Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structured Work Plan for Teaching

(Dec-2018 to March-2019)

1. **Details of Classes to be taught**

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B. Sc. BT FY Div A & B	Dr. V V Patil	Biotechnology	Fundamentals of Biological Chemistry
2	M. Sc. BT FY			Bioprocess Engineering

2. **Summary of Lesson Plan**

Name of Teacher: Dr. V. V. Patil **Class: B. Sc. BT FY Div A & B (Second 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	Fundamentals of Biological Chemistry	**Unit -1: Carbohydrates** -Structure of atom, Molecules weak interaction stabilizing biomolecules -Henderson-Hasselbach equation pH, pK, Buffers and thermodynamics principles. - **Carbohydrates**: Introduction, biological importance. Definition -Classification of Carbohydrates	01 Dec 18 to 18 Dec 18	02 02 01	Guest Lecture Quiz Contest Classroom Seminar	Unit Test – I 20.01.2019 Unit Test – II 22.03.2019

		Monosaccharides other than glucose glyocosidic bond Disaccharides, Polysaccharides [Starch, Glycogen] -Revision **Unit -2: Lipids & Nucleic Acids** **-** Introduction, Classes Fatty acids [Physical properties. Chemical properties, Saponification value, acid value, iodine number, rancidity]. - Glycerolipid, Sphingolipid **Nucleic acids:** Nucleosides, nucleotides, Polynucleotide -DNA- its different forms [A, B, C, D, E & Z] -RNA and its types**.** Forces stabilizing nucleic acid structure -Revision **Unit -3: Proteins** **-Amino acids:** Structure and/ classification -Properties of amino acids Acid base behaviour/ colour reactions/ Zwitterions	24 Dec 18 to 10 Jan 19 17 Jan 19 to 12 Feb 19	05 02 03 01 02 02 02 02 04 03		

		-Protein structure: Classification -Conformation of proteins (primary, secondary, super secondary, quaternary domains) -Peptide bond -Biological function of protein -Revision **Unit -4: Enzymes** -Basic concept, active site, energy of activation - Lock and key hypothesis - Induced fit hypothesis - **Co-enzymes:** Niacin Folic acid, Cyno-cobalamine -Revision	18 Feb 19 to 07 Mar 19	02 03 01 02 02 03 02 02 03 02		

Subject	**Practical to be covered**	**Date**	**No. of Practicals**
Fundamentals of Biological Chemistry	1. Preparation of solutions, buffer sensitivity, specificity accuracy, Molarities, molality, Normality.	13 & 15.12.18	02
	2. Qualitative test for carbohydrates	20 & 22.12.18	02
	3. Estimation of reducing sugars by Benedict's Method	27 & 29.12.18	02
	4. Spot tests for Amino Acids	03 & 05.01.19	02
	5. Estimation of Amino acids	10 & 12.01.19	02

	6. Protein estimation	17 & 19.01.19	02
	07. Saponification of Fats	07 & 09.02.19	02
	08. Estimation of Cholesterol	14 & 16.02.19	02
	09. Sugar estimation by DNSA	21 & 23.02.19	02
	10. Sugar estimation by Anthrone Method	28 & 02.03.19	02
	11. DNA estimation by DPA Method.	07 & 09.03.19	02

Name of Teacher: Dr. V. V. Patil **Class: M. Sc. BT FY (Second 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	Bioprocess Engineering	**Unit -1: Basic Chemical Engineering calculations**: -Material balance. Material balance with reactions. -Material balance with recycle and purge. Energy balance. Enthalpy, specific heat, means specific heat. Heat Balance. -Heat of reaction and heat of solution. Material and Energy balance together. **-Fluid statics**: Classification of fluids -Concept of Reynold's number, Rheological properties of fermentation process (Viscosity, cell concentration, product concentration etc) -Fluid mechanics. Potential flow. Newtonian and non Newtonian fluid (Bingham plastic, pseudo plastic, dilatants etc.) Heat and mass Transfer **Unit -2:** **Fermenters:** Ideal Properties of Bioreactor Components of the fermenters & their specifications: Body Construction, Agitator, Impeller, Baffles etc.	01 Dec 18 to 18 Dec 18 17 Jan 19 to	02 02 01 01 02 02 03	Guest Lecture Quiz Contest Classroom Seminar	Unit Test – I 20.01.2019 Unit Test – II 22.03.2019

		- **Types of Bioreactors:** (Packed-bed reactor, Air –lift, Trickle bed Photo bioreactors) Rotating Biological Reactors pneumatic. - **Air & Media sterilization:** Air Sterilization Principles, Mechanisms of capture of particles in Air, Depth & Screen Filters, Sizing Testing & validation of filters for air sterilization, Principle of Media Sterilization, Decimal reduction Design of sterilization cycle using kinetics of thermal depth of microbes and Equipments used in sterilization - Batch & Continuous Q.C. and Q. A. Standard Operating Procedures (SOP) & Good Manufacturing Practices (GMP) **Unit -3:** **-Media for large-scale processes & their optimization**: Constituents of media, their estimation & quantification Design of media. Costing of media. -Isolation, Screening, Preservations and maintenance of Microorganisms, strain improvement Mutagenesis, Genetic Engineering for Strain Improvement. Development of inocula **-Types of Bioprocesses**: Biotransformations (enzyme, whole cell), Batch, Fed-batch	12 Feb 19 18 Feb 19 to 07 Mar 19	03 04 02 03 03		

		Cell recycle & continuous fermentation processes. Monod model & constitutive equations used for expressing growth Substrate consumption & product formation, Solid State fermentation **Unit -4:** **Measurement & Control of Bioprocesses Parameters**: Cell growth. pH, temperature, Substrate consumption, product formation, Measurement of O2/CO2 uptake, evolution. Specific rates of consumption substrate & formation of product. Strategies for fermentation control. Computer controlled fermentations, Foam & its control. Scale up in Bioprocesses fermentations, Factors used in scale up **-Downstream processing**: Strategy for recovery, Harvesting of Biomass and Product Removal of microbial cells & solid matter, foam separation, filtration, centrifugation, cell Disruption Liquid-liquid extraction, chromatography and membrane processes, Drying and crystallization **-Bioprocess Economics**: Choice of process, process analysis, fixes & variable cost Depreciation, Amortized costs, Selection of Pricing, Profitability, Scales of operations etc.		04 05 05 05		

Subject	Practical to be covered	Date	No. of Practicals
Bioprocess Engineering	1. Media formulation and optimization	13 & 14.12.18	02
	2. Study of Growth Kinetics of Bacteria and Yeast by turbidometry& SCP	20 & 21.12.18	02
	3. Screening and maintenance of Industrially important microorganism- Acids, Antibiotics, Enzymes.	27 & 28.12.18	02
	4. Study of scale up of fermentation	03 & 04.01.19	02
	5. Study of design of bioreactor	10 & 11.01.19	02
	6. Determination of TDP	17 & 18.01.19	02
	7. Determination of TDT and design of sterilizer	07 & 08.02.19	02
	8. Study of types of fermentation process	14 & 15.02.19	02
	9. Downstream process of industrial products (Intra & Extra cellular)	21 & 22.02.19	02
	10. Problems based on: - Growth kinetics, fluid flow, Reynold's number	28 & 01.03.19	02
	11. Visit to fermentation Industry	09.03.19	01

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Structured Work Plan for Teaching

(June – 2018 to Dec . 2018)

Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	**B. Sc. I**	V. V. Patil	Biotechnology	**Course Title: Lab Course I** **Course Code : U-LAC-187** **Course Title: Lab course III** **Course Code: U-LAC-193**
2	**B.Sc. II**			**Course Title: Good Laboratory Practices** **Course Code:U-ADC-334**

1. **Summary of Lesson Plan**

Name of Teacher: V. V. Patil **Class : B.Sc. BT. I (First Semester)**

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	**Lab Course I**	Cell Diversity	1/08/18 To 10/10/18 Batch A, B, C	03
2		Separation of cells using sedimentation and velocity Centrifugation		03
3		Study of sub cellular organelles		03
4		Study of Karyotyping		03
5		Study of Mitosis		03
6		Harvesting and cell lysis		03
7		Demonstration of Antigen- Antibody reaction through clinical approach		03
8		Immunoprecipitation		03
9		Study of Meiosis		03
10		Preparation of blood smear and morphological study of different cells		03
11		Determination of cell density by turbidometer.		03
12		Study of osmosis		03

Name of Teacher: V. V. Patil **Class : B.Sc. BT. I (First Semester)**

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	**Lab Course III**	General Rules and Safety in Microbiology Laboratory	2/07/18 To 10/10/18 Batch D, E, F	03
2		Study of basic requirements in Microbiology Laboratory- Autoclave, Hot air oven & Incubator		03
3		Staining techniques (Monochrome staining, Grams staining ,Negative staining)		03
4		Preparation of solid and liquid media		03
5		Isolation of bacteria by spread plate, streak plate and pours plate method		03
6		Isolation of microorganisms from soil, water and air		03
7		Isolation of microorganisms by using selective media		03
8		Study of motility of Microorganisms by hanging drop method		03
9		Study of bacterial growth curve		03
10		Effect of environment on growth of microorganisms		03

Name of Teacher: V. V. Patil **Class : B.Sc. BT. II (Third Semester)**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized
1	Good Laboratory Practices	Unit I: -Introduction to GLP, History, Scope	01/08/18 to 10/10/18	02	1. Guest Lecture
		- Fundamental points of GLP (Resources Characterization, Rules, Results, Quality assurance)		04	2. Classroom Seminar
		Practical: 1. Standard Operating Procedures		03	
		Unit II: - General Rules/Protocols for Lab Safety measures		02	
		-Precaution and Safety in handling of chemicals, Laboratory tools, Glasswares and instruments.		03	

		-Internal and External Audit Practicals: 1. Preparation of Standard Solution and Buffers 2. Demo and Maintenance of Internal and External Audit Unit III: - Levels of Laboratories, Log Book Maintanance -Basic SOPs for instrument handaling and Maintenance -Practicals: 1. Calibration of Instruments: PH meter, colorimeter, spectrophotometer, water bath, Distillation assembly, Burette, Pipette etc. Unit IV: -Keeping data records, its analysis by using statistical and mathematical tools. -Result analysis and its interpretation. -Practicals 1. Use of Microsoft world, Excel. (for Data entry, calculation and graphical representation) 2. Use of internet and emails		02 02 02 02 02 04 02 01 02 02	