

**DEPARTMENT OF BIOTECHNOLOGY**  
**FEEDBACK FROM STAKEHOLDERS AND ACTION TAKEN**  
**(2016-17)**

**Action Taken**

1) Increase in the duration of laboratory sessions

Annexure 1


**DEPARTMENT OF BIOSCIENCES TECHNOLOGY (2017 - 18 /ODD SEMESTER)**

**Class: II B.Tech (Biotech) Batch-I**

<i>Hour</i>	1	2	3	4	5	6	7	8	9	10
<i>Day &amp; Time</i>	08:30 - 08:50	09:00 - 09:50	09:55 - 10:45	10:50 - 11:40	11:45 - 12:35	12:35 - 01:45	01:45 - 02:35	02:40 - 03:30	3.35 - 4.25	04:30 - 05:20
<i>Mon</i>	<b>Assem bly</b>	BBC H	MiB M	IMA K	Maths I	<b>Lunc h</b>		MiB LAB B1 / IMA LAB B2 L25		
<i>Tue</i>		BBC H	Biochem lab B1 MiB lab B2- L26				Maths I	IMA K	PCE L	
<i>Wed</i>							BIB J	BBC H	MiB M	
<i>Thu</i>		IMA K	Maths I	PCE L	MiB M		BIB TJ	Biochem lab B2/ IMA B1 L28		
<i>Fri</i>		Maths II					PCE L	BIB J	BBC H	

(2) Inclusion of Interested method of teaching

Annexure (2)

	<b>KARUNYA INSTITUTE OF TECHNOLOGY AND SCIENCES</b>	
	(Declared as Deemed to be University under Sec. 3 of the UGC Act 1956)	
	Karunya Nagar, Coimbatore – 641 114	
	Teaching Scheme: Lecture 3 hr/week Examination Scheme: 100 Marks	
Branch: Biotechnology		Semester: VI
Course Code: 14FP2005		Course Title: HEAT AND MASS TRANSFER

### Teaching plan

#### Course Outcomes:

On the successful completion of the course, students will be able to,:

- CO1 Learn to design heat exchangers for food processing
- CO2 Learn to design cold storage for food preservation.
- CO3 Learn to select suitable processing equipment

Consulting Hours: 03.00 to 4.50 p.m.

Room: BTLH006

Topic No.	Topics to be covered	Book & Page Nos. used for teaching	Teaching Method
1	Introduction to heat transfer	Saunders P 235-236	Chalk and Talk
2	Conduction, Convection and Radiation	Incropera P 3-12	Chalk and Talk
3	Fourier's Law of Heat conduction	Incropera P 68-70	Chalk and Talk
4	Thermal Conductivity of gases, liquids and solids	Incropera P 70-77	Chalk and Talk

	insulation, Critical radius of insulation		
12	Convection heat transfer	Incropera P 379-380	Chalk and Talk
13	Natural convection	Mc Cabe and Smith 350-351	Chalk and Talk
14	Forced Convection	Mc.Cabe and Smith 376-380	Chalk and Talk
15	Convection heat transfer co-efficient	Mc.Cabe and Smith 351-352	Chalk and Talk
16	HBL, TBL, Prandtl number, Nusselt number	Mc.Cabe and Smith 352-353	Chalk and Talk
17	h for Turbulent flow & Laminar flow	Incropera P 382-383	Chalk and Talk
18	Convection in non-circular objects & Convection in flow past immersed objects	Mc.Cabe and Smith 373-376	Chalk and Talk
19-20	Boiling & Condensation	Mc.Cabe and Smith 388-390, 400-406	Chalk and Talk
21	Basics of Radiation heat transfer & Types of surfaces	Mc.Cabe and Smith 417-421	Chalk and Talk
22	Kirchhoff's Law, Stephan Boltzmann Law	Mc.Cabe and Smith 423-424	Chalk and Talk
23	Radiation b/w a body and surroundings & Planck's Distribution law	Incropera P 783-784	Chalk and Talk
24, 25	Wien's Displacement law, Lambert's law, Combined Radiation and Convection Heat Transfer	Incropera P 784	Chalk and Talk
26-28	Problems	-Do-	Chalk and Talk
29	Types of Heat exchanger	Incropera P706-708	Video and power point presentation
30	Overall Heat Transfer Coefficient	Incropera P 708-711	Video and power point presentation
31	Shell and Tube-1, 1-2,	Mc.Cabe and Smith 441-44	Jigsaw Method
32	2-4 passes	- Mc.Cabe and Smith 445	Jigsaw Method
33	Plate Heat Exchanger	Mc.Cabe and Smith 455-457	Jigsaw Method

(3) More notes for theory class

### Annexure (3)

Biosciences and Technology - LMS Activity - Source (Computer Technology Centre-KITS)			
2017-18 Odd Semester			
Course Short Name	Course Name	Teachers	Activity
148T2055_1313_1	Pollution Control and Engineering Batch 1	Anu Jacob (1313)	3139
148T2016_1313_1	Enzyme Engineering Batch 1	Anu Jacob (1313)	917
148T2015_1313_1	Bioreactor Engineering Batch 2	Anu Jacob (1313)	455
148T2018_1634_3	Cell Biology and Immunology Batch 1	Anu Jacob (1313), Dr. Jesse Joel T. (1634)	314

(4) Inclusion of Mass transfer and reaction engineering Lab session

### Annexure (4)

**Table 4**

<b>Category</b>	<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Credits [L:T:P:C]</b>
<i>4. Professional core</i>	1	18BT2006	Biochemistry	3:1:0:4
	2	18BT2007	Biochemistry Lab	0:0:3:1.5
	3	18BT2008	Microbiology	3:0:0:3
	4	18BT2009	Microbiology Lab	0:0:3:1.5
	5	18BT2010	Fluid Mechanics	3:1:0:4
	6	18BT2011	Fluid Mechanics & Heat transfer Lab	0:0:3:1.5
	7	18BT2012	Bioprocess Principles	3:0:0:3
	8	18BT2013	Bioprocess Lab	0:0:3:1.5
	9	18BT2014	Molecular Biology	3:0:0:3
	10	18BT2015	Genetic Engineering and Bioethics	3:0:0:3
	11	18BT2016	Molecular biology & Genetic Engineering Lab	0:0:3:1.5
	12	18BT2017	Bioprocess Engineering	3:0:0:3
	13	18BT2018	Enzyme Engineering & Technology	3:0:0:3
	14	18BT2019	Heat & Mass transfer	3:1:0:4
	15	18BT2020	Downstream Processing	3:0:0:3
	16	18BT2021	Downstream Processing Lab	0:0:3:1.5
	17	18BT2022	Immunology	3:0:0:3
	18	18BT2023	Cell biology & Immunology Lab	0:0:3:1.5
	19	18BT2024	Chemical Reaction Engineering	3:1:0:4
	20	18BT2025	Mass transfer & Chemical Reaction Engineering Lab	0:0:3:1.5
	21	18BT2026	Biochemical Thermodynamics	3:1:0:4
	22	18BT2027	Basics of Bioinformatics	2:0:0:2
	23	18BT2028	Bioinformatics Lab	0:0:2:1
<b>Total credits</b>				<b>59</b>

(5) Laboratory sessions for process equipment design

Annexure (5)

## 17BT2041 PROCESS EQUIPMENT DESIGN

Credit: 3:0:0

### Course Objectives:

- To design safe and dependable processing facilities.
- This course focus on plant layout and design of piping systems
- This will provide the basic knowledge to carryout design process cost effectively.

### Course Outcomes:

The students will be able to

- Utilize principles of process equipment design, the mechanical aspects of the design
- Design various unit operation equipments, including safety considerations
- Develop flow measurement devices
- Design safe and dependable processing facilities
- Describe the Scale up criteria of bioreactors
- Analyze the plant layout.

**UNIT I** - Shell and tube heat exchanger , double pipe heat exchanger , Single effect evaporator and vertical tube evaporation,

**UNIT II** - Design of the following equipments as per ASME, ISI codes, drawing according to scale; monoblock and multiplayer vessels, combustion details and supporting structure.

**UNIT III** - Construction details and assembly drawing of distillation column; Plate and Packed absorption Towers; Design of fractional Distillation Towers.

**UNIT IV** - Design of venturimeter and orifice meter, Design of flow control device - Gate, Globe valves, their material of construction.

**UNIT V** - Design of airlift fermentor ; parts of fermenter, Ideal batch reactor design, Plant layout For Ethylalcohol and Citric acid .

### Text Books.

1. Joshi, M.V, "Process Equipment Design", MacMillan, 3rd edition, 2004.

### Reference Books:

1. Brownbell I.E., Young E.H.. "Chemical Plant Design" 1985.
  2. Kern D.Q. "Heat Transfer". McGraw Hill, 1985.
  3. McCabe, W.L., J.C. Smith and P. Harriott "Unit Operations of Chemical Engineering",
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(6) Inclusion of application/ analytical oriented Courses

Annexure (6)

**KARUNYA UNIVERSITY**  
 (Karunya Institute of Technology and Sciences)  
 (Declared as deemed to be university under Sec.3 of the UGC Act, 1956)  
 Karunya Nagar, Coimbatore-641 114  
**DEPARTMENT OF BIOSCIENCES AND TECHNOLOGY**  
**PROGRAMME -BIOTECHNOLOGY**

12.04.2017

Sub: Minutes for Board of Studies Meeting of the Department of Biotechnology held on 12.04.2017- reg.

**Internal Members:**

- |                             |                         |
|-----------------------------|-------------------------|
| 1. Dr. J. Jannet Vennila    | : Director and Chairman |
| 2. Dr. R. S. David Paul Raj | : PC & Member           |
| 3. Dr. V.M. Berlin Grace    | : Member                |
| 4. Mr. P. Muthusamy         | : Member                |
| 5. Dr. M. Lakshmi Prabha    | : Member                |
| 6. Dr. RT. Narendrakannan   | : Member                |
| 7. Dr. Reya Issac           | : Member                |
| 8. Dr. G. Gnanavel          | : Member                |

**External Members:**

1. Dr. M. L. StephenRaj, Head, Department of Biotechnology, MEPCO Schlenk Engineering College, Sivakasi (Academia)
2. Mr. K. C. Thirumoorthy, Director & CEO, M/s TRM Biotech Private Limited, Tiruchengode (Industry)
3. Mrs. Mercy Nisha Pauline, Assistant Professor, Government College of Technology, Coimbatore (Alumni)

The Minutes of Board of Studies Meeting held on 12-04-2017 for the Department of Biotechnology is herewith enclosed for your kind perusal.

The meeting started with an opening prayer by Dr. David Paul Raj

**Points Discussed:**

1. The Program Educational Objectives (PEO), Program Outcome(PO) and Program Specific Objectives(PSO) were framed and discussed.
2. It is proposed to introduce the following Course components for B. Tech (Biotechnology) Programme from 2017 onwards. Revision of curriculum towards employability was discussed.

**B.TECH BIOTECHNOLOGY – 2017 batch  
 COURSE COMPONENTS**

Sl. No.	Sub. Code	Table 1	
		General – 3 credits	Credits
		Subject	
1	New Code	Value Education I / II	2-0-0
<b>Subject Total</b>			<b>2</b>

Table 2



Sl. No.	Sub. Code	Basic Sciences – 12 credits	Credits
		Subject	
1	17BT2001	Basics of Biochemistry	3:1:0
2	New Code	Numerical Methods	3:1:0
3	New Code	Probability and Statistics	3:1:0
<b>Subjects Total</b>			<b>12</b>

Table 3

Sl. No.	Sub. Code	Engineering Sciences & Technical Arts – 7 credits	Credits
		Subject	
1	17BT2003	Principles of Chemical Engineering	3:0:0
2	New Code	Aptitude and Soft Skills	4:0:0
<b>Subjects Total</b>			<b>7</b>

Table 4

Sl.No	Sub. Code	Programme Core – 75 credits & a full / part semester project	Credits
		Name of the Subject	
1	17BT2002	Biochemistry Lab	0:0:2
2	17BT2004	Cell Biology	3:0:0
3	17BT2005	Microbiology	3:0:0
4	17BT2006	Microbiology Lab	0:0:2
5	17BT2007	Instrumental Methods of Analysis	3:0:0
6	17BT2008	Instrumental Methods of Analysis Lab	0:0:2
7	17BT2009	Basic Industrial Biotechnology	3:0:0
8	17BT2010	Metabolism and Bioenergetics	3:1:0
9	17BT2011	Bioprocess Principles	3:0:0
10	17BT2012	Bioprocess Lab	0:0:2
11	17BT2013	Fluid Mechanics for Biotechnologists	3:1:0
12	17BT2014	Fluid Mechanics and Heat Transfer Lab	0:0:2
13	17BT2015	Molecular Biology	3:0:0
14	17BT2016	Genetic Engineering and Bioethics	3:0:0
15	17BT2017	Molecular Biology and Genetic Engineering Lab	0:0:2
16	17BT2018	Bioorganic Principles	3:0:0
17	17BT2019	Bioreactor Engineering	3:0:0
18	17BT2020	Enzyme Engineering	3:0:0
19	17BT2021	Immunology	3:0:0
20	17BT2022	Cell Biology and Immunology Lab	0:0:2
21	17BT2023	Chemical Reaction Engineering	3:0:0
22	17BT2024	Downstream Processing	3:0:0
23	17BT2025	Downstream Processing Lab	0:0:2
24	17BT2026	Mechanical Operations	3:0:0
25	17BT2027	Chemical and Biothermodynamics	3:0:0
26	17BT2028	Heat and Mass Transfer Operations	3:0:0
27	New Code	Analytical Bioinformatics	3:0:0
<b>Total</b>			<b>75</b>
28	17BT2998	Part/ Full Semester Project	0:0:12



17BT2999		0:0:18
<b>Total</b>		<b>87/93</b>

**Table 5**

<b>List of Professional Electives – 27/21 Credits</b>		
Code No.	Name of the Subject	Credits
17BT2029	Plant physiology and Crop Improvement	3:0:0
17BT2030	Plant Genetic Engineering	3:0:0
17BT2031	Agriculture and Biomass Energy	3:0:0
17BT2032	Horticultural Crop Production, Management and Green House Technology	3:0:0
17BT2033	Developmental Biology	3:0:0
17BT2034	Human Genetics and Genomics	3:0:0
17BT2035	Vaccine Biotechnology	3:0:0
17BT2036	Animal Biotechnology and Cell Culture Techniques	3:0:0
17BT2037	Cancer Biology	3:0:0
17BT2038	Biopharmaceutical Technology	3:0:0
17BT2039	Biochemical Engineering	3:0:0
17BT2040	Metabolic Engineering	3:0:0
17BT2041	Process Equipment Design	3:0:0
17BT2042	Pilot plant & Scale Up practice	3:0:0
17BT2043	Industrial Safety & Hazard Analysis	3:0:0
17BT2044	Industrial Effluent Treatment	3:0:0
17BT2045	Pollution Control and Engineering	3:0:0
17BT2046	Mechanical Operation Lab	0:0:2
17BT2047	Plant and Animal Tissue Culture Lab	0:0:2
17BT2048	Bioprocess control and Instrumentation	3:0:0
New Code	Clinical Database management	3:0:0
New Code	Clinical database management Lab	0:0:2
New Code	Biological Big Data Analysis	3:0:0
New Code	Python Programming	3:0:0
<b>Subjects offered to other Departments</b>		
17BT2049	Applied Medical Biochemistry	3:0:0
17BT2050	Medical Biochemistry Lab	0:0:1
17BT2051	Human Physiology and Anatomy	3:0:0
17BT2052	Biomaterials and Artificial Organs	3:0:0
17BT2053	Occupational Safety Management	3:0:0
17BT2054	Medical Waste Treatment	3:0:0
17BT2055	Cell Biology and Immunology	3:0:0
17BT2056	Tissue Engineering	3:0:0
17BT2057	Techniques in Pathology and Microbiology	3:0:0
17BT2058	Microbiology and Immunology	3:0:0
New Code	Mini Project	0:0:2
New Code	Implant Training	0:0:1
New Code	Internship	0:0:8



Table 6

List of University Electives – 6 Credits		
Code No.	Name of the Subject	Credits
17BT2059	Analytical Instrumentation	3:0:0
17BT2060	Biology in Everyday Life	3:0:0
17BT2061	Biotechnology and Environment	3:0:0
17BT2062	Entrepreneurship in Bioengineering	3:0:0
17BT2063	Pollution Control	3:0:0

3. As the following chemical engineering subjects require the aspects of biotechnology, the CDC members insisted that the syllabus of the following subjects offered for Biotechnology students to be framed and handled only by biotech faculties with chemical engineering background

- 14ME2014 Engineering Thermodynamics (3:0:0)
- 14CE2003 Mechanics of Fluids (3:1:0)

Hence, it is proposed to replace 14CE2003 Mechanics of Fluids (3:1:0) with 17BT2013 Fluid Mechanics for Biotechnologists (3:1:0) and 14ME2014 Engineering Thermodynamics (3:0:0) with 17BT2027 Chemical and Biothermodynamics (3:0:0) in core list of B. Tech (Biotechnology) 2016 Batch.

**B.TECH BIOTECHNOLOGY – 2016 batch  
COURSE COMPONENTS**

Table 4

Sl.No	Sub. Code	Programme Core – 75 credits & a full / part semester project	Credits
		Name of the Subject	
1	14BT2002	Biochemistry Lab	0:0:2
2	14BT2004	Cell Biology	3:0:0
3	14BT2005	Microbiology	3:0:0
4	14BT2006	Microbiology Lab	0:0:2
5	14BT2007	Basic Industrial Biotechnology	3:0:0
6	14BT2008	Metabolism and Bioenergetics	3:1:0
7	14BT2009	Bioprocess Principles	3:0:0
8	14BT2010	Bioprocess Lab	0:0:2
9	14BT2011	Molecular Biology	3:0:0
10	14BT2012	Genetic Engineering and Bioethics	3:0:0
11	14BT2013	Molecular Biology and Genetic Engineering Lab	0:0:2
12	14BT2014	Bioorganic Principles	3:0:0
13	14BT2015	Bioreactor Engineering	3:0:0
14	14BT2016	Enzyme Engineering	3:0:0
15	14BT2017	Immunology	3:0:0
16	14BT2018	Cell Biology and Immunology Lab	0:0:2



			3:0:0
17	14BT2019	Chemical Reaction Engineering	3:0:0
18	14BT2020	Downstream Processing	0:0:2
19	14BT2021	Downstream Processing Lab	3:0:0
20	14BT2022	Mechanical Operations	3:0:0
21	14BI2001	Analytical Bioinformatics	3:0:0
22	17BT2027	Chemical and Biothermodynamics	3:1:0
23	17BT2013	Fluid Mechanics for Biotechnologists	3:0:0
24	14FP2005	Heat and Mass Transfer	0:0:2
25	14FP2003	Fluid Mechanics and Heat Transfer Lab	3:0:0
26	14BI2002	Instrumental Methods of Analysis	0:0:2
27	14BI2012	Instrumental Methods of Analysis Lab	75
		<b>Total</b>	<b>0:0:20</b>
	14BT2999	Full Semester Project	<b>95</b>
		<b>Total</b>	

4. It is proposed to offer a Diploma in Biotechnology skill enhancement with the following domains

- o Domain-1: Clinical Database Management
- o Domain-2: Fermentation Technology

The credit distribution for the diploma is proposed as follows:

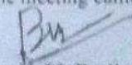
Value Education = 2 credits  
 Soft Skills = 2 credits  
 3 Theory x 3 credits = 9 credits  
 2 Lab x 4 credit = 8 credits  
 Half Semester Project = 12 credits  
 Industry Internship = 8 credits


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 Total = 41 credits

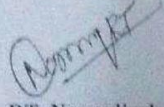
5. It is proposed to pass the following online MOOC SWAYAM courses in the B. Tech Biotechnology Curriculum from 2017 onwards

- i. Plant Science (3 Weeks)
- ii. Genetics (4 weeks)
- iii. Cell Biology (3 weeks)
- iv. Developmental Biology (4 weeks)
- v. Biochemistry (10 weeks)
- vi. Bioreactors (5 weeks)
- vii. Engineering Thermodynamics (9 weeks)
- viii. Bioenergy (5 weeks)
- ix. Mechanical Operations (4 weeks)
- x. Stress Management (4 weeks)

The meeting came to a close with a prayer offered by Dr. Reya Issac

  
 Dr. V. M. Berlin Grace  
 (Internal Member)

  
 Mr. P. Muthusamy  
 (Internal Member)

  
 Dr. RT. Narendrakannan  
 (Internal Member)

*MLP*  
Dr. M. Lakshmi Prabha  
(Internal Member)

*Reya Issac*  
Dr. Reya Issac  
(Curriculum coordinator)

*G. Gnanavel*  
Dr. G. Gnanavel  
(Internal Member)

*K. C. Thirumoorthi*  
Mr. K. C. Thirumoorthi  
(External Member)

*JML 5/12/15*  
Mrs. J. Mercy Nisha Pauline  
(Alumni)

*MLR 5/12/15*  
Dr. M. L. Stephen Raj  
(External Member)

*Dr. R.S. David Paul Raj*  
Dr. R.S. David Paul Raj  
(Internal Member/PC)

*J. Jannet Vennila*  
Dr. J. Jannet Vennila  
(HOD, BST and Chairman)



(7) Increase credit for advanced process equipment design

Annexure (7)

18BT3006	Advanced Process Equipment Design and Drawing Lab	L	T	P	C
		0	0	4	2

CO- request: Process equipment Design

Course Objectives:

1. To design safe and dependable processing facilities.
2. This course focuses on plant layout and selection.
3. This will provide the basic knowledge to carry out process equipment design and cost effect.

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Biotechnology

[Date]

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**Course Outcome :**

**After completing the course the students will be**

1. On completion of this lab subject students should be able to understanding the symbols of process equipments.
2. Understand the procedures for construction of geometric figures
3. Students know very well about plant layout and safety of process equipments
4. Students should be able to understand the mass and energy balance calculations
5. Students will have completed detailed design of unit operations
6. Students should be able to understanding the drawing of process equipments.

**List of Equipments:**

1. Basics of various unit operation symbols
2. Plant layout
3. Engineering Letters, Lines and numbers.
4. Shell and tube heat exchanger
5. Single effect evaporator
6. Batch reactor
7. Air lift Fermentor
8. Fractional distillation column
9. Rotary drum filter
10. Absorption column
11. Gate Valves
12. Venturi meter

**References:**

1. Unit operation by McCabe Smith (Mc Cabe Smith)
2. Heat Transfer by Kern (Kern)



## Action Taken Report

Feedback	Action taken
<b>Students Feedback</b>	
Increase in the duration of laboratory sessions	2 h duration Laboratories were increased to 3 hrs in 2017. (Annexure 1)
Inclusion of Interested method of teaching	Faculty modified method of teaching, learning process and included methods such as Jigsaw method. Teaching plan was collected prior to the semester. (Annexure 2)
More notes for theory class	Faculties uploads course material through online platform such as LMS/ Courses.karunya.edu (Annexure 3)
<b>Faculty Feedback</b>	
Inclusion of Mass transfer and reaction engineering Lab session	Introduced Mass transfer and reaction engineering Lab in 2018 curriculum (Annexure 4)
Laboratory sessions for process equipment design	In theory (17BT2041), design calculations and drawing were integrated (Annexure 5)
Inclusion of application/ analytical oriented Courses	New Course in Fluid Mechanics for Biotechnologists (17BT2013), Heat and Mass Transfer Operations (17BT2028), Chemical and Bio-thermodynamics , Plant Genetic Engineering, Agriculture And Biomass Energy, Plant and Animal Tissue Culture Lab, Bioprocess Control and Instrumentation, Analytical Instrumentation were introduced in 2017 (Annexure 6)
Increase credit for advanced process equipment design	Introduced Advanced Process Equipment Design and Drawing Lab with 4 credit in 2018 (Annexure 7)
<b>Alumni Feedback</b>	
Need to improve skills in reagent preparation/ instrument handling/ tissue culture skills	2 h duration Laboratories were increased to 3 hrs in 2017. (Annexure 1)