

**Annual Teaching Plan**  
**Vivekanand College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**

Name of the Teacher:- Mr.S.G.Kulkarni

Semester:-I

Course Title: - DSC07BTE 12 Biotechnology-II (Biochemistry-I),

Month June 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Origin of life	Basic concept, A.I.Oparin, Haldane , Urey Miller expt
03	-----	63	Concept of Biomolecules	Intro and definition
01	-----	01		
Month July 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Properties of Water	Interactions in aqueous system , Ionization of Water Ionic properties of water.
02	02	04	Phosphate buffer system, Bicarbonate buffer system, Hemoglobin buffer system, Protein buffer system	Ph , Pka value definition H-H equation , Titration curve of amino acid Details and schematic presentation of buffer system
04				
Month August 2024			Module/Unit:	Sub-units planned
05	04	09	Nucleic acid classification , Types of DNA, types of RNA	Types of DNA, RNA forces stabilizing nucleic acid structure.
Month September 2024			Module/Unit:	Sub-units planned
05	01	16	Pract- Estimation of Protein by Biuret Method Carbohydrate classification, aldose, ketose , Biological importance of carbohydrates , Disaccharides Lipids – Classification Physical properties of lipid, chemical properties of lipid Derived lipid –Cholesterol Lipoprotein	In detail Carbohydrate classification , any 10 functions of Carbohydrates. Glycosidic bond, 3 detail disaccharides – Maltose, Lactose, Sucrose Simple lipid, Compound lipid , Derived lipid, Examples of Phospholipid , In detail physical and 3 properties of lipid , Sap value, Iodine , aci4 value Cholestrol detail structure, Lipoprotein – LDL, VLDL, HDL
10				

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**Vivekanand College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**

**Name of the Teacher:- Mr.S.G.Kulkarni**

**Semester:-II**

**Course Title: - DSC07BTE 22 Biotechnology-IV (BiochemistryII),**

Month November 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Amino acid classification , Peptide bond concept	Classification depending upon R group , single letter code of amino acids. Properties of amino acids
05	-----	05	Classification of protein based on Composition , Protein sequencing methods	Simple, conjugate, derived Snger's Edmans, Dansyl chloride
04	-----	04		
Month December 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Structural level classification of proteins	Primary, secondary, tertiary, Quaternary, Ramachandran plot, Biological functions of proteins
06	-----	06	Chrom.atography	Details and types of Paper, TLC, column chromatography with detail mechanism and applications
Month January 2024			Module/Unit:	Sub-units planned
09	-----	09	Enzymes	Intro, IUB classification , active site, energy of activation , transition state, graph presentation , Lock and key , induced fit hypothesis, Types of enzyme inhibition competitive, uncompetitive, non competitive, Km equation , LB plot
Month February 2024			Module/Unit:	Sub-units planned
06	-----	06	Vitamines and coenzymes	Classification of Water soluble vitamin B1,B3,B5,B6 and their coenzyme role in different biochemical reaction , Fat soluble vitamins.

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**Academic Year 2024-25**

**Name of the Teacher:- Mr.S.G.Kulkarni**

**Semester:-III Course Title: - DSC-VI DSC07BTE32- Metabolic Pathways-I**

Semester:-III Course Title: - DSC-VI DSC07BTE32- Metabolic Pathways-I				
Month November 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Metabolism	Introduction to metabolism and catabolism and its 3 stages , methods employed to study the metabolism, High energy compounds with examples Introduction, reaction and energetics of Glycolysis, Gluconeogenesis.
05	-----	05	Carbohydrate metabolism	
04	-----	04		
Month December 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Carbohydrate metabolism Shuttle system –	TCA Cycle, Glyoxylate cycle, HMP and its significance
06	-----	06		Malate aspartate shuttle, Glycerol phosphate shuttle , Cori cycle
Month January 2025			Module/Unit:	Sub-units planned
09	-----	09	Lipid Metabolism	Biosynthesis of fatty acid with respect to palmitic acid & degradation of fatty acid $\beta$ -oxidation w.r.to palmitic acid.
Month February 2025			Module/Unit:	Sub-units planned
06	-----	06	Respiration	Aerobic- Flow of electrons in ETC, Redox potential components of ETC, Mechanism of ATP generation –Chemiosmotic hypothesis, ATP synthase complex, Inhibitors of ETC , Anaerobic respiration , Alcoholic and Lactic acid fermentation .

  
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**Academic Year 2024-25**

**Name of the Teacher:- Mr.S.G.Kulkarni Semester:-IV**

**Course Title: - DSC-VI DSC07BTE42- Metabolic Pathways-II**

Name of the Teacher:- M.S.G.Kulkarni			Semester:-	
Course Title: - DSC-VI DSC07BTE42- Metabolic Pathways-II				
Month November 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Plant Water Relation	Introduction, Absorption of Water- Mechanism, Theories (Active, Passive), Translocation of Water- Mechanism, Theories (Root pressure, Capillary), Transpiration. Ultra structure of chloroplast, Photosynthetic pigments, red-drop and Emerson's enhancement effect, mechanism of photosynthesis, light reaction, dark reaction , C-3 pathway, C-4 pathway, CAM, photorespiration
05	03	08	Photosynthesis -	
04	03	07		
Month December 2024			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Nitrogen Metabolism	Role of nitrogen in plants, source of nitrogen , nitrogen fixation – symbiotic and non symbiotic, mechanism of nitrogen fixation , nif gene- concept and significance.  Introduction to plant hormones Biosynthesis of Plant hormones- Auxin, Cytokinin, Gibeerlins
06	02	08	Plant Hormones	
Month January 2025			Module/Unit:	Sub-units planned
09	02	11	Secondary metabolite	Introduction examples and biological concept
Month February 2025			Module/Unit:	Sub-units planned
06	02	08	Photoperiodism and vernalisation	Tpes of plants SDP, LDP, DNP, mechanism of Photoperiodism, Theories, Vernalization , theories and mechanism , importance and applications

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# Annual Teaching Plan

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Department of Biotechnology (Entire)

Academic Year 2024-25

Name of the teacher: Miss. V. N. Arekar

Semester: II

Course Title: Ecology

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Ecosystem, Productivity	Kinds of productivity, Food chain, Ecological pyramids, Energy flow in ecosystem, Biogeochemical cycle: Carbon, Nitrogen, Sulphur, Phosphorus cycle
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Biodiversity	Conservation & importance of biodiversity, Hot Spots.
07	03	10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Population Ecology	population characteristics & growth curve
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Evolution	Lamarckism, Darwinism, Modern synthetic & mutational theory, Hardy-Weinberg law and Equation
08	03	11		

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**Vivekanand College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. V.N. Arekar**  
**Semester: III**

**Course Title:** Environmental Microbiology

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Water Pollution	Hardness, Water softening methods, COD and BOD, Purification of water,
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Air Pollution Soil Pollution	London and LA Smog, Greenhouse Effect, Ozone Depletion, Role of pesticide
07	02	09		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Environmental Toxicology	Pesticide Toxicity –Mode of action of toxicants (Metals, organophosphates, carbamates and mutagens
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Environmental Impact Assessment, Bioremediation	Concept and types, Agricultural bioremediation, Biofuel production.
08	03	11		

*V.N. Arekar*  
Name and Signature of Teacher

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Annual Teaching Plan  
Vivekanand College, Kolhapur (An Empowered Autonomous Institute)  
Department of Biotechnology (Entire)  
Academic Year 2024-25  
Name of the teacher: Miss. V.N. Arekar  
Semester: I

Course Title: Biotechnology I- Biotechnology for Human Welfare I

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Introduction to Biotechnology	Origin and definition, History of Biotechnology, Scope and importance Branches of Biotechnology in India, CSIR Institutes in India, Commercial potential & Achievements of Biotechnology
08	-	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Production of Biofertilizer and biopesticide	Production of Biofertilizer and biopesticide
07		10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Health Biotechnology	Gene Therapy, Vaccines- concept, types of vaccines, Stem Cells
07		10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Forensic science	Global history and development of forensic science, Sir Alec Jeffrey's Important Contribution, Divisions of FSL
08		11		

*V.N. Arekar*  
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# Annual Teaching Plan

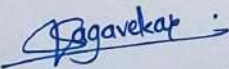
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Academic Year 2024-25

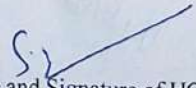
Name of the teacher: Miss. T. S. Vagavekar.

Semester: VI

Course Title: Food and Microbial Biotechnology

Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Microbial Production of Industrial product	Microbial Production of - Edible mushroom, Single Cell Protein- Spirulina, Yeast Pharma product- Antibiotics - Penicillin, Organic products - Citric acid, Vitamins ( B <sub>12</sub> ), Amino acids- Lysine, Industrial Enzyme - amylase -koji fermentation
08	02	10		
Month January 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Fermented Foods and Beverages	Nutraceutical Dairy Products – Cheese, Probiotic – Homo and Heterolactic fermentation, Bakery Products – Bread, Fermented Pickles – Sauerkraut, Beverages – Beer, Wine (Red table and white table), Champagne
07	01	08		
Month February 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Food Spoilage, preservation & toxicity	Types of spoilage- Physical, Chemical and Biological (auto and microbial), Preservation methods- High and Low temperatures, Controlled atmosphere and Anaerobiosis, Radiations and Asepsis, Chemical preservatives (Salt, sugar, organic acids, SO <sub>2</sub> , NO <sub>2</sub> ). Food Toxicity – Mycotoxin (Aflatoxin), Exotoxin (Staphylococcal), Neurotoxin (Botulinum), Food borne illness- Shigellosis, Amoebiasis, Aspergillosis.
07	02	09		
Month March 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Fermentation economics	Contribution of various expense heads to a process (Recurring and non-recurring expenditure) citing any suitable example Detection and quantification of the product by physicochemical, biological and enzymatic methods, Sterility testing,
08	01	09		
			Quality Assurance of fermentation product	

  
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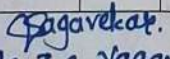
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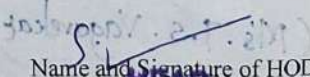
**Name of the teacher: Miss. T. S. Vagavekar.**

**Semester: II**

**Course Title: Microbiology-III (Bacterial Cytology and Cultivation)**

Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Morphology and cytology of Bacteria	i) Size, ii) Shape, iii) Arrangements <b>1. Cell wall:</b> Composition and detailed structure of Gram positive and Gram negative cell walls, archaeobacterial cell wall, Lipopolysaccharide, Sphaeroplasts, protoplasts and L: forms. Effect of antibiotics and enzymes on the cell wall <b>2. Cell membrane:</b> Structure, function and chemical composition of bacterial and archaeal cell membranes
08	02	10	Morphology of Bacteria  Cytology of Bacteria	
Month January 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Cytology of Bacteria	<b>3. Endospore:</b> Structure, formation and stages of sporulation <b>4. Capsule:</b> Structure, composition and function <b>5. Flagella:</b> Structure, composition and function <b>6. Fimbriae and pili:</b> structure, composition and function <b>7. Cytoplasm:</b> Ribosomes, mesosomes, nucleoid, chromosome and plasmids, Cell inclusion - gas vesicles, carboxysomes, PHB granules, metachromatic granules and glycogen bodies
07	02	09		
Month February 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Microbial nutrition	Nutritional requirements of microorganisms: Water; Micronutrients; Macronutrients; Carbon, Energy source; Oxygen and Hydrogen; Nitrogen, Sulphur and Phosphorous and growth factors- auxotroph, prototroph and fastidious organisms. Nutritional types of microorganism based on carbon and energy sources - a. Autotrophs b. Heterotrophs c. Phototrophs d. Chemotrophs, e. Photoautotrophs f. Chemoautotrophs g. Photoheterotrophs, h. Chemoheterotrophs. Common components of media and their functions Peptone, Yeast extract, NaCl, Agar and Sugar. Culture media - a) Living Media (Lab. Animals, plants, bacteria, embryonated eggs, tissue cultures),
07	03	10	Culture media and pure culture techniques	
Month March 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Culture media and pure culture techniques	b) Non living media - i) Natural, ii) Synthetic, iii) Semisynthetic, iv) Differential, v) Enriched, vi) Enrichment, vii) Selective. i) Streak plate ii) Pour plate iii) Spread plate Definition of growth, phases & growth curve - a] Continuous culture, b] Synchronous growth, c] Diauxic growth Effect of environmental factors on growth-temperature, pH., osmotic pressure, hydrostatic pressure, surface tension, heavy metals, ultraviolet light.
08	02	10	Methods for isolation of pure culture  Microbial growth	

  
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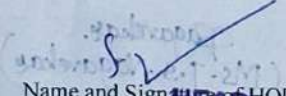


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**Vivekanand College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. T. S. Vagavekar.**  
**Semester: V**

**Course Title: Industrial Biotechnology**

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Introduction to Industrial Biotechnology	Concept and range of fermentation technology, Types of fermentations (Batch, continuous, dual, multiple), Concept of solid state & submerged fermentation. Microbial metabolic products- Primary & Secondary products. Basic design of Fermentor Components of Fermentor and their functions, Types of Fermentor- Stirred tank Fermentor, Airlift Fermentor, Tower Fermentor.
08	01	09		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Microbial Screening, Scale up and strain improvement	Primary and secondary screening, Primary screening of antibiotics, organic acids and amines, enzymes, vitamins and amino acid producers, volatile component degraders, organisms using specific carbon and nitrogen sources. Secondary screening of antibiotic producers, Scale up of fermentations, Strain improvement- concept and methods - mutation, genetic recombination. Maintenance and preservation of industrially important cultures. Microbiological assay
07	02	09		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Fermentation Media	Concept of pure and mixed culture, Composition of typical fermentation media, Criteria for typical fermentation medium, Types of fermentation media, General role of media components- water, carbon source, nitrogen source, minerals, precursors, growth factors, buffers, antifoams, inducers, inhibitors. Optimization of media- Plackett and Burmann design, Factors affecting fermentation process. Microbial growth kinetics basic concept (Batch, Continuous and Fed Batch).
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Downstream Process and Product Recovery	Downstream Processes in fermentation and bioprocess technology Solid and liquid separation, Flocculation and Flotation, filtration and centrifugation, Cell disruption by solid and liquid shear, ultrasonication, enzyme action and mechanical disruption.  Product recovery and purification- principle, Precipitation, Crystallization, Liquid-Liquid extraction, Distillation (Fractional and Steam), evaporation, Chromatographic separation (Principles), Adsorption and concentration, Membrane filtration, drying and packing.
08	-	08		

  
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# Annual Teaching Plan

Vivekanand College, Kolhapur (An Empowered Autonomous Institute)

Department of Biotechnology (Entire)

Academic Year 2024-25

Name of the teacher: Miss. T. S. Vagavekar.

Semester: I

Course Title: Microbiology-I (Introduction to Microbial world)

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Development of microbiology as a discipline	Abiogenesis. Ubiquitous nature of microbial life. Development from simple to complex life form. <b>A. Early contributions</b> Robert Hook, Anton Van Leeuwenhoek, Louis Pasteur, Robert Koch, John Tyndall. <b>B. Scientific contribution leading to diversification of Microbiology</b> i. Medical Microbiology and Immunology- Edward Jenner, Paul Ehrlich, Ellie Metchnikoff, Lister. ii. Food Microbiology and Fermentation- Alexander Fleming, Louis Pasteur, Selman Waksman iii. Soil Microbiology- Winogradsky, Martinus Beijerinck
08	02	10	Significance of Scientific contributions in development in Microbiology as a discipline	
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Significance of Scientific contributions in development in Microbiology as a discipline	iv. Microbial Genetics – Watson and Crick, Hargobind Khurana, Griffith, Avery, McCarty, and Macloed. Medical, Environmental, Food, Agriculture, Industrial microbiology Applied branches of Microbiology and major microbiological institutes in India.
07	02	09	Beneficial and harmful activities of microorganisms	
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Diversity of Microbial World	Binomial nomenclature, three kingdom, five kingdom classification and utility. General principles of bacterial nomenclature - a) Taxonomic ranks, b) Common or Vernacular name, c) Scientific or International name, General principles of bacterial nomenclature - a) Taxonomic ranks, b) Common or Vernacular name, c) Scientific or International name,
07	03	10	A. Systematic of Classification	
			Bacterial taxonomy	
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Bacterial taxonomy	Criteria for bacterial classification- Morphological, cultural, biochemical & serological characters, Concept of bacterial species & strain. Introduction to Bergey's manual of systematic bacteriology. Differences in prokaryotic and eukaryotic (Occurrence, morphology, mode of reproduction and economic importance) Bacteria, Yeast, Fungi, Actinomycetes, Algae, Viruses, Protozoa, Viroids and Prions
08	02	10	B. Differences in Cellular and Acellular microorganisms	
			C. Different groups microorganisms	

*(Ms. T. S. Vagavekar)*  
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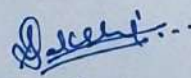
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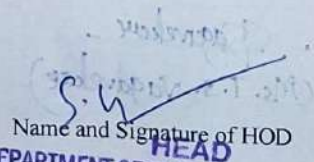
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**Academic Year 2024-25**  
**Name of the teacher: Miss. S.S. Rote**  
**Semester: V**

**Course Title: Bio safety, Bioethics and Intellectual Property Rights**

Month November 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Bioethics	Basic Principles of Bioethics; Overview of National Regulations of Bioethics and and International considerations.  Regulatory bodies for Bioethics in India, Role of Institutional Ethical Committee, Role of Institutional Ethical Committee, Bioethics in Plants, Animals and Microbial Genetic engineering
08	-	08		
Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Biosafety	Introduction to Biosafety, Concepts, symbols and significance in experimental biological sciences. International laws on Biosafety, Levels of Biosafety (BSL-1 to 3) for Specific microorganisms, Introduction to Biological Safety Cabinets, and Introduction to the concept of containment level and Good Laboratory Practices (GLP).
07	-	07		
Month January 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Intellectual Property Rights	Introduction to Intellectual Property Rights (IPR) and Indian Patent Law. World Trade Organization and its related intellectual Property provisions, Intellectual property and its legal protection in research
07	-	07		
Month February 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Significance of IPR in Biotechnology;	Budapest Treaty; , Protection of GMOs, Tools of IPR and terminologies in IPR-Patent, Copyright, Trademarks and Trade secrets, Geographical Indications
08	-	08		

  
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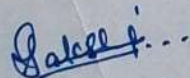
  
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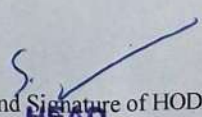


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**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. S.S. Rote**  
**Semester: V**

**Course Title: Basics in Genetic Engineering**

Month November 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Enzymes in r-DNA technology	Introduction and Scope, Enzymes and its applications, Restriction enzymes- types (I, II, III), nomenclature, recognition sequences, cleavage patterns, modification of cut ends (linkers and adaptors), Alkaline phosphatase, DNA ligase T4 and <i>E. coli</i> Ligases, Reverse Transcriptases, Polymerases- Klenow enzymes, T4 DNA polymerases, Taq DNA polymerases, Polynucleotide kinase.
08	-	08		
Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Cloning Vectors	Introduction, Properties of good vectors, Cloning & expression vectors, Types- <i>E. coli</i> vector- plasmid – pBR 322 and pUC18  Bacteriophage vectors – $\lambda$ phage vector, M13 Vectors ( $\lambda$ replacement e.g. EMBL 3, EM BL 4 and $\lambda$ insertional e.g. $\lambda$ gt 10 and $\lambda$ gt 11) Cosmid vector, Phagemid vector e.g. pBlue script II KS/SK, Yeast vector- YAC and BAC, Animal vectors – Retroviral, Plant vector – Ti plasmid, Ri plasmid, shuttle vector- e.g. pJBD 219.
07	-	07		
Month January 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Nucleic Acid Hybridization	Probe Preparation, Methods of labeling probes. Radio labeling – Nick translation, End labeling, Primer extension, Non Radiolabelling – Biotin, dioxygenin, fluorescent dyes, Applications of probes
07	-	07		
Month February 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total		Maxam Gilbert method, Sanger Coulson method, Automated DNA sequencing, Southern Blotting, Northern Blotting, Western blotting
08	-	08		

  
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# Annual Teaching Plan

Vivekananda College, Kolhapur (An Empowered Autonomous Institute)

Department of Biotechnology (Entire)

Academic Year 2024-25

Name of the teacher: Miss. S.S. Rote

Semester: VI

Course Title: Advance in Genetic Engineering

Month November 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Isolation of Gene	Isolation desired gene from DNA, Isolation of specific gene with PCR, cDNA and genomic library. Screening of libraries- immunological screening and colony or plaque hybridization
08	02	10		
Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	PCR and its application	Primer designing, Fidelity of thermostable enzymes. Steps in PCR reaction, Types of PCR – RT-PCR, real time PCR, touchdown PCR, hot start PCR, colony PCR, Applications- site directed mutagenesis, Molecular diagnostics, viral and bacterial detection Introduction to molecular identification --16 s r RNA 18 s r RNA, and Bar code.
07	03	10		
Month January 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Cloning methodologies	<b>Construction of plasmid</b> – e. g. Somatostatin, Insertion of foreign DNA into host cells, Agrobacterium mediated gene transfer, Transformation, Transfection. <b>Chemical methods-</b> CaCl <sub>2</sub> precipitation, poly cation mediated gene transfer. <b>Physical methods-</b> Liposome, microinjection, electroporation, and biolistic transfer.
07	03	10		
Month February 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Screening of recombinants Application of r-DNA technology	Direct selection, Insertional inactivation selection, Blue white selection, Expression based screening (HART) Fluorescent Activated Cell Sorter, Human Recombinant Proteins- Erythropoietin and HGH. Production of transgenic- knockout mice, In medicines – Insulin and Somatostatin, Introduction to Gene Silencing, Principle of Si-RNA and Si- RNA technology Molecular Markers Introduction – Morphological , Biochemical, Molecular Markers- RFLP, RAPD, AFLP.
08	02	10		

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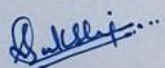
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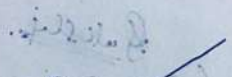


**Annual Teaching Plan**  
**Vivekananda College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. S.S. Rote**  
**Semester: IV**

**Course Title: Molecular Biology II**

Month November 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Transcription in prokaryote and Eukaryote	Mechanism of transcription- Enzyme involved, initiation, elongation and termination. Inhibitors of transcription, Post transcriptional modification, Transcriptional control by hormones.
08	-	08		
Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Genetic Code	Properties of genetic code. Assignment of codons with Unknown sequences a) Polyuridylic b) Acid Copolymers method. Assignment of codons with known sequences a) Binding technique b) Repetitive seq. technique. Wobble Hypothesis, Variation in genetic code.
07	-	07		
Month January 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Translation in prokaryote and Eukaryote	Structure and role of ribosome in translation, Amino acid t-RNA complex formation, Initiation, Elongation, termination of translation Inhibitors of translation. Post- translation modifications (Protein folding, Removal of Leader sequences, Phosphorylation, Glycosylation).
07	-	07		
Month February 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Regulation of gene expression	Regulation of gene expression in prokaryote a) Lac operon b) Tryptophan operon c) Arabinose operon. Regulation of gene expression at transcriptional and translation level.
08	-	08		

  
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**Annual Teaching Plan**  
**Vivekananda College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss A.S. Kale**  
**Semester: I**

**Course Title: Bioinstrumentation I**

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Methods of cell disruption Centrifugation and Types of centrifuge	Blenders, Sonication, Salt participation, Dialysis, Ultra-filtration, Types of centrifugation, Svedberg's constant
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Basic laboratory instrumentation	Electrophoresis, PAGE, SDS- PAGE, Supporting media, pH meter, autoclave, Laminar air flow
07	03	10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Microscopy Principle, working & application of Types of Microscopy	History, Introduction, Bright Field microscopy Dark Field microscopy Florescence Microscopy Phase Contrast Microscopy
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Colorimeter UV-Visible Spectroscopy	Introduction, Lamberts- Beers law, Introduction to spectroscopy, Electromagnetic spectrum, Application of UV-Visible and Visible spectroscopy
08	03	11		

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 (Miss A.S. Kale)  
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# Annual Teaching Plan

Vivekananda College, Kolhapur (An Empowered Autonomous Institute)

Department of Biotechnology (Entire)

Academic Year 2024-25

Name of the teacher: Miss. A.S. Kale

Semester: III

Course Title: Molecular Biology I

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Experimental evidences for DNA as a genetic material Organization of genome	Griffith's Exp., Avery, Macleod, McCarty Exp., Blender Exp., RNA As a genetic material Gierer and Schram expt. Viral (Lambda, T4), Bacteria (E. coli), Eukaryote, Typical Structure of chromosome (Euchromatin & Heterochromatin), Packaging of DNA (Nucleosome, Solenoid Model)
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Properties and Function of DNA	Tm, Cot Curve, Purity of DNA, Acid- Base Nature, Buoyant Density Concept of Gene, Unit of Gene (Cistron, Recon, and Muton), One gene One Polypeptide Hypothesis, interrupted gene, Fine Structure of gene
07	03	10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Nucleic Acid biosynthesis DNA Repair	De novo synthesis of Purine and Pyrimidine ring, Salvage Pathway, Feedback inhibition. Direct repair, Excision repair (Nucleotide and Base), Mismatch Repair, SOS repair, Recombination repair, Repair of double strand DNA break.
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	DNA Replication	Semi conservative model of replication (M.S Expt.). Direction of replication (Uni & Bidirectional). Prokaryotic and eukaryotic replication- Enzymes involved in replication, Initiation, elongation and termination. Rolling circle model and telomere replication.
08	03	11		

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**Vivekananda College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. A.S. Kale**  
**Semester: IV**  
**Course Title: Advance in cell biology**

Month November 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Secretary pathway and protein trafficking	Secretary pathway-ER associated ribosomal translation, co-translational vectoral transport of nascent polypeptide chain to ER lumen. Transport to Golgi apparatus, secretory granules. Transport of proteins to- mitochondria, chloroplast, peroxisomes, nucleus.
08	-	08		
Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Cell signalling Cell surface receptor proteins-	Introduction, general principles of cell signalling. Types of cell signalling-contact dependent signalling, autocrine, paracrine, synaptic, endocrine, gap junctions, combinatorial signalling. Cell surface receptor proteins- Ion channel linked receptors, G-protein linked receptors and enzyme linked receptors. Signaling through G-protein coupled receptors
07	-	07		
Month January 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Cell division cycle	Introduction, definition, phases of cell cycle. Regulation of cell cycle- CDK and cyclins (G-CDK, S-CDK, M-CDK and APC). Cell cycle checkpoint-Start checkpoint, G2/M checkpoint, Metaphase to anaphase transition Programmed cell death. Cancer - types, characteristics of cancer cells, causes of cancer, tumor suppressor genes.
07	-	07		
Month February 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Cell division	Introduction and types of cell division-amitosis, mitosis and meiosis. Mitosis- history, phases in mitosis, significance. Meiosis -history, phases in meiosis, significance. Role of spindle fibers in chromosome separation. Condensation of chromosome. Synaptonemal complex.
08	-	08		

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**Vivekananda College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. A.S. Kale**  
**Semester: II**

**Course Title: Basic in cell biology**

Month November 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Cell Structure Organization of cell	Discovery of Cell, Cell theory -Definition, discovery, three assumptions of cell theory, exceptions, organismal theory, protoplasm theory, Organization of Prokaryotic cell. Organization of Prokaryotic cell,  Organization of Eukaryotic cell (plant and animal cell), Ultra structure & functions of cell organelles Mitochondria, Chloroplast, E.R., Golgi apparatus, Lysosome, Peroxisome, Ribosomes.
08	02	10		
Month December 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Cell membrane & Membrane transport	Cell membrane –components, Molecular models of cell membrane-Unit membrane model, Protein, crystal model, fluid mosaic model, Types of membrane transport, Passive transport-simple diffusion, facilitated diffusion, osmosis. Active transport-primary and secondary transport, Sodium pump, Na <sup>+</sup> -K <sup>+</sup> ATPase pump, Bulk transport-endocytosis and exocytosis
07	03	10		
Month January 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Nucleus	Introduction, morphology, occurrence, shape, size, number, position Ultra structure of nucleus-Nuclear membrane, nucleoplasm, nucleopore complex, nucleus. Chromosome structure - introduction, General features of Prokaryotic chromosome. General features of Eukaryotic chromosome-. Chromosome number, size, Chromosomal nomenclature & General structure
07	03	10		
Month February 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Cytoskeleton assembly	Introduction, Cytoskeleton elements, Microtubules-occurrence, structure, chemical composition, microtubule associated proteins, functions, Microfilaments- occurrence, structure, chemical composition, functions, Intermediate filaments(IF) - occurrence, structure, chemical composition, types of IF, functions  Organization of cilia and flagella
08	03	10		

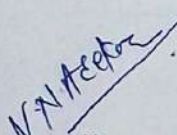
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 (Miss. A.S. Kale)  
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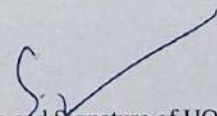
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**Annual Teaching Plan****Vivekanand College, Kolhapur (An Empowered Autonomous Institute)****Department of Biotechnology (Entire)****Academic Year 2024-25****Name of the teacher: Miss.V. N. Arekar****Semester: VI****Course Title: Application of Biotechnology in Health**

<b>Month July 2024</b>			<b>Module/Unit: I</b>	<b>Sub-units planned</b>
<b>Lectures</b>	<b>Practical</b>	<b>Total</b>	<b>Stem cells and Transgenic Technology</b>	Concept of stem cell progenitors, stem cell technology and its application,
08	02	10		
<b>Month August 2024</b>			<b>Module/Unit: I</b>	<b>Sub-units planned</b>
<b>Lectures</b>	<b>Practical</b>	<b>Total</b>	<b>Transgenic technology, Vaccines</b>	types of vaccine, Subunit vaccines- Recombinant vaccines
07	03	10		
<b>Month September 2024</b>			<b>Module/Unit: II</b>	<b>Sub-units planned</b>
<b>Lectures</b>	<b>Practical</b>	<b>Total</b>	<b>Bio reporters</b>	Monoclonal Antibodies- Hybridoma Technology, Biosensors, Gene Therapy,
07	03	10		
<b>Month October 2024</b>			<b>Module/Unit: II</b>	<b>Sub-units planned</b>
<b>Lecture</b>	<b>Practical</b>	<b>Total</b>	<b>Public health</b>	DNA sample preparation, Methods of disease Diagnosis
08	03	11		

  
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Vivekanand College, Kolhapur (An Empowered Autonomous Institute)

Department of Biotechnology (Entire)

Academic Year 2024-25

Name of the teacher: Miss. V. N. More

Semester: IV

Course Title: DSC – 1345 D Immunology

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	1. Introduction-	Types of immunity i) Innate (specific and non-specific) ii) Acquired (Active and Passive), Types of Defense- a) first line of defense (barriers at the portal of entry, physical and chemical barriers) b) second line of defense (Phagocytosis– oxygen dependent and independent) c) third line of defense-specific defense mechanism.
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Introduction to cells and organs of immune system-	Organs of immune system-primary and secondary lymphoid organs structure and their role. Cells of immune system-a) broad categories of leucocytes, their role and properties b) B-lymphocytes c) T-cells-subsets d) other cells (APC, Null, NK)
07	03	10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	2. Antigen and Antibody	Antigen- definition, nature, types of antigen, factors affecting antigenicity. Antibody- definition, nature, basic structure of immunoglobulin molecule, major human immunoglobulin classes, properties and functions. Theories of antibody production. Immune response-primary and secondary immune response,
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Antigen Antibody reactions	Principle and applications of a) agglutination b) Precipitation c) complement fixation d) ELISA. <b>Hypersensitivity-</b> Concept and types with example. (Type-I, II, III) i. Bacteriophages – T4 phage (Lytic), Lambda phage (Lytic and lysogeny) ii. Plant viruses – TMV iii. Animal viruses – HIV, nCoV, HPV
08	03	11		

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Name and Signature of Teacher

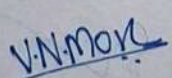
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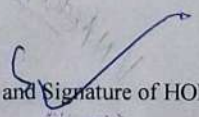
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**Vivekanand College, Kolhapur (An Empowered Autonomous Institute)**  
**Department of Biotechnology (Entire)**  
**Academic Year 2024-25**  
**Name of the teacher: Miss. V. N. More**  
**Semester: II**

**Course Title: MIN07BTE22 Microbiology –IV (Virology)**

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	General Virology:	A. History, Origin and Evolution of viruses B. General characteristics of Viruses C. Structure of viruses i. Enveloped and Non enveloped viruses ii. Capsid symmetries – Icosohedral and Helical iii. Structural components of virus – Protein - Envelope proteins, Matrix proteins and Lipoproteins, Genome – dsDNA, ssDNA, dsRNA, ssRNA (positive sense, negative sense and ambisense), linear, circular, segmented
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Classification & nomenclature of viruses	i. ICTV nomenclature ii. Baltimore classification
07	03	10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	A. Isolation, Cultivation, Purification and Enumeration of Viruses	i. Isolation and cultivation of viruses- Bacteriophages, Animal viruses, Plant viruses ii. Purification of viruses- Centrifugation and precipitation iii. Enumeration of viruses- Direct and Indirect method
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	B. Replication of viruses:	i. Bacteriophages – T4 phage (Lytic), Lambda phage (Lytic and lysogeny) ii. Plant viruses – TMV iii. Animal viruses – HIV, nCoV, HPV
08	03	11		

  
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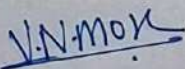
  
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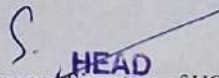


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Academic Year 2024-25  
Name of the teacher: Miss. V. N. More  
Semester: I

Course Title: Sub code - MIN07BTE12 Microbiology-II (Techniques in Microbiology)

Month July 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Concept of Sterilization	Definitions of: Sterilization, Disinfection, Antiseptic, Germicide, Microbiostasis, Asepsis, Sanitization. Methods of sterilization by- a) <b>Physical agents:</b> i) temperature-dry heat, moist heat ii) <b>Radiation-</b> U.V, Gamma radiation iii)
08	02	10		
Month August 2024			Module/Unit: I	Sub-units planned
Lectures	Practical	Total	Checking efficiency of Disinfection-	<b>Bacteria proof filter-</b> membrane filter. b) Chemical agents: - Phenol & Phenolic compounds, Alcohol, Heavy metals (e.g. mercury). c) <b>Gaseous agents-</b> Ethylene oxide, formaldehyde <b>Checking efficiency of sterilization-</b> biological and chemical indicator
07	03	10		
Month September 2024			Module/Unit: II	Sub-units planned
Lectures	Practical	Total	Microscopy and Staining Techniques	<b>Microscopy: Microscopy</b> a) General principles of microscopy- Image formation, magnification, numerical aperture (Uses of oil immersion objective), resolving power of microscope and working distance. b) Ray diagram, special features, applications and comparative study of compound microscope and Electron Microscope (Scanning and Transmission Electron Microscope).
07	03	10		
Month October 2024			Module/Unit: II	Sub-units planned
Lecture	Practical	Total	Stains and staining procedures	- Definition of dye and stain, Classification of stains – Acidic, Basic and Neutral, Principles, Procedure, Mechanism and application of staining, Procedures - i) Simple staining, ii) Negative staining, iii) Differential staining : Gram staining and Acid fast staining, iv) Special staining: Capsule staining, cell wall staining, endospore staining
08	03	11		

  
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