

**AARUPADAI VEEDU INSTITUTE OF
TECHNOLOGY, PAIYANOOR, CHENNAI**

&

**VINAYAKA MISSION'S KIRUPANANDA VARIYAR
ENGINEERING COLLEGE, SALEM**

(Constituent Colleges of Vinayaka Mission's Research Foundation,

Deemed to be University, Salem, Tamil Nadu, India)

(AICTE APPROVED AND NAAC ACCREDITED)

Faculty of Engineering and Technology

REGULATIONS 2017

DEPARTMENT OF BIOTECHNOLOGY

Programme:

B.Tech.BIOTECHNOLOGY

Full Time (4 Years)

STRUCTURED CHOICE BASED CREDIT SYSTEM (SCBCS)

CURRICULUM AND SYLLABUS

(Semester I to VIII)

PROGRAM OUTCOMES (POs) OR GRADUATE ATTRIBUTES

Engineering Graduates will be able to:

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) PROGRAM SPECIFIC OUTCOMES (PSOs)

Upon successful completion of the course the students are expected to:

PSO1: To identify, formulate, design, analyse and develop processes and technologies for biotechnological products for societal usage and economically sustainable for the present and future

PSO2: To expertise in implementation of modern biotechnological tools to address human health, complex engineering problems and to improve the research approach in interdisciplinary facet.

PSO3: To recognise the knowledge, need for and the importance of bioethics, environmental and social responsibilities for life long learning in the broadest context in technological changes.

(C) PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To provide the biotechnology graduates to have expertise in biotechnological aspects which will enable them to have a career and professional achievements in public and private sector

PEO2: Address the nuances of biotechnology in real life on application of microorganisms in industrial production of enzymes and products, downstream processing, genetic engineering, tissue culture and applications.

PEO3: Identify, design and develop biotechnological process and technologies to meet the industrial challenges and produce tools which a sound and economically viable and sustainable.

Credit Structure of Course Category

Sl. No.	Category of Courses	Credits
01	A. Foundation Courses (FC)	54 - 63
	i. Humanities and Sciences (English and Management Subjects)	12 – 21
	ii. Basic Sciences (Maths, Physics and Chemistry Subjects)	24 – 33
	iii. Engineering Sciences (Basic Engineering Courses)	18 - 27
02	B. Core courses (CC) relevant to the chosen programme of study.	81
03	C. Elective Courses (EC)	18 - 27
	i. Programme Specific (Class Room or Online)	12 – 15
	ii. Open (Class Room or Online)	6 - 9
04	D. Project + Internship + Industry Electives (P + I + I)	18
	i. Project	9
	ii. Internship / Industry Supported Courses	9
05	E. Employability Enhancement Courses + Co - Curricular Courses + Extra Curricular Courses (EEC)**	9 - 18
Minimum Credits to be earned		180
<p>** - Mandatory, Credits would be mentioned in Mark sheets but not included for CGPA Calculations. Overall CGPA Calculations will be out of minimum 171 credits earned in categories A to D.</p>		

CURRICULUM
B.TECH.-
BIOTECHNOLOGY
- SEMESTER
I TO VIII

B.TECH. – BIOTECHNOLOGY - SEMESTER I TO VIII**CATEGORY A – FOUNDATION COURSES - HSS, BS AND ES COURSES - CREDITS (54-63)****(i) HUMANITIES AND SCIENCES (ENGLISH AND MANAGEMENT SUBJECTS) - CREDITS (12 - 21)**

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17EGHS01	TECHNICAL ENGLISH	ENGLISH	FC (HS)	3	0	0	3	NIL
2.	17EGHS02	BUSINESS ENGLISH	ENGLISH	FC (HS)	3	0	0	3	NIL
3.	17MBHS04	TOTAL QUALITY MANAGEMENT	MANAGEMENT	FC (HS)	3	0	0	3	NIL
4.	17EGHS81	ENGLISH LANGUAGE LAB	ENGLISH	FC (HS)	0	0	4	2	NIL
5.	17YMHS82	YOGA & MEDITATION	PHYSICAL EDUCATION	FC (HS)	0	0	4	2	NIL
6.	17EGHS82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	ENGLISH	FC (HS)	0	0	2	1	NIL

(ii) BASIC SCIENCES (MATHS, PHYSICS AND CHEMISTRY SUBJECTS) - CREDITS (24 - 33)

1.	17MABS03	MATHEMATICS FOR BIO-ENGINEERING	MATHS	FC (BS)	2	2	0	3	NIL
2.	17PCBS02	PHYSICAL SCIENCES	PHYSICS & CHEMISTRY	FC (BS)	4	0	0	4	NIL
3.	17MABS07	BIOSTATISTICS	MATHS	FC (BS)	2	2	0	3	MATHEMATICS FOR BIO-ENGINEERING
4.	17PHBS05	SMART MATERIALS	PHYSICS	FC (BS)	3	0	0	3	NIL
5.	17CHBS03	BIOORGANIC CHEMISTRY	CHEMISTRY	FC (BS)	3	0	0	3	NIL
6.	17CHBS01	ENVIRONMENTAL SCIENCE AND ENGINEERING	CHEMISTRY	FC (BS)	3	0	0	3	NIL
7.	17PHBS02	NANOTECHNOLOGY	PHYSICS	FC (BS)	3	0	0	3	NIL
8.	17PCBS81	PHYSICAL SCIENCES LAB	PHYSICS & CHEMISTRY	FC (BS)	0	0	4	2	NIL
9.	17CHBS81	BIOORGANIC CHEMISTRY LAB	CHEMISTRY	FC (BS)	0	0	4	2	NIL

(iii) ENGINEERING SCIENCES (BASIC ENGINEERING COURSES) - CREDITS (18 - 27)

1.	17BTES04	FUNDAMENTALS OF BIOTECHNOLOGY	BTE	FC (ES)	3	0	0	3	NIL
2.	17CSES01	ESSENTIALS OF COMPUTING	CSE	FC (ES)	3	0	0	3	NIL
3.	17CSES06	PROGRAMMING IN C	CSE	FC (ES)	3	0	0	3	NIL
4.	17BMES01	BIOSENSORS & MEASUREMENT DEVICES	BME	FC (ES)	3	0	0	3	NIL
5.	17BMES02	MEDICAL INSTRUMENTATION	BME	FC (ES)	3	0	0	3	NIL
6.	17CSES85	PROGRAMMING IN C LAB	CSE	FC (ES)	0	0	4	2	NIL
7.	17BMES81	BIOSENSORS & MEASUREMENT DEVICES LAB	BME	FC (ES)	0	0	4	2	NIL
8.	17BMES82	MEDICAL INSTRUMENTATION LAB	BME	FC (ES)	0	0	4	2	NIL

CATEGORY B – CORE COURSES RELEVANT TO THE PROGRAMME - CREDITS (81)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17BTCC01	ESSENTIALS OF BIOCHEMISTRY	BTE	CC	3	0	0	3	NIL
2.	17BTCC02	CELL BIOLOGY	BTE	CC	3	0	0	3	NIL
3.	17BTCC03	MICROBIOLOGY	BTE	CC	3	0	0	3	NIL
4.	17BTCC04	CLASSICAL AND MOLECULAR GENETICS	BTE	CC	3	0	0	3	NIL
5.	17BTCC05	UNIT OPERATIONS IN PROCESS INDUSTRIES	BTE	CC	3	0	0	3	NIL
6.	17BTCC06	ADVANCED BIOCHEMISTRY	BTE	CC	3	0	0	3	ESSENTIALS OF BIOCHEMISTRY
7.	17BTCC07	ENZYME ENGINEERING AND TECHNOLOGY	BTE	CC	3	0	0	3	NIL
8.	17BTCC08	BIOINSTRUMENTATION	BTE	CC	3	0	0	3	NIL
9.	17BTCC09	MOLECULAR BIOLOGY	BTE	CC	3	0	0	3	CLASSICAL AND MOLECULAR GENETICS
10.	17BTCC10	PRINCIPLES OF CHEMICAL ENGINEERING	BTE	CC	3	0	0	3	UNIT OPERATIONS IN PROCESS INDUSTRIES
11.	17BTCC11	PLANT AND ANIMAL BIOTECHNOLOGY	BTE	CC	3	0	0	3	NIL
12.	17BTCC12	GENETIC ENGINEERING	BTE	CC	3	0	0	3	MOLECULAR BIOLOGY
13.	17BTCC13	THERMODYNAMICS FOR BIOTECHNOLOGY	BTE	CC	4	0	0	4	PRINCIPLES OF CHEMICAL ENGINEERING
14.	17BTCC14	IMMUNOLOGY	BTE	CC	3	0	0	3	NIL
15.	17BTCC15	FOOD PROCESSING TECHNOLOGY	BTE	CC	3	0	0	3	NIL
16.	17BTCC16	BIOPROCESS ENGINEERING	BTE	CC	3	0	0	3	ENZYME ENGINEERING AND TECHNOLOGY
17.	17BTCC17	DOWNSTREAM PROCESSING IN BIOTECHNOLOGY	BTE	CC	4	0	0	4	BIOPROCESS ENGINEERING
18.	17BTCC18	MASS TRANSFER OPERATIONS	BTE	CC	3	0	1	4	THERMODYNAMICS FOR BIOTECHNOLOGY
19.	17BTCC81	BIOCHEMISTRY LAB	BTE	CC	0	0	4	2	NIL
20.	17BTCC82	CELL BIOLOGY LAB	BTE	CC	0	0	4	2	NIL
21.	17BTCC83	MICROBIOLOGY LAB	BTE	CC	0	0	4	2	NIL
22.	17BTCC84	ADVANCED BIOCHEMISTRY LAB	BTE	CC	0	0	4	2	NIL
23.	17BTCC85	MOLECULAR BIOLOGY LAB	BTE	CC	0	0	4	2	NIL
24.	17BTCC86	CHEMICAL ENGINEERING LAB	BTE	CC	0	0	4	2	NIL
25.	17BTCC87	BIOINSTRUMENTATION LAB	BTE	CC	0	0	4	2	NIL
26.	17BTCC88	GENETIC ENGINEERING LAB	BTE	CC	0	0	4	2	NIL
27.	17BTCC89	IMMUNOLOGY LAB	BTE	CC	0	0	4	2	NIL
28.	17BTCC90	FOOD PROCESSING TECHNOLOGY LAB	BTE	CC	0	0	4	2	NIL
29.	17BTCC91	BIOPROCESS ENGINEERING LAB	BTE	CC	0	0	4	2	NIL
30.	17BTCC92	DOWNSTREAM PROCESSING ENGINEERING LAB	BTE	CC	0	0	4	2	NIL

CATEGORY C – ELECTIVE COURSES - CREDITS (18 - 27)

(i) PROGRAMME SPECIFIC (CLASS ROOM OR ONLINE) - CREDITS (12 - 15)									
SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17BTEC01	PLANT AND ANIMAL DISEASES AND THEIR CONTROL	BTE	EC (PS)	3	0	0	3	MICROBIOLOGY
2.	17BTEC02	OCEAN SCIENCE	BTE	EC (PS)	3	0	0	3	NIL
3.	17BTEC03	PRINCIPLES OF BIOINFORMATICS	BTE	EC (PS)	3	0	0	3	NIL
4.	17BTEC04	DIAGNOSTICS AND THERAPEUTICS	BTE	EC (PS)	3	0	0	3	MICROBIOLOGY
5.	17BTEC05	CYTOGENETICS	BTE	EC (PS)	3	0	0	3	NIL
6.	17BTEC06	STEM CELL BIOLOGY AND TISSUE ENGINEERING	BTE	EC (PS)	3	0	0	3	NIL
7.	17BTEC07	GENETICALLY MODIFIED ORGANISMS AND ETHICAL ISSUES	BTE	EC (PS)	3	0	0	3	NIL
8.	17BTEC08	MOLECULAR EVOLUTION	BTE	EC (PS)	3	0	0	3	MOLECULAR BIOLOGY
9.	17BTEC09	MICROBIAL BIOTECHNOLOGY	BTE	EC (PS)	3	0	0	3	MICROBIOLOGY
10.	17BTEC10	CRYOPRESERVATION THEORY AND APPLICATIONS	BTE	EC (PS)	3	0	0	3	NIL
11.	17BTEC11	PROTEIN ENGINEERING	BTE	EC (PS)	3	0	0	3	NIL
12.	17BTEC12	NEUROBIOLOGY AND COGNITIVE SCIENCES	BTE	EC (PS)	3	0	0	3	NIL
13.	17BTEC13	FOOD MICROBIOLOGY	BTE	EC (PS)	3	0	0	3	NIL
14.	17BTEC14	ENDOCRINOLOGY	BTE	EC (PS)	3	0	0	3	NIL
15.	17BTEC15	BIOREMEDIATION TECHNOLOGY	BTE	EC (PS)	3	0	0	3	NIL
16.	17BTEC16	CANCER BIOLOGY	BTE	EC (PS)	3	0	0	3	MOLECULAR BIOLOGY
17.	17BTEC17	APPLIED BIOTECHNOLOGY	BTE	EC (PS)	3	0	0	3	PLANT AND ANIMAL BIOTECHNOLOGY
18.	17BTEC18	METABOLIC ENGINEERING	BTE	EC (PS)	3	0	0	3	ADVANCED BIOCHEMISTRY
19.	17BTEC19	CLINICAL TRIALS	BTE	EC (PS)	3	0	0	3	NIL
20.	17BTEC20	AGRICULTURAL BIOTECHNOLOGY	BTE	EC (PS)	3	0	0	3	NIL
21.	17BTEC21	GENOMICS AND PROTEOMICS	BTE	EC (PS)	3	0	0	3	GENETIC ENGINEERING
22.	17BTEC22	MOLECULAR MODELLING AND DRUG DESIGNING	BTE	EC (PS)	3	0	0	3	PRINCIPLES OF BIOINFORMATICS
23.	17BTEC23	NANOBIOTECHNOLOGY	BTE	EC (PS)	3	0	0	3	NIL
24.	17BTEC24	BIOFERTILIZER TECHNOLOGY	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
25.	17BTEC25	BIOLOGY FOR NON BIOLOGISTS	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
26.	17BTEC26	ECO-FRIENDLY MULTI-STOREY BUILDING	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
27.	17BTEC27	RENEWABLE ENERGY AND CONSTRUCTION METHODS	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
28.	17BTEC28	ENVIRONMENT FRIENDLY PRACTICES IN CIVIL ENGINEERING	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
29.	17BTEC29	GREEN BUILDING AND SUSTAINABLE ENVIRONMENT	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
30.	17BTEC30	NATURAL RESOURCES MANAGEMENT	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS

31.	17BTEC31	APPLICATIONS OF ENZYME IN WASTE MANAGEMENT	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS
32.	17BTEC32	BIOLOGICAL DATABASE	BTE	EC (PS)	3	0	0	3	NOT FOR BTE STUDENTS

(ii) OPEN ELECTIVE (CLASS ROOM OR ONLINE) - CREDITS (6 - 9)

1.	17CSCC02	OBJECT ORIENTED PROGRAMMING	CSE	EC (OE)	3	0	0	3	NIL
2.	17CSCC07	OPERATING SYSTEM	CSE	EC (OE)	3	0	0	3	NIL
3.	17CSCC09	JAVA PROGRAMMING	CSE	EC (OE)	3	0	0	3	NIL
4.	17CSCC16	CLOUD COMPUTING	CSE	EC (OE)	3	0	0	3	NIL
5.	17CSCC17	CYBERSECURITY	CSE	EC (OE)	3	0	0	3	NIL
6.	17CSEC30	UNIX INTERNALS	CSE	EC (OE)	3	0	0	3	NIL
7.	17CSEC34	WEB DESIGN AND MANAGEMENT	CSE	EC (OE)	3	0	0	3	NIL
8.	17CSPI07	LEARNING IT ESSENTIALS BY DOING	CSE	EC (OE)	3	0	0	3	NIL
9.	17CSPI10	MOBILE APPLICATION DEVELOPMENT	CSE	EC (OE)	3	0	0	3	NIL
10.	17BMCC03	BIOSENSORS AND TRANSDUCERS	BME	EC (OE)	3	0	0	3	NIL
11.	17BMCC05	PATHOLOGY AND MICROBIOLOGY	BME	EC (OE)	3	0	0	3	NIL
12.	17BMEC01	MEDICAL OPTICS	BME	EC (OE)	3	0	0	3	NIL
13.	17BMEC02	BIOTELEMETRY	BME	EC (OE)	3	0	0	3	NIL
14.	17BMEC04	MEMS AND ITS BIOMEDICAL APPLICATIONS	BME	EC (OE)	3	0	0	3	NIL
15.	17BMEC09	DESIGN OF MEDICAL DEVICES	BME	EC (OE)	3	0	0	3	NIL
16.	17BMEC13	PRINCIPLES OF TISSUE ENGINEERING	BME	EC (OE)	3	0	0	3	NIL
17.	17BMEC22	MEDICAL ETHICS AND STANDARDS	BME	EC (OE)	3	0	0	3	NIL
18.	17BMSE23	MEDICAL WASTE MANAGEMENT	BME	EC (OE)	3	0	0	3	NIL
19.	17BMSE24	MEDICAL TECHNOLOGY AND ENTREPRENEURSHIP	BME	EC (OE)	3	0	0	3	NIL
20.	17BMSE28	NANO TECHNOLOGY IN MEDICINE	BME	EC (OE)	3	0	0	3	NIL
21.	17CVEC35	MUNICIPAL SOLID AND WASTE MANAGEMENT	CIVIL	EC (OE)	3	0	0	3	NIL
22.	17CVEC14	AIR POLLUTION MANAGEMENT	CIVIL	EC (OE)	3	0	0	3	NIL
23.	17CVEC06	HYDROLOGY	CIVIL	EC (OE)	3	0	0	3	NIL
24.	17CVEC07	DISASTER MITIGATION AND MANAGEMENT	CIVIL	EC (OE)	3	0	0	3	NIL
25.	17CVEC08	REMOTE SENSING TECHNIQUES AND APPLICATIONS	CIVIL	EC (OE)	3	0	0	3	NIL
26.	17EEEC18	RENEWABLE ENERGY TECHNOLOGY	EEE	EC (OE)	3	0	0	3	NIL
27.	17EEEC20	MATHEMATICAL MODELLING AND SIMULATION	EEE	EC (OE)	3	0	0	3	NIL
28.	17EEEC21	NON-CONVENTIONAL ENERGY SOURCES	EEE	EC (OE)	3	0	0	3	NIL
29.	17ATEC08	TRACTOR AND FARM EQUIPMENTS	AUTO	EC (OE)	3	0	0	3	NIL
30.	17ATEC18	ALTERNATIVE FUELS	AUTO	EC (OE)	3	0	0	3	NIL
31.	17MECC16	INDUSTRIAL AUTOMATION	MECH	EC (OE)	3	0	0	3	NIL
32.	17ECEC06	MEMS AND SENSORS	ECE	EC (OE)	3	0	0	3	NIL

33.	17ECEC23	MACHINE VISION	ECE	EC (OE)	3	0	0	3	NIL
34.	17MESE03	HYDROGEN AND FUEL CELL TECHNOLOGY	MECH	EC (OE)	3	0	0	3	NIL
35.	17MESE05	WASTE ENERGY CONVERSION TECHNOLOGY	MECH	EC (OE)	3	0	0	3	NIL
36.	17MESE06	BIO ENERGY TECHNOLOGY	MECH	EC (OE)	3	0	0	3	NIL

CATEGORY D
PROJECT + INTERNSHIP + INDUSTRY ELECTIVES (P + I + I)
CREDITS (18)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISIT E
1	17BTPI01	PROJECT	BTE	PI	0	0	18	9	NIL

(ii) INTERNSHIP + INDUSTRY ELECTIVES - CREDITS (9)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISIT E
1.	17BTPI02	MINI PROJECT	BTE	PI	0	0	6	3	NIL
2.	17BTPI03	INDUSTRIAL ENZYMOLOGY	BTE	PI	3	0	0	3	NIL
3.	17BTPI04	BIOPHARMACEUTICALS	BTE	PI	3	0	0	3	NIL
4.	17BTPI05	INDUSTRIAL BIOSAFETY	BTE	PI	3	0	0	3	NIL
5.	17BTPI06	WASTE MANAGEMENT	BTE	PI	3	0	0	3	NIL
6.	17BTPI07	PROCESS ECONOMICS AND INDUSTRIAL MANAGEMENT	BTE	PI	3	0	0	3	NIL
7.	17BTPI08	FERMENTATION AND BREWING TECHNOLOGY	BTE	PI	3	0	0	3	NIL

CATEGORY E

EMPLOYABILITY ENHANCEMENT COURSES, CO - CURRICULAR COURSES AND EXTRA CURRICULAR COURSES (EEC) - CREDITS (9 - 18)**
(- MANDATORY, CREDITS WOULD BE MENTIONED IN MARK SHEETS BUT NOT INCLUDED FOR CGPA CALCULATIONS.)**

(i) EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISIT E
1.	17APEE01	PERSONALITY SKILLS DEVELOPMENT - I	MATHS	EE	2 WEEKS OF TRAINING			1	NIL
2.	17APEE02	PERSONALITY SKILLS DEVELOPMENT - II	ENGLISH & MANAGEMENT	EE	2 WEEKS OF TRAINING			1	NIL
3.	17BTEE01	TECHNICAL SKILLS -I	BTE	EE	2 WEEKS OF TRAINING			1	NIL
4.	17BTEE02	TECHNICAL SKILLS –II	BTE	EE	2 WEEKS OF TRAINING			1	NIL
5.	17BTEE03	TECHNICAL SKILLS –III	BTE	EE	2 WEEKS OF TRAINING			1	NIL
6.	17BTEE04	TECHNICAL SKILLS–IV	BTE	EE	2 WEEKS OF TRAINING			1	NIL
7.	17BTEE05	TECHNICAL SKILLS -V	BTE	EE	2 WEEKS OF TRAINING			1	NIL
8.	17BTEE06	TECHNICAL SKILLS–VI	BTE	EE	4 WEEKS OF TRAINING			2	NIL
9.	17BTEE07	TECHNICAL SKILLS –VII	BTE	EE	4 WEEKS OF TRAINING			2	NIL
10.	17BTEE08	TECHNICAL SKILLS -VIII	BTE	EE	4 WEEKS OF TRAINING			2	NIL

(ii) CO - CURRICULAR COURSES (CCC)

1.	17APEE03	NCC	NCC	EE	2 WEEKS OF TRAINING	1	NIL
2.	17APEE04	NSS	NSS	EE	2 WEEKS OF TRAINING	1	NIL
3.	17APEE05	SPORTS AND GAMES (INTER –UNIVERSITY LEVEL)	PHYSICAL EDUCATION	EE	-	1	NIL
4.	17APEE06	SPORTS AND GAMES (INTRA-UNIVERSITY LEVEL)	PHYSICAL EDUCATION	EE	-	2	NIL
5.	17APEE07	SPORTS AND GAMES (STATE AND NATIONAL LEVELS)	PHYSICAL EDUCATION	EE	-	2	NIL

(iii) EXTRA CURRICULAR COURSES (ECC)

1.	17BTEE06	EXTRA CURRICULARCOURSE - I	BTE	EE	15 HOURS	1	NIL
2.	17BTEE07	EXTRA CURRICULARCOURSE - II	BTE	EE	15 HOURS	1	NIL
3.	17BTEE08	EXTRA CURRICULARCOURSE - III	BTE	EE	15 HOURS	1	NIL
4.	17BTEE09	EXTRA CURRICULARCOURSE - IV	BTE	EE	15 HOURS	1	NIL
5.	17BTEE10	EXTRA CURRICULARCOURSE - V	BTE	EE	15 HOURS	1	NIL
6.	17BTEE11	EXTRA CURRICULARCOURSE - V	BTE	EE	30 HOURS	2	NIL
7.	17BTEE12	EXTRA CURRICULARCOURSE - V	BTE	EE	45 HOURS	3	NIL

**FOR DEGREE WITH
SPECIALISATION**

**CATEGORY C –
PROGRAMME SPECIFIC
ELECTIVE COURSES -
CREDITS (12 - 15)**

SPECIALISATION - INDUSTRIAL BIOTECHNOLOGY

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17BTSE01	INDUSTRIAL BIOTECHNOLOGY	BTE	EC (SE)	3	0	0	3	NIL
2.	17BTSE02	CHEMICAL REACTION ENGINEERING	BTE	EC (SE)	3	0	0	3	NIL
3.	17BTSE03	FERMENTER DESIGN AND ANALYSIS	BTE	EC (SE)	3	0	0	3	NIL
4.	17BTSE04	BIOSEPARATION TECHNOLOGY	BTE	EC (SE)	3	0	0	3	NIL
5.	17BTSE05	INDUSTRIAL WASTE MANAGEMENT	BTE	EC (SE)	3	0	0	3	NIL
6.	17BTSE06	FUNDAMENTALS OF FLUID MECHANICS	BTE	EC (SE)	3	0	0	3	NIL
7.	17BTSE07	BIOPROCESS ECONOMICS AND REACTOR DESIGN	BTE	EC (SE)	3	0	0	3	NIL
8.	17BTSE08	BIOREACTOR THEORY	BTE	EC (SE)	3	0	0	3	NIL
9.	17BTSE09	INDUSTRIAL BIOTECHNOLOGY LAB	BTE	EC (SE)	0	0	4	2	NIL
10.	17BTSE10	FERMENTATION LAB	BTE	EC (SE)	0	0	4	2	NIL
11.	17BTSE11	FLUID MECHANICS FOR BIOTECHNOLOGY LAB	BTE	EC (SE)	0	0	4	2	NIL

SPECIALISATION - MEDICAL AND PHARMACEUTICAL BIOTECHNOLOGY

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1.	17BTSE12	INDUSTRIAL MANAGEMENT AND PHARMACEUTICAL MARKETING	BTE	EC (SE)	3	0	0	3	NIL
2.	17BTSE13	PHARMACEUTICAL PHYTO CHEMISTRY	BTE	EC (SE)	3	0	0	3	NIL
3.	17BTSE14	MEDICAL PHARMACOLOGY AND DRUG DELIVERY	BTE	EC (SE)	3	0	0	3	NIL
4.	17BTSE15	PHARMACEUTICAL ASPECTS OF MICROBIOLOGY	BTE	EC (SE)	3	0	0	3	NIL
5.	17BTSE16	PHARMACEUTICAL PROCESS CHEMISTRY	BTE	EC (SE)	3	0	0	3	NIL
6.	17BTSE17	PHARMACOGENOMICS	BTE	EC (SE)	3	0	0	3	NIL
7.	17BTSE18	HERBS AND DRUG ACTION	BTE	EC (SE)	3	0	0	3	NIL
8.	17BTSE19	SKILL BASED ETHANO MEDICINE	BTE	EC (SE)	3	0	0	3	NIL
9.	17BTSE20	PHARMACEUTICAL CHEMISTRY LABORATORY	BTE	EC (SE)	0	0	4	2	NIL
10.	17BTSE21	PHYTO CHEMISTRY LAB	BTE	EC (SE)	0	0	4	2	NIL
11.	17BTSE22	PHARMACEUTICAL MICROBIOLOGY LAB	BTE	EC (SE)	0	0	4	2	NIL
12.	17BTSE23	ANALYTICAL METHODS OF PHARMACEUTICAL LABORATORY	BTE	EC (SE)	0	0	4	2	NIL