

PLANT MORPHOLOGY AND ANATOMY

Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 (objective/short answer type) will be compulsory having 14 questions (half mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I

The basic body plan of flowering plants – modular type of growth. Diversity of plant forms in annuals, biennials and perennials; convergence of evolution of tree habit in gymnosperms, monocotyledons and dicotyledons; trees – largest and longest lived plants. Simple and complex permanent tissues, secretory tissues, tissue systems.

UNIT – II

The shoot system: The shoot apical meristem and its histological organization; vascularization of primary shoot in monocotyledons and dicotyledons; formation of internodes; branching pattern; monopodial and sympodial growth; canopy architecture; cambium and its functions; formation of secondary xylem; a general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings; sapwood and heartwood; secondary phloem – structure and function; periderm. Anomalous secondary growth.

UNIT – III

The leaf: origin, development, arrangement and diversity in size and shape. Stomata – structure and types, stomatal index. Vascularization of

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leaf – nodal structure and venation; internal structure in relation to photosynthesis and water loss. Senescence and abscission.

The root system: root apical meristem; differentiation of primary and secondary tissues and their functions; structural modification for storage, respiration, reproduction and for microbial interaction with microbes.

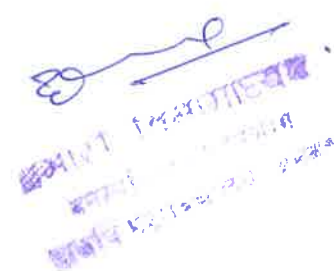
UNIT – IV

Morphology and anatomy of seed (monocotyledons and dicotyledons).

Significance of seed – suspended animation; ecological adaptation; unit of genetic recombination and replenishment; dispersal strategies.

Vegetative reproduction: Vegetative propagation, grafting; economic aspects.

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CELL BIOLOGY AND PLANT BIOCHEMISTRY

Scheme of examination:

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UNIT – I

Cell Biology - Tools and techniques used in cell study; ultrastructure and functions of different cell organelles of eukaryotes and prokaryotes (cell wall, plasma membrane, nucleus, mitochondria, chloroplast, ribosomes, peroxisomes, golgi bodies etc.).

Cell divisions: cell cycle, mitosis phases, structure and functions of spindle apparatus; anaphasic chromosomes movement; Meiosis: phases, synaptonemal complex formation and fate of chiasmata and significance of crossing over.

UNIT – II

Chromosome organization: eukaryotic and prokaryotic, Chromosomes – morphology; centromere, telomere; specialized types of chromosomes (sex chromosomes, lampbrush chromosomes, polytene chromosomes).

Chromosomal aberrations (Deletion, Duplication, Translocation and Inversion); Aneuploidy and polyploidy.

UNIT – III

Biomolecules:-

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Carbohydrates: Importance, nomenclature, classification, structure and function of mono-, di- and polysaccharides, their properties, glycosidic linkages and glycoproteins.

Lipids: Importance of fatty acids (Saturated and unsaturated), biosynthesis (alpha and beta oxidation and synthesis).

Secondary metabolites: Concept of Secondary metabolites, classification and significance of Secondary metabolites with special reference to flavonoides, alkaloids and steroids.

UNIT – IV

Proteins: Importance of amino acids, structure, electrochemical properties, peptide bonds, chemical bonds and nomenclature, structure and classification of proteins, protein synthesis, physical and chemical properties, protein changes during seed germination, seedling and senescence.

Enzymes: Discovery, nomenclature, EC number, characteristics of enzymes, enzyme kinetics, mechanism of action, Km value, active sites, holoenzyme, apoenzyme, coenzyme and factors, multienzyme system, regulation of enzyme activity.

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श्रीमती विद्यागोत्रिणी
वन्द्योति बाबा विभाग
राज्य पशुविद्यालय, अहमदाबाद

GENETICS AND PLANT BREEDING

Scheme of examination:

MM: 35

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3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I

Experimental basis for DNA as genetic material; nucleic acids: DNA and RNA-their structures, types, replication and functions; RNA Primers, Okazaki-fragments, ideas about polymerase; exons and introns; DNA-Protein interactions, Nucleosome models; Structure of Gene; Regulation of gene expression in prokaryotes and eukaryotes; genetic code :triplet codes their characteristics and significance.

UNIT II

Genetic inheritance: Mendel's laws of inheritance and their exceptions; allelic (complete dominance, co-dominance and incomplete dominance, lethality) and non-allelic interactions (complementary genes, epistasis and duplicate genes), linkage and crossing over. Elementary ideas of chromosome mapping.

UNIT III

Cytoplasmic inheritance- maternal influence, shell coiling in snails, Kappa particles in *Paramecium*. Multiple allelism: characteristics; ABO blood groups in men. Multiple gene inheritance: characteristics; plant height,

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PLANT PHYSIOLOGY AND METABOLISM

Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
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3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

UNIT – I**Water relations:**

Water: structure, physicochemical properties, importance to plant life, concept of water potential. Absorption of water and Transport of water: Ascent of sap, Mechanism of process: Transpiration, Guttation, stomatal movement, limiting factors.

Mineral Nutrition: Essential micro and macro nutrients; their uptake, factors affecting, hydroponics and nutrient requirement, deficiency and toxicity symptoms.

Transport of organic substances: Mechanism of phloem transport, factors regulating the translocations of nutrients.

UNIT II

Photosynthesis: Photosynthetic apparatus, photochemistry, pigments, light reaction, photo system I & II, Z scheme, photophosphorylation, C₃ Calvin cycle, C₄ cycle, photorespiration, Crassulacean acid metabolism and factors affecting the photosynthesis.

UNIT III

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Respiration: ATP-the biological energy currency, aerobic and anaerobic respiration, Kreb's cycle, electron transport system, oxidative phosphorylation, Pentose phosphate pathway, respiratory inhibitors and factors affecting the process.

Nitrogen Metabolism: Biological N_2 fixation by free living organism, symbiotic N_2 fixation, root nodules, nitrogenase and ammonium assimilation.

UNIT IV

Phases of growth and development: Seed dormancy and germination, plant movement, senescence and Biological clock- their regulatory factors.

Photoperiodism & vernalisation; Physiology and mechanism of action, concept of florigen and phytochrome.

Plant hormones : auxins, gibberellins, cytokinins, ethylene and growth retardants; discovery, bioassay & physiology.

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Inorganic Chemistry

Scheme of examination: MM: 23

1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Chemistry of Elements of First Transition Series: Characteristic properties of d-block elements.

Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

Unit-II

Chemistry of Elements of Second and Third Transition Series

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behavior, spectral properties and stereochemistry.

Unit-III

Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds.

Unit-IV

Oxidation and Reduction

Use of redox potential data-analysis of redox cycle, redox stability in water-Frost, Latimer and Pourbaix diagrams.

Unit-V

Non-aqueous Solvents

Physical properties of a solvent, types of solvents and their general

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characteristics, reactions in non-aqueous solvents with reference to liquid
 NH_3 and liquid SO_2 .

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Organic Chemistry

Scheme of examination:

MM: 23

1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Electromagnetic Spectrum : An introduction

Absorption Spectra-I : Ultraviolet (UV) absorption spectroscopy - absorption laws (Beer Lamber law) molar absorptivity, presentation and analysis o UV spectra, types of electronic transitions, effect of solvent on transitions, effect of conjugation, concept of chromophore and auxochrome Bathochromic, hypsochromic and hyperchromic and hypochromic shifts, UV spectra and conjugated enes and enones.

UNIT – II

Absorption spectra – II:

Infrared IR absorption spectroscopy - molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

UNIT – III

Alcohols: Classification and nomenclature.

Monhydric Alcohols : Methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters, Hydrogen bonding Acidic nature, Reactions of alcohols.

Dihydric Alcohols : Methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$\text{Pb}(\text{OAc})_4$ and HIO_4] and pinacol pinacolone rearrangement.

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Trihydric alcohols : Methods of formation, chemical reactions of glycerol.

Unit-IV

Phenols: Nomenclature, structure and bonding, Preparation of Phenols, Physical properties and acidic character. Comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide ion reactions of phenols electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement. Gatterman synthesis, Hauben-Hoesch reaction, Leader manasse reaction and Reimer Tiemann reaction.

UNIT - V

Ethers and Epoxides: Nomenclature of ethers and methods of their formation, physical properties, Chemical reactions, cleavage and autoxidation, Ziesels' method.

Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

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Phase Equilibrium –I: Statement and meaning of the terms - phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system- water, CO₂ and S systems phase equilibria of two component system - solid - liquid equilibria, simple eutectic Bi - Cd, Pb-Ag systems, desilverisation of lead.

UNIT – IV

Electrochemistry-I:Electrical transport - conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law,

Electrochemistry-II: Applications of conductivity measurements :

Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

UNIT V

Electrochemistry-III: Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes. Ostwald's dilution law its uses and limitations, Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.

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Inorganic Chemistry

Scheme of examination: MM: 23

1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

VBT of transition metal complexes, formation of octahedral complexes based on VBT, outer orbital and inner orbital complexes, formation of tetrahedral a square planar complexes based VBT, Limitations of VBT.

UNIT II

Acid and Bases: Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

UNIT III

Lanthanide: Electronic structure, oxidation state and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

UNIT IV

General features and chemistry of actinides, similarities between the later actinides and the later lanthanides super heavy elements.

UNIT V

Principles involved in extraction of elements, chemistry of separation of Np, Pu and Am from U.

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Organic Chemistry

Scheme of examination:

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UNIT – I

Aldehydes and Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties.

Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Keoevengel condensations, Condensations with ammonia and its derivatives. Wittig reaction, Mannich reaction.

Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen, Wolf-Kishner, LiAlH_4 and NaBH_4 reductions, Halogenation of enolizable ketones.

UNIT II

Carboxylic Acid – I: Nomenclature, structure and bonding, Physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids, Reactions of Carboxylic acids Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides, reduction of carboxylic acids, Mechanism of decarboxylation.

Methods of formation and chemical reactions of halo acids. Hydroxy acid; malic, tartaric and citric acids.

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Methods of formation and chemical reactions of α, β – unsaturated monocarboxylic acid.

Carboxylic acid-II: Dicarboxylic acid: Methods of formation and effect of heat and dehydration agents (Succinic, Glutaric and Adipic acids.).

UNIT III

Carboxylic Acid Derivatives: Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides, Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Preparation of carboxylic acid derivatives, chemical reactions, Mechanisms of esterification and hydrolysis (acidic and basic).

UNIT IV

Organic Compounds of Nitrogen: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkenes, Mechanisms of nucleophilic substitution in nitro arenes and their reductions in acidic, neutral and alkaline media, Picric acid.

UNIT V

Halonitroarenes: Reactivity, structure and nomenclature of amines, physical properties, stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel - phthalimide reaction, Hofmann bromide reaction.

Reaction of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Diazotisation mechanism.

Synthetic transformation of aryl diazonium salts, azo coupling.

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महाराष्ट्र विश्वविद्यालय

Physical Chemistry

Scheme of examination:

MM: 24

1 In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Thermodynamics-II: Second Law of Thermodynamics: Need for the law, different statement of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.

Concept of Entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium, Entropy change in ideal gases and mixing of gases.

UNIT II

Thermodynamics-III: Third law of thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) Thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of G and A with P, v and T.

UNIT III

Phase Equilibrium – II: Solid solutions - compound formation with congruent melting point (Mg-Zn) and incongruent melting point (NaCl-H₂O), (FeCl₃ - H₂O) and CuSO₄-H₂O system, Freezing mixtures, acetone-dry ice.

Liquid-liquid mixtures - Ideal liquid mixtures, Raoult's and Henry's law, Non-ideal system-azeotropes - HCl-H₂O and ethanol water systems.

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Partially miscible liquids: Phenol- water, trimethylamine -water nicotine water systems, Lower and upper consolute temperature, Effect of impurity on consolute temperature.

Immiscible liquids, steam distillation.

Nernst distribution law-thermodynamic derivation, applications.

UNIT IV

Electrochemistry-IV: Types of reversible electrodes - gas - metal ion, metal -metal ion, metal-insoluble salt-anion and redox electrodes, Electrode reactions, Nernst equation, derivation of cell EMF and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance.

Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements, computation of cell EMF.

Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), polarization, cover potential and hydrogen overvoltage.

UNIT V

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.


Definition of pH and pK_a , determination of pH using hydrogen quinhydrone and glass electrodes, by potentiometric methods.

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MAMMALIAN PHYSIOLOGY

Scheme of examination:

MM: 35

1. In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.

UNIT – I

Nutrition & Digestion

Nature of Food stuff, Digestive enzymes & their action in alimentary canal, Hormonal control of digestion, Absorption

UNIT - II

Circulation

Composition & Function of Blood and lymph, Blood clotting mechanism, Cardiac cycle, Heart beat, blood pressure, Angina pectoris, Myocardial infarction, E.C.G

UNIT - III

Respiration

Mechanism & control of Breathing, Gaseous exchange in tissues, Transportation of oxygen and carbon di oxide in blood, Mechanism & regulation of respiration

Excretion

Structure & Function of Kidney, Mechanism of urine formation, Hormonal regulation of water & electrolyte balance

UNIT - IV

Nervous system

Structure of neurons, Origin and propagation of nerve impulse, Synaptic transmission, Reflex action & reflex arc

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Dr. Chaitanya
प्रमुख
मानवी शिक्षण विभाग
महाराष्ट्र शासकीय विद्यापीठ, अहमदनगर

Muscular system

Structure & types of muscle, Mechanism of skeletal muscle contraction

UNIT - V

Endocrine System

Endocrine glands and their Hormones, Mechanism of Hormone action, Role of hypothalamus, Role of hormones in Reproduction, Pregnancy & Lactation



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BIOTECHNOLOGY AND IMMUNOLOGY

Scheme of examination:

MM: 35

1. *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT - I

Definition, History, scope and application of biotechnology, Major areas of biotechnology.

Vectors for gene transfer (plasmids and phages).

Protoplast fusion in prokaryotes and eukaryotes.

Recombinant DNA technology

UNIT - II

Applications of genetic engineering, hazards and regulations.

Transgenic animals, their uses in biotechnology

Brief account of cloning, its advantages and disadvantages.

Biotechnology in Medicine (outline idea only) : P.C.R., Antibiotics. Vaccines.

UNIT - III

Hybridoma technology, Monoclonal antibodies and their applications

Food, drink and dairy Biotechnology (outline idea only) : Fermented food production : dairy products, alcoholic beverages, food preservation.

Scope of biotechnology based industries.

UNIT - IV

Immunity: Innate & acquired immunity, Antigen : Antigenicity of molecules,

haptens. Immunoglobulins: Structure and functions, Antigen-antibody reactions:

Precipitation reaction, agglutination reaction, neutralizing reaction, complement and lytic reactions and phagocytosis.

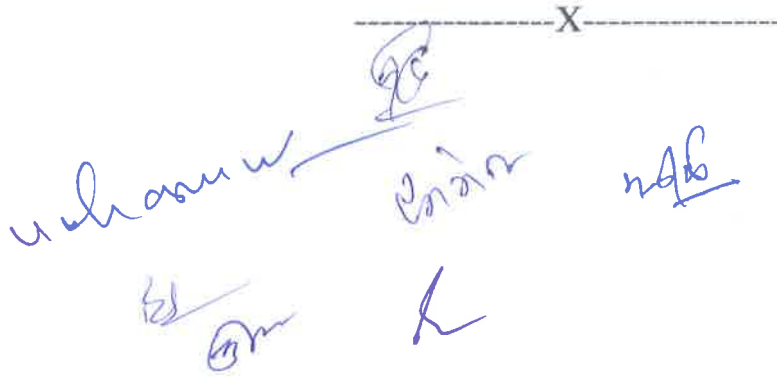
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A collection of handwritten signatures in blue ink, including names like 'R.C.', 'K.M.', 'M.A.S.', and 'R.'. To the right, there is a circular stamp with text in Hindi: 'ए. प्रभाकर', 'अधीन विभाग', and 'महाविद्यालय, अलवर'.

UNIT - V

Mechanism of humoral & cell mediated immune response.

Complement and its action

AIDS



प्रभाकर
प्राणी विज्ञान विभाग
राजध्वं महाविद्यालय, अहमदाबाद

BIOCHEMISTRY

Scheme of examination:

MM: 35

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UNIT – I

Carbohydrates: Classification & Structure, Metabolism- Oxidation of glucose through glycolysis, Kreb's cycle & oxidative phosphorylation, Interconversion of glycogen and glucose in liver

UNIT II

Lipids: Classification & structure. Metabolism- Beta-oxidative pathway of fatty acids

Biosynthesis of Triglycerides.

UNIT III

Proteins- Classification & structural properties, Amino acids & peptides- Properties & structure, Metabolism- Transformation of amino acids, Deamination, Transamination, Decarboxylation, Synthesis of Urea (Ornithine cycle)

UNIT IV

pH and Buffers, Nature of chemical bonding,

Enzymes: Classification & Characteristics of enzymes. Michaelis-Menten Equation.

UNIT V

Biochemical techniques (Brief account): Chromatography, Colorimetry & pH Meter, Vitamins, Fat soluble and water soluble vitamins.

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MICROBIOLOGY

Scheme of examination:

MM: 35

1. *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Brief introduction to the history of Microbiology: Work of Anton Van Leeuwenhoek, Work of Louis Pasteur, John Tyndall, Robert Koch & Jenner
Prokaryota(Bacteria): Size, shape & pattern of Arrangement
Structural Organization—Slime layer (Capsule), Cell envelope, Cytoplasmic membrane (Inner membrane), Cell wall (Outer membrane) of gram-ve & gram +ve bacteria, Mesosomes; Cytoplasmic organization, Cell projections- Flagella & pili

UNIT II

Virus (Lytic & Lysogenic cycles)
Genetic material of bacteria: Chromosomes, Plasmids,
Replication of bacterial DNA

UNIT III

Reproduction in Bacteria: Asexual reproduction: Binary fission, budding, Endospore formation & cyst formation, Sexual reproduction: Conjugation, Transduction & Bacterial recombination.

Microbial nutrition culture of Bacteria

- Carbon & energy source
- Nitrogen & minerals
- Organic growth factors
- Microbial growth
- Environmental factors: Temperature, pH

UNIT IV

Bacterial of medical importance:

Gram +ve:

- Cocci : Staphylococci, Streptococci

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शाही विज्ञान विभाग
राजसूय महाविद्यालय, अलावर

• Bacilli: Diphtheria, Tetanus

Gram -ve:

• Cocci: Gonorrhoea, Meningitis

• Bacilli: Diarrhoea

UNIT V

Mycobacteria: Tuberculosis

Hepatitis (with emphasis on B type)

The causative agents, Transmission, Pathogenicity, Laboratory, Diagnosis, Treatment & Prevention



Dr. [Signature]
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महाराष्ट्र विश्वविद्यालय, अहमदनगर