification of meritimatic & permanet tissue and functions and classification of tissue system.

Anatomy of Root, stem and leaf: difference between dicot and Monocot stem. Secondary growth of stem and root. Anatomy of hydrophytes, Xeophytes & Mesophytes.

Important phylums:

Algae: Habitat, general characters & uses, description of ulothrix & spirogyra.

Bacteria: structure - types of nutrition, reproduction and economic importance.

Fungi: structure description of Rhizopus and yeast and their economic importance, Fermentation.

Broyophyta: structure and economic importance, description of funaria (Moss) Pteridophyta: general structures of pteridophytes description of fern (Droypteris) General study of gymnosperms and life history of cycas. Classification of angiospermn, Description of families - identification and economic importance Cruciferae, Malvaceae, Leguminosae, compositeae, cucurbitaceae.

Soil: Absorption of water through root hairs osmosis, Translocation and Root pressure Nitrogen cycle. Special modes of nutrition in plants (Autotrophic, heterotrophic, Parasites, saprophytes, Symbionts insectivorous and their ecological relation.

Photosynthesis: Chloroplast, light, chlorophyll and Carbon dioxide, Mechanism of photosynthesis formation of A.T.P. and their functions and importance of photosynthesis. Transpiration: factors and importance, Mechanism of opening and closing of stomata. Respiration: aerobic, anaerobic respiration, mechanism of respiration (Glycolysis, Kreb's cycle, E.T.S.) Growth & movement: definition of growth, Region of growth & their measurements, types of movements in plants, Growth harmone.

Syllabus for UG02 (Part-A and -B)

There will be only one test paper for this session. The question paper will comprise of 100 MCQs from the following discipline. *i.e.* English, Numerical Aptitude/Data Interpretation, Analytical Skills, Reasoning, General Aptitude, General Knowledge.