

SHIVAJI UNIVERSITY, KOLHAPUR
TOTAL STRUCTURE OF THE SYLLABUS
FOR BACHELOR OF ENGINEERING (B.E.)
BRANCH : BIOTECHNOLOGY ENGINEERING

CLASS : S.E. (Biotechnology Engineering)
(To be implemented from Academic Year 2014-15)
SEMESTER (III)

Name of the Subject	Teaching Scheme (Hours/week)				Examination Scheme (Marks)				
	L	T	P	Total	Theory	TW	POE	OE	Total
1. Engineering Mathematics-III	3	1*	-	4	100	25	-	-	125
2. Unit Operations-1	4	-	2	6	100	50	-	-	150
3. Macromolecules and Biomembranes	3	-	2	5	100	25	25	-	150
4. Cell Biology	4	-	2	6	100	25	25	-	150
5. Microbiology	4	-	2	6	100	25	50	-	175
6. Soft Skills-1	-	1*	-	1	-	25	-	-	25
7. Basic Computer Language Skills	-	-	2	2	-	25	-	-	25
Total	18	2	10	30	500	200	100	-	800

L : Lecture, T : Tutorial, P : Practical, TW : Term Work, POE : Practical Oral Exam, OE: Oral Exam

* Tutorials shall be conducted batch wise.

CLASS : S.E. (Biotechnology Engineering)
SEMESTER (IV)

Name of the Subject	Teaching Scheme (Hours/week)				Examination Scheme (Marks)				
	L	T	P	Total	Theory	TW	POE	OE	Total
1. Biostatistics	3	1*	-	4	100	25	-	-	125
2. Unit Operations-2	3	-	2	5	100	25	25	-	150
3. Enzyme Technology	3	-	2	5	100	25	25	-	150
4. Molecular Biology	4	-	4	8	100	25	50	-	175
5. Metabolic Pathways	3	-	2	5	100	50	-	-	150
6. Soft Skills-2	-	1*	-	1	-	25	-	-	25
7. Microbial Identification Studies	-	-	2	2	-	25	-	-	25
Total	16	2	12	30	500	200	100	-	800

L : Lecture, T : Tutorial, P : Practical, TW : Term Work, POE : Practical Oral Exam, OE: Oral exam

* Tutorials shall be conducted batch wise.

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CLASS : T.E. (Biotechnology Engineering)
(To be implemented from Academic Year 2015-16)
SEMESTER (V)

Name of the Subject	Teaching Scheme (Hours/week)				Examination Scheme (Marks)				
	L	T	P	Total	Theory	TW	POE	OE	Total
1. Process Calculations	3	-	-	3	100	-	-	-	100
2. Biological Thermodynamics	3	-	-	3	100	-	-	-	100
3. Fermentation Technology-1	3	-	2	5	100	50	-	-	150
4. Genetic Engineering	3	-	4	7	100	25	25	-	150
5. Bioinformatics	3	-	2	5	100	25	-	-	125
6. Immunology and Diagnostics	3	-	2	5	100	25	25	-	150
7. Basics of Cell Culture	-	-	2	2	-	25	-	-	25
Total	18	-	12	30	600	150	50	-	800

L : Lecture, T : Tutorial, P : Practical, TW : Term Work, POE : Practical Oral Exam, OE: Oral exam

CLASS :T.E. (Biotechnology Engineering)
SEMESTER (VI)

Name of the Subject	Teaching Scheme (Hours/week)				Examination Scheme (Marks)				
	L	T	P	Total	Theory	TW	POE	OE	Total
1. Bioprocess Equipment Design	3	-	2	5	100	25		25	150
2. Analytical Techniques in Biotechnology	4	-	2	6	100	25	25	-	150
3. Fermentation Technology-2	4	1*	-	5	100	25	-	-	125
4. Drug Design, Development and Manufacturing	4	-	-	4	100	-	-	-	100
5. Industrial Organization, Management and Entrepreneurship	4	-	-	4	100	-	-	-	100
6. Plant Biotechnology	3	-	-	3	100	-	-	-	100
7. Seminar §	-	-	2	2	-	25	-	-	25
8. Industrial Visit	-	-	1	1	-	50	-	-	50
Total	22	1	7	30	600	150	25	25	800

L : Lecture, T : Tutorial, P : Practical, TW : Term Work, POE : Practical Oral Exam, OE: Oral exam

* Tutorials shall be conducted batch wise.

§ For Seminar, a group of ten students shall be considered for work load purpose.

Industrial training is compulsory and should be completed in vacation after sem VI

CLASS :B.E. (Biotechnology Engineering)
(To be implemented from Academic Year 2016-17)
SEMESTER (VII)

Name of the Subject	Teaching Scheme (Hours/week)				Examination Scheme (Marks)				
	L	T	P	Total	Theory	TW	POE	OE	Total
1. Bioreaction Engineering	4	-	2	6	100	25	25	-	150
2. Process Engineering Costing and Plant Design	4	1*	-	5	100	25	-	-	125
3. Protein Engineering	3	1*	-	4	100	25	-	-	125
4. Pharmaceutical Biotechnology	4	-	-	4	100	25	-	-	125
5. Elective -1	3	1*	-	4	100	25	-	-	125
6. Comprehensive Test ~	-	-	2	2	-	50	-	-	50
7. Industrial Training #	-	-	-	-	-	50	-	-	50
8. Project Work Phase -1	-	-	2	2	-	50	-	-	50
Total	18	3	6	27	500	275	25	-	800

L : Lecture, T : Tutorial, P : Practical, TW : Term Work, POE : Practical Oral Exam, OE: Oral exam

* Tutorials shall be conducted batch wise.

~ Objective tests based on the subjects from S.E. to B.E. level

Industrial training shall be completed at the end of 6th Semester and assessment work will be carried out with project phase -I

Elective-1

1. Medical Biotechnology
2. Good Manufacturing Practices
3. Vaccine and Biosimilar Technology
4. Bioethics, Biosafety and IPR

CLASS :B.E. (Biotechnology Engineering)
SEMESTER (VIII)

Name of the Subject	Teaching Scheme (Hours/week)				Examination Scheme (Marks)				
	L	T	P	Total	Theory	TW	POE	OE	Total
1. Bioprocess Modeling and Simulation	4	-	2	6	100	25	-	-	125
2. Bioseparation Processes	4	-	2	6	100	25	25	-	150
3. Animal Biotechnology	3	-	-	3	100	25	-	-	125
3. Bioprocesses	4	-	2	6	100	25	25	-	150
5. Elective-2	3	1*	-	4	100	25	-	-	125
6. Project Work Phase -2	-	-	4	4	-	50	-	75	125
Total	18	1	10	29	500	175	50	75	800

L : Lecture, T : Tutorial, P : Practical, TW : Term Work, POE : Practical Oral Exam, OE: Oral exam

Elective-2

1. Environmental Biotechnology
2. Food and Dairy Biotechnology
3. Metabolic Engineering
4. Genomics and Proteomics

EQUIVALENCE OF OLD AND NEW SYLLABI (S.E.)

Old Examination	Sr. No.	Subject under old syllabus	New Examination	Equivalent subject under new syllabus
	1	Engineering Mathematics-III	S.E.(Biotech.Engg) Sem- III	Engineering Mathematics-III

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S.E.(Biotech.Engg) Sem- III	2	Microbiology	S.E.(Biotech.Engg) Sem- III	Microbiology
	3	Cell Biology	S.E.(Biotech.Engg) Sem- III	Cell Biology
	4	Macromolecules and Biomembranes	S.E.(Biotech.Engg) Sem- III	Macromolecules and Biomembranes
	5	Unit Operations-I	S.E.(Biotech.Engg) Sem- III	Unit Operations-I
	6	Microbial Identification studies	S.E.(Biotech.Engg) Sem- IV	Microbial Identification studies
	7	Soft skills-I	S.E.(Biotech.Engg) Sem- III	Soft skills-I
S.E.(Biotech.Engg) Sem- IV	1	Biostatistics	S.E.(Biotech.Engg) Sem- IV	Biostatistics
	2	Unit operations-II	S.E.(Biotech.Engg) Sem- IV	Unit operations-II
	3	Enzyme Technology	S.E.(Biotech.Engg) Sem- IV	Enzyme Technology
	4	Metabolic pathways and their regulation	S.E.(Biotech.Engg) Sem- IV	Metabolic pathways
	5	Molecular Biology	S.E.(Biotech.Engg) Sem- IV	Molecular Biology
	6	Basic Computer languages skills	S.E.(Biotech.Engg) Sem- III	Basic Computer languages skills
	7	Soft Skill - II	S.E. (Biotech. Engg) Sem – III	Soft Skill - II

EQUIVALENCE OF OLD AND NEW SYLLABI (T.E.)

Old Examination	Sr. No.	Subject under old syllabus	New Examination	Equivalent subject under new syllabus
T.E.(Biotech.Engg) Sem- I	1	Nil	T.E.(Biotech.Engg) Sem- V	Process Calculations
	2	Biological Thermodynamics	T.E.(Biotech.Engg) Sem- V	Biological Thermodynamics
	3	Immunology	T.E.(Biotech.Engg) Sem- V	Immunology and diagnostics
	4	Fermentation Technology	T.E.(Biotech.Engg) Sem- V	Fermentation Technology - 1
	5	Genetic Engineering	T.E.(Biotech.Engg) Sem- V	Genetic Engineering
	6	Bioinformatics	T.E.(Biotech.Engg) Sem- V	Bioinformatics
	7	Basics of cell culture	T.E.(Biotech.Engg) Sem- V	Basics of cell culture
T.E.(Biotech.Engg) Sem- VI	1	Bioinstrumentation	T.E.(Biotech.Engg) Sem- VI	Analytical techniques in Biotechnology
	2	Medical Biotechnology	B.E.(Biotech.Engg) Sem- VII	Medical Biotechnology(EI-1)
	3	Microbial Technology	T.E.(Biotech.Engg) Sem- VI	Fermentation Technology -2
	4	Drug Development and Gene Therapy	T.E.(Biotech.Engg) Sem- VI	Drug Design Development and Manufacturing
	5	Industrial economics, management and entrepreneurship	T.E.(Biotech.Engg) Sem- VI	Industrial organization, management and entrepreneurship
	6	Bioprocess Equipment Design and Drawing	T.E.(Biotech.Engg) Sem- VI	Bioprocess Equipment Design
	7	Nil	T.E.(Biotech.Engg) Sem- VI	Plant Biotechnology
	8	Industrial Visits	T.E.(Biotech.Engg) Sem- VI	Industrial Visits

EQUIVALENCE OF OLD AND NEW SYLLABI (B.E.)

Old Examination	Sr. No.	Subject under old syllabus	New Examination	Equivalent subject under new syllabus
B.E.(Biotech.Engg) Sem- VII	1	Bioreaction Engineering	B.E.(Biotech.Engg) Sem- VII	Bioreaction Engineering
	2	Protein Engineering	B.E.(Biotech.Engg) Sem- VII	Protein Engineering
	3	Pharmaceutical Biotechnology	B.E.(Biotech.Engg) Sem- VII	Pharmaceutical Biotechnology
	4	Bioprocesses	B.E.(Biotech.Engg) Sem- VIII	Bioprocesses
	5	Elective- I	B.E.(Biotech.Engg) Sem- VII	Elective- I
	6	Comprehensive tests (On all subjects from S.E.toB.E.-I)	B.E.(Biotech.Engg) Sem- VII	Comprehensive tests (On all subjects from S.E.toB.E.-I)
	7	Industrial training	B.E.(Biotech.Engg) Sem- VII	Industrial training at end of 6th Semester (3Week)
	8	Project Work Phase – I	B.E.(Biotech.Engg) Sem- VII	Project Work Phase - I

Old Examination	Sr. No.	Subject under old syllabus	New Examination	Equivalent subject under new syllabus
B.E.(Biotech.Engg) Sem- VIII	1	Bio separation Processes	B.E.(Biotech.Engg) Sem- VIII	Bio separation Processes
	2	Bioprocess Modeling and Simulation	B.E.(Biotech.Engg) Sem- VIII	Bioprocess Modeling and Simulation
	3	Bioprocess Engineering & Economics	B.E.(Biotech.Engg) Sem- VII	Process Engineering costing and plant Design
	4	Animal Biotechnology	B.E.(Biotech.Engg) Sem- VIII	Animal Biotechnology
	6	Elective- II	B.E.(Biotech.Engg) Sem- VIII	Elective- II
	7	Project Work Phase – II	B.E.(Biotech.Engg) Sem- VIII	Project Work Phase - II