

SCHEME -2013
BIOTECHNOLOGY & BIOCHEMICAL ENGINEERING (B)
Combined I and II Semesters

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.101	Engineering Mathematics - I (ABCEFHMNPRSTU)	6	2	1	-	50	3	100	150
13.102	Engineering Physics (ABCEFHMNPRSTU)	6	2	1	-	50	3	100	150
13.103	Engineering Chemistry (ABCEFHMNPRSTU)	6	2	1	-	50	3	100	150
13.104	Engineering Graphics (ABCEFHMNPRSTU)	6	1	-	2	50	3	100	150
13.105	Engineering Mechanics (ABCEFHMNPRSTU)	6	2	1	-	50	3	100	150
13.106	Basic Civil Engineering (ABEFHMNPRSTU)	6	2	1	-	50	3	100	150
13.107	Basic Biochemical Engineering & Biotechnology (B)	6	2	1	-	50	3	100	150
13.108	Basic Electrical Engineering (ABCHMNPSTU)	6	2	1	-	50	3	100	150
13.109	Basic Electronics Engineering (BCEHMNPSU)	6	2	1	-	50	3	100	150
13.110	Mechanical Engineering Workshop (ABCEFHMNPRSTU)	2	-	-	1	25	3	50	75
13.111	Electrical & Electronics Engineering Workshop (ABCEFHMNPRSTU)	2	-	-	1	25	3	50	75
Total		58	17	8	4	500		1000	1500

Third Semester

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.301	Engineering Mathematics-II (ABCEFHMNPRSTU)	4	3	1	-	50	3	100	150
13.302	Humanities (BEFMRSU)	3	3	0	-	50	3	100	150
13.303	Bioprocess Calculations (B)	5	3	2	-	50	3	100	150
13.304	Microbial Biochemistry (B)	4	3	1	-	50	3	100	150
13.305	Microbiology (B)	4	3	1	-	50	3	100	150
13.306	Principles of Momentum Transfer (B)	5	3	2	-	50	3	100	150
13.307	Biochemistry Laboratory (B)	2	-	-	2	50	4	100	150
13.308	Microbiology Laboratory (B)	2	-	-	2	50	4	100	150
Total		29	18	7	4	400		800	1200

Fourth Semester

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.401	Engineering Mathematics -III (BCHMNPSU)	4	3	1	-	50	3	100	150
13.402	Chemical & Biochemical Reaction Engineering (B)	4	3	1	-	50	3	100	150
13.403	Molecular Biology & Genetics (B)	3	2	1	-	50	3	100	150
13.404	Computer Programming in C++ (B)	4	3	1	-	50	3	100	150
13.405	Industrial Bioprocess Technology (B)	4	3	1	-	50	3	100	150
13.406	Bioprocess Engineering (B)	4	2	2	-	50	3	100	150
13.407	Instrumental Methods of Analysis Laboratory (B)	3	-	-	3	50	4	100	150
13.408	Fluid Solid Systems Laboratory (B)	3	-	-	3	50	4	100	150
Total		29	16	7	6	400		800	1200

Fifth Semester

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.501	Engineering Mathematics IV - Complex Analysis & Linear Algebra (ABHT)	4	3	1	-	50	3	100	150
13.502	Mass Transfer Operations (B)	4	3	1	-	50	3	100	150
13.503	Enzyme Engineering & Technology (B)	3	2	1	-	50	3	100	150
13.504	Principles of Heat Transfer in Bioprocesses (B)	4	3	1	-	50	3	100	150
13.505	Thermodynamics of Bioprocesses (B)	4	3	1	-	50	3	100	150
13.506	Genetic Engineering (B)	4	3	1		50	3	100	150
13.507	Molecular Biology laboratory (B)	3	-	-	3	50	4	100	150
13.508	Bioprocess Engineering Lab (B)	3	-	-	3	50	4	100	150
Total		29	17	6	6	400		800	1200

Sixth Semester

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.601	Transport Phenomena in Bioprocesses (B)	5	3	2	-	50	3	100	150
13.602	Downstream Processing (B)	4	2	2	-	50	3	100	150
13.603	Biomaterials & Tissue Engineering (B)	3	2	1	-	50	3	100	150
13.604	Proteomics & Protein Engineering (B)	3	2	1	-	50	3	100	150
13.605	Numerical Methods for Process Engineers (B)	4	2	2	-	50	3	100	150
13.606	ELECTIVE I	4	3	1	-	50	3	100	150
13.607	Software Laboratory (B)	3	-	-	3	50	3	100	150
13.608	Heat & Mass Transfer Laboratory (B)	3	-	-	3	50	4	100	150
Total		29	14	9	6	400		800	1200

Seventh Semester

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.701	Process Dynamics & Control (B)	4	2	2	-	50	3	100	150
13.702	Bioinformatics (B)	3	2	1	-	50	3	100	150
13.703	Bioprocess Instrumentation (B)	3	2	1	-	50	3	100	150
13.704	Design of Biological Waste Treatment Systems (B)	4	2	2	-	50	3	100	150
13.705	ELECTIVE II	3	2	1	-	50	3	100	150
13.706	Reaction Engineering & Process Control Laboratory (B)	3	-	-	3	50	4	100	150
13.707	Downstream Processing laboratory (B)	3	-	-	3	50	4	100	150
13.708	Mini Project	3	-	-	3	50		100	150
13.709	Seminar, Industrial Visits	3	-	-	3	100			100
Total		29	10	7	12	500		800	1300

Eighth Semester

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/P				
13.801	Bioprocess Plant & Equipment Design (B)	5	3	2	-	50	4	100	150
13.802	Economics & Mangement of Process Industries (B)	4	2	2	-	50	3	100	150
13.803	Environmental Pollution, Monitoring & Control (B)	4	3	1	-	50	3	100	150
13.804	ELECTIVE III	4	3	1	-	50	3	100	150
13.805	ELECTIVE IV	4	3	1	-	50	3	100	150
13.806	Bioinformatics Laboratory (B)	3	-	-	3	50	4	100	150
13.807	Project and Viva-Voce	5	-	-	5	200		100	300
Total		29	14	7	8	500		700	1200

13. 606 Elective I

13.606.1	Biopharmaceutical Technology (B)
13.606.2	Biosensors and Diagnostics (B)
13.606.3	Cancer Biology (B)
13.606.4	Immunology and Immunotechnology (B)
13.606.5	Energy Engineering (B)
13.606.6	Novel Analytical Methods in Biotechnology (B)
13.606.7	Metabolic Regulation and Engineering (B)

13.705 Elective II

13.705.1	Biostatistics (B)
13.705.2	Process Optimization
13.705.3	Bioprocess Plant safety and Hazard Assessment (B)
13.705.4	Biocatalysts and Catalysis
13.705.5	Computational Fluid Dynamics (B)
13.705.6	Drug Design, Development and Manufacture (B)
13.705.7	Ethics and Intellectual Property Rights (B)

13. 804 Elective III

13.804.1	Bioentrepreneurship (B)
13.804.2	Bio-fuel Technology and Engineering (B)
13.804.3	Research Methodologies (B)
13.804.4	Modeling and Scale up of Bioreactors (B)
13.804.5	Project Engineering (B)

13. 805 Elective IV

13.805.1	Design of Biological Waste Treatment Systems (B)
13.805.2	Bioengineering and Nanotechnology (B)
13.805.3	Commercialization, Marketing and Management of Biotech Products (B)
13.805.4	Total Quality Management (B)
13.805.5	Mathematical Modeling and Simulation of Bioprocesses (B)