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**PERIYAR  
 MANIAMMAI**  
 INSTITUTE OF SCIENCE & TECHNOLOGY  
(Deemed to be University)  
 Established Under Sec. 3 of UGC Act, 1956 - NAAC Accredited  
 think • innovate • transform

**B.Tech Biotechnology in Specialization  
 With Computer Science and Biology  
 Curriculum & Syllabus  
 Regulation 2021 Revision-2**

**Semester I**

S.No.	AICTE Code	Course Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	BSC	XMA101	Calculus and Linear Algebra	3	1	0	4	3	1	0	4
2.	ESC	XCP102	Programming for Problem Solving	3	0	0	3	3	0	0	3
3.	BSC	XAP103	Applied Physics for Engineers	3	1	0	4	3	1	0	4
4.	ESC	XBT104	Biology for Engineers	3	0	0	3	3	0	0	3
5	HSM C	XGS105	Speech Communication	0	0	3	3	0	0	3	3
6	MC	XUM106	Constitution of India *#	0	0	0	0	2	0	0	2
7	ESC	XCP107	Programming for Problem Solving Lab	0	0	1	1	0	0	3	3
8	BSC	XAP108	Applied Physics for Engineers Laboratory	0	0	1	1	0	0	3	3
			<b>Total</b>	<b>12</b>	<b>2</b>	<b>5</b>	<b>19</b>	<b>14</b>	<b>2</b>	<b>9</b>	<b>25</b>

**Total Credits: 19; Total Hours: 25**

### Semester II

S. No.	AICTE Code	Course Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	BSC	XMA201	Calculus, Ordinary Differential Equations and Complex Variable	3	1	0	4	3	1	0	4
2.	ESC	XBE202	Electrical and Electronic Engineering Systems	3	1	0	4	3	1	0	4
3.	BSC	XAC203	Applied Chemistry for Engineers	3	1	0	4	3	1	0	4
4	HSM C	XGS204	Technical Communication	2	0	0	2	2	0	0	2
5	ESC	XWP205	Workshop/Manufacturing Practices	1	0	2	3	1	0	3	4
6	ESC	XBT206	Chemical Engineering Thermodynamics	2	1	0	3	2	1	0	3
7	ESC	XBE207	Electrical and Electronic Engineering Systems Laboratory	0	0	1	1	0	0	3	3
8	BSC	XAC208	Applied Chemistry for Engineers Lab	0	0	1	1	0	0	3	3
<b>Total</b>				<b>14</b>	<b>4</b>	<b>4</b>	<b>22</b>	<b>14</b>	<b>4</b>	<b>9</b>	<b>27</b>

**Total Credits: 22; Total Hours: 27**

### Semester III

S. No.	AICTE Code	Course Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	BSC	XPS301	Probability and statistics	3	0	0	3	3	0	0	3
2.	PCC	XBT302	Biochemistry	2	1	0	3	3	1	0	4
3.	PCC	XBT303	Microbiology	3	0	0	3	3	0	0	3
4.	PCC	XBT304	Material and Energy Balances	2	1	0	3	2	1	0	3
5.	PCC	XBT305	Genetics and Evolutionary Biology	3	0	0	3	3	0	0	3
6.	HSMC	XUM306	Entrepreneurship Development	2	0	0	2	2	0	0	2
7	MC (HSMC)	XUM307	Universal Human Values 2: Understanding Harmony	2	1	0	3	2	1	0	3
8	PCC	XBT308	Biochemistry Laboratory	0	0	2	2	0	0	6	6
9	PCC	XBT309	Microbiology Laboratory	0	0	2	2	0	0	6	6
10	PROJ	XBT310	In-plant Training - I	0	0	0	1	0	0	0	0
<b>Total</b>				<b>17</b>	<b>3</b>	<b>4</b>	<b>25</b>	<b>18</b>	<b>3</b>	<b>12</b>	<b>33</b>

**Total Credits: 25; Total Hours: 33**

### Semester IV

S. No.	AICTE Code	Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1.	PCC	XBT401	Basic Transport Processes	2	1	0	3	2	1	0	3
2.	PCC	XBT402	Bioenergetics and Metabolism	2	1	0	3	2	1	0	3
3.	PCC	XBT403	Cell Biology	3	0	0	3	3	0	0	3
4.	PCC	XBT404	Immunology	3	0	0	3	3	0	0	3
5.	HSM C	XUM405	Economics for Engineers	3	0	0	3	3	0	0	3
6	MC	XUM406	Disaster Management*#	0	0	0	0	2	0	0	2
7	PCC	XBT407	Basic Transport Processes Laboratory	0	0	1	1	0	0	3	3
8	PCC	XBT408	Cell Biology Laboratory	0	0	2	2	0	0	6	6
9	PCC	XBT409	Immunology Laboratory	0	0	2	2	0	0	6	6
			<b>Total</b>	<b>13</b>	<b>2</b>	<b>5</b>	<b>20</b>	<b>15</b>	<b>2</b>	<b>15</b>	<b>32</b>

**Total Credits: 20; Total Hours: 32**

### Semester V

S.No.	AICTE Code	Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1	PCC	XBT501	Bioanalytical Tools	3	0	0	3	3	0	0	3
2	PCC	XBT502	Molecular Biology	3	0	0	3	3	0	0	3
3	PCC	XBT503	Bioreaction Engineering	2	1	0	3	3	1	0	4
4	PCC	XBT504	Plant Biotechnology	3	0	0	3	3	0	0	3
5	PEC	XBT505A	Food Biotechnology	3	0	0	3	3	0	0	3
		XBT505B	Agricultural Biotechnology								
		XBT505C	Pharmaceutical Biotechnology								
		XBT505D	Bioprocess Control and Instrumentation								
		XBT505E	Tissue Engineering								
		XBT505F	Human Genetics								
6	OE	XOE1	Open Elective Courses	3	0	0	3	3	0	0	3
7	PCC	XBT507	Bioanalytical Tools Laboratory	0	0	2	2	0	0	6	6
8	PCC	XBT508	Bioreaction Engineering Laboratory	0	0	2	2	0	0	6	6
9	PROJ	XBT509	In-plant Training - II	0	0	0	1	0	0	0	0
10	PMC	XBTMO1	Minor Course I*#	0	0	1	0	0	0	1	3

			<b>Total</b>	<b>17</b>	<b>1</b>	<b>5</b>	<b>23</b>	<b>18</b>	<b>1</b>	<b>13</b>	<b>34</b>
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**Total Credits: 23; Total Hours: 34**

### Semester VI

S.No.	AICTE Code	Course Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1	PCC	XBT601	Animal Biotechnology	3	0	0	3	3	0	0	3
2	PCC	XBT602	Process Biotechnology – Upstream Processes	2	1	0	3	3	1	0	4
3	PCC	XBT603	Process Biotechnology – Downstream Processes	2	1	0	3	3	1	0	4
3	PEC	XBT604A	Mass Transfer Fundamentals	3	0	0	3	3	0	0	3
		XBT604B	Fermentation Technology								
		XBT604C	Nanobiotechnology								
		XBT604D	Bioreactor Design and Scale up Process								
		XBT604E	Biomaterials								
		XBT604F	Fundamentals of Algorithms for Bioinformatics								
4	OE	XOE2	Open Elective Courses	3	0	0	3	3	0	0	3
5	HSM C	XGS605	English Language Skills	1	0	2	3	1	0	3	4
6	MC	XUM606	Cyber Security*#	0	0	0	0	3	0	0	3
7	PCC	XBT607	Process Biotechnology Laboratory	0	0	2	2	0	0	6	6
8	PMC	XBTMO2	Minor Course II*#	0	0	1	0	0	0	1	3
			<b>Total</b>	<b>14</b>	<b>2</b>	<b>5</b>	<b>20</b>	<b>19</b>	<b>2</b>	<b>10</b>	<b>33</b>

**Total Credits: 20; Total Hours: 33**

### Semester VII

S.No.	AICTE Code	Course Code	Courses	Credits				Hours			
				L	T	P	Total	L	T	P	Total
1	PCC	XBT701	Microbial Biotechnology	3	0	0	3	3	0	0	3
2	PCC	XBT702	Recombinant DNA Technology	3	0	0	3	3	0	0	3
3	PEC	XBT703A	Stem Cell Biotechnology	2	1	0	3	3	0	0	3
		XBT703B	Cancer Biology								
		XBT703C	Design of Bioprocess Equipments								
		XBT703	Molecular Therapeutics								

		D	and Diagnostics								
		XBT703E	Transport Phenomena in Biological System								
		XBT703F	Biosafety and Hazard Management								
4	OE	XOE3	Open Elective Courses	3	0	0	3	3	0	0	3
5	MC	XES705	Environmental studies**	0	0	0	0	3	0	0	3
6	PCC	XBT706	Recombinant DNA Technology Laboratory	0	0	2	2	0	0	6	6
7	PCC	XBT707	Bioinformatics	1	0	1	2	1	0	5	5
8	PROJ	XBT708	Project Work (Phase-I)	0	0	2	2	0	0	4	4
9	PROJ	XBT709	In-plant Training – III	0	0	0	2	0	0	0	0
10	PMC	XBTMO3	Minor Course III**	0	0	1	0	0	0	1	3
			<b>Total</b>	<b>12</b>	<b>1</b>	<b>7</b>	<b>20</b>	<b>16</b>	<b>0</b>	<b>16</b>	<b>33</b>

**Total Credits: 20; Total Hours: 33**

#### Semester VIII

S.No.	AICTE Code	Course Code	Courses	Credits				Hours				
				L	T	P	Total	L	T	P	Total	
1	PEC	XBT801 A	Introduction to Quantum Biology, AI and Data Science									
		XBT801B	Enzyme Engineering									
		XBT801C	Biowaste and Byproducts Utilization									
		XBT801 D	Molecular Modeling	2	1	0	3	2	1	0	3	
		XBT801E	Clinical Trials and Healthcare Policies in Biotechnology									
		XBT801F	Biotechnological Approach in Crop Improvement									
2	OE	XOE4	Open Elective Courses	3	0	0	3	3	0	0	3	
3	OE	XOE5	Open Elective Courses	3	0	0	3	3	0	0	3	
4	PROJ	XBT804	Project Work (Phase-II)	0	0	9	9	0	0	18	18	
5	PMC	XBTMO4	Minor Course IV**	0	0	1	0	0	0	1	3	
			<b>Total</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>18</b>	<b>8</b>	<b>1</b>	<b>19</b>	<b>30</b>	

**Total Credits: 18; Total Hours: 30**

\* Professional Elective

OE - Open Elective

\*\* Non-credit Course

#### Courses of Specialization

S. No.	Course Code	Semester	Courses	Credits				Hours			
				L	T	P	C	L	T	P	Total
1.	XBTHC	III	C and Java	1	0	2	3	3	0	2	5

	1										
2.	XBTHC 2	IV	Python	1	0	2	3	3	0	2	5
3.	XBTHC 3	IV	Biostatistics	2	1	0	3	3	2	0	5
4.	XBTHC 4	V	R program and R studio	1	0	2	3	3	0	2	5
5	XBTHC 5	VI	MAT Lab	1	0	2	3	3	0	2	5
6	XBTHC 6	VII	Mini Project	0	0	5	5	0	0	10	10
			<b>Total</b>	<b>6</b>	<b>1</b>	<b>13</b>	<b>20</b>	<b>15</b>	<b>2</b>	<b>18</b>	<b>35</b>

**Grant Total Credits: 187**