

“ May He give the Desire of Your heart and make all your plans succeed” - Psalm20:4

BIO-BOTANY

VOLUME-I

1.LIVING WORLD[Biological classification](4-6bits)

2Marks: Biosphere[1]; Attributes of living world[2]; Homeostasis[3]; Metabolism[3]; Cyclosis[4]; Biological puzzle[4]; Virology[4] Landing and pinning[7]; Transfection[7]; Prophage[8]; Virion[8]; Virioid[8]; Virusooids[8]; Mycophages and Cyanophages[9]; Virus as Bioinsecticides[10]; Enaïma & Anaïma[10]; 3 domains of life [11]; Chromista[12]; Red tide[12]; Bacteriology & animalcules[14]; Nucleiod[14]; Shapes & Flagellation of bacteria[15]; Ultrastructure of Bacterial cell[15]; H.pylori & Bt toxin[16]; Glycocalyx/capsule[16]; Porins[16]; Plasma membrane of Bacteria[16]; Cytoplasm of bacteria[16]; Nucleiod/Genophore[16]; Histones[16]; Plasmid based on function[16]; Mesosomes [17]; Polysomes[17]; Sex pili [17]; Magnetosomes[19]; Retting of fibres[24]; Curing of Tea[24]; Biofilms[25]; Probiotics[25]; Archaeobacteria[25]; Stromalites[26]; Pruteen[26]; Various Archaeobacteria[26]; Cyanophyceae[26]; Endophytic & Symbiotic association of cyanobacteria[26]; Chromoplast/Plasm[26]; Heterocyst[27]; Myxophyceae[27]; Serendipity[29]; Mycology[28]; E.J Butler[29]; Hyphae[29]; Fungal cellulose[29]; Coenocytic mycelium[29]; Plectenchyma[29]; Holomorph[29]; 4 Classes of Fungi[31]; Examples of Zygomycetes[32]; Oomycetes[32]; Examples of Ascomycetes[32]; 4 types of Ascomycetes[33,34]; Sac fungi & Ascomycetes[33]; Ascogenous fungi[33]; Powdery mildew[33]; Ascospore formation[33]; Clamp connection [34]; Doliopore septum[34]; Club fungi[34]; Basidiomycetes example[34]; Fungi Imperfecti[34]; Fungi as Food[35]; Fungi in bakery & Brewery[35]; Fungi in Enzyme production[36]; Aflatoxin[36]; Toad stool[36]; Dermatophytes[37]; Late blight of potato[37]; Lichens[38].

3Marks: Intrinsic and Extrinsic growth[2]; Prokaryotes & Eukaryotes[2]; Sexual and asexual reproduction[2]; consciousness and life[3]; Anabolism & catabolism [3]; Level of organization[4]; Symmetry of virus[5]; Living and nonliving nature of virus[5]; DNA and RNA virus [6]; Prions[9]; Needs of classification[10]; Systems of classification[11]; Merits and demerits of 5 kingdom classification[11]; Robert Koch[14]; Milestone in bacteriology[14]; General characteristic features of Bacteria[14]; Plasmid[16]; Flagella [17]; Steps involved in Gram staining [17]; Binary fission in Bacteria[20]; Endospores[20]; Bacteria in Soil fertility[23]; Bacteria in Antibiotics [23]; Industrial application of Bacteria[23]; Bacterial disease in Plants[24]; Bacterial diseases in Animal[24]; Bacterial disease in Human[25]; Photosynthetic pigments[26]; Vegetative reproduction in Bacteria[27]; Bacteria in SCP, Bloom & Biofertilizer[27]; Pleuropneumonia Like Organism (PPLLO)[27]; Ray fungi[28]; Symbiotic actinobacterium[28]; Antibiotics of Actinomycetes[28]; Milestone in mycology[28]; 3 Steps in Sexual reproduction in Fungi[29]; 8 Subdivisions and 11 classes of Fungi[31]; Zygomycetes[32]; Asexual Spores & Special structure[34]; Fungi in Medicine[35]; Fungi in Industry [35]; Fungi in Agriculture[36]; classify Lichens based on Habitat[38]; Lichens classification based on morphology[38]; Lichens classification based on distribution & its parts[38]; Economic importance of Lichens[39].

5Marks: Milestones in virology[4,5]; Different classes of virus[6]; TMV and its structure[6]; Bacteriophage & its structure[7]; Lytic and lysogenic cycle of Bacteriophage[7]; List of Viral diseases[9]; Comparison of 5 kingdom classification[13]; Differentiate Gram positive & Gram negative bacteria[18]; Respiration in Bacteria[19]; Nutrition in Bacteria [19,20]; Sexual reproduction in bacteria[20-22]; Asexual reproduction in Fungi[30]; Sexual reproduction in Fungi[30]; Diseases caused by Fungi[36]; Mycorrhizae, its importance & its types[37].

2.PLANT KINGDOM(3-4bits)

2Marks: Distribution of Plant groups in India & World[43]; Contribution of M.O Parthasarathy[45]; Red Snow[45]; Epiphytic algae[45]; Halophytic algae[45]; Endozoic algae[45]; Aquatic & fresh water Algae [45]; Algology & Eminent algologist[45]; Cellwall components of algae[45]; Pyrenoids[47]; Reproduction in Algae[47]; 11 classes of Algae by Fritsch[48]; Parts of Thallus [48]; Carpgonium[49]; Kelps [49]; Sea cultivation of algae[49]; Fucoxanthin[49]; Amphibians of plant kingdom/Non-vascular cryptogams[51]; Contributions of Shiv ram Kashyap[51]; Classification of Bryophytes[52]; Peat[52]; Vascular cryptogams[53]; Sporangia[53]; Strobilus[53]; Prothallus[54]; Reproduction in Pteridophytes[54]; Reimer's classification of Pteridophytes[54]; Stele [55]; Eustele & Atactostele [55]; Amber [56]; Naked seeds in gymnosperm and its origin[56]; Secondary growth in Gymnosperm[56]; Sporne's classification of Gymnosperm [57]; Haploid & Triploid endosperm[57,59]; Contribution of Birbal Sahni[59].

3Marks: Classification of Plant kingdom[43]; Types of algae based on Thallus[45]; Vegetative & Asexual reproduction in algae[47,48]; Sexual reproduction in Algae [48]; Economic importance of Bryophytes[52,53]; Economic importance of Pteridophytes[5 4]; Difference between Gymnosperm & Angiosperm[57,58]; Economic importance of Gymnosperm[58]; Fossil plant groups of Plantae[59].

5Marks: Alteration of generation in Plants[44]; Chlorophyceae[48]; Pheophyceae[48,49]; Rhodophyceae[49]; Economic importance of Algae[50]; General characteristics of Bryophytes[51,52]; General characteristics of Pteridophytes[53]; Protostele and its types[55]; Siphonostele and its types[55]; General characteristics of Gymnosperm [57]; Salient features of Angiosperm [59]; Differentiate Dicotyledons and Monocotyledons[60].

3.VEGETATIVE MORPHOLOGY(2-5bits)

2Marks: Plant Morphology[63]; 2 categories of Plant morphology [63]; Vegetative morphology[63]; Breathing root[68]; Prop roots[68]; Stilt root[69]; Clasp root[69]; Buttress root [69]; Epiphytic root[69]; Foliar root [69]; Hausorial root[70]; Photosynthetic roots [70]; Apical & Axillary bud[71]; Extra axillary & Accessory bud [71]; Radical bud[71]; Cauline bud [71]; Foliar bud[71]; Caudex stem[72]; Culm stem[72]; Excurrent stem[72]; Decurrent stem[72]; Creepers[72]; Root climbers[72]; Thorn climbers[73]; Lianas [73]; Corm[75]; Rhizome[75]; Underground Tuberous stem[76]; Monopodial stem[76]; Sympodial stem [76]; Pulvinus [76]; Stipules[77]; Storage leaf[83]; Phyllode [83]; Pitcher[83]; Bladder[83]; Plicate[84]; Dorsiventral leaf [84]; Isobilateral leaf [84].

3Marks: Herbs[64]; Shurbs[64]; Climber[64]; Lianes [64]; Trees [64]; Plant habitant [64]; Parts of Magnoliophytes[65]; Characteristics of Roots[66]; Regions of Root[66]; Taproot [67]; Adventitious root[67]; Functions of roots[67]; Root modification chart[67]; Storage tap roots[68]; Characteristic features of Stem[70]; Primary functions of stem[70]; Secondary function of Root[71]; Specialized buds/ Bulbils[71]; Trailers[72]; Stem climbers[72]; Hook climbers[73]; Tendril climbers[73]; Phylloclade[73]; Cladode [74]; Thorns[74]; Bulb[75]; Characteristics of leaf[76]; Functions of Leaf[76]; Modification of leaf chart[82]; Leaf tendrils[82]; Leaf hooks[82].

5Marks: classify Plant based on Life span[64,65]; Storage adventitious root [68]; Sub aerial modifications of Stem[74]; Structure of leaf[76,77]; Venation[77,78]; Phyllotaxy[78-80]; Ptyxis[83,84]; Leaf duration[84]; Leaf symmetry[84].

4.REPRODUCTIVE MORPHOLOGY

2Marks: Cauliflorous inflorescence[88]; Terminal & Axillary inflorescence[88]; Spike and Spikelet[89]; Catkin[90]; Spadix[90]; Panicle[91]; Corymb[91]; Umbel [91]; Pappus[100]; Petaloid calyx[100]; Bell, urn & Tube shaped calyx[100]; Corolla based on fusion[100]; Lodicule[103]; Ikebena[103]; Parts of stamen[103,104]; Microsporogia[104]; Connation [104]; Introrse & Extrorse[107]; Pistil[107]; Apocarpous & Syncarpous[107]; Simple & Bifid style[108]; Gynobasic & Lateral style[108]; Pistillode[108]; Hypanthium[109]; Pomology[114]; Fruit wall[114]; Berry [114]; Drupe[114]; Pepo[115]; Hesperidium[114]; Pome[115]; Balausta[115]; Dicot & Monocot seed[121]; Endospermous & Non endospermous seed [121].

3Marks: Racemose & Cymose inflorescence[89]; Racemose chart[89]; Involucre[92]; Raof flowers with its functions[95]; Flower sex[95,96]; Arrangement of whorls[97]; Calyx based on fusion [99]; Apopetalous actinomorphic[100]; Papilionaceous corolla[100]; Adelphy[1 Adnation[104,105]; Classify stamens based on length[105]; Classify stamens based on insertion[105]; Classify anthers based on attachment[106]; Classify anther based on dehiscence[106]; Carpels based on the number[107]; Carpels based on number of locules[108]; Stigma and its types[108]; classify ovary based upon position[110]; Floral formula symbols[113]; Man sized inflorescence[113]; Classify fruits based on the formation[114]; Aggregate fruits[117]; Functions of fruit[118]; Dormant seeds[118]; Significance of seeds[121].

5Marks: Main axis elongated racemose inflorescence[89,90]; Main axis shortened racemose inflorescence [91]; Main axis flattened racemose Inflorescence [91,92]; Cymose inflorescence[92,93]; Mixed inflorescence[93,94]; Special type of inflorescence [94]; Plant sex[96]; Flower symmetry[96,97]; Cycle of flowers[97,98]; Merosity [98]; Calyx based on Duration[99]; Sympetalous actinomorphic corolla[101]; Sympetalous zygomorphic corolla[102]; Aestivation and its types[102]; Anther types [105,106]; Extension of the condensed internode of the receptacle [109]; Placentation inside the ovary[111]; Follicles and its types[115,116]; Dry indehiscent fruits[116,117]; Schizocarpic fruits[117]; Mple fruit[118]; Classify types of fruits[119].

5.TAXONOMY AND SYSTEMATIC BOTANY

2Marks: Taxonomy[125]; Systematics[125]; ICBN[127]; Botanical names[128]; Binomial name [129]; Author citation [129]; Steps in Preparation of Herbarium[133]; International Botanic garden[126]; Contribution of Janaki Ammal[136]; APG IV[142]; Cladistics[147]; Needs of cladistics[147,148]; Systematic position of Fabaceae[148]; Floral formula & Diagram of Clitoria ternatea[150]; Medicinal and food plants of fabaceae[152]; Green manuring[153]; Galega officinalis[153]; Systematic position of solanaceae[154]; Floral diagram & Formula of Datura metal [156]; Food plant of Solanaceae[157]; Medicinal plant of solanaceae[157]; Floral diagram & Formula of Solanum nigrum [158]; Systematic position of Liliaceae[159]; Floral diagram & Formula of Allium cepa [161]; Food plant of Liliaceae[162]; Medicinal plant of Liliaceae[162]; State flower of Tamilnadu & its characters[164].

3Marks: Difference between Taxonomy & Systematics[125]; Nomenclature & Eminent Taxonomist[127]; Any 5 roles of Botanical garden[133]; National and International Herbaria[135]; Uses of Herbarium[135]; Kew Herbarium[136]; Sexual system of classification[137]; Natural system of classification[138]; Bicarpellate & Heteromerae[139]; Adolf engler and Karl prantl system of classification [140]; Early angiosperm & its characteristics[142]; Monocots & its characteristics[142]; Eudicots & its characteristics[143]; various disciplines of modern taxonomy[143]; Karyotaxonomy[144]; RFLP [145]; AFLP[145]; RAPD[145]; Significance of Molecular taxonomy[146]; Significance of DNA Barcode[146]; Difference between classical & modern taxonomy [146]; 3 Groups of Cladistics [147]; Pollination in Yucca plant[163].

5Marks: Taxonomy hierarchy [125,126]; Types of species based on process and product of evolution[127]; ICN principles [127,128]; Codes of Nomenclature[128]; Type concept[129,130]; Taxonomical aids[130,131]; Preparation of Herbarium sheets[134]; Bentham and Hooker system of classification[139]; Chemotaxonomy, Characteristics & its Aims[144]; Biosystematics & its Aims[144]; Serotaxonomy & its importance[144]; Molecular taxonomy & its Uses[145].

6.CELL: THE UNIT OF LIFE (4-5bits)

2Marks: Resolution[168]; Numerical aperture[168]; Magnification[168]; Primary & Secondary magnification[169]; Patch stop carrier[169]; Phase plate [169]; Micrometry & its types [171]; Exception to the cell theory[174]; Protoplasm theory[174]; Colloidal nature of Protoplasm[174]; Endosymbiotic theory [177]; Ultrastructure of plant cell [179]; Structure of Plant cell wall [181]; Components of Cell wall[180];

3Marks: Scientist & their contributions[167,168]; Scanning electron microscope[174]; Cell theory[174]; Cell doctrine[174]; Comparison of cell organization[177]; A model of endosymbiotic theory [178]; Primary wall [181]; Secondary wall [181]; Middle lamellae[181]; Plasmodesmata and pits[181];

5Marks: Comparison of Microscope[173]; Important 5 points on Physical property of protoplasm[175]; Differentiate Plant & Animal cell [180];

7.CELL CYCLE(1-3Bits)

2Marks: Contribution of Beneden[201]; Role of Nucleus[202]; Chromatin[202]; Centromere[202]; Chromatids[203]; Homologous pairs[203]; Duration of cell cycle[203]; C-value[203]; Restriction point[204]; Why cells are arrested in G1 stage?[204]; Dolly in connection to G0 phase[204]; G0 phase[204,205]; S phase[205]; MPF[205]; Amitosis[205]; Karyokinesis[205]; cytokinesis[205]; Examples of Amitosis and its drawbacks[206]; Aster[207]; Metaphase plate[207]; APC/C[207]; Draw the mitosis[208]; Cell plate[209]; Synapsis[210]; Bivalent[210]; Crossing over[210]; Chiasmata[210]; Lamp brush chromosome[210]; Termination[210]; Mitosis in Plants and animals[213]; Mitogen[213]; Anastral Amphiastral[213]; Independent assortment[211]; Events in Anaphase I[211]; Events in telophase I[211].

3Marks: Interphase[203]; Closed and open mitosis[206]; Cytokinesis in animal cells[209]; Significance of meiosis[212]; Endomitosis[213].

5Marks: Significance of Mitosis[209]; Difference between Mitosis and meiosis[213]; Cell cycle diagram[214].

8.BIOMOLECULES (1-4bits)

2Marks: Components of cellular mass[218]; Micro & Macro nutrients[218]; Water content & in properties[219]; Lattice formation of H₂O[219]; Morphine[220]; Polymers & macromolecules[220]; Test for starch[223]; Mutualism[225]; Lipids[225]; Saturated & Unsaturated fatty

acids[225,226]; Lecithin[226]; Polypeptides [228]; Amphoteric molecule[228]; Zwitterion & isoelectric point[228]; Formation of dipeptide[228]; Biuret test[232]; Telomerase[238]; Chargaff's rule[241].

3Marks: Primary and secondary metabolites[220]; Monosaccharides & Eg.[221]; Glycosidic bond[222]; Polysaccharide[222]; Storage polysaccharide in plant[222]; Animal Starch[223]; Cellulose [223]; Fungal cellulose[224]; Benedict's test[224]; Membrane lipids[226]; ~~Cholesterol~~[226]; Protein denaturation[230]; Properties of enzymes[232]; Metabolism by enzymes[232]; Activation energy[233]; Lock and key mechanism[233]; Km Value & its significance[234]; Competitive inhibition of enzymes[235]; ~~Non~~competitive inhibition of enzymes[235]; Allosteric enzymes[235]; Uses of enzymes[238]; Nucleotide & Nucleoside[240]; Three forms of DNA[242]; Compare DNA & RNA [240,242]; mRNA[243]; tRNA[243]; rRNA[243].

5Marks: Classify carbohydrates[221]; Various other polysaccharides, Structure & its functions[225]; Classification of aminoacids[229]; Structure of protein[230]; Protein bonding[231]; Factors affecting enzymatic reaction[234]; Enzyme cofactors[236]; Classification of enzymes[237,238]; Features of DNA[241].

VOLUME-II

9.TISSUE AND TISSUE SYSTEM (2-4bits)

2Marks: Contributions of Katherine Esau [1]; Plant anatomy[1]; Tissue[2]; Annular collenchyma[7]; Filliform sclereids[8]; Draw the types of sclereids[8]; Bast fibres[9]; Surface fibres[9]; Mesocarp & Leaf fibres[9]; Leptome[10]; Perforation plate[10]; Vessel gymnosperm & vessels angiosperm[11]; Fibre tracheids[11]; Axial parenchyma[11]; Callose[12]; Sycotic[13]; Collenchyma & Sclerenchyma [15]; Fibre & Sclereids[15]; Tracheids & Fibres[15]; Three Tissue system by Sachs[16]; Histology[16]; Piliferous layer[17]; Cuticle[17]; Stomata[18]; Bulliform cells[18]; Silica cells[18]; Subsidiary cells[18]; Sunken stomata[18]; Trichomes[19]; Trichoblast[19]; Prickles[20]; Passage cells[21]; Albimous cells[21]; Diagram of Vascular bundles[22]; Protoxylem & Metaxylem[23]; Protoxylem & Metaphloem[23]; Primary & Secondary xylem[23]; Primary & Secondary phloem[23]; Caspian strips[24]; Ground plan & T.S of Dicot root[25]; Ground plan & T.S of Monocot root[25]; Starch sheath[27]; Eustele[27]; Bundle cap[28]; Cambium[28]; Ground plan & T.S of Dicot Stem[25]; Protoxylem lacuna[29]; Ground plan & T.S of Monocot stem[25]; Respiratory cavity[31]; Border parenchyma[32]; T.S. of Dicot leaf [32]; T.S of Monocot leaf[33]; Kranz sheath[33]; Guttation[33].

3Marks: Characteristics of Meristematic tissues[2]; Shoot Apical cell theory[3]; Shoot Histogen theory[4]; Shoot Tunica corpus theory[4]; Root apical cell theory[4]; Histogen theory[4]; Korper Kappe theory[5]; Quiescent centre concept[5]; Parenchyma characteristics[5]; Parenchyma types [6]; Collenchyma- characteristics[6]; Types of collenchyma[6]; Fibres in our daily life[9]; Meristematic tissue & Permanent tissue [14]; Sieve cells & Sieve tubes[15]; Types & characteristics of Tissue systems[17]; Functions of Epidermal tissue system[20]; Zones of Fundamental tissue system[20]; Inter & Extra stellar ground tissue[20]; Differentiate Dicot & Monocot roots[26]; Anatomical difference between Dicot stem & Monocot stem[30]; Anatomical difference between Root and Stem[30]; Isobilateral & Dorsiventral leaf[30,31]; Stomata & Hydathodes[34]; Halophiles[34].

5Marks: Classification of meristem[3]; Types of sclereids [7]; Five types of fibres[8,9]; Different types of tissues[14]; Types of vascular bundles[23]; Mesophyll of leaves[31].

10.SECONDARY GROWTH

2Marks: Longitudinal & Latitudinal growth[38]; Intrafascicular & Interfascicular cambium[39]; Storied cambium[40]; Non storied cambium[40]; Porous wood & Non porous wood[41]; Annual rings of Tropica, temperate, desert and seashore regions[44]; Structure of a wood[45]; Tyloses[46]; Tyloids[46]; C.S of Wood showing annual rings[47]; Haematoxylin[47]; Canada balsam[47]; Periderm[48]; Cork[48]; Phellem & Phelloids[48,49]; C.S of Periderm[49]; Rhytidome[49]; Polyderm[49]; Structure of Lenticel[51]; Quinine & Terpentine[51].

3Marks: Fusiform initials & Ray initials [39,40]; Growth rings[44]; Pseudo growth rings[44]; Importance of studying Growth rings[44]; Dendrochronology[44]; Spring wood & Autumn wood[45]; Diffuse & Ring porous wood[46]; Sapwood & Heart wood[47]; Phellogen[49]; Differentiate Phellem & Phelloderm[49]; Vascular cambium & Cork cambium[50]; Lenticels[51]; Secondary growth in dicot stem & dicot root[53].

11.TRANSPORT IN PLANTS (1-2bits)

2Marks: Long distance & Short distance transport[58]; Passive & Active transport[58,59]; Cell to cell transport Chart[59]; Diffusion[59]; Semipermeable & Selective permeable[60]; Facilitated diffusion[60]; Aquaporin[61]; Compare & Contrast Co-transport & Counter transport[62]; Prove the Power of imbibition[63]; Turgor pressure[65]; Wall Pressure[65]; Osmosis[65]; Cavitation/Embolism[73]; Transpiration pull[73]; Rate of transpiration in some plants[75]; Guard cells[76]; Theories of Stomatal movement[76]; Epithem[80].

3Marks: Characteristics & Significance of Diffusion[59,60]; On basis of handling of molecule & direction of transport [61,62]; Imbibition, example and Significance[63]; Suction pressure[65]; Hypertonic, Hypotonic & Isotonic[65]; Thistle funnel experiment[66]; Types of osmosis[66]; Potato osmoscope[67]; Reverse osmosis & its uses[67]; Movement of Water in osmotic system[70]; Difference between active & passive absorption[71]; Ascent of sap[71]; Theory of photosynthesis in guard cells[76]; Anti-transpirants & its uses[79,80]; Significance of Transpiration[81]; Ringing experiment[81]; Direction of translocation[82]; Source and Sink[82]; Phloem loading[82]; Why plants transport sucrose not as starch[82]; Phloem unloading[83]; Activated diffusion theory[83]; Electro osmotic theory[83]; Cytochrome pump theory[86]; Protein Lecithin theory[87]; Donnan equilibrium[87].

5Marks: Channel protein[61]; Carrier Protein[61,62]; Water potential and correlating factors[64]; Osmotic pressure & Osmotic potential[64]; Plasmolysis & deplasmolysis[66,67,68]; Path of water across root cells[68]; Mechanism of water absorption[69,70]; Vital force theories & Objections[72]; Root pressure theory[72,73]; Transpiration & Types[75]; Starch sugar interconversion theory & its objection[76,77]; Theory of K⁺ transport[77,78]; Factors affecting transpiration[78,79]; Ganong's potometer & Cobalt chloride paper method[80]; Munch mass flow hypothesis [83,84]; Explain any two passive & Active mineral absorption[85].

12.MINERAL NUTRITION (1-2bits)

2Marks: Role of silicon[92]; Actively mobile elements[92]; Relatively immobile minerals[92]; NPK fertilizer[94]; Siderophores[94]; Critical concentration[95,96]; Manganese toxicity[96]; Aluminium toxicity[96]; Iron & Manganese toxicity[97]; Plants & prokaryotes in Nitrogen fixation[99]; Non symbiotic nitrogen fixation[99]; Leghaemoglobin[99].

Mithun Kumar M M.Sc., MBA, B.Ed., M.A., M.Sc., BIOLOGY NEET TRAINER @ CE ACADEMY, 8124349888 (Call If any queries)

3Marks: Floating treatment wetland[90]; Arnon & Stout criteria for Essential elements[91]; Mineral types[92]; Role of nitrogen & its deficiency[93]; Role of phosphorus & its deficiency symptoms[93]; Role of K⁺ and its deficiency symptoms[93]; Role of Ca²⁺ & its deficiency symptoms[93]; Role of Mg²⁺ & deficiency symptoms[93]; Role of S and deficiency symptoms[93]; EDTA[94]; Role of Fe & its deficiency[94]; Role of Mn²⁺ & its deficiency[94]; Role of Cu²⁺ & its deficiency[94]; Role of Zn²⁺ & its deficiency[95]; Role of B & its deficiency symptoms[95]; Role of Mo & its deficiency[95]; Role of Ni & its deficiency[95]; Stages of root nodules formation[98]; Saprophytic mode of nutrition[102]; Total parasitic plant[102]; Partial parasitic plant[102]; Symbiotic mode of nutrition[103].

5Marks: Classification of mineral based on their functions[92,93]; Mineral Deficiency diseases & its symptoms[96]; Hydroponics & Aeroponics[97]; Nitrogen fixation & its types[98]; Nitrogen Cycle[99,100]; Nitrogen metabolism[100-102]; Insectivorous mode of nutrition[103].

13.PHOTOSYNTHESIS (1-3bits)

2Marks: Define photosynthesis[109]; Why Photosynthesis is redox reaction?[109,110]; Carotenes[113,114]; Anthophylls[114]; Phycobilins[114]; Paper chromatography[113]; Quantasomes[115]; Dark reaction[125]; RUBISCO[127]; C4 cycle[127]; Significance of C4 cycle[130]; Why C4 is more efficient than C3?[130]; Significance of CAM cycle[131]; Significance of Photorespiration[132]; Compensation point[132]; Law of Limiting factor[133]; Factors affecting photosynthesis[133]; PAR[133]; Warburg effect[134]; Bacterial photosynthetic pigments[135]; Symbiotic bacteria[136].

3Marks: Significance of photosynthesis[110]; Various photosynthetic pigments[111]; Structure of Chlorophyll molecule [111,112]; Biosynthesis of Chlorophyll molecule[112]; Comparison of chlorophyll a with other pigments[112,113]; Shield pigments[113]; Properties of light[115]; Flashing light experiment[115]; Absorption spectrum[116]; Action spectrum[116]; Emerson's first effect[116]; Emerson's enhancement effect[117]; Conclusion of Hill's reaction[117]; Photophosphorylation[118]; Fluorescence[118]; Phosphorescence[119]; PSI and PSII[120]; OEC[120]; Water oxidizing clock[120]; Oxidative phosphorylation & Photophosphorylation [121,122]; Cyclic photophosphorylation chart[122]; Non cyclic photophosphorylation chart[123]; Bioenergetics of Light reaction[123]; Difference between Cyclic & non cyclic photophosphorylation[124]; Hatch & Slack pathway chart[128]; Kranz anatomy[129]; CAM cycle[130]; Photorespiration chart[131]; Wilmott's bubbler experiment[135]; Test tube fun experiment[135]; Photosynthesis in plant and Bacteria[136].

5Marks: Site of photosynthesis[110,111]; Modern concept of light and dark reaction[117,118]; Photosystem and reaction centre[119,120]; ETC in each PS complexes[121]; Chemiosmotic theory[124]; Dark reaction chart[126]; C3 and C4 Difference[129]; Photorespiration & Dark respiration[132]; Effect of light and temperature on photosynthesis[134]; Internal factors affecting photosynthesis[135,136].

14.RESPIRATION (1-2bits)

2Marks: Respiration[140]; Blackman's Respiration types[140]; ATP structure[141]; Stages of respiration[142]; Energy budget of glycolysis[145]; Two phases of glycolysis[145]; Structure of mitochondrion[146]; Substrate level phosphorylation[146]; Overall reaction of reaction & Krebs' cycle[148]; Gluconeogenesis[149]; Oxidative phosphorylation[150]; Difference in ETC when compare to Photosynthetic ETC[150]; Recent review on ATP production in ETC[151]; ETC inhibitors[151]; Climacteric fruits[151]; Cyanide resistant respiration[152]; Define RQ[152]; Net gain of ATP from 1 glucose molecule[152]; Significance of RQ[153]; RQ of some substance[153]; Anthocyanin in Climacteric fruits[153]; Mixed acid fermentation[156]; Characteristics of Anaerobic fermentation[156]; Difference between Glycolysis & fermentation[156]; ATP production in Glycolysis & Anaerobic respiration[156].

3Marks: Compensation point[140,141]; Energy currency of cell[141]; Redox reaction[141]; Types of respiration[142]; Difference between aerobic respiration & Anaerobic respiration[143]; Overall stages of respiration[143]; Link reaction[146]; Alternative substrate for respiration[148]; Significance of Krebs' Cycle[149]; Amphibolic pathway[149]; Ganong's respiroscope[153,154]; Fermentation & its types[154]; Difference between Alcoholic and Lactic acid fermentation[155]; Kuhne's fermentation experiment[156].

5Marks: Glycolysis chart[144]; Krebs' cycle[147]; Chemiosmotic theory in ETC[149,150]; RQ and 5 substrate equation with values[152,153]; Factors affecting Respiration[157]; Pentose phosphate pathway and its significance[158-160].

15. PLANT GROWTH AND DEVELOPMENT (2-4bits)

2Marks: Open and closed form of growth [163,164]; Peculiarity of growth in saguaro & Bamboos[163]; Indication of growth[164]; Absolute and relative growth rate[167]; Differentiation[170]; Dedifferentiation[170]; Redifferentiation[170]; Plasticity[170]; Phytohormones[170]; Classify plant growth regulators[171]; Types of Auxin[172]; Anti-Auxins[172]; Agent Orange[173]; Apical dominance[173]; Bolting[174]; Richmond lang effect[176]; Photoperiodism[179]; Critical day length[179]; FLorigen[180]; Importance of Photoperiodism[180]; Vernalization[182]; Vernalin[182]; Practical application of Vernalization[183]; Seed Dormancy[184]; Senescence[185]; Phytochronology[185].

3Marks: Characteristics of growth[163,164]; Growth of Embryo[167]; Internal Factor controls growth[168]; Arc auxanometer[169]; Characteristics of Phytohormones[171]; Synergetic and Antagonist effect of Phytohormones[171]; Avena curvature test[172,173]; Physiological effects of Auxin[173]; Agricultural applications of Auxin[174]; Agricultural application of Gaseous phytohormones[176]; Climacteric and Non Climacteric fruits[178]; Agricultural role of ABA[179]; Long day and Short day plant[179]; Short day and Long short day plant[179]; Intermediate and Day neutral plant[180]; Photoperiodic induction[180]; Phytochrome[180,182]; Epigeal and Hypogeal germination[183]; Physiology of Senescence[185,186]; Factors affecting senescence[186]; PCD [186]; Abscission[186]; Abscission zone[187]; Significance of Abscission[187].

5Marks: Phases of growth[164]; Kinetics of growth[165]; Arithmetic growth rate[165,166]; Geometric growth rate[166,167]; External factor controls the Growth[168]; Discovery, Occurrence, Chemical structure, Transportation, Precursor, Bioassay and Physiological effects of Auxin[171-173]; Discovery, Occurrence, Chemical structure, Transportation Precursor, Bioassay and Physiological effects of Gibberellin[174-175]; Discovery, Occurrence, Chemical structure, Transportation Precursor, Bioassay and Physiological effects of Cytokinin[175-176]; Discovery, Occurrence, Chemical structure, Transportation Precursor, Bioassay and Physiological effects of Ethylene[176]; Discovery, Occurrence, Chemical structure, Transportation Precursor, Bioassay and Physiological effects of ABA[178]; Photoperiodism in plants[181]; Vernalization[182,183]; Seed germination[183,184]; Methods of Breaking dormancy[184]; Types of Senescence[185].

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“Commit to the lord whatever you do, and he will establish your plans”-Pro16:3

BIO-ZOOLOGY VOLUME-I

1.THE LIVING WORLD(1-2bits)

2marks: Biodiversity[11]; Taxonomy [11]; Basic needs for classification [11]; Systematic [11]; Cladistics/cladogram [13]; Taq Polymerase [14]; Extremophile [14]; Curd as Probiotics [15]; Cavalier-Smith classification[15]; Taxonomic hierarchy [16]; Species[17]; Interspecific cross [17]; monotypic genus[17]; Polytypic genus [17]; Taxonomical keys[21]; Museum [21]; Zoological Marine parks [21].

3Marks: Three domains [14]; Five kingdom classification[15]; Systematics of Human [17]; Family [18]; Order[18]; Phylum[18]; family [18]; Binomial nomenclature [19]; Trinomial Nomenclature [19].

5Marks: Rules of nomenclature [20]; Molecular taxonomical tools[21]; Automated species identification tools [21]

2.KINGDOM ANIMALIA(3-4bits)

2marks: Cellular level organization [19]; Tissue level organization[19]; Organ level organization [19]; Open & closed type circulation [19]; Incomplete and complete digestive system[19]; Metamerism [22]; Notochord[22]; Parazoa and Eumetazoa [23]; Canal system/Ostia/Spongocoel [24]; Chaonocytes/ Collar cells[24]; Larva and Eg. of Porifers [24]; Cnidoblast [25]; Coelentron [25]; Metagenesis [25]; Larva and eg. of Cnidaria [25]; Comb jellies [25-26]; Lasso cells / Colloblast [26]; Larva and Eg. of Ctenophora[26]; Flame cells/Solenocytes[26]; Larval stages and Eg of Platyhelminthes [26,27]; Rennet glands [27]; Examples of Aschelminthes [27]; Hydrostatic skeleton [27]; Larva and examples of Annelida[28]; Ecdysis/Moulting [29]; Haemocoel [29]; Sensory & Excretion of Arthropoda [29]; Examples of Arthropoda[29]; Ctenidia [29];Marbled cone snail[30]; Osphradium and Radula [30]; Larva and Examples of Mollusca [30]; Ambulacral system [30]; Examples of Echinodermata [31]; Acorn worms [31];Larva and examples of Hemichordata [31]; Cleidoic eggs and its membrane [37]; Tortoise Vs Turtles [38]; Pneumatic bones and flight muscles [39]; Homobatrachotoxin [39]; Regeneration & Eg.[46]; Autonomy & Eg. [46] Mesentery [46]

3Marks:Diploblastic and triploblastic animals [20]; Pseudocoelom [21]; Eucoelom[21]; Schizocoelomates & Enterocoelomates [22]; Grades of Eumetazoa [23]; Divisions of Bilateria [24]; Polyp and medusa [25] Compare the excretion all phylum; Chordates and non chordates [32]; Classify Phylum chordata [33]; Characteristic features of Urochordata[32,34]; Characteristic features of Cephalochordata[34]; Differentiate Agnatha and gnathostomata [35]; Features of Chondrichthyes [35]; Features of Osteichthyes [36]; Contributions of Salim ali[43].

5Marks: Patterns of symmetry[20]; Three fundamental and distinct features of Chordata [32]; Important characters of Class: Amphibia [37]; Characteristic features of Reptilia [37]; Important features of Class: Mammalia [40]

3.TISSUES LEVEL OF ORGANIZATION(1-2bits)

2Marks: Tissues [49]; Histology [49]; Classify animal tissues [50]; 4 Basic tissue types [51]; Epithelial tissues & its function [51]; Squamous epithelium [51]; Cuboidal epithelium [51]; Microvilli and Goblet cells [52]; Classify Glandular epithelium [52]; Epithelial tissue disorder [52]; Classify Connective tissues[54]; Tissue fluid [54]; Fat cell [55]; Compare white and brown [55]; Palmaris muscles [59];

3Marks: Functions of compound Epithelium [53]; Location of Stratified (Squamous, Cuboidal and Columnar) epithelium [53]; Types of junctions [54]; Connective tissues and Its functions [54]; Components of connective tissues [54]; Reticular connective tissues [55]; Locations of Elastic connective tissues [55,56]; Compare the Bones and cartilage [56,57]; Fluid connective tissue [58]; Biopsy and Autopsy [58]; Diseases of Nervous system [59];

5Marks: Dense regular and Dense irregular Connective tissues [55]; Heritable type & Autoimmune disorders of connective tissue[58]; Compare the 3 types of Muscles [58,59]

4.ORGAN AND ORGAN SYSTEMS IN ANIMALS

2Marks: Why Earthworm is friends of farmers?[64]; Taxonomy of earthworm[65]; Metamerites [65]; Clitellum [66]; Prostomium, peristomium and Pygidium [66]; Body setae [66]; Intestinal caeca [69]; Worm castings or Vermicasts[69]; Lateral heart/Commissural vessels [69]; Nephrostome & its segments[71]; Chlorogogen cells [71]; Protandry [72]; Journey of Spermatozoa in earthworm [72] Regeneration in Earthworm [73]; Spermathecae & Spermatophores [73,72]; Vermitech[74]; Vermiculture [74]; Vermiwash & Vermicompost [74]; Wormery/Wrombin [74]; Taxonomy of Cockroach[74]; Podomeres/Tarsomeres [75]; Mouth of Cockroach [75];Gonopophysis[76]; Crop and gizzard [77]; Hepatic/enteric caecae [77]; Malpighian tubules [77]; Ostia [78]; Alary muscles [79]; Pulsatile vesicle [79]; Organs of Nervous system in cockroach [79]; Ommatidia[80]; Spermatophore travel in Cockroach [81]; Utricular gland[82]; Phallomeres [82]; Ootheca [82]; Taxonomy of

Frog [83]; Order: Anura [84]; Nictitating membrane [85]; Nuptial pad [85]; Teeth of frog [86]; Sinus vinosus & Truncus arteriosus[88]; Articular membrane [94];Elytra[94]; Cocoon[94]; Typhlosole [95];

3Marks: Epigeics, Aneics and Endogeics [65]; Coelum and Hydrostatic skeleton [67]; How Earthworm Crawls?[68]; How do earthworm sense without ear/eyes?[70]; Three types of Nephridia [70,71]; Life cycle of Lampito mauritii [73]; Phase I and Phase II development of Earthworm[74]; Sclerites [75]; Spiracles [78]; Sensory receptors in cockroach [79]; Parametabolous & Ecdysis [82]; Oviparous cockroach [82]; Compare Frog and toad [84]; Compare Anus and Cloaca [86]; Digestive pathway of Frog [86]; Classify the Nervous system of Frog [89,90]; Metamorphosis of Frog cycle [91]; Economic importance of frog [91];

5Marks: Compare the Lampito mauritii & Metaphire posthuma [67]; Sexual dimorphism in Cockroach [77]; Respiration in Frog [88]

5.DIGESTIVE SYSTEM(1-2bits)

2Marks: Thecodont[99]; Diphyodont [99]; Heterodont [99]; Tartar [99]; Gingivitis[99]; GERD[100]; Gastric rugae [100]; Peyer's patches [101]; Brunner's gland & Crypts of Leiberkuhn [101]; Vermiform appendix [101]; Haustra [101]; Haemorrhoids [102]; Glisson's capsule[104]; Sphincter of oddi [104]; Deglutition[105]; Chyme [105]; Role of bicarbonates [106];Enterokinase[106]; Lactose intolerance [107]; Caloric value of Carbohydrates, Proteins and Fats [110,111]; Egestion [110]; Marasmas and Kwashiorkor [111]; Sphincter of Boydon[117]; Ampulla of Vater & falciform ligament[117]

3Marks: Salivary glands [103]; Gastric glands [103]; Pancreas [105]; Succus entericus [107]; Digestion of Carbohydrate[105-107]; Digestion of Protein [105-107]; Digestion of fat [105-107]; Indigestion and constipation [111]; Jaundice[112]; Liver cirrhosis [112]; Gall stones [112]; Appendicitis [112]; Peptic ulcer[113]

5Marks: Histology of gut [102];Hiatus hernia[112]; Diarrhoea[112]; Obesity [113]; Test for Starch, Glucose and Protein [113]; Accessory digestive glands [115]; Alimentary canal-Functions and Secretion [115]

6.BREATHING & EXCHANGE OF GASES (RESPIRATION)[2-3bits]

2Marks: Respiratory zone [121]; Diffusion membrane of Alveoli [122]; Surfactant [124]; Pleura [124]; Dead space [127]; Nitrogen Necrosis [131]; Acute mountain sickness [131]; Asthma [132]; Emphysema [132]; Bronchitis [132] Pneumonia [132]; Tuberculosis [132]; Pulmonary Embolism and Edema [133]; Atelectasis [133]

3Marks: Respiratory functions [121]; Characteristic features of respiration [124]; Steps involved in Respiration [124]; Why do some people snore?[125]; Exchange of Gases in lungs [128]; Haemoglobin [128]; Methaemoglobin [128,129]; Occupational respiratory disorders [132]; COPD [134]; Respiratory pathways [137]

5Marks: Mechanism of breathing [125]; Respiratory volumes [126,127]; Respiratory capacities [127]; Transport of oxygen [129]; Transport of carbondioxide [129,130]; Compare Inspiration and Expiration [130]; Regulation of respiration[131]; Evil effects of smoking [132]

7.BODY FLUIDS AND CIRCULATION(2-3bits)

2Marks:Extracellular fluids [143,144]; Formed elements [145]; Haematocrit [145]; Monocytes [146]; Antigen & Antibodies of RBC [147]; Rhocum[147]; Serum[148,149]; Heparin [149]; Lymph [149]; Why abdominal cramp happens after doing exercise after meal?[152]; Law of laplace[152]; Heart wall [153]; Location and weight of heart [153]; valves of heart [153]; Tuberculae corneae & Chordae tendinae [153]; Systole and diastole[155]; Lub and Dub sound [156]; Isovolumetric contraction [156]; Tachycardia and Bradycardia(Arrhythmia)[156]; CO[156]; SV[156];- Frank Starling law and its role [156,157]; Sphygmomanometre[157]; Baroreceptor reflex[157]; Orthostatic reflex[157]; Hypertension [161]; CHD[161]; Stroke[161]; Angina pectoris [161]; Varicose veins [161]; Embolism [161]; Aneurysm [161]; RHD [162]; Cardiomyopathy [163]; Pericarditis [163]; Bundle of His[167]; Papillary muscles[167]; Purkinje fibres[167].

3Marks: Composition of fluid [144]; Four Plasma proteins [144]; Blood supply to Liver [144]; Erythroblastosis Foetalis [147]; Layers of Blood vessels [150]; Anastomoses [150]; Differentiate artery and vein [150,151];capillaries [150]; Coronary artery [152]; Open and closed circulatory system [152]; Single and double pumping circulation [152]; Myogenic and Pacemaker[153]; EDV and ESV [156]; Regulation of cardiac activity[161]; Myocardial infarction [162]; CPR[162].

5Marks: Erythrocytes [145]; WBC [145,146]; ABO blood groupings[147]; Coagulation of blood [148] Composition of lymph and its functions [149]; Origin and conduction of heart beat[153,154]; Cardiac cycle [156]; ECG[157,158]; Double circulation [158-160].

VOLUME-II

8.EXCRETORY PRODUCTS AND THEIR ELIMINATION(EXCRETION)[2-3bits]

2Marks: Excretion[2]; Osmotic regulation[2]; Osmotic homeostasis[2]; Osmoconformers[2]; Osmoregulators[2]; Euryhaline and Stenohaline[2]; Nitrogenous waste products[2]; Excretory products in different group of animals[3]; Bertini[4]; Hilum[4]; Calyces[4]; Pelvis [5]; Renal corpuscle[5]; Filtration slits[5]; Cortical and juxtamedullary nephron[7]; Vasa recta[9]; Aquaporins [12]; Osmolarity [12]; Podocytes[23];

3Marks: Ammonoteles [2]; Ureoteles [3]; Excretory structures in various organism [3]; Hyperosmotic and Hypoosmotic urine[3]; Detrusor muscle[3]; Peritubular capillaries[7]; Ornithine cycle[9]; Renal clearance [10]; Counter current multiplier [12,13]; Counter current exchanger[14]; ANF[16]; Kidney failure [17,18]; Uremia [18]; Renal calculi [18]; Glomerulonephritis [18]; Haemodialysis [18]; Kidney transplantation [19]; First Kidney transplantation [19].

5Marks: Structure of Kidney[4]; Structure of Nephron[5]; Glomerular filtration [9,10]; Tubular reabsorption[11]; Counter current mechanism[13,14]; ADH and Diabetes insipidus[14,15]; RAAS pathway[16]; Micturition[16,17]; Role of other organs in excretion [17]; Urinary tract infection [17].

9.LOCOMOTION AND MOVEMENT(2-3bits)

2Marks: Locomotion[27]; Tendon, Fascicle and Myofibrils[28]; Sarcoplasm [28]; Myoglobin [28]; Glycosomes [28]; Sarcomere[29]; Thick and thin filaments[29]; T-tubules [29]; Hydrostatic skeleton [36]; Exoskeleton[36]; Endoskeleton[36]; Human skeletal system[36,37]; Sternum[38]; Collar bone[39]; Acromion[40]; Glenoid cavity[40]; Olecranon process[40]; Carpal tunnel[40]; Pubic symphysis[41]; Patella[41]; Acetabulum[41]; Medullary cavity[41]; Metaphysis[42]; Periosteum[42]; Osteoblast & Osteoclast[42]; Endosteum [42]; Epiphyseal plate[42]; Synarthroses[42]; Amphiarthroses[42]; Diarthroses[45]; Types of Synovial joint[45,46]; Tetany[46]; Atrophy[46]; Muscle pull[46]; Muscular dystrophy[46]; Myasthenia gravis[46]; Osteoporosis[47].

3Marks: Types of movement [28]; Types of Muscle[28]; Coverings of in muscle[28]; A and I band[28]; H zone and Z disc [29]; SMGA[34]; Schematic presentation of muscle contraction[34]; Isotonic and Isometric contraction[35]; Red and White muscle fibres[35]; Oxidative and glycolytic fibres[35]; Functions of skeletal system[37]; Rib cage[38,39]; Arthritis[46,47]; Benefits of regular exercise[47].

5Marks: Contractile proteins[30,31]; Cross bridge cycle muscle contraction[32]; Sliding filament hypothesis [33]; Axial skeletal (name, numbers & location)[37,38]; Appendicular skeleton(name, numbers & location)[39,41]; Structure of typical long bone[41,42]; Types of joints[42,45]; Bones of skeletal system[43].

10.NEURAL CONTROL AND COORDINATION(2-3bits)

2Marks: Neuron[54]; Neuroglia[54]; Glial cells [54]; Neurilemma [54]; Nissl's granules [55]; Axon hillock[55]; Schwann cells [55]; Myelin sheath [55]; 'Neuron, the longest cell of human body' justify [55]; Nodes of Ranvier[56]; Synaptic knob[56]; Graph of action potential [58]; Action membrane potential[59]; Threshold potential [59]; All or none phenomenon[59]; Spike potential[59]; Lazy gates[59]; Saltatory conduction[59]; Synapse[59]; Synaptic cleft [60]; Exocytosis [60]; Neurotransmitters[60]; Basal nuclei [61]; Cerebral cortex[61]; Sulci and Gyri[61]; Blood brain barrier[62]; Corpus callosum[63]; Association area[63]; Choroid plexus[63]; Pineal body [63]; Functions of brain lobes [63]; Depression [64]; Infundibulum [64]; Mammillary bodies[64]; Brain stem[64]; Corpora quadrigemina [65]; Cerebral peduncles [65]; Scapular girdle[65]; Aqueduct of Sylvius[65]; C.S of spinal cord [66]; Grey matter of Spinal cord[66]; Two tracts at white matter of spinal cord [66]; Two enlargements of Spinal cord [66,67]; Reflex Arc [67]; Extrinsic muscles at eyes[71]; Aqueous humor [72]; Eye lens[72]; Layers of Eye[72]; Canal of Schlemm[72]; Conjunctivitis & Sty[72]; Accommodation[73]; Macula lutea[74]; Blind spot[74]; 'Graft rejection not seen in cornea'-Reason[74]; Path of sound waves[76]; Ceruminous gland[76]; Stereocilia[77]; Eustachian tube[77]; Tectorial membrane[77]; Round & Oval window[77]; Basilar & Reisner's membrane[77]; Conductive deafness[78]; Sensory neural deafness[78]; Decibel[78]; Vestibular system[79]; Maculae[79]; Otoliths[79]; Ampulla[79] Fig. Organ of equilibrium [78]; Structure of macula[79]; Papillae[80]; Gustatory hairs [81]; Pacinian corpuscles[82]; Meissner's corpuscles[82]; Vitiligo[82].

3Marks: Basic function of neuron[54]; Functional classes of neurons[54]; Classify neuron based upon the number of axon and dendrites [56]; ICF and ECF[56]; Ionic channels in the axolemma[57]; Resting potential[57]; Sodium and potassium pump[58]; Reversal of polarity [59]; Falling phase[59]; Hyperpolarisation [59]; Cranial meninges [61]; Vital functions of medulla oblongata[62]; Functions of limbic system[62]; Areas of cerebral cortex[62]; Epithalamus[63]; Hypothalamus[64]; Limbic system [64]; Cerebellum [65]; Pons varoli [65]; Medulla oblongata [65]; CSF[65]; Cauda equine [66]; Functional components of Reflex arc [67]; Somatic nervous system[69]; Sympathetic & Parasympathetic nervous system[70]; Types of receptors[71]; Glands at eyes[71]; Cornea[72]; Mechanism of vision[74]; Visual pigments[74]; Rods and cones[75]; Outer ear[76]; Middle ear[76,77]; Inner ear[77]; Organ of Corti [77]; Olfactory receptors [80]; Gustatory receptors[80]; Receptors in skin[82].

5Marks: Two kinds of reflexes [67,68]; Cranial nerves and its function[68]; Peripheral nervous system[68,69]; ANS and its components[69]; Receptor based on their locations[71]; Choroid [72,73]; Retina[73,74]; Refractive errors of eye[74]; Mechanism of hearing[77,78]; Organ of equilibrium[78,79].

11.CHEMICAL COORDINATION AND INTEGRATION(2-3bits)

2Marks: Hormones [90]; Homeostasis [91]; Chemical nature of hormones[92]; Sella turcica[94]; Rathke's pouch[94]; MSH[94]; Diabetes insipidus[95]; Oxytocin [95]; Melatonin in Circadian rhythm[96]; Isthmus [96]; Acini[96]; Sporadic goiter[97]; Iodine requirement for Thyroxine[97]; Functions of TCT[97]; Functions of T4[97]; Cells of parathyroid gland[97]; Old age people are sick often, why?[98]; Oral intake of insulin not possible, Why?[101]; ANF[103]; Renin[103]; Erythropoietin[103]; Calcitriol[103]; CCK[103]; Gastrin and Secretin[103]; Dwarfism[103]; Gigantism[104]; Acromegaly[104]; Cretinism[105]; Gull's Disease[105]; Thyrotoxicosis[105]; Simple goiter[105]; Tetany[105]; Hyperparathyroidism[106]; Addison's disease[106]; Cushing's syndrome[106]; Hypoglycemia[106]; Normal glucose level[106]; 'Alcohol consumption leads to infertility in male'-Why?[108]; BMR[110]; Why Steroid intake should be curtailed?[110]; Acidosis[113].

3Marks: Exclusive & Partial endocrine glands[92]; Hypothalamic hypophyseal portal blood vessels and axis[92]; Hypothalamic hormones & its functions[93]; GH[94]; TSH[94]; ACTH[94]; FSH[95]; LH[95]; LTH[95]; ADH[95]; Amino acid sequence of ADH & oxytocin[95]; Pineal gland [96]; Follicular and C cells of Thyroid gland[97]; Hypercalcemic hormone[98]; Thymus gland[98]; Zones of Adrenal glands[98]; Catecholamines[98]; Glucocorticoids & Mineralocorticoids[99]; 3F hormone[100]; Composite gland[100]; Insulin & its $T_{1/2}$ life [101]; Glucagon[101]; GI tract hormones[103]; Diabetes mellitus & insipidus[108,109].

5Marks: Testis & its hormone[101]; Ovarian hormone[101,103]; Mechanism of hormone action[108,109].

12.TRENDS IN ECONOMIC ZOOLOGY(1-2bits)

2Marks: Classify animals based on economic importance[117]; Biological indicator of soil fertility[117]; Vermiculture[117]; Vermitech[117]; Drilospheres[120]; Vermiwash[120]; Silk road[121]; Fig. Life cycle of Bombyx mori[123]; IMRE[125]; BmNPV[125]; Apiculture[126]; 5 types of Honey bee[126]; Nuptial fight[126]; Brood cells[127]; Propolis[129]; Life cycle of Lac insects[130]; Lac culture[130]; Swarming[130]; 3 host plants of lac insect [130]; Hyperparasitism [131]; Aquaponics[131]; Deep water culture[131]; Media based method[131]; Nutrient film technique[131]; Aqua verticala[131,132]; Aquaculture[133]; Aquaculture on basis of source[133]; Pisciculture[133]; Mariculture[133]; Breeding pond[135]; Fish seed[135]; Exotic fishes[137]; Disease management of fish farming[137]; Omega 3 fatty acids in fish[137]; Fish oil[137]; Fish meal[137]; Isinglass[137]; Species of Prawn[138]; Composition of pearl[141]; Quality of pearl[141]; Animal husbandry [141]; Objectives of animal breeding[142]; Out crossing [142]; Cross breeding[142]; Interspecific hybridization[142]; Artificial insemination[142]; Thawing[142]; Advantages of artificial insemination[143]; Dairying & breeds [143]; Vechur breed[143]; Good milkers of cattle[143]; Prominent indigenous cow breeds[144]; Beef meat[144]; Leghorn [145]; Chittagong[145]; White Plymouth rock[145]; Brahma[145]; Aseel [145]; Silkie[145]; Poultry Products & byproducts[147]; Poultry diseases[147].

3Marks: Endemic and exotic Earthworm spp.[119]; Earthworm pests and diseases[120]; Sericulture & its 3 components[121]; Different types of silkworm[122]; 2 Races of silkworm[123]; 4 types of silk India[123]; Moriculture[124]; Uses of Silk[125]; Diseases & Pest of Silkworm[125]; Social organization of Honey bee[126]; Queen bee[126]; Workers bee[126]; Role of Invertase [126]; Drone[127]; Structure of a bee hive[127]; Lesson of cooperation from honey bee[127]; Honey[129]; Bee wax[129]; Economic importance of Lac [131]; Aquaponic- mindmap[132]; Brackish water fishes[133]; Marine fisheries[133]; Characteristics of cultivable fishes[134]; Types of cultivable fishes[134]; External factors affecting fish culture[134]; Management of fish farm[135]; Composite fish farming[137]; Types of Prawn fishery[137,138]; Collection of oysters[140]; Rearing of oyster[140]; MOET[143]; 3 groups of cattle based on serving purpose to man[143]; Common disease of cattle[143,144]; Milk products[144]; Poultry farming [145]; Types of chicken breeds[145]; Benefits of Poultry farming[147].

5Marks: Vermicomposting [119]; Advantages of using vermicompost[120]; Life cycle of Bombyx mori[121,122]; Rearing of silkworms[124]; Post cocoon processing[124,125]; Langstroth bee hive method[128]; Accessory equipments in Bee hive[128,129]; Lac cultivation[131]; Advantages of Aquaponic gardening [132,133]; Types of breeding based on mode[135,136]; Culture of Freshwater prawn[138]; Culture of Marine prawn[138,139]; Pearl culture[139]; Steps in Insertion of nucleus in mantle of oyster[140]; Methods of animal breeding [142]; Stages involved in poultry farming and types of poultry farming[146]; Duck farming[147].