

5		HS &Open Elective- IV	3-0-0	3
6	BM 382	Biomedical Image Processing Laboratory	0-0-3	2
7	BM 384	Biomedical Instrumentation Laboratory	0-0-3	2
8		Elective Laboratory – III	0-0-3	2
		Elective Laboratory – IV	0-0-3	2
TOTAL				25

SEVENTH SEMESTER

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1	BM 421	Tissue Engineering	3-1-0	3
2		Professional Elective - VI	3-1-0	3/4
3		Professional Elective – VII	3-1-0	3
4		HS &Open Elective – V	3-0-0	3
5	BM 481	Tissue Engineering Laboratory	0-0-3	2
6	BM 483	Computational Biomechanics Laboratory	0-0-3	2
7	BM 471	Bioprocess Design Laboratory	0-0-3	2
8	BM 491	Research Project– I	0-0-6	4
9	BM 493	Seminar and Technical Writing– I	0-0-3	2
10	BM 495	Short term Industrial/Research Experience	0-0-3	2
TOTAL				26/27

EIGHTH SEMESTER

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1		Professional Elective–VIII	3-0-0	3/4
2		Professional Elective–IX	3-0-0	3
3		Professional Elective–X	3-0-0	3
4		HS &Open Elective–VI	3-0-0	3
5	BM 472	Biomicrofluidics Laboratory	0-0-3	2
6	BM 482	Computer Aided Tissue Engineering Laboratory	0-0-3	2
7	BM 492	Research Project–II	0-0-9	6
8	BM 494	Seminar and Technical Writing – II	0-0-3	2
9	BM 496	Comprehensive Viva Voce	0-0-0	2
TOTAL				26/27

DEPARTMENT OF BIOTECHNOLOGY AND BIOMEDICAL ENGINEERING**Curriculum of B.Tech. (Biotechnology Engineering)****FIRST SEMESTER (STRUCTURE COMMON TO ALL BRANCHES)**

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1	MA 101	Mathematics – I	3-1-0	4
2	PH 101	Physics – I	3-1-0	4
3	CY 101	Chemistry	3-1-0	4
4	EE 100	Basic Electrical Technology	OR	3-1-0
	EC 100	Basic Electronics Engineering		
5	CE 100	Engineering Mechanics	OR	3-1-0
	CE 130	Environmental and Safety Engineering		
6	PH 170	Physics Laboratory	OR	0-0-3
	CY 170	Chemistry Laboratory		
7	CS 171	Computing Laboratory – I	0-0-3	2
8	CE 171	Engineering Drawing	0-0-3	2
9	WS 171	Workshop Practice – I	0-0-3	2
10		Extra Academic Activity – I	0-0-3	2
TOTAL			15-5-15	30

SECOND SEMESTER (STRUCTURE COMMON TO ALL BRANCHES)

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1	MA 102	Mathematics – II	3-1-0	4
2	PH 102	Physics – II	3-1-0	4
3	CS 102	Data Structures and Algorithms	3-1-0	4
4	EC 100	Basic Electronics Engineering	OR	3-1-0
	EE 100	Basic Electrical Technology		
5	CE 130	Environmental and Safety Engineering	OR	3-1-0
	CE 100	Engineering Mechanics		
6	CY 170	Chemistry Laboratory	OR	0-0-3
	PH 170	Physics Laboratory		
7	CS 172	Computing Laboratory – II	0-0-3	2
8	ME 170	Machine Drawing and Solid Modeling	0-0-3	2
9	ME 172	Workshop Practice – II	0-0-3	2
10		Extra Academic Activity – I	0-0-3	2
TOTAL			15-5-15	30

THIRD SEMESTER

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1	MA 201	Mathematics– III	3-1-0	4
2	BM 201	Anatomy and Physiology	3-0-0	3
3	LS 201	Biochemistry	3-1-0	4
4	LS 203	Microbiology	3-0-0	3

5		HS & OpenElective-I		3-0-0	3
6	MA 270	Numerical Methods Laboratory	OR	0-0-3	2
	HS 270	Language Laboratory			
7	EC 270	Basic Electronics Laboratory	OR	0-0-3	2
	EE 270	Basic Electrical Engineering Laboratory			
8	LS 271	Biochemistry Laboratory		0-0-3	2
9	LS 273	Microbiology Laboratory		0-0-3	2
TOTAL					25

FOURTH SEMESTER

Sl. No	Sub. Code	Subjects		L-T-P	Credits
1	MA 202	Mathematics-IV		3-1-0	4
2	BM 232	Biofluid Mechanics		3-1-0	4
3	BM 244	Cell and Molecular Biology		3-0-0	3
4		Professional Elective-I		3-0-0	3
5		HS & OpenElective-II		3-0-0	3
6	MA 270	Numerical Methods Laboratory	OR	0-0-3	2
	HS 270	Language Laboratory			
7	EC 270	Basic Electronics Laboratory	OR	0-0-3	2
	EE 270	Basic Electrical Engineering Laboratory			
8	BM 272	Biofluid Mechanics Laboratory		0-0-3	2
9	BM 274	Analytical Biotechnology Laboratory		0-0-3	2
TOTAL					25

FIFTH SEMESTER

Sl. No	Sub. Code	Subjects		L-T-P	Credits
1	BM 331	Bioheat and Mass Transfer		3-1-0	4
2	BM 341	Genetic Engineering		3-1-0	4
3		Professional Elective- II		3-0-0	3
4		Professional Elective- III		3-0-0	3
5		HS & OpenElective-III		3-0-0	3
6	BM 375	Bioheat and Mass transfer Laboratory		0-0-3	2
7	BM 371	Cell and Molecular Engineering Laboratory		0-0-3	2
8		Elective Laboratory - I		0-0-3	2
9		Elective Laboratory - II		0-0-3	2
TOTAL					25

SIXTH SEMESTER

Sl. No	Sub. Code	Subjects		L-T-P	Credits
1	BM 352	Biochemical Engineering		3-1-0	4
2	BM 354	Bioseparation		3-1-0	4
3		Professional Elective - IV			3/4
4		Professional Elective - V		3-0-0	3

5		HS & Open Elective – IV	3-0-0	3
6	BM 372	Bioseparation Laboratory	0-0-3	2
7	BM 374	Biochemical Engineering Laboratory	0-0-3	2
8		Elective Laboratory – I	0-0-3	2
9		Elective Laboratory – II	0-0-3	2
TOTAL				25/26

SEVENTH SEMESTER

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1	BM 441	Protein Engineering	3-0-0	3
2		Professional Elective – VI		3/4
3		Professional Elective – VII	3-0-0	3
4		HS & Open Elective – V	3-0-0	3
5	BM 471	Bioprocess design Laboratory	0-0-3	2
6	BM 473	Food Technology Laboratory	0-0-3	2
7	BM 481	Tissue Engineering Laboratory	0-0-3	2
8	BM 491	Research Project – I	0-0-6	4
9	BM 493	Seminar and Technical Writing – I	0-0-3	2
10	BM 495	Short term Industrial / Research Experience	0-0-3	2
TOTAL				26/27

EIGHTH SEMESTER

Sl. No	Sub. Code	Subjects	L-T-P	Credits
1		Professional Elective – VIII		3/4
2		Professional Elective – IX	3-0-0	3
3		Professional Elective – X	3-0-0	3
4		HS & Open Elective – VI	3-0-0	3
5	BM 472	Biomicrofluidics Laboratory	0-0-3	2
6	BM 484	Structural Biology Laboratory	0-0-3	2
7	BM 492	Research Project– II	0-0-9	6
8	BM 494	Seminar and Technical Writing - II	0-0-3	2
9	BM 496	Comprehensive Viva Voce	0-0-0	2
TOTAL				26/27

LIST OF PROFESSIONAL ELECTIVES

Sl. No	Sub. Code	Subjects	L-T-P	Credits	Offered to*
1	BM 202	Clinical Science	3-1-0	4	BT
2	BM 203	Clinical Biochemistry	3-0-0	3	#
3	BM 205	Clinical Microbiology	3-0-0	3	#
4	BM 232	Biofluid Mechanics	3-1-0	4	BM
5	BM 234	Biothermodynamics	3-0-0	3	#
6	BM 242	Immunology	3-0-0	3	#
7	BM 244	Cell and Molecular Biology	3-0-0	3	BM

8	BM 252	Bioenergetics & Metabolism	3-0-0	3	BT
9	BM 254	Bioprocess Calculation	3-0-0	3	#
10	BM 256	Enzymology	3-0-0	3	#
11	BM 271	Anatomy and Physiology Laboratory	0-0-3	2	BT
12	BM 272	Biofluid Mechanics Laboratory	0-0-3	2	BM
13	BM 273	Clinical Biochemistry Laboratory	0-0-3	2	#
14	BM 274	Analytical Biotechnology Laboratory	0-0-3	2	BM
15	BM 275	Clinical Microbiology Laboratory	0-0-3	2	#
16	BM 311	Medical Signal and Signal Processing	3-1-0	4	BT
17	BM 312	Biomedical Instrumentation	3-1-0	4	BT
18	BM 313	Biological Control System	3-0-0	3	#
19	BM 314	Biomedical Image Processing	3-1-0	4	BT
20	BM 315	Laser & Fiber Optics in Medicine	3-0-0	3	#
21	BM 316	Biosensors and Biotransducers	3-0-0	3	#
22	BM 321	Biomaterials	3-1-0	4	BT
23	BM 322	Biopolymers	3-0-0	3	#
24	BM 324	Surface Engineering of Biomaterials	3-0-0	3	#
25	BM 331	Bioheat and Mass Transfer	3-1-0	4	BM
26	BM 332	Biomechanics	3-0-0	3	#
27	BM 341	Genetic Engineering	3-1-0	4	BM
28	BM 342	Applied Cell Biology	3-0-0	3	#
29	BM 343	Bioinformatics	3-0-0	3	#
30	BM 345	Animal Tissue Culture	3-0-0	3	#
31	BM 352	Biochemical Engineering	3-1-0	4	BM
32	BM 353	Pharmaceutical Technology	3-0-0	3	#
33	BM 354	Bioseparation	3-1-0	4	BM
34	BM 356	Bioinstrumentation and Process Control	3-1-0	4	#
35	BM 358	Bioreactor Analysis and Design	3-0-0	3	#
36	BM 361	Agricultural Biotechnology	3-0-0	3	#
37	BM 362	Plant Tissue Culture	3-0-0	3	#
38	BM 370	Bioinformatics Laboratory	0-0-3	2	#
39	BM 371	Cell and Molecular Engineering Laboratory	0-0-3	2	BM
40	BM 372	Bioseparation Laboratory	0-0-3	2	BM
41	BM 373	Environmental Biotechnology Laboratory	0-0-3	2	#
42	BM 374	Biochemical Engineering Laboratory	0-0-3	2	BM
43	BM 375	Bioheat and Mass Transfer Laboratory	0-0-3	2	BM
44	BM 376	Bioprocess Instrumentation Laboratory	0-0-3	2	#
45	BM 378	Animal Cell Culture and Immunotechnology Laboratory	0-0-3	2	#
46	BM 381	Biomaterial Laboratory	0-0-3	2	BT
47	BM 382	Biomedical Image Processing Laboratory	0-0-3	2	BT
48	BM 383	Biomedical Signal Processing Laboratory – I	0-0-3	2	BT
49	BM 384	Biomedical Instrumentation Laboratory	0-0-3	2	BT

50	BM 385	Medical Equipment Design Laboratory	0-0-3	2	#
51	BM 386	Experimental Biomechanics Laboratory	0-0-3	2	#
52	BM 387	Biomedical Signal Processing Laboratory - II	0-0-3	2	#
53	BM 391	Special Topics in Biotechnology & Medical Engg.-I		3/4	#
54	BM 392	Special Topics in Biotechnology & Medical Engg.-II		3/4	#
55	BM 393	Special Laboratory in Biotechnology & Medical Engg.-I	0-0-3	2	#
56	BM 394	Special Laboratory in Biotechnology & Medical Engg.-II	0-0-3	2	#
57	BM 395	Engineering Product Development Project – I	0-0-6	4	#
58	BM 396	Engineering Product Development Project – II	0-0-6	4	#
59	BM 401	Hospital Management	3-0-0	3	#
60	BM 402	Health Informatics	3-0-0	3	#
61	BM 403	Hospital Engineering and Information system	3-0-0	3	#
62	BM 405	Telemedicine	3-0-0	3	#
63	BM 411	Medical Embedded system	3-0-0	3	#
64	BM 413	Medical Imaging	3-0-0	3	#
65	BM 421	Tissue engineering	3-0-0	3	BT
66	BM 422	Computer Application in Tissue Engineering	3-0-0	3	#
67	BM 423	Nanotechnology in Tissue Engineering	3-0-0	3	#
68	BM 424	Artificial Organs and Rehabilitation Engineering	3-0-0	3	#
69	BM 425	Biomaterials in Tissue Engineering	3-0-0	3	#
70	BM 427	BioComposites	3-0-0	3	#
71	BM 428	Nanotechnology in Biomedical Engineering	3-0-0	3	#
72	BM 431	Physiological system modeling	3-0-0	3	#
73	BM 432	Biomicrofluidics	3-0-0	3	#
74	BM 433	Biotransport	3-0-0	3	#
75	BM 441	Protein Engineering	3-0-0	3	BM
76	BM 442	Cancer Biology	3-0-0	3	#
77	BM 444	Structural Biology	3-0-0	3	#
78	BM 452	Fermentation Technology	3-0-0	3	#
79	BM 463	Food Technology	3-0-0	3	#
80	BM 465	Biological waste treatment	3-0-0	3	#
81	BM 483	Computational Biomechanics Laboratory	0-0-3	2	BT
82	BM 484	Structural Biology Laboratory	0-0-3	2	BM
83	BM 252	Bioenergetics & Metabolism	3-0-0	3	BM

Note: # for both BM & BT Engineering Curriculum

LIST OF PROFESSIONAL ELECTIVES FROM OTHER DEPARTMENTS

Sl. No	Sub.Code	Subject	L-T-P	Credit
1	CH 224	Polymer Science and Technology	3-0-0	3
2	CH 311	Heat Transfer Operations	3-1-0	4
3	CH 315	Mass Transfer Operations	3-1-0	4
4	CH 322	Environmental Biotechnology	3-0-0	3

5	CH 425	Environmental Engineering	3-0-0	3
6	CR 325	Computational Materials Science	3-0-0	3
7	CR 433	Sensor Technology	3-0-0	3
8	CR 435	Functional Materials & Devices	3-0-0	3
9	CR 415	Bio-ceramics	3-0-0	3
11	CS 222	Data Base Management	3-0-0	3
12	CS 314	Simulation and Modeling	3-0-0	3
13	CS 341	Microprocessor and Micro-controllers	3-1-0	4
14	CS 373	Microprocessor Laboratory	0-0-3	2
15	CS 421	Computer Networks	3-0-0	3
16	CS 474	Image Processing Laboratory	0-0-3	2
17	CS 477	Soft Computing Laboratory	0-0-3	2
18	CS 638	Pattern Recognition	3-1-0	4
19	CY 303	Introduction to Nano-biotechnology	3-0-0	3
20	CY 517	Chemistry of Natural Products.	3-1-0	4
21	CY 602	Industrial Waste Management	3-1-0	4
22	EC 322	Embedded Systems	3-0-0	3
23	EC 331	Control System Engineering	3-1-0	4
26	EC 421	Digital VLSI Design	3-1-0	4
27	EC 423	HDL and High Level VLSI	3-1-0	4
29	EC 442	Advanced Techniques in Digital Signal Processing	3-1-0	4
30	EC 444	Soft Computing	3-1-0	4
31	EC 446	Adaptive Signal Processing	3-1-0	4
34	EE 336	Advanced Instrumentation	3-0-0	3
35	EE 356	Digital Signal Processing	3-0-0	3
36	EE 426	Fuzzy Modeling & Control	3-0-0	3
37	EE 427	Soft computing	3-0-0	3
38	EE 445	Data communication and Networks	3-0-0	3
39	EE 456	Robotics and Computer Vision	3-0-0	3
40	MA 524	Statistical Methods	3-1-0	4
41	MA 553	Optimization Techniques	3-1-0	4
42	ME 416	Robotics	3-0-0	3
43	ME 434	Computer Graphics for CAD/CAM	3-0-0	3
44	MM 359	Engineering Polymers and Composites	3-1-0	4
45	MM 449	Nano Structure of Materials	3-0-0	3
46	MN 436	Environmental Pollution and Control in Mines	3-1-0	4
47	PH 555	Physics of Material Synthesis and Characterization	3-1-0	4
48	PH 640	Physics of Macromolecules	3-1-0	4

LIST OF OPEN ELECTIVES

(Normally not offered to student of Biotechnology and Biomedical Engineering)

Sub.Code	Subjects	L-T-P	Credits	Non Eligible Branches
BM 317	Biomedical Engineering	3-0-0	3	-
BM 318	Medical Instrumentation	3-0-0	3	-
BM 415	Electronic devices for Rehabilitation Engineering	3-0-0	3	-
BM 429	Materials in medical science	3-0-0	3	-
BM 443	Introduction to Biotechnology	3-0-0	3	-

SUMMARY OF COURSES (B.Tech.)**Sub Discipline: Miscellaneous Topics**

BM 201	Anatomy and Physiology	3-0-0	3
BM 202	Clinical Science	3-1-0	4
BM 203	Clinical Biochemistry	3-0-0	3
BM 205	Clinical Microbiology	3-0-0	3
BM 401	Hospital Management	3-0-0	3
BM 402	Health Informatics	3-0-0	3
BM 403	Hospital Engineering and Information system	3-0-0	3
BM 405	Telemedicine	3-0-0	3

Sub Discipline: Medical Electronics and Instrumentation

BM 311	Medical Signal and Signal Processing	3-1-0	4
BM 312	Biomedical Instrumentation	3-1-0	4
BM 313	Biological Control System	3-0-0	3
BM 314	Biomedical Image Processing	3-1-0	4
BM 315	Laser & Fiber Optics in Medicine	3-0-0	3
BM 316	Biosensors and Biotransducers	3-0-0	3
BM 317	Biomedical Engineering	3-0-0	3
BM 318	Medical Instrumentation	3-0-0	3
BM 411	Medical Embedded system	3-0-0	3
BM 413	Medical Imaging	3-0-0	3
BM 415	Electronic devices for Rehabilitation Engineering	3-0-0	3

Sub Discipline: Tissue Engineering and Biomaterials

BM 321	Biomaterials	3-1-0	4
BM 322	Biopolymers	3-0-0	3
BM 324	Surface Engineering of Biomaterials	3-0-0	3
BM 421	Tissue engineering	3-0-0	3
BM 422	Computer Application in Tissue Engineering	3-0-0	3
BM 423	Nanotechnology in Tissue Engineering	3-0-0	3
BM 424	Artificial Organs and Rehabilitation Engineering	3-0-0	3
BM 425	Biomaterials in Tissue Engineering	3-0-0	3

BM 427	BioComposites	3-0-0	3
BM 428	Nanotechnology in Biomedical Engineering	3-0-0	3
BM 429	Materials in medical science	3-0-0	3

Sub Discipline: Bio-transport and Biomechanics

BM 232	Biofluid Mechanics	3-1-0	4
BM 234	Biothermodynamics	3-0-0	3
BM 331	Bioheat and Mass Transfer	3-1-0	4
BM 332	Biomechanics	3-0-0	3
BM 431	Physiological system modeling	3-0-0	3
BM 432	Biomicrofluidics	3-0-0	3
BM 433	Biotransport	3-0-0	3

Sub Discipline: Cell and Molecular Engineering

BM 242	Immunology	3-0-0	3
BM 244	Cell and Molecular Biology	3-0-0	3
BM 341	Genetic Engineering	3-1-0	4
BM 342	Applied Cell Biology	3-0-0	3
BM 343	Bioinformatics	3-0-0	3
BM 345	Animal Tissue Culture	3-0-0	3
BM 441	Protein Engineering	3-0-0	3
BM 442	Cancer Biology	3-0-0	3
BM 443	Introduction to Biotechnology	3-0-0	3
BM 444	Structural Biology	3-0-0	3

Sub Discipline: Bioprocess Engineering

BM 252	Bioenergetics & Metabolism	3-0-0	3
BM 254	Bioprocess Calculation	3-0-0	3
BM 256	Enzymology	3-0-0	3
BM 352	Biochemical Engineering	3-1-0	4
BM 353	Pharmaceutical Technology	3-0-0	3
BM 354	Bioseparation	3-1-0	4
BM 356	Bioinstrumentation and Process Control	3-1-0	4
BM 358	Bioreactor Analysis & Design	3-0-0	3
BM 452	Fermentation Technology	3-0-0	3

Sub Discipline: Agricultural and Environmental Biotechnology

BM 361	Agricultural Biotechnology	3-0-0	3
BM 362	Plant Tissue Culture	3-0-0	3
BM 463	Food Technology	3-0-0	3
BM 465	Biological waste treatment	3-0-0	3

Sub Discipline: Laboratory Courses

BM 271	Anatomy and Physiology Laboratory	0-0-3	2
BM 272	Biofluid Mechanics Laboratory	0-0-3	2