Academic calendar

(For Theory)

Name of Subject: Biophysics and Bioinstrumentation **Paper no: BTT 1**

No of theories/ week : 04

Sr. no	Name of Chapter	Contents	Date of Completion	No of Lectures required
1	**Unit II** **Chromatography Techniques**	1. General Principle 2. Plane Chromatography: Paper 3. Thin layer Chromatography 4. Column Chromatography: Ion Exchange	15-12-18 To 6/01/18	5
2	**Spectroscopic Techniques**	1. Definition. Electromagnetic wave 2. Electromagnetic spectrum 3. Applications of each region of electromagnetic spectrum for spectroscopy. 4. Introduction to molecular energy levels. Excitation. Absorption. Emission. Rotational spectra. 5. Principle, construction and working of colorimeter, 6. Principle, construction and working of UV- Visible Spectrophotometer 7. Application to biomolecules	09-01-18 To 04-02-2018	7
	UNIT-III **Electrophoresis:** **Radioactivity**	1.General Principle, 2. Electrophoretic Mobility 3.Factors Affecting electrophoretic Mobility 4.Example : Agarose Electrophoresis 1.Atomic Nucleus. Properties. Nuclear forces.	06-02-2018 To 03-03-2018	4 8

		2.Nuclear models (liquid drop and shell model). 3.Radioactive nucleus. 4. Types of Radioactive decay. 5. Half life-physical and biological. Handling and standardization of alpha and beta emitting isotopes. 6.Measurement of radiation - Dosimetry and detectors. Principle, construction and working of – pen and batch dosimeter		
	UNIT IV **Bioinstruments** **Thermoregulation** **Microscopes**	Principle , construction, working and applications for analysis of biomolecules of following instruments. 1 pH meter. 2Centrifuge (RCF, sedimentation concept), different types of centrifuges. Thermometric properties and types of thermometers 1. clinical, thermocouple, 2. bimetallic, platinum resistance, thermistor - thermometers). 3. Body temperature and its regulation. **1 Optics**: Properties of light: Reflection, refraction, dispersion, diffraction, Interference and Polarization. 2 Concept of polarization. Polarization by reflection – Brewster's law. Polarization by double refraction – Nicol Prism. **3 Concepts** - Resolving power. Chromatic and achromatic aberrations.	04-03-2018 To 31-03-2018	5 3 7

		Construction and working of following microscopes–Dissecting, 4 Compound light and Darkfield. 5 Phase contrast. 6 Fluorescence. Electron microscopes: Concept of vacuum, Working of electron gun. 7 Construction and working of SEM, TEM, STEM. Sample preparation.		
	Unit I **Magnetism** **Fluid Statics** **Atomic structure**	1 The magnetic field. The definition of B. Poles and dipoles. 2 Gauss' law of magnetism. Magnetism of earth. 3 Paramagnetism. Diamagnetism. Ferromagnetism. Nuclear magnetism. Biomagnetism with examples. 4. Fluids: Definition, Pressure and Density. 5. The variation of pressure in a fluid at rest. Pascal's Principle. Measurement of pressure. Various units of pressure and their inter-conversion. 1. Historical background upto Bohr model. Significance of second and third postulate of Bohr's model. 2. Derivation of radius and energy value. Quantization of energy levels using Rydburg's constant, 3. Atomic spectra is signature of the element. Bohr – Sommerfeld model.	15-12-18 To 6/01/18	3 3 4

		Vector atom model. Quantum numbers. Selection rules. 4. Uncertainty Principle, Pauli's exclusion principle. Emission spectra to understand selection rules		

Name of Lecturer: Suraj D Kadam **Signature**

Academic calendar

(for practical's)

Name of Subject: Biophysics and Bioinstrumentation

Practical paper Name: Lab. Course 1 **Paper no: BTP 1**

No of practical/ week: 03

Sr. no	Name of experiment	Date of completion	No of days for same practical
1.	TLC , Paper Chromatography	05-01-18 and 08-01-18	**01**

2.	Instrumentation – Colorimeter	05-01-18and 08-01-18	01
3.	Study of Lambert's & Beer's laws	05-01-18 and 08-01-18	02
4.	Absorption spectrum of protein	12-01-18 and 15-01-18	01
5.	Safety measure – time	12-01-18 and15-01-18	01
6.	Agarose Electrophoresis	19-01-18 and 22-01-18	01
7.	pH meter	02-02-18 and 05-02-18	01
8.	Temperature measurement: using thermocouple, RTD	09-02-18 and 12-02-18	01
9.	Practicals Based on Microscopy	16-02-18 and 19-02-18	01
10.	Problems based on Radioactivity	23-02-18 and 26-02-18	01

Name of Lecturer: Suraj D. Kadam **Signature**

Academic Calendar Format

(Theory)

Name of Subject: Biotechnology
Name of the paper: Fundamentals of molecular Biology
Class: B.Sc. II Year **Date: 30/01/2018** **Marks = (30)**
No. of Lectures of Subject per week =04 **No. of practical's per week = 02(6 Lect. 3H)**

Sr. No.	Name of Chapter	Contents	Date of Completion	No. of Lectures Required
1.	**Unit – I**	**The beginnings of molecular biology** 1. Introduction 2. Historical perspective The structure of DNA-Primary structure: the components of nucleic acids, Secondary structure of DNA, Tertiary structure of DNA Genome organization: from nucleotides to chromatin 1 .Introduction 2 .Eukaryotic genome 3. Bacterial genome The versatility of RNA 1. Introduction 2. Secondary structure of RNA 3. Tertiary structure of RNA Roles -RNA is involved in a wide range of cellular processes Unique function: The discovery of RNA catalysis and Ribozymes catalyze a variety Of chemical reactions	**15/12/2017** **To** **30/12/20117**	**10**
2.	**Unit – II**	**From gene to protein** 1. Introduction 2. The central dogma 3. The genetic code Protein structure, Protein function Prokaryotic Transcription and Translation Eukaryotic Transcription and Translation Post Transcriptional and Post Translational Modifications in Eukaryotes	**16/01/2018** **To** **05/02/2018**	**12**

3.	**Unit – III**	**DNA replication and Telomere maintenance** 1. Introduction 2. DNA polymerases are the enzymes that catalyze DNA synthesis Historical Perspective 3. Semidiscontinuous DNA replication- In prokaryotes and eukaryotes 4. Telomere maintenance: the role of telomerase in DNA replication, aging, and cancer	**01/01/2018 To 15/01/2018**	**08**
4.	**Unit IV**	**DNA repair, recombination and gene expression** 1. Introduction 2 .Types of mutations and their phenotypic consequences 3. General classes of DNA damage 4. Repair of single Base excision repair -Mismatch repair - Nucleotide excision repair Disease - Hereditary nonpolyposis colorectal cancer: a defect in mismatch repair Base changes and structural distortions by removal of DNA damage 5. Double-strand break repair by removal of DNA damage -Homologous recombination -Nonhomologous end-joining Disease -Xeroderma pigmentosum and related disorders: defects in nucleotide excision repair Disease - Hereditary breast cancer syndromes: mutations in *BRCA1* and *BRCA2* 6. SOS repair 7. Prokaryotic gene expression and regulation -Operon concept-Lac operon, Tryptophan operon, Arabinose operon 8. Eukaryotic gene expression and regulation (in brief)	**6/02/2018 To 30/02/2018**	**15**

Mr. S. D. Kadam

Name of Lecturer **Signature**

Academic calendar (practical's)

Name of Subject: Fundamentals of molecular biology

Practical paper Name: Lab. Course No of practical/ week: 02(3 hrs)

Sr. no	Name of experiment	Date of completion	No of days for same practical
1	The study of fundamental laboratory techniques in molecular biology	**02/01/2018 (A)** **08/01/2018 (B)**	**01** **01**
2.	Isolation of DNA from Bacterial cells.	**09/01/2018** **15/01/2018**	**01** **01**
3.	Isolation of DNA from Animal cells.	**16/01/2018**	**02**
4.	Isolation of DNA from plant cells.	**22/01/2018**	**02**
5.	To resolve the given DNA sample by using agarose gel electrophoresis.	**23/01/2018** **29/01/2018**	**02** **02**
6.	Quantification of DNA by using Diphenylamine (DPA) method	**05/02/2018**	**02**
7.	Spectroscopic determination of nucleic acid purity and concentration.	**20/02/2018**	**02**
8.	To estimate RNA quantitatively using orcinol reagent.	**20/02/2018**	**02**
9.	Extraction of crude enzyme/protein and To estimate protein in the plant and animal sources by using Folin-Lowry's method.	**26/02/2018**	**02**
10.	To carry out ammonium sulphate precipitation of amylase enzyme present in the crude protein extract.	**05/03/2018**	**02**
11.	To carry out dialysis for desalting ammonium sulphate precipitated enzyme.	**06/03/2018**	**02**
12.	To determine the molecular weight of the given protein by SDS-PAGE.	**12/03/2018**	**02**
13.	To Prepare a survival curve for the given bacterial culture using germicidal ultraviolet Radiation as a mutagen.	**13/03/2018**	**02**

Mr. S. D. Kadam

Name of Lecturer **Signature**

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structured Work Plan for Teaching

(June – 2019 to DEC. 2019)

Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. II	**Suraj D. Kadam**	Biotechnology	**Course Title: Recombinant DNA technology** **Course Code : U-RET-607** **Course Title: Lab Course XVII** **Course Code: U-LAC-611**
2	M.Sc. II			**Course Title: Biochemistry** **Course Code: P-BIO-135** **Course Title: Lab course II** **Course Code: P-LAC-139**

1. Summary of Lesson Plan

Name of Teacher: Suraj D. Kadam **Class : B.Sc. BT. III (V Semester)**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	**Recombinant DNA technology**	**Unit 1** 1. Principles of Gene cloning, Molecular tools and their applications: 2. Restriction Endonuclease and their types, 3. DNA Ligases, Alkaline phosphatase. 4. Vectors {Plasmids (pBR322, pUC18/19), Bacteriophages (λ Phage, M 13 Phage) and Cosmids.} 5. Gene cloning strategies-insertion of DNA molecule into a vector (Transformation, Conjugation, Electroporation, Agrobacterium-mediated transformation).	18-06-18 To 15-07-18	01 02 02 01 03 03 03	Class Seminar	Unit – I 25/07/18

		Unit II 1. r-DNA Techniques. Blotting techniques: Southern Blotting, 2. Northern Blotting, 3. Western Blotting, Dot Blot Blotting, 4. Autoradiography. 5. DNA Sequencing: Sanger's and Maxam Gilbert's Method. 6. PCR: Mechanism, Types and Application. 7. DNA chips (Micro array)	16-07-18 To 10-08-18	03 01 02 01 03 02 02	Class Seminar	Unit – II 20/08/18
		Unit III 1. Construction of Genomic library Maniatis Strategy, cDNA cloning with conventional cDNA and full length cDNA.-genomic library. 2. Nucleic Acid Probe, 3. Screening of library-Probe based direct and indirect methods.	12-08-18 To 06-09-18	04 02 04	Class Seminar	Unit – III 29/08/18
		Unit IV **1.** Agricultural and Industrial Applications: i) BT-Cotton, ii) Transgenic maize, iii)Goldenrice iv) Protein engineering to Improve Detergent. **2.** Enzymes. Pharmaceutical Applications : i) Recombinant Human Insulin ii)Hepatitis B-vaccineiii) Monoclonal Antibodies iv)Clotting factors v) Tissue Plasminogen Activatorvi) Erythropoietin v) Human growth hormone	07-09-18 To 11-10-18	04 04	] Class Seminar	

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	**Recombinant DNA technology**	Isolation of Genomic DNA from Bacterial cell.	03/07/18 To 25/10/18 Batch A,B,C,D	04
2		Isolation of Plasmid DNA from resistant clinical isolates.		04
3		Agarose gel electrophoresis and restriction digestion of DNA.		04
4		Ligation of DNA		04
5		Preparation of competent cells and Bacterial transformation		04
6		Screening of recombination by blue white selection.		04
7		Southern blotting		04
8		Western blotting		04
9		PCR amplification of isolated bacterial genomic DNA using universal primers		04
10		Extraction and purificationof amplified DNA fragment from gel.		04
11		RFLP and RAPD		04
12		GFP cloning		04
13		Visit to Molecular Biology & Genetic Engineering Research Laboratory		04

C:\Program Files (x86)\PDF Tools AG\3-Heights(TM) Document Converter Service\Temp\4b3578791f09e0eea52ef8897f6d865ce81af47db77bc47cbabf2c15e1fb29a2.docx

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. II	**Suraj D. Kadam**	Biotechnology	**Course Title: Recombinant DNA technology** **Course Code : U-RET-607** **Course Title: Lab Course XVII** **Course Code: U-LAC-611**
2	M.Sc. II			**Course Title: Biochemistry** **Course Code: P-BIO-135** **Course Title: Lab course II** **Course Code: P-LAC-139**

1. Summary of Lesson Plan

Name of Teacher: Suraj D. Kadam **Class : M.Sc. BT. I (III Semester)**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	**Biochemistry**	**UNIT III** 1. Nucleosides, nucleotides, Polynucleotide, 2. DNA and its different forms [A, B, C, D, E and Z], 3. RNA and its types. Chargoffs rule, 4. Forces stabilizing nucleic acid structure. 5. Properties of nucleic acid-denaturation and renaturation, hyperchromism 6. Amino acids: Structure and classification. 7. Properties of amino acids-colour reactions, Zwitterions	18-06-18 To 12-07-18	01 01 01 01 02 02 02	Classroom Group Discussion	Unit – I 30/07/18

		Unit IV 1. Protein structure: Conformation of proteins (primary, secondary, super secondary, Tertiary and quaternary domains) 2. Peptide bond, 3. Forces stabilizing 4. secondary structure, 5. Ramachandran plot, 6. examples of quaternary structure.	15-07-18 To 11-08-18	03 02 02 01 02		Unit –III 29/08/18
		Unit II 1. Lipids: Introduction, 2. Classes, Fatty acids [Physical properties and Chemical properties- 3. Sap value, acid value, iodine number, rancidity]. 4. Glycerolipid, Sphingolipid, cholesterol.	11-08-18 To 31-08-18	04 03		
		Unit I 1. Structure of atom, Molecules, weak interaction stabilizing biomolecules, 2. Henderson Hasselbach equation 3. pH, pK, buffers. 4. Thermodynamics principles energy rich bond.	01-09-18 To 20-09-18	04 04		
		Unit V 1. Enzymes: Basic concept, active site, energy of activation. 2. Transition state hypothesis, 3. Lock and key hypothesis,	19-09-18 To 09-10-18	02 02 02		

		induced fit hypothesis. 4. Enzyme classification. Co-enzymes: Thiamine, riboflavin.		04		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1		Introduction to measurements: balances and pipetting. Preparation of solutions of given normality and its standardization.	02/07/18 to 22/10/18 Batch A and B	02
2		PH meter: buffering capacity of a buffer, Indicators. To determine the pKa value and hence the dissociation constant of a given acid by using pH meter.		02
3		Colorimetry: To determine the dissociation constant of a given indicator colorimetrically and to prepare the buffer solutions in the pH range of 2.2 to 8.0		02
4		Thin layer chromatography: lipids, mixture of dyes		02
5		Spectrophotometry: Double beam and recording Spectrophotometry, Derivatives and difference spectra: Indicators, cytochromes, haemoglobin.		02
6		spectrophotometer: Estimation of protein by Lowry, Biuret and Bradford methods, Analysis of Standard curves,		02
7		Enzyme assays Invertase, time, temperature, and cofactors. Km and Vmax, Various kinetic plots.		02
8		Polyacrylamide gel electrophoresis: Native gel.		02
9		SDS-PAGE of proteins.		02
10		column chromatography.		02