



Shiv Chhatrapati Shikshan Sanstha's

**Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)**

**Department of Biotechnology
Structured Work Plan for Teaching
Academic Year 2018-19 (Term-I)**

Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc.II	Manisha A. Dhotre	Biotechnology	Course Title: Metabolism Course Code : U-MET-401 Course Title: Lab Course XII Course Code: U-LAC-412

1. Summary of Lesson Plan

Name of Teacher: Manisha A. Dhotre

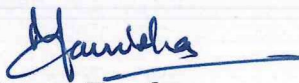
Class : B.Sc. BT. II (Third Semester)


Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Metabolism	Unit I 1. Respiration 2. aerobic respiration – glycolysis and its regulation 3. Krebs cycles and its regulation 4. Substrate Level Phosphorylation 5. oxidative phosphorylation: ETC and its inhibitors 6. Electrochemical proton gradient chemiosmotic theory, ATP synthase, 7. P/O ratio, pasteur effect, warburg effect, respiratory quotient 8. Alcohol and Lactic acid Fermentation, cori cycle.	22-06-18 To 14-07-18	01 02 02 01 03 03 01 02	TUTORIALS Classroom Group Discussion	Unit – I 07/08/18 Unit – II 4/10/18
		Unit II 1. Photosynthesis		01		

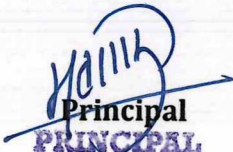
	<p>2. photosynthetic pigments, concept of photosynthetic unit, Hill reaction, oxygenic & anoxygenic photosynthesis</p> <p>3. Light reaction: Cyclic and Non Cyclic</p> <p>4. Photophosphorylation</p> <p>5. Dark reaction: C₃, C₄, CAM, Photorespiration</p>	<p>16-07-18 To 04-08-18</p>	<p>03</p> <p>03</p> <p>01</p> <p>04</p>		
	<p>Unit III</p> <p>1. Glyoxylate PW.</p> <p>2. Pentose Phosphate Pathway</p> <p>3. Entner-Doudoroff PW</p> <p>4. Carbohydrate metabolism – Gluconeogenesis, Glycogenesis, Glycogenolysis.</p> <p>5. Lipid Metabolism – Biosynthesis of FA</p> <p>6. Fatty acid oxidation, alternative PW of fatty acid oxidation</p> <p>7. Ketone bodies</p>	<p>06-08-18 To 10-09-18</p>	<p>01</p> <p>02</p> <p>01</p> <p>04</p> <p>04</p> <p>03</p> <p>01</p>		
	<p>Unit IV</p> <p>1. Amino acid Metabolism: Amino acid synthesis</p> <p>2. Amino acid catabolism</p> <p>3. urea cycle.</p> <p>4. Nucleotide Metabolism</p> <p>Nucleotide synthesis: De-Novo</p> <p>5. Salvage PW</p> <p>6. Nucleotide degradation.</p>	<p>11-09-18 To 3-10-18</p>	<p>03</p> <p>02</p> <p>01</p> <p>02</p> <p>02</p> <p>02</p>		

Sr. No.	Subject	Practicals	Date	No. of Practical
1	Metabolism	Hydrolysis of Sucrose and Starch	2/07/18 To 3/10/18 Batch A, B,C,D	04
2		Qualitative Test for Amino Acids		04
3		Qualitative Test for Proteins		04
4		To Perform Fatty acid Titration		04
5		Estimation of Ketone Bodies		04
6		Determination of Urinary Titrable acidity		04
7		Estimation of Urinary Creatinine		04
8		Estimation of Enzyme activity of Acid Phosphatase		04
9		Estimation of Enzyme activity of β -amylase		04
10		Estimation of Total Serum Cholesterol by Zak and Henley's method		04
11		Determination of Serum Bilirubin by Van de Bergh reaction		04
12		Solution of Problems in Biochemistry and Metabolism		04

Date: 20 June, 2018


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Academic Year 2018-19 (Term-I)

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	M.Sc. II	Manisha A. Dhotre	Biotechnology	Course Title: Microbial Biotechnology Course Code: P-MIB-335 Course Title: Lab Course X Course Code: P-LAC-339

Name of Teacher: Manisha A. Dhotre

Class : M.Sc. BT. II (Third 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	Microbial Biotechnology	Unit I Microbial Production of Organic Acids: Production, recovery and applications of: 1. Citric acid 2. Lactic acid Microbial Production of Organic Solvents: Production, recovery and applications of: 1. Alcohol 2. Glycerol 3. Acetone Microbial Production of Vitamins: Production, recovery and applications of vitamins: 1. Vitamin-B12 2. Riboflavin	22-06-18 To 11-07-18	04 04	INDUSTRIAL VISIT Classroom Group Discussion	Unit – I 07/08/18 8 Unit – II 4/10/18
		Unit II Microbial Production of Amino Acids: Production, recovery and applications of amino acids: 1. L-Glutamic acid 2. L-Lysine	13-07-18 To 31-07-18	04		

		<p>3.L- Tryptophan</p> <p>Production of insulin and erythropoietin</p> <p>Biogas production from biomass: Methane</p> <p>Biorecovery: Mechanism of Biorecovery with example.</p> <p>Biosorption</p> <p>Microbial recovery of petroleum</p>		02		
		<p>Unit III</p> <p>Production of Chemotherapeutic Agents :Production, recovery and applications of antibiotics:</p> <ol style="list-style-type: none"> 1. Penicillin 2. Tetracycline 3. Erythromycin <p>Production of microbial polysaccharides:Production, recovery and applications of polysaccharides:</p> <ol style="list-style-type: none"> 1.Xanthan 2.Dextran 3.Alginate <p>Production of Polyhydroxyalkanoates:</p> <ol style="list-style-type: none"> 1. Polyhydroxybutyrate (PHB) 2. Biopol-a biodegradable plastic 	02-08-18 To 30-08-18	04		
		<p>Unit IV</p> <p>Enzyme Technology:</p> <ol style="list-style-type: none"> 1. Immobilization of enzymes and cells. 2. Production and applications of : Proteases, Pectinases, Cellulase, amylase. <p>Biotransformation:</p> <ol style="list-style-type: none"> 1. Types of bioconversion reactions: Oxidation, Reduction, Hydrolytic reactions, Condensations 	03-09-18 To 22-09-18	06		

		<p>2. Transformation of steroids and sterols</p> <p>3. Transformation of nonsteroid compounds: L-Ascorbic acid, Prostaglandins, Antibiotics.</p>				
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Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Microbial	Fermentative production of amylase by <i>Bacillus subtilis</i> .	01/07/18 to 3/10/18 Batch A and B	02
2	Biotechnology	Fermentative production of alpha amylase from fungi <i>Aspergillus niger</i>		02
3		Production of Sauerkraut by microorganism		02
4		Ethanol fuel production from Tissue Paper Waste or Molasses.		02
5		Estimation of Alcohol by specific gravity method		02
6		Estimation of Alcohol by Idometry test		02
7		I] Isolation and identification of lipase producer. II] Production and estimation of lipase producing organism.		02
8		Production of alkaline protease from <i>Bacillus</i> species.		02
9		I] Isolation and screening of Lactic acid producing bacteria II] Production and estimation of Lactic acid.		02
10		Isolation and Characterization of microorganisms used as Biofertilizer		04
11		Production of Extracellular Polysaccharide from <i>Rhizobium</i> Species isolated from leguminous Plant (<i>Glycine max</i>)		04
12		Production of fermented milk by <i>Lactobacillus</i> .		04

Date: 20 June, 2018


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Academic Year 2018-19 (Term-II)

Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc.II	Manisha A. Dhotre	Biotechnology	Course Title: Enzymology Course Code : U-ENZ-498 Course Title: Lab Course XV Course Code: U-LAC-502

1. Summary of Lesson Plan

Name of Teacher: Manisha A. Dhotre

Class : B.Sc. BT. II (Fourth 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	Metabolism	Unit I ENZYMES & ENZYME CATALYSIS: 1.General Features of enzymes 2.Characteristics of enzymes 3.Classification - IUB system, rationale, overview and specific examples, 4.Enzyme substrate complex, Concept of active centre, binding sites 5.Types of Specificity 6. Effect of different factors on reaction rate 7.Factors affecting catalytic efficiency - proximity and orientation effects, distortion or strain, acid - base and nucleophilic catalysis 8.Methods for studying fast reactions 9. Chemical modification of enzymes	03-12-18 04-12-18 05-12-18 07-12-18 10-12-18 11-12-18 12-12-18 14-12-18 17-12-18 18-12-18 19-12-18	01 01 02 01 01 02	Tutorials Classroom Seminar	Unit – I 20/01/19 Unit – II 22/03/19 Assignment 24/12/18

	<p>10.Isoenzymes and multiple forms of enzymes.</p> <p>21-12-18 02</p> <p>11.Examples of Enzymatic Reactions: Lysozyme and Chymotrypsin, Zymogen, Ribozyme.</p> <p>24-12-18 01</p> <p>26-12-18 02</p>		
	<p>Unit II.</p> <p>APPLICATION AND CHARACTERISATION OF ENZYMES</p> <p>1.Commercial application of enzymes in food pharmaceutical and other industries</p> <p>28-12-18 02</p> <p>31-12-18</p> <p>2. Commercial application of Enzymes for analytical and diagnostic applications</p> <p>01-01-19 02</p> <p>3.Production and Purification of Crude Enzyme extracts from plant, animal and microbial sources-some case studies</p> <p>2-01-19</p> <p>04-01-19 03</p> <p>4.Methods of characterization of enzyme</p> <p>07-01-19 01</p> <p>08-01-19 02</p> <p>09-01-19</p>		
	<p>Unit III ENZYME KINETICS:</p> <p>1.Michaelis - Menten Equation - form and derivation, steady state enzyme kinetics</p> <p>11-01-19 02</p> <p>14-01-19</p> <p>16-01-19</p> <p>2.Significance of Vmax and Km,</p> <p>18-01-19 01</p> <p>3.Bisubstrate reactions</p> <p>21-01-19 01</p> <p>4.Graphical procedures in enzymology - advantages and disadvantages of alternate plotting</p> <p>22-01-19 02</p> <p>5. Enzyme inhibition - types of inhibitors - competitive, non-competitive and uncompetitive, their mode of action and experimental determination.</p> <p>23-01-19</p> <p>25-01-19</p> <p>28-01-19 03</p> <p>29-01-19 01</p>		


		6.Enzyme activity, international units, specific activity, turnover number 7. end point kinetic assay	30-01-19	01		
		Unit IV ENZYME REGULATION & IMMOBILIZED ENZYMES				
		1.Product inhibition, feedback control	04-02-19	01		
		2.enzyme induction and repression and covalent modification, Allosteric regulation	05-02-19 06-02-19 08-02-19	03		
		3. Relative practical and economic advantage for industrial use, effect of partition on kinetics and performance with particular emphasis on charge and hydrophobicity (pH, temperature and Km)	11-02-19 12-02-19	02		
		4. Various methods of immobilization - ionic bonding, adsorption, covalent bonding (based on R groups of amino acids), microencapsulation and gel entrapment. Immobilized multienzyme systems	13-02-19 15-02-19 18-02-19 20-02-19	04		
		5.Biosensors - glucose oxidase, cholesterol oxidase, urease and antibodies as biosensors.	22-02-19 25-02-19 26-02-19 27-02-19	04		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Enzymology	To study effect of α amylase activity on starch	12/12/18 To 20/03/19 Batch A,B,C,D	04
2		Determination of α amylase activity		04
3		To study effect of pH on α amylase activity		04
4		To study effect of Substrate on α amylase activity		04
5		To study effect of Salt on α amylase activity		04
6		To study effect of Temperature α amylase activity		04
7		To study effect of Time on α amylase activity		04
8		A] Immobilization of Yeast cells by Calcium-Alginate Entrapment method B] Determination of viability of immobilized Cells by invertase activity		04
9		Hydrolysis of sucrose by yeast β -Fructofuranosidase		04
10		Determination of Hydrolyzed Sucrose solution by Benedict Method		04
11		Indirect Estimation of Lactate Dehydrogenase		04
12		A] Purification of HRP by Affinity Chromatography B] Estimation of HRP activity		04
13		Problems Based on MM equation and Lineweaver-Burk plot		04

Date: 01 Dec. 2018


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Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	M.Sc. II	Manisha A. Dhotre	Biotechnology	Course Title: Food and Nano Biotechnology Course Code:P-FNB-434 Course Title: Lab Course XIV Course Code: P-LAC-437

Name of Teacher: Manisha A. Dhotre
 Semester)

Class : M.Sc. BT. II (Fourth

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	Food and Nano Biotechnology	Unit-I: Biotechnology for Food Ingredients <ul style="list-style-type: none"> ● Metabolic engineering of bacteria for food ingredients ● Biotechnology of microbial polysaccharides in food ● Microbial biotechnology for food flavor production Aspects of Food Production. <ul style="list-style-type: none"> ● Food safety: HACCP System to food protection, Responsibility for food safety. 	28-11-18 03-12-18 04-12-18 05-12-18 06-12-18 10-12-18	02 02 02 01	INDUSTRIAL VISIT Classroom SEMINAR	Unit - I 04/01/20 Unit - II 18/02/20 0 Unit -III 27/03/20 0

		<ul style="list-style-type: none"> • Food Additives: Definition, Types and Functional characteristics. • Natural Colors: Types, Applications • Sweeteners: Types and Applications. • Causes of food spoilage • Food Preservation Methods 	11-12-18 12-12-18 13-12-18 17-12-18 18-12-18 19-12- 18	01 01 02 02 		
		Unit-II: Fermented Food Products <ul style="list-style-type: none"> • Fermentation technology for traditional food of the Indian subcontinent • Solid state fermentations for food applications • Genetic engineering of bakers yeast Biotechnology of wine yeast • Biotechnology of beta carotene from Dunaliella • SCP: Spirulina and Chlorella 	20-12- 18 24-12-18 26-12-18 27-12-18 31-12-18 01-01-19 02-01-19 03-01-19 07-01-19 08-01-19	02 01 02 02 02		
		Unit-III : <ul style="list-style-type: none"> • Molecular evolution and diversity of food borne pathogens • Application of microbial molecular techniques for food systems • Application of ELISA assays for detection and 	09-01- 19 10-01-19 14-01-19 16-01-19 17-01-19	02 02 02		


		<p>quantitation of toxins in foods and <i>E.coli</i> in food</p> <ul style="list-style-type: none"> • Biosensors for food quality assessment • Biotechnological approaches to improve nutritional quality and shelf life of fruits and vegetables • Biotransformation applicable to food industries • Functional foods: Concept of Prebiotics, Probiotics and Nutraceuticals 	<p>23-01-19</p> <p>24-01-19</p> <p>28-01-19</p> <p>29-01-19</p> <p>30-01-19</p> <p>31-01-19</p> <p>04-02-19</p>	<p>02</p> <p>02</p> <p>02</p> <p>02</p> <p>02</p>		
		<p>Unit IV</p> <p>NanoBiotechnology</p> <ul style="list-style-type: none"> • The nanoscale dimension and paradigm. • Types of nanomaterials and their classifications. D, 2D and 3D etc. • Nanocrystal, Nanoparticle, Quantum dot, Quantum Wire and Quantum Well etc. Polymer, Carbon, Inorganic, Organic and Biomaterials -Structures and characteristics. • Physical and Chemical Fundamentals of Nanomaterial. Green Synthesis of Nanoparticles using bacteria and plants. • Characterization of nanoparticles.. 	<p>05-02-19</p> <p>06-02-19</p> <p>07-02-19</p> <p>11-02-19</p> <p>12-02-19</p> <p>13-02-19</p> <p>14-02-19</p> <p>18-02-19</p> <p>20-02-19</p> <p>21-02-19</p> <p>25-02-19</p> <p>26-02-19</p> <p>27-02-19</p>	<p>02</p> <p>02</p> <p>03</p> <p>03</p> <p>02</p>		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Food and Nano	Determination of quality of milk sample by methylene blue reduction test	10/12/18 to 05/03/19 Batch A and B	02
2	Biotechnology	Determination of physiological properties of milk		02
3		Determination of calcium and phosphorous in milk		02
4		Efficiency of pasteurization of milk by phosphates test		02
5		Quantitative analysis of milk by standard plate count (SPC) method		02
6		Estimation of Ascorbic Acid		02
7		Isolation and characterization of food fermenting micro-organisms from idli batter		02
8		Isolation of probiotics micro-organisms from various sources		02
9		Effect of temperature on growth of probiotics micro-organisms		02
10		Effect of pH on growth of probiotics micro-organisms		02
11		Effect of salt concentration on growth of probiotics micro-organisms		02
12		Estimation of lactic acid		02
13		Production of nanoparticles		02

Date: 27 Nov. 2018


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