Syllabus of Chemistry for Scientific Assistant 2016 (SA - 16) Recruitment Topics:-

1. **Atomic structure.**
2. **Radioactivity.**
3. **Molecular mass & mole.**
4. **Chemical bonding.**
5. **Gases & kinetic theory.**
6. **Solid state.**
7. **Thermodynamics.**
8. **Chemical equilibrium.**
9. **Ionic equilibrium.**
10. **Electrochemistry.**
11. **Colligative properties of solution.**
12. **Phase rule.**
13. **Colloids.**
14. **Chemical kinetics.**
15. **Periodic table.**
16. **Properties and uses of non-metals (N, P, Si, O, S, F, Cl, Br, I).**
17. **Extraction, properties and uses of metals (Na, Mg, Al, Fe, Zn, Sn, Cu, Ag).**
18. **Manufacture, properties and uses of the compounds (NaOH, Na_2CO_3, $FeSO_4$, $Na_2S_2O_3$, H_2O_2, O_3, H_2S, $CuSO_4$, $AgNO_3$, HCl, HNO_3, HNO_2, H_2SO_4, bleaching powder).**
19. **Hydrocarbon: alkanes, alkenes, alkynes.**
20. **Stereoisomerism.**
21. **S_N1, S_N2, E1, E2, addition reactions, aromatic substitution reactions.**
22. **Alcohols, ethers, carboxylic acids and their derivatives.**
23. **Amines, nitriles and nitro compounds.**
24. **Grignard Reagent.**
25. **Aromatic compounds.**
26. **Carbohydrates.**
27. **Amino acids and peptides.**
28. **Heterocyclic compounds.**
29. **Nucleic acids.**
30. **Systematic qualitative analysis of inorganic and organic compounds.**

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Syllabus of Physics for the post of Scientific Assistant2016 (SA-16) Recruitment

Topics:-

1. **Units and dimension**
2. **Vectors, scalar quantities**
3. **Dynamics**
4. **Friction**
5. **Circular motion**
6. **Gravitation**
7. **Properties of matter**
8. **Thermodynamics**
9. **Gases and kinetic theory**
10. **Surface tension**
11. **Elastic property**
12. **Oscillations**
13. **Wave properties**
14. **Sound waves**
15. **Reflection and refraction at plane surfaces**
16. **Spherical mirrors**
17. **Lenses**
18. **Optical instruments**
19. **Interference, diffraction and polarization of light waves**
20. **Electrostatics**
21. **Current electricity**
22. **Magnetism**
23. **Electromagnetism**
24. **Alternating current circuits**
25. **Atomic structure**
26. **Radioactivity and nuclear energy**
27. **Semiconductor devices**

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Syllabus of Zoology for Scientific Assistant 2016 (SA - 16) Recruitment Topics:-

1. **Classification of Non-Chordate** with distinctive features and suitable examples of sub-kingdom Protozoa (up to Phylum - Porifera, Cnidaria, Platyhelminthis, Annelida, Arthropoda, Mollusca and Echinodermata
2. **General structure and function of Non-Chordate with reference to** –

   Locomotion – Microfibrils (Amoeba), Cilia (Paramoecium) , Feeding and digestion – Microphagy (Amoeba), Macrophagy (Periplanata), Respiration – Ctenidium and pulmonary sac (Pila), gills (prawn), Trachea (cockroach), Excretion – Nephridia (Earthworm), Circulation – Open circulation (Cockroach), Closed circulation (Earth worm), Nervous system – Cockroach, Apple snail,Reproduction- Fission (Amoeba); Budding (Hydra); Conjugation (Paramoecium); Metagenesis in Obelia
3. **Classification of Phylum Chordata** with distinctive features and suitable examples – upto living subclass (Amphibia, Reptilia and Mammalia); up to subclass (Fishes and Aves)
4. **Functional anatomy** – digestive system in Oreochromis; Circulatory system in Columba.
5. **Structure & function of Chordate with reference to- Integument – general structure & function;** integumentary derivatives (scales in fishes, feathers of Columba ,Pharynx (Branchiostoma); stomach (Bos), Respiratory structures and Respiration : Gill (Fish); lung and Air sac (Columba), Circulatory structure and circulation: Single circuit heart (fish); double circuit heart (Amphibia and Mammals),Nervous system – Brain in Oreochromis , Origin and distribution of cranial nerves in fish.
6. **Cell Biology** - Fluid mosaic model of plasma membrane; Cell cycle check points; Physio- chemical properties, types, structures and functions of DNA and RNA.
7. **Genetics** - DNA as a genetic material explanation with experiment; Mechanisms of replication, transcription and translation in *E. coli;* Linkage and recombination; Modes of inheritance of autosomal and sex linked genes in man (Thalassemia, Haemophilia and colour blindness); Sex determination in Drosophila (Genic Balance Theory).
8. **Developmental Biology** - Spermatogenesis and Oogenesis; Fertilization in sea urchin; Types of eggs and cleavages; process of cleavage in Amphioxus; Gastrulation in Amphioxus; Extra-embryonic membranes in chick; Placenta types and function.

9. **Ecology** - Population – definition and growth; Community – definition and types; Basic idea of ecotoxicology and xenobiotics; Climate change – Global warming, acid rain, ozone depletion (cause and effect).
10. **Animal Behaviour** - Honey bee – Hive, castes and their roles
11. **Biodiversity and Wildlife** - Basic concept of Biodiversity, Biodiversity hotspots; Conservation of wild life – purpose and methods, concept of Biosphere Reserve, importance and strategies of wildlife conservation; National park and Wildlife Sanctuary.
12. **Histology** - Histology of pancreas (theory)
13. **Endocrinology** - General characters of hormones: Naming and function of hormones secreted from Pituitary
14. **Animal Physiology** - Nerve impulse propagation and synaptic transmission; Osmoconformers and Osmoregulators – definition and example; Osmoregulation in fishes
15. **Biochemistry** - Enzyme – classification and characteristics; mechanism of enzyme action; effects of pH and temperature on enzymatic action
16. **Evolutionary Biology** - Definition of systematics and taxonomy; Species as a unit of evolution (definition and types: biological, sibling and polytypic species); Chemical basis of origin of life; Anatomical and Physiological adaptations: Aquatic (fish), Desert (Camel) and Volant (Pigeon) animals; Zoogeographical realms (Wallace scheme) with characteristic mammalian fauna.
17. **Parasitology** - Parasitism (definition and types) and other inter-specific interactions (symbiosis, commensalism and mutualism); Life history, Pathogenecity and clinical features of *Entamoeba histolytica, Plasmodium vivax* and *Ascaris.*
18. **Immunology** - Outline structure and classification of immunoglobulin, antigen-antibody reaction.
19. **Sericulture**: Life history and rearing of Bombyx mori, harvesting and processing of cocoon, reeling and extraction of silk, diseases of worms of Bombyx mori and control measures.
20. **Aquaculture**: Principles, definition and scope. Exotic fishes- their merits and demerits. Basic principles of different aquaculture system (Polyculture and integrated farming); culture of prawn.
21. **Pest and Management**: Definition and types of pests with examples; Life history, behaviour, ecology, damage and control of the pests- Paddy Scirpophaga (Syn. Tryporyza) incertulas, Stores grain-Sitophilus oryzae, Mammalian pest (Bandicota bengalensis).
22. **Apiculture**: Development of Apiary in India. Types of honey bees, modern methods of apiary management, products and its uses. Problems and prospects
23. **Poultry**: Fowl - Types of breeds, rearing and disease management.

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Syllabus of Anthropology for Scientific Assistant 2016 (SA - 16) Recruitment Topics:-

1. Definition of Anthropology, aim, scope, branches and applied areas of Biological Anthropology. Relationship of it with other biological and social sciences.
2. Morphology of man; External morphology – Features of man. Skeletal morphology – Definition and function of human skeleton. Types and definitions of bones. Name, number, and position of bones of human skeleton. Modifications of human skeleton as consequences of evolution- erect posture, bipedalism. Human Dentition-Types and salient Features and Dental Formula- Deciduous and Permanent.
3. Definition and application of knowledge of genetics.
4. Structure of an identical eukaryotic cell.
5. Cell division- anthropological significance.
6. Gametogenesis: Spermatogenesis and Oogenesis, stages and differences.
7. Normal chromosomal constitution and numerical chromosomal aberration in man. Denver system of human chromosome classification. Causes and manifestation of Down's, Turner's and Klinefelter's Syndrome
8. Basic structure of DNA its differences with RNA.
9. Mendalian principles, its explanation and application in man; Mendalian Inheritance in Man- autosomal dominant (PTC) autosomal recessive (albinism) sex chromosomal-dominant (Xg blood group), recessive (colour blindness); Polymorphic character in man (ABO Blood group system.)
10. Concept of Race (Ethnic Group); UNESCO statement of race (1950,1952); Geographical distribution and features of major races/population of mankind (Caucasoid, Negroid and Mongoloid); Racial concept - Garn - geographical, local and micro races; Criteria for population/racial classification: (Skin colour, head hair and ABO blood groups); Racial / ethnic composition of the population of undivided India by Risley, Guha and Sarkar.
11. Human adaptation: Hot, cold, altitude, infectious disease, stress.
12. Introduction to archeological anthropology, its relation to anthropology, palaeoanthropology, history, prehistory and historical archeology.
13. A brief history of archeology, mentioning only the stages of Antiquarianism, Three Age Paradigm, Culture history, Processual and Post-processual archeology.
14. A brief idea of palaeoenvironment in high and low latitudes and altitudes.
15. Methods for reconstructing the past- environmental archeology, experimental archeology, ethnoarcheology, primate ethology.

16. Field techniques- exploration, excavation, data analysis and publication of report.
17. Dating methods- concept and importance of chronology in archeology, absolute and relative methods- brief outlines of C14, TL, FUN, Archeomagnetism, K/Ar, stratigraphy and river terraces.
18. History and fundamentals of anthropological theories- holistic nature of Anthropology and integration of its subdisciplines; Scope and Objective of Social and Cultural Anthropology.
19. The Theories: Evolutionism, Historical Particularism; Diffusionism -including concepts like universals, diffusion, acculturation.
20. Structural-functionalism, Cultural Materialism, Culture and Personality, Structuralism, Symbolic Anthropology, Cultural Ecology and Political Economy.
21. Introduction to culture and society- Concepts of society, group, community, structure, organization, system, institution, process/interaction, Social function, Status, Role, Diaspora, Social network and Social Capital
22. Concepts of features and nature of culture, Different Concepts of Culture across the theories (e.g. evolution, patterns of culture, civilization, super organic, worldview, cognition, symbol, method/model, shared construct)
23. Concept of Tribe: Indian tribes, distribution – geographical Social organization: Garo, Santal, Chenchu, Toda
24. Concepts of Social Organizations and Issues of culture- age grading, territorial group, community, social stratification, band, tribe, peasant, division of labour, social control and social contract; health, folklore, art, language and culture, communication, gender, identity, education and socialisation, power, life-cycle, dream, change in society and culture, violence and terror, colonialism, postcoloniality and globalization.
25. Kinship and Social Life-Traditional Concepts of kinship, incest prohibition; exogamy and endogamy. Principles of descent -types and functions. Unilineal, bilateral and double descent, Descent groups, approaches to the study of terminology; Concepts and typology of family; Marriage – Concepts, types and variation of marriage systems. Alliance and descent; Regulation of marriage-preferential, prescriptive, proscriptive and open systems. Types and form of marital transactions, like Dowry, bride-price, emerging issues of marriage including same-sex marriages.
26. Definition (Mivert) and general characteristic features of order Primates; Evolution trends of the Primates; Classification of the order Primates –Simpson and modified by Simpson (1917) with features and example upto family; Platyrrhine and Catarrhine monkeys- distribution, characteristics and differences; Anthropoid apes: Features, classification, distribution, and social behavior; Skeletal comparison of anthropoid apes with that of man.
27. Theories of Human evolution - Lamarckism, Darwinism, Synthetic theory

28. Fossil Primates: Dryopithecus, Sivapithecus, Ramapithecus (only chronology); Earlier hominid-A. afarensis, and A.africanus ; Emergence of genus Homo- H.habilis, H. erectus, (Java and Peking variety); Emergence of Archaic Homo sapiens- Neanderthal(La chapelle-aux–saints and Tabun); Anatomically Modern Homo sapiens- Cro-Magnon

29. Development of prehistoric cultures from the earliest evidences up to the beginning of historical times; on a regional basis – Africa and Europe.
30. Earliest Pleistocene cultures of Africa, and their subsequent development with special emphasis to east Africa Lake Turkana basin (sites – Olduvai Gorge, Omo, Hadar, Laetoli, Koobi-Fora, Olorgesaile)
31. Earliest Pleistocene cultures of Europe and their subsequent development with special emphasis on western Europe
32. The justifications of lower, middle and upper Palaeolithic, Mesolithic and Neolithic classifications and nomenclatures
33. Medical Anthropology (including Pharmaceutical Anthropology), Urban Anthropology, Development and Anthropology, Applied, Cognitive Anthropology and Visual Anthropology.
34. Economic Anthropology: Subsistence Strategies: Hunting and Gathering, Horticulture, Pastoralism, Shifting Cultivation, Agriculture and Peasants, Informal Economy, Poverty, Sustainable Livelihood and Sustainable Development; exchange, and consumption of goods and services in complex societies
35. The major theoretical approaches of political anthropology and or anthropology of power Political Anthropology: and politics; Political processes, such as factionalism, styles of leadership, political rituals. Comparative study of political institutions in simple and complex cultures; race, regional and/ or linguistic groups, state/nationhood, religions and ethnicity and (inter-) ethnic relations, social movements.

36. Population growth; poverty, inequality and justice; Issues of gender and sexuality; warfare (nuclear, biological, imperial) and peace; terror; marginalization and exclusion; epidemic diseases and disaster; social movements
37. Regional Anthropology: South Asia- Religion, Regionalism, nationalism in India.
38. Caste, class and inequalities in India.
39. Fundamentalism, communalism, migration and ethnicity in India, land reforms and panchayet reforms in India
40. Peasant village: Feature, habitation, economy and changes

41. Personal identification from blood groups and skeleton.Paternity diagnosis (brief outline)
42. Genetic counseling-definition, aim and methods. Genetic counselling for thalassemia and haemophilia.
43. Birth defects: Teratogens, Cocaine, Alcohol, Cigar, Ocuupational Hazards
44. Indigenous Religions - myth and ritual, sorcery, witchcraft and divination; animism, animatism, totem and taboo, magic, and shamanism, sacrifice, spirit possession, initiation rituals, witchcraft and other institutionalized principal religions of the World Backward Communities In India
45. Development of Indian tribes - an outline of anthropological studies, distribution according to linguistic groups, economy, geographical region. Sectors, Problems, plans and agencies of development, welfare of the tribes, S.C. and O.B.C. in India, Constitutional provisions and safeguards of the S.C., S.T. and O.B.C.
46. Measure of central tendency- mean, median, mode, standard deviation, standard error of mean
47. Brief history of Indian prehistory; Debates on the classifications and nomenclatures of the prehistoric cultural periods of India. Study of prehistoric cultures from the earliest evidences up to the beginning of historical times on a regional basis.
48. Palaeolithic India - brief outlines of the regional cultures of -North India- Sohan river valley, Beas- Banganga river valley; central India -Narmada valley; Eastern India- Subarnarekha, Tarafeni, Gandheswari river valleys, Mayurbhanj, Keonjhar; South India- Kortalayar river valley; Western India- Nevasa
49. Microlithhic cultures of India - brief outlines of the regional cultures of eastern, central, western and southern India, with reference to teaching the microlithic cultures on regional variability and environmental adaptability, with dates.
50. Neolithic cultures of India - brief outlines of the regional cultures of eastern, central, western, southern, northern and north- east India, with emphasis on regional features and variability; concepts of acculturation and influence of neighbouring areas on the Neolithic artifacts and way of life of the people.

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Syllabus of Physiology for Scientific Assistant 2016 (SA - 16) Recruitment Topics:-

1. **Units of human system** - : Structure and functions of plasma membrane, nucleus and different cell organelles – Endoplasmic reticulum, Golgi bodies, Mitochondria, Lysosome and Peroxisome. Structure, function and classification of Epithelial, Connective, Muscular and Nervous tissues.

2. **Biophysical and Biochemical Principles - :** Physiological importance of the physical processes - Diffusion, Osmosis, Dialysis, Ultrafiltration , Surface tension, Adsorption and Absorption. A brief idea about acids, bases, buffers, indicators. Definition, significance and maintenance of pH in the blood. Definition, classification and physiological importance of Colloids. Definition and classification of Enzymes, factors affecting enzyme action. Concept of coenzymes and isozymes.

3. **Digestive System** - Structure in relation to functions of alimentary cana1 and digestive glands. Composition, functions and regulation of secretion of digestive juices including bile. Digestion and absorption of carbohydrate, protein and lipid. Movements of the stomach and small intestine.

4. **Carbohydrates:** Definition and classification. Monosaccharides – Classification, structure. Chemical reactions of monosaccharides (Glucose & Fructose); Reactions with concentrated mineral acids, alkali, phenylhydrazine and their biochemical importance. Disaccharides – Maltose, Lactose and Sucrose: Structure, occurrence and physiological importance. Polysaccharides – Starch, Glycogen, Dextrin, Cellulose.

5. **Lipids:** Definition and classification. Fatty acids - Classification. Properties of Fat and Fatty acids—Hydrolysis, Saponification,Saponification number, Iodine number, Hydrogenation, Rancidity-Acid number.

6. Phospholipids, Cholesterol and its ester - physiological importance.

7. Amino acids, Peptides and Proteins: Classification and structure. Structure of peptide bonds. Glycolysis, TCA cycle, Glycogenesis, Glycogenolysis; Gluconeogenesis.

8. Fat deposition. Beta oxidation of saturated fatty acid Ketone bodies – formation and significance. Deamination, Transamination. Amino acid pool - fate and functions of amino acids in the body. Formation of urea and its importance.

9. Mineral metabolism - Ca. P, Fe. BMR: definition, factors affecting, determination by Benedict-Roth apparatus.

10. **Nutrition -** Basic constituents of food and their nutritional significance. Vitamins: definition, classification, functions, deficiency symptoms and daily requirements. Hypervitaminosis. Respiratory quotient: definition, factors affecting and significance.Biological value of proteins. Essential and non-essential amino acids, Nitrogen equilibrium. Minimum protein requirement-Positive and negative nitrogen balance. SDA: definition and importance.

11. **Blood** - Composition and functions. Plasma proteins - origin and functions. Plasmapheresis. Bone marrow. Formed elements of blood - their morphology and functions. Erythropoiesis and leucopoiesis. Haemoglobin - different types of compounds and derivatives. Blood volume, its determination (dye and radioisotope method) and regulation. Coagulation of blood - mechanism, factors affecting, procoagulants, anticoagulants and disorders of coagulation.

12. **Body Fluids** - Lymph and tissue fluids - composition, formation and functions.

13. **Cardiovascular Physiology** – Anatomy and histology of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Cardiac cycle: events. Heart sounds. Heart rate. Cardiac output: methods of determination (dye dilution and Fick principle), factors affecting, regulation. Structure of arteries, arterioles, capillaries, venules and veins. Pulse - arterial and venous. Blood pressure, its regulation and controlling factors. Baro- and chemoreceptors. Vasomotor reflexes. Methods of measurement of blood pressure.Peculiarities of regional circulations: coronary, pulmonary, renal, hepatic and cerebral.

14. **Respiratory Physiology** - Anatomy and histology of the respiratory passage and organs. Role of respiratory muscles in breathing. Artificial respiration. Significance of physiological and anatomical dead space. Lung volumes and capacities. Exchange of respiratory gases between lung and blood and between blood and tissues. Transport of oxygen and carbon dioxide in blood. Regulation of respiration - neural and chemical. Hypoxia.

15. **Renal Physiology** - Relationship between structure and functions of kidney. Mechanism of urine formation. Normal and abnormal constituents of urine. Physiology of urine storage and micturition. Renal regulation of acid-base balance. Non-excretory functions of kidney.

16. **Muscle Physiology** - Different types of muscle and their structure. Red and white muscle. Muscular contraction: structural, mechanical and chemical changes in skeletal muscle during contraction and relaxation. Isotonic and isometric contractions. Properties of muscle: all or none law, beneficial effect, summation; refractory period, tetanus, fatigue. A brief idea about the muscle spindle.

17. **Nerve Physiology** - Structure and classification of nerves. Origin and propagation of nerve impulse. Velocity of impulse in different types of nerve fiber. Properties of nerve fibers: all or none law, rheobase and chronaxie, refractory period. indefatiguability. Synapses: structure, different types, mechanism of synaptic transmission. Motor unit. Myoneural junction: structure, mechanism of impulse transmission. Degeneration and regeneration in nerve fibers.

18. **Nervous System** – organization and basic functions - sensory, motor and association of the nervous system, central and peripheral nervous system; ascending tracts carrying touch, kinaesthetic, temperature and pain sensations and Descending tracts: pyramidal tract and brief outline of the extra-pyramidal tracts. Pain - Reflex action - definition, reflex arc, classification, properties. Functions of the spinal cord and brain stem Structure, connections and functions of cerebellum. Different nuclei and functions of thalamus and hypothalamus. Cerebral cortex: histological structure and localization of functions. CSF: composition, formation, circulation and functions. Organization and function of the autonomic (sympathetic and parasympathetic) nervous system. Speech, aphasia, conditioning, learning and memory – a brief idea

19. Classification of general and special senses and their receptors. Receptors as biological transducer.

20. Olfaction and Gustation: Structure of sensory organ, neural pathway of olfactory and gustatory sensation.

21. Physiology of olfactory and gustatory sensation. Olfactory and gustatory adaptation. After-taste.

22. **Audition:** Structure of ear, auditory pathway, mechanism of hearing.

23. **Vision:** Structure of the eye. Histology of retina. Visual pathway. Light reflex. Chemical changes in retina on exposure to light. Accommodation - mechanism and pathway. Errors of refraction. Positive and negative after-image. Light and dark adaptation. Elementary idea of colour vision and colour blindness.

24. Skin and Regulation of Body Temperature: Structure and functions of skin. Insensible and sensible perspiration Regulation of body temperature -- physical and physiological processes involved in it.

25. Physiology of sweat secretion and its regulation.

26. Anatomy of endocrine system. Hormones - classification. Basic concept of regulation of hormone actions. Positive and negative feedback mechanism. Elementary idea of hormone action.

27. **Hypothalamus:** Basic concept of neurohormone. Hypothalamo-hypophyseal tract and portal system. Pituitary: Histological structure, hormones, functions. Hypo and hyperactive states of pituitary gland.

28. **Thyroid:** Histological structure. Functions of thyroid hormones (T4T3) Thyrocalcitonin. Hypo and hyper-active states of thyroid. Parathyroid: Histological structure, functions of parathyroid hormone. Tetany.

29. **Adrenal Cortex:** Histological structure and functions of different hormones. Hypo and hyper-active states of adrenal cortex. Adrenal Medulla: Histological structure and functions of medullary hormones. The relation of adrenal medulla with the sympathetic nervous system.
30. **Pancreas:** Histology of islets of Langerhans. Origin and functions of pancreatic hormones. Diabetes mellitus.
31. Brief idea of the origin and functions of renin-angiotensin, prostaglandins. erythropoietin and melatonin. Elementary idea of gastrointestinal hormone.
32. Primary and accessory sex organs and secondary sex characters. Testis: histology, spermatogenesis, testicular hormones and their functions. Ovary: histology, oogenesis, ovarian hormones and their functions.

33. Oestrus and menstrual cycles and their hormonal control. Fertilization, implantation and structure and functions of placenta. Maintenance of pregnancy – role of hormones. Development of mammary gland and lactation - role of hormones.

34. **Haematology** : Blood groups - ABO and Rh. Blood transfusion - precaution and hazards. Immunological basis of identification of ABO and Rh blood groups. Functions and estimation of haemoglobin. Abnormal haemoglobins - thalassaemia and sickle-cell anaemia. Definition, determination and significance of TC, DC, ESR, Arneth count, PCV, MCV, MHC, MCHC, bleeding time, clotting time and prothrombin time. Anaemia - types (definition and causes). Leucocytosis, leucopenia and leukaemia. Purpura.

35. **Biochemistry and Molecular Biology :** Brief idea of HMP shunt and its significance. Lipoproteins - types and functions. Purine and pyrimidine bases, nucleosides, nucleotides and polynucleotides. Structure of DNA and RNA. Elementary idea of gene, genome, transcription, genetic code, translation and genetic engineering. Pathophysiological significance of the blood constituents-glucose, urea, creatinine, uric acid, cholesterol, bilirubin, SGPT and SGOT, alkaline and acid phosphatases and ketone bodies.

36. **Microbiology and Immunology:** Virus - DNA and RNA virus. Bacteriophage. Bacteria-structure and morphological classification. Gram positive, Gram negative and acid-fast bacteria. Pathogenic and non-pathogenic bacteria - definition with a few examples. Sterilization and Pasteurization. A brief idea of antibiotics. Elementary knowledge of innate and acquired immunity. Humoral and cell mediated immunity Vaccination - principles and importance of immunization. Basic principle of immunological detection of pregnancy.

37. **Social Physiology:** Composition and nutritional value of common Indian foodstuffs – rice, wheat, pulses, egg, meat, fish and milk. Dietary fibers. Calorie requirement. Concept of ACU. Principle of balanced diet formulation of individuals - infants, growing children, students, pregnant women, lactating women and aged persons. Dietary management or obese, diabetic person, hypertensive person and athlete. Diet survey. Malnutrition and its causes - PCM, marasmus, kwashiorkor and their prevention. Iron and iodine deficiency. Population problem and its control. Problem of infertility and brief idea about in vitro fertilization and intrauterine gamete transfer. Brief idea of AIDS and hepatitis B and their preventions

38. **Work Physiology:** Physical work - definition and units of measurement. Concept and classification of physical work – static, dynamic, positive and negative work. Cardiovascular and respiratory changes during physical exercise. Brief idea of maximal aerobic power and excess post-exercise oxygen consumption. Basic idea of doping. EMG. Physical fitness index - Harvard step test. ECG- normal waves and leads. Anthropometry and its uses.

39. **Environmental Physiology:** Environment - its physiological aspects. Effect of extreme temperature on humans. Hypobaric environment - effects on physiological system, acclimatization. Hyperbaric conditions and Caisson disease. Brief idea of cyanosis, dyspnoea, hyperpnoea, apnoea and asphyxia. Some common pollutants and their effects - carbon monoxide, lead and arsenic . Effects of noise on human body and preventive measures.

40. **Biostatistics:** Basic concepts – variable, population, parameter, sample, statistic. Classification of data –qualitative, quantitative, continuous and discontinuous. Presentation of data– frequency distribution, bar diagram, pie diagram, frequency polygon and histogram. Mean, median, mode, standard deviation and standard error.

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West Bengal Staff Selection Commission.

Syllabus of Botany for Scientific Assistant 2016 (SA - 16) Recruitment Topics:-

Plant virus - General characteristics; Transmission and Translocation, Lytic cycle (T4 phase) and Lysogenic cycle (Lambda phage).

1. **Bacteria** - Chemical nature of cell wall of Gram positive and Gram negative bacteria; Genetic recombination in bacteria (Conjugation, Transformation, Transduction) and Economic importance of bacteria.
2. **Algae** - Diagnostic characters and examples of Cyanophyceae, Rhodophyceae, Chlorophyceae, Charophyceae and Phaeophyceae and Economic importance of algae.
3. **Fungi** - Diagnostic characters and examples of Oomycotina, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina; Fungal symbioses: Mycorrhiza, Lichen and their importance and Economic importance of fungi.
4. **Plant Pathology** - Symptoms - necrotic, hypoplastic and hyperplastic, Koch's postulates, Biotrophs, Necrotrophs, Disease triangle, disease cycle and control measures of plant diseases.
5. **Bryophytes** - Amphibian nature; Diagnostic characters and examples of Hepaticopsida, Anthocerotopsida and Bryopsida and Economic importance of bryophytes.
6. **Pteridophytes** - Diagnostic characters and examples of Psilophyta, Lycophyta, Sphenophyta & Filicophyta and Economic importance of pteridophytes.
7. **Gymnosperms** - Diagnostic characters and examples of Progymnosperms, Cycadophyta, Coniferophyta and Gnetophyta and Economic importance of gymnosperms.
8. **Paleobotany** - Geological time scale; Importance of fossil study; Modes of Preservation;
9. **Palynology** – Characteristics of spore and pollen; Applications of palynology.

11.Economic Botany – Scientific names, families, parts used and importance of economically important plants like Cereals (rice, wheat), Pulses (mung, gram), Spices (ginger, cumin), Beverages (tea, coffee), Medicinal Plants (cinchona, neem, ipecac, vasaka), Oil yielding plants (mustard, groundnut, coconut), Vegetables (potato, radish, bottlegourd, cabbage), Fibre yielding plants (cotton, jute), Timber yielding plants (teak, sal), Fruits (mango, apple) and Sugar yielding plant (sugarcane).

12. **Ecology** - Ecotypes and microclimate; Plant succession - stages of succession (hydrosere); Ecological adaptation of hydrophytes, halophytes and xerophytes.

13. **Biodiversity** - Definition, levels of biodiversity (genetic, species and ecosystem); Examples of *in-situ* & *ex-situ* conservation.

14. Angiosperm Morphology – Morphology of Root, Stem and leaf; Modifications of root, stem and leaf; Forms of Corolla and Aestivation; Types of Inflorescence with examples; Types of Placentation with examples.

15. Embryology - Embryo development in Capsella; Endosperm development.

16. Anatomy - Stomata - Types (Metcalfe & Chalk); Mechanical Tissues - Principle and distribution; Stelar types with examples; Normal secondary growth in dicot stem and anomalous secondary growth in stem of *Tecoma* and *Dracaena.*

17.Taxonomy of Angiosperms - Artificial, Natural and Phylogenetic systems of c1assificaiton; Principles of ICBN; 11.3 Bentham and Hooker's system of classification; Diagnostic features of the families- Malvaceae, Leguminosae (Fabaceae), Cucurbitaceae, Solanaceae, Labiatae (Lamiaceae), Acanthaceae, Rubiaceae, Compositae (Asteraceae), Gramineae (Poaceae) and Orchidaceae.

18. Proteins - Primary, secondary and tertiary structure.

19. Nucleic acid- DNA structure, types of RNA.

20. **Enzyme** - Classifications with examples (IUBMB) and Mechanism of action.

21 Transport in plants - ascent of sap and Xylem cavitation; Phloem transport and source-sink relation.

22 Transpiration- Mechanism of stomatal movement and its significance

23 Photosynthesis - Pigments, Action spectra and Enhancement effect; Electron transport system and Photophosphorylation; C3 and C4 photosynthesis; CAM- Reaction and Significance.

24. Respiration- Glycolysis and Krebs cycle with Reactions and Significance; ETS and oxidative phosphorylation.

25. Nitrogen metabolism –Biological dinitrogen fixation; Amino acid synthesis (reductive amination and transamination.

26. Plant Growth regulators – Physiological roles of Auxin, Gibberellin, Cytokinin, Ethylene and ABA.

27. Photoperiodism - Plant types, Role of phytochrome and GA in flowering and Vernalization.

28. Nucleus - Ultrastructure of nuclear envelope, nucleolus and their functions.

29. Chromosome – Molecular Structure and Nucleosome concept.

30. Chromosomal aberrations - Deletion, Duplication, Inversion and Translocation.

31. Aneuploidy and Polyploidy - Types, importance and role in evolution.

32. DNA replication -Mechanism in prokaryote.

33. Transcription and Translation - Mechanism in prokaryote; Processing of mRNA.

34. Genetic Code - Properties.

35. Epistasis – Definition and difference with dominance

36. Linkage - Linkage group and Genetic map (three-point test cross).

37. Mutation - Point mutation; tautomerisation; transition, transversion and frame shift, physical and chemical Mutagen.

38. Split gene and Transposons - Brief concept

39. Plant Breeding - Mass and Pure line selection; Heterosis and hybrid seed production.

40. Biometry - Measures of Central Tendency (Mean, Mode and Median); Goodness of fit (Chi- square test).

41. Plant tissue culture - Callus culture and plant regeneration; Micropropagation; Somatic embryogenesis and Artificial seed; Protoplast culture and its applications.

42. Recombinant DNA Technology - Recombinant DNA, restriction enzymes, plasmids as vector; Basic steps of Gene cloning ; Transgenic plants.

43. Pharmacognosy - Scope and importance of Pharmacognosy; Secondary metabolites - alkaloids, terpenoids, phenolics and their functions; Organoleptic evaluation of crude drugs.

44. Applied Botany – Application, Production and Sources of Biofertilizer; Food value of Mushroom and Cultivation technique of *Pleurotus.*

45. Laboratory Techniques - Sterilization technique by autoclaving; Preparation of PDA medium (slants, pouring of plates); Bacteria staining by simple staining method (methylene blue/crystal violet).

46. Intsrumentation - Acquaintance with laboratory instruments - Autoclave, Incubator, Clinical centrifuge, Analytical balance, pH Meter, Colorimeter, Water bath, Distillation plant.

Sd/-

Secretary-cum-Controller of Examinations,
West Bengal Staff Selection Commission.