VINAYAKA MISSION'S RESEARCH FOUNDATION

(Deemed to be University under section 3 of the UGC Act 1956)

B.E/B.TECH.BACHELOR OF BIOTECHNOLOGY

DEGREE PROGRAMME - FULL TIME

CURRICULUM AND SYLLABI

CHOICE BASED CREDIT SYSTEM (CBCS)

UNDER FACULTY OF ENGINEERING AND TECHNOLOGY

(Semester I to VIII)

REGULATIONS 2025

(FOR THE STUDENTS ADMITTED FROM 2025 ONWARDS)

A) 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.

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.

PROGRAMME OUTCOMES

Graduates will be able to:

PO1	Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) 30 critical thinking in the broadest context of technological change. (WK8) .

Mapping of PEOs with POs

PEO\PO	1	2	3	4	5	6	7	8	9	10	11
1	S	M	M	M	S	S	S	M	M	S	M
2	S	M	S	S	S	S	S	M	M	S	S
3	M	M	M	M	M	M	L	M	S	S	M

S- Strong Correlation, M – Medium Correlation, L – Low Correlation

KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice are as in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice inthe discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitude.

CREDIT STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM – REGULAR STUDENTS

Sl. No.	Category of Courses	Types of Courses		Suggested Breakup of Credits (min – max)
1.	**A. Foundation Courses (48)**	Humanities and Social Sciences		9
2.		Basic Science courses		18
3.		Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.		21
4.	**B. Professional (62)**	Core courses		62
5.	**C. Elective Courses (33)**	Professional Electives/Specialization Electives		12-15
		Industry Electives: Industry Designed/ Industry Supported/ Industry Sponsored courses / Industry Integrated		3-9
		Vocational Skill Development Courses		2
		Open Electives	Innovation and Entrepreneurship	3-9
			Interdepartmental Open Electives, Management courses	3-9
			University Multidisciplinary Open Electives	1
6.	**D. IKS (2)**	Indian Knowledge System		2
7.	**E. DT (1)**	Design Thinking		1
8.	**F. Courses for Presentation of technical Skills related to the specialization (14)**	Project work		8
		Mini Project		3
		Internship		3
9.	****G. Mandatory Courses (5)** (to be completed from 1st semester to 7th semester)	Research Methodology		1
		Indian Constitution		1
		Environmental Sciences		1
		Idea Lab		1
		Yoga and Meditation / NCC / NSS / RRC / YRC /Student Clubs / Unnat Bharat Abhiyan / Swachh Bharat / Sports and Games		1
Minimum Credits to be earned				**165**
**** The credits earned in category 'G' Courses will not be counted in CGPA calculation for awarding of the degree.**				

STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM – LES

Sl. No.	Category of Courses	Types of Courses		Suggested Breakup of Credits (min – max)
1.	**A. Foundation Courses (9)**	Humanities and Social Sciences		3
		Basic Science courses/Engineering Science courses		6
2.	**B. Professional (62)**	Core courses		62
3.	**C. Elective Courses (33)**	Professional Electives/Specialization Electives		12-15
		Industry Electives: Industry Designed/ Industry Supported/ Industry Sponsored courses / Industry Integrated		3-9
		Vocational Skill Development Courses		2
		Open Electives	Innovation and Entrepreneurship	3-9
			Interdepartmental Open Electives, Management courses	3-9
			University Multidisciplinary Open Electives	1
4.	**D. IKS (2)**	Indian Knowledge System		2
5.	**E. DT (1)**	Design Thinking		1
6.	**F. Courses for Presentation of technical Skills related to the specialization (14)**	Project work		8
		Mini Project		3
		Internship		3
7.	****G. Mandatory Courses (5)** (to be completed from 3rd semester to 7th semester)	Research Methodology		1
		Indian Constitution		1
		Environmental Sciences		1
		Idea Lab		1
		Yoga and Meditation / NCC / NSS / RRC / YRC /Student Clubs / Unnat Bharat Abhiyan / Swachh Bharat / Sports and Games		1
Minimum Credits to be earned				**126**
**** The credits earned in category 'G' Courses will not be counted in CGPA calculation for awarding of the degree.**				

CURRICULUM

B.TECH – BIOTECHNOLOGY

SEMESTER I TO VIII

B.TECH. – BIOTECHNOLOGY - SEMESTER I TO VIII									
A. FOUNDATION COURSES									
HUMANITIES AND SOCIAL SCIENCES -CREDITS (9)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	34125H01	TECHNICAL ENGLISH COMMUNICATION	ENG	FC-HS	2	0	0	2	NIL
2.	34125H81	ENGLISH LANGUAGE LAB	ENG	FC-HS	0	0	2	1	NIL
3.	34125H04	ENGLISH LANGUAGE LEARNING USING GENERATIVE AI (THEORY AND PRACTICALS)	ENG	FC-HS	1	0	2	2	NIL
4.	34125H03	BUSINESS ENGLISH	ENG	FC-HS	2	0	0	2	NIL
5.	34125H05	PROFESSIONAL ENGLISH COMMUNICATION	ENG	FC-HS	2	0	0	2	NIL
6.	34125H82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT	ENG	FC-HS	0	0	2	1	NIL
7.	34125H02	UNIVERSAL HUMAN VALUES-II UNDERSTANDING HARMONY	ENG	FC-HS	2	1	0	3	NIL
BASIC SCIENCE COURSES - CREDITS (18)									
1.	34125B01	ALGEBRA AND CALCULUS	MATH	FC-BS	2	1	0	3	NIL
2.	34125B03	PHYSICAL SCIENCES	PHY & CHEM	FC-BS	4	0	0	4	NIL
3.	34125B81	PHYSICAL SCIENCES LAB	PHY & CHEM	FC-BS	0	0	4	2	NIL
4.	34125B22	PROBABILITY AND STATISTICS	MATH	FC-BS	2	1	0	3	NIL
5.	34125B04	SMART MATERIALS AND NANOTECHNOLOGY	PHY	FC-BS	3	0	0	3	NIL
6.	38125B01	CLASSICAL AND MOLECULAR GENETICS	BTE	FC-BS	3	0	0	3	NIL

ENGINEERING SCIENCE COURSES INCLUDING WORKSHOP, DRAWING, BASICS OF ELECTRICAL/MECHANICAL/COMPUTER ETC - CREDITS (21)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE REQUISITE**
1.	38125E01	FUNDAMENTALS OF BIOTECHNOLOGY	BTE	FC-ES	3	0	0	3	NIL
2.	35025E03	PYTHON PROGRAMMING (THEORY AND PRACTICALS)	CSE	FC-ES	3	0	2	4	NIL
3.	35025E01	ARTIFICIAL INTELLIGENCE IN SCIENTIFIC RESEARCH AND EDUCATION	CSE	FC-ES	3	0	0	3	NIL
4.	35025E02	PROBLEM SLOVING AND PROGRAMMING USING C (THEORY AND PRACTICALS)	CSE	FC-ES	3	0	2	4	NIL
5.	34625E01	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	EEE & ECE	FC-ES	4	0	0	4	NIL
6.	34625E81	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB	EEE & ECE	FC-ES	0	0	4	2	NIL
7.	34425E81	ENGINEERING GRAPHICS AND DESIGN	MECH	FC-ES	0	0	6	3	NIL
8.	34225E81	COMPUTER AIDED BIOTECHNOLOGY DESIGN LABORATORY	CIVIL	FC-ES	0	0	4	2	NIL
B. PROFESSIONAL CORE									
CORE COURSES - CREDITS (62)									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE REQUISITE**
1.	38125C09	FUNDAMENTALS OF BIOCHEMISTRY (THEORY AND PRACTICALS)	BTE	CC	3	0	2	4	NIL
2.	38125C12	MICROBIOLOGY	BTE	CC	3	0	0	3	NIL
3.	38125C89	MICROBIOLOGY LAB	BTE	CC	0	0	4	2	NIL

4.	38125C05	CELL AND MOLECULAR BIOLOGY	BTE	CC	3	0	0	3	NIL
5.	38125C84	CELL AND MOLECULAR BIOLOGY LAB	BTE	CC	0	0	4	2	NIL
6.	38125C02	BIOCHEMISTRY AND METABOLISM	BTE	CC	3	0	0	3	FUNDAMENTALS OF BIOCHEMISTRY
7.	38125C81	BIOCHEMISTRY LAB	BTE	CC	0	0	4	2	NIL
8.	38125C03	BIOORGANIC CHEMISTRY	BTE	CC	3	0	0	3	NIL
9.	38125C82	BIOORGANIC CHEMISTRY LAB	BTE	CC	0	0	4	2	NIL
10.	38125C17	UNIT OPERATIONS IN PROCESS INDUSTRIES	BTE	CC	3	0	0	3	NIL
11.	38125C01	ANALYTICAL TECHNIQUES IN BIOTECHNOLOGY (THEORY AND PRACTICALS)	BTE	CC	3	0	2	4	NIL
12.	38125C07	ENZYME ENGINEERING AND TECHNOLOGY	BTE	CC	3	0	0	3	NIL
13.	38125C14	PRINCIPLES OF CHEMICAL ENGINEERING	BTE	CC	3	0	0	3	NIL
14.	38125C85	CHEMICAL ENGINEERING LAB	BTE	CC	0	0	4	2	NIL
15.	38125C10	GENETIC ENGINEERING	BTE	CC	3	0	0	3	NIL
16.	38125C87	GENETIC ENGINEERING LAB	BTE	CC	0	0	4	2	NIL
17.	38125C11	IMMUNOLOGY	BTE	CC	3	0	0	3	NIL
18.	38125C88	IMMUNOLOGY LAB	BTE	CC	0	0	4	2	NIL
19.	38125C04	BIOPROCESS ENGINEERING	BTE	CC	3	0	0	3	NIL
20.	38125C83	BIOPROCESS ENGINEERING LAB	BTE	CC	0	0	4	2	NIL
21.	38125C13	PRINCIPLES OF BIOINFORMATICS (THEORY AND PRACTICALS)	BTE	CC	3	0	2	4	NIL
22.	38125C08	FOOD PROCESS TECHNOLOGY (THEORY AND PRACTICALS)	BTE	CC	3	0	2	4	NIL

23.	38125C06	DOWNSTREAM PROCESSING IN BIOTECHNOLOGY	BTE	CC	3	0	0	3	BIOPROCESS ENGINEERING
24.	38125C86	DOWNSTREAM PROCESSING IN BIOTECHNOLOGY LAB	BTE	CC	0	0	4	2	NIL
25.	38125C15	PROTEIN ENGINEERING	BTE	CC	3	0	0	3	NIL
26.	38125C16	SUSTAINABLE GREEN BIOTECHNOLOGY FOR ENVIRONMENTAL PROTECTION	BTE	CC	3	0	0	3	NIL
C.ELECTIVE COURSES (33)									
PROFESSIONAL ELECTIVES - CREDITS (12- 15)									
SL.NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE REQUISITE**
1.	38125P16	THERMODYNAMICS FOR BIOTECHNOLOGY	BTE	EC-PS	3	0	0	3	PRINCIPLES OF CHEMICAL ENGINEERING
2.	38125P07	CANCER BIOLOGY	BTE	EC-PS	3	0	0	3	CELL AND MOLECULAR BIOLOGY
3.	38125P11	GOOD MANUFACTURING AND LABORATORY PRACTICE	BTE	EC-PS	2	1	0	3	NIL
4.	38125P03	BASICS OF HUMAN ANATOMY AND PHYSIOLOGY	BTE	EC-PS	3	0	0	3	NIL
5.	38125P02	AI AND ML FOR BIOTECHNOLOGISTS	BTE	EC-PS	3	0	0	3	NIL
6.	38125P06	BIOLOGY OF ORGANISMS	BTE	EC-PS	3	0	0	3	NIL
7.	38125P12	INDUSTRIAL BIOTECHNOLOGY	BTE	EC-PS	3	0	0	3	NIL
8.	38125P08	CHEMICAL REACTION ENGINEERING	BTE	EC-PS	3	0	0	3	NIL
9.	38125P15	STOICHIOMETRY AND FLUID MECHANICS	BTE	EC-PS	3	0	0	3	NIL
10.	38125P13	MASS TRANSFER OPERATIONS	BTE	EC-PS	3	0	0	3	NIL
11.	38125P10	GENOMICS AND PROTEOMICS	BTE	EC-PS	3	0	0	3	GENETIC ENGINEERING
12.	38125P01	AGRICULTURAL BIOTECHNOLOGY	BTE	EC-PS	3	0	0	3	NIL
13.	38125P09	CRYOPRESERVATION THEORY AND APPLICATIONS	BTE	EC-PS	3	0	0	3	NIL
14.	38125P04	BASICS OF MICROBIAL BIOTECHNOLOGY	BTE	EC-PS	3	0	0	3	NIL

15.	38125P05	BIOETHICS AND IPR	BTE	EC-PS	3	0	0	3	NIL
16.	38125P14	PLANT AND ANIMAL BIOTECHNOLOGY	BTE	EC-PS	3	0	0	3	NIL
SPECIALIZATION ELECTIVES –NUTRITIONAL BIOLOGY (12-15)									
SL.NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE REQUISITE**
1.	38125NB03	DIET THERAPY	BTE	EC-SE	3	0	0	3	NIL
2.	38125NB04	FOOD COMMODITIES	BTE	EC-SE	3	0	0	3	NIL
3.	38125NB06	NUTRITIONAL BIOCHEMISTRY	BTE	EC-SE	3	0	0	3	NIL
4.	38125NB05	INTRODUCTION TO FOOD SAFETY	BTE	EC-SE	3	0	0	3	NIL
5.	38125NB02	COMMUNITY HEALTH AND NUTRITION	BTE	EC-SE	3	0	0	3	NIL
6.	38125NB01	BASIC DIETETICS	BTE	EC-SE	3	0	0	3	NIL
7.	38125NB82	NUTRITIONAL BIOCHEMISTRY LAB	BTE	EC-SE	0	0	4	2	NIL
8.	38125NB81	DIETETICS LAB	BTE	EC-SE	0	0	4	2	NIL
SPECIALIZATION ELECTIVES –THERAPEUTIC BIOTECHNOLOGY (12-15)									
SL.NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE REQUISITE**
1.	38125TBT03	DIAGNOSTICS AND THERAPEUTICS	BTE	EC-SE	3	0	0	3	NIL
2.	38125TBT07	STEM CELL AND TISSUE ENGINEERING	BTE	EC-SE	3	0	0	3	NIL
3.	38125TBT02	CLINICAL TRIAL	BTE	EC-SE	3	0	0	3	NIL
4.	38125TBT06	NANOBIOTECHNOLOY IN HEALTH CARE	BTE	EC-SE	3	0	0	3	NIL
5.	38125TBT04	ESSENTIALS OF PHARMACOGENOMICS	BTE	EC-SE	3	0	0	3	NIL
6.	38125TBT01	BIOSIMILARS AND MONOCLONAL ANTIBODY PRODUCTION	BTE	EC-SE	3	0	0	3	NIL
INDUSTRY DESIGNED/ INDUSTRY SUPPORTED/ INDUSTRY OFFERED/ INDUSTRY SPONSORED COURSES - CREDITS (3 -9)									
SL.NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE REQUISITE**
1.	34125I20	LEARNING IT ESSENTIALS BY DOING	INFOSYS	EC-IE	3	0	0	3	NIL
2.	34125I22	MOBILE APPLICATION DEVELOPMENT	INFOSYS	EC-IE	3	0	0	3	NIL

3.	34125I14	FUNDAMENTALS OF FOOD PACKAGING EQUIPMENT AND TECHNOLOGY	UGP ENGG	EC-IE	3	0	0	3	NIL
4.	34125I23	PACKAGING EQUIPMENT FOR SOLID, SEMI-SOLID, AND LIQUID FOOD PRODUCTS	UGP ENGG	EC-IE	3	0	0	3	NIL
5.	34125I25	PRECISION PACKAGING SYSTEMS FOR VARIED PHYSICAL PRODUCT QUANTITIES	UGP ENGG	EC-IE	3	0	0	3	NIL
6.	34125I21	MACHINERY AND AUTOMATION IN BEVERAGE PACKAGING	UGP ENGG	EC-IE	3	0	0	3	NIL
7.	34125I11	DRY FOOD PACKAGING SOLUTIONS: FOCUS ON FLOUR AND POWDER PRODUCTS	UGP ENGG	EC-IE	3	0	0	3	NIL
8.	34125I12	EQUIPMENT AND SYSTEMS FOR PACKAGING FLUIDS AND SEMI-SOLIDS IN THE FOOD INDUSTRY	UGP ENGG	EC-IE	3	0	0	3	NIL
9.	34125I06	CLINICAL RESEARCH	IDD RESEARCH SOLUTION	EC-IE	3	0	0	3	NIL

VOCATIONAL SKILL DEVELOPMENT COURSES (2)

SL. No	CODE	COURSE	OFFERING DEPT	CATEGORY	L	T	P	C	PREREQUISITE
1.	38125V81	MUSHROOM CULTIVATION	BTE	EC-VSDC	0	0	4	2	NIL
2.	38125V82	QUALITY CONTROL IN DAIRY INDUSTRY	BTE	EC-VSDC	0	0	4	2	NIL
3.	38125V83	SINGLE CELL PROTEIN: SUSTAINABLE MICROBIAL PROTEIN TECHNOLOGY	BTE	EC-VSDC	0	0	4	2	NIL
4.	38125V84	SUSTAINABLE AGRICULTURAL PRACTICE: BIO COMPOSTING	BTE	EC-VSDC	0	0	4	2	NIL

OPEN ELECTIVES									
INNOVATION AND ENTREPRENEURSHIP CREDITS - (3-9)									
1	34125O09	PRODUCT DESIGN AND DEVELOPMENT	MANAG	OE-IE	3	0	0	3	NIL
2	34125O05	CREATIVITY AND INNOVATION MANAGEMENT	MANAG	OE-IE	3	0	0	3	NIL
3	34125O08	INTELLECTUAL PROPERTY RIGHTS	MANAG	OE-IE	3	0	0	3	NIL
4	34125O07	ENTREPRENEURSHIP AND NEW VENTURE CREATION	MANAG Ignite 5.0 course by Wadhwani foundation	OE-IE	3	0	0	3	NIL
INTERDEPARTMENTAL OPEN ELECTIVES– CREDITS- (3-9)									
1.	35325O01	BODY AREA NETWORKS	BME	OE-EA	3	0	0	3	NIL
2.	35325O02	FUNDAMENTALS OF BIOMEDICAL ENGINEERING	BME	OE-EA	3	0	0	3	NIL
3.	35325O03	TELEHEALTH TECHNOLOGY	BME	OE-EA	3	0	0	3	NIL
4.	34225O02	INDUSTRIAL PLANT DESIGN AND ENGINEERING	CIVIL	OE-EA	3	0	0	3	NIL
5.	34225O03	SUSTAINABLE WASTE MANAGEMENT PRACTICES	CIVIL	OE-EA	3	0	0	3	NIL
6.	34225O01	DISASTER MANAGEMENT AND MITIGATION STRATEGIES	CIVIL	OE-EA	3	0	0	3	NIL
7.	35025O01	CYBER SECURITY	CSE	OE-EA	3	0	0	3	NIL
8.	35025O03	FUNDAMENTALS OF MACHINE LEARNING	CSE	OE-EA	3	0	0	3	NIL
9.	35025O02	DATA SCIENCE FOR PROFESSIONALS	CSE	OE-EA	3	0	0	3	NIL
10.	34725O02	DIGITAL IMAGE PROCESSING AND PATTERN GENERATION	ECE	OE-EA	3	0	0	3	NIL

11.	34725O03	EVOLUTION OF MOBILE COMMUNICATION 1G TO 5G	ECE	OE-EA	3	0	0	3	NIL
12.	34725O04	PRINCIPLES OF RADAR AND SATELLITE COMMUNICATION	ECE	OE-EA	3	0	0	3	NIL
13.	34625O01	ENERGY CONSERVATION AND MANAGEMENT	EEE	OE-EA	3	0	0	3	NIL
14.	34625O02	IOT SYSTEM: AN INTRODUCTION TO SENSORS AND TRANSDUCERS	EEE	OE-EA	3	0	0	3	NIL
15.	34625O03	SMART CITIES: ELECTRICAL SYSTEM AND TECHNOLOGIES	EEE	OE-EA	3	0	0	3	NIL
16.	34425O01	3D PRINTING AND ITS APPLICATIONS	MECH	OE-EA	3	0	0	3	NIL
17.	34425O02	ENERGY HARVESTING AND RENEWABLE ENERGY SYSTEMS	MECH	OE-EA	3	0	0	3	NIL
18.	34425O03	INDUSTRIAL ROBOTICS	MECH	OE-EA	3	0	0	3	NIL
19.	36925O02	BIOPHARMACEUTICS	PE	OE-EA	3	0	0	3	NIL
20.	36925O03	FUNCTIONAL FOODS AND NUTRACEUTICALS	PE	OE-EA	3	0	0	3	NIL
21.	36925O01	BIOMOLECULES	PE	OE-EA	3	0	0	3	NIL
22.	34125O02	TOTAL QUALITY MANAGEMENT	MANAG	OE-EA	3	0	0	3	NIL
23.	34125O03	MANAGEMENT PRINCIPLES FOR ENGINEERS	MANAG	OE-EA	3	0	0	3	NIL
24.	34125O01	ENGINEERING MANAGEMENT AND ETHICS	MANAG	OE-EA	3	0	0	3	NIL
UNIVERSITY MULTIDISCIPLINARY OPEN ELECTIVES (1)									
1.	40625U01	DENTAL HYGIENE AND QUALITY OF LIFE	DENTISTRY	OE-UOE	1	0	0	1	NIL
2.	40625U02	NUTRITION FOR WELLNESS AND SPECIFIC DISEASES	NURSING	OE-UOE	1	0	0	1	NIL
3.	40625U03	FUNDAMENTALS OF HOMOEOPATHY	HOMOEOPATHY	OE-UOE	1	0	0	1	NIL

4.	40625U04	ADVERTISING	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
5.	40625U05	TEAMWORK AND COLLABORATION	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
6.	40625U06	EMOTIONAL INTELLIGENCE	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
7.	40625U07	MEDIA MANAGEMENT	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
8.	40625U08	EXERCISE ESSENTIALS FOR PHYSICAL FITNESS	PHYSIOTHERAPY	OE-UOE	1	0	0	1	NIL
9.	40625U09	ESSENTIAL SKILLS FOR MEDICAL EMERGENCIES	MEDICINE	OE-UOE	1	0	0	1	NIL
10.	40625U10	MEDICINE PLANTS IN DISEASE MANAGEMENT	PHARMACY	OE-UOE	1	0	0	1	NIL
11.	40625U11	BASIC LIFE SUPPORT	ALLIED HEALTH SCIENCES	OE-UOE	1	0	0	1	NIL
12.	40625U12	MALLARKHAMBAM	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
13.	40625U13	SILAMBAM	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
14.	40625U14	BASIC FITNESS TRAINING	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
15.	40625U15	RECREATIONAL GAMES	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
16.	40625U16	INTRODUCTION TO LAW	LAW	OE-UOE	1	0	0	1	NIL
17.	40625U17	FUNDAMENTALS OF LAW IN TECHNOLOGY AND CYBER SPACE	LAW	OE-UOE	1	0	0	1	NIL

18.	40625U18	FOUNDATION COURSE IN YOGA	REHABILITATION AND BEHAVIORAL SCIENCES	OE-UOE	1	0	0	1	NIL
19.	40625U19	INTRODUCTION TO PSYCHOLOGY	REHABILITATION AND BEHAVIORAL SCIENCES	OE-UOE	1	0	0	1	NIL
20.	40625U20	INTRODUCTION TO PUBLIC POLICY AND GOVERNANCE	LIBERAL ARTS	OE-UOE	1	0	0	1	NIL
21.	40625U21	INDIAN ECONOMY AND DEVELOPMENT CHALLENGES	LIBERAL ARTS	OE-UOE	1	0	0	1	NIL
22.	Course Code will be given after receiving SWAYAM Certificate	ANY SWAYAM / MOOC / NPTEL COURSES WHICH ARE NOT RELATED TO THE DISCIPLINE OF STUDY OF THE STUDENT CAN BE CHOSEN AS AN OPEN ELECTIVE IN CONSULTATION WITH THE RESPECTIVE FACULTY ADVISOR OF THE INSTITUTION.		OE-UOE	1	0	0	1	NIL
D. INDIAN KNOWLEDGE SYSTEM (2)									
SL.NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	38125K01	INDIAN KNOWLEDGE SYSTEM	IKS	IKS	2	0	0	2	NIL
E. DESIGN THINKING (1)									
1.	38125D01	DESIGN THINKING AND ADVANCED PROBLEM SLOVING	HCL	DT	1	0	0	1	Nil
F. COURSES FOR PRESENTATION OF TECHNICAL SKILLS RELATED TO THE SPECIALIZATION (15)									
1.	38125R01	PROJECT WORK	BTE	PI-P	0	0	16	8	NIL
2.	38125M01	MINI PROJECT	BTE	PI-M	0	0	6	3	NIL

3.	38125T01	INTERNSHIP	BTE	PI-I	3 weeks			3	NIL
G. MANDATORY COURSES One Credit Course (**5 Courses to be completed from 1st semester to 7th semester**)									
1.	38125Z82	RESEARCH METHODOLOGY	BTE	MC	0	0	2	1	NIL
2.	34125Z81	INDIAN CONSTITUTION	LAW	MC	0	0	2	1	NIL
3.	34125Z01	ENVIRONMENTAL SCIENCES	CHEM	MC	0	0	2	1	NIL
4.	38125Z01	IDEA LAB	BTE	MC	0	0	2	1	NIL
5.	34125Z82/ 34125Z84/ 34125Z85/ 34125Z86/ 34125Z90/34125Z87/34125Z89/34125Z88/ 34125Z83	YOGA AND MEDITATION/ NCC / NSS / RRC / YRC/ STUDENT CLUBS / UNNAT BHARAT ABHIYAN / SWACHH BHARAT/SPORTS AND GAMES	GEN	MC	0	0	2	1	NIL
	**** The credits earned in category 'G' Courses will not be counted in CGPA calculation for awarding of the degree.**								

B. TECH BIOTECHNOLOGY- MINOR DEGREE

BIOENERGY AND SUSTAINABLE TECHNOLOGY

SL. NO	CODE	COURSE	OFFERING DEPT.	CATEGORY	L	T	P	C	PREREQUISITE
1	38125G07	INTRODUCTION TO BIOENERGY AND SUSTAINABLE DEVELOPMENT	BTE	MIN	3	0	0	3	Nil
2	38125G06	ECOLOGY AND ECONOMY OF BIOENERGY	BTE	MIN	3	0	0	3	Nil
3	38125G05	BIOMASS AS SOURCE OF ENERGY	BTE	MIN	3	0	0	3	Nil
4	38125G03	BIOENERGY PRODUCTION AND UTILIZATION	BTE	MIN	3	0	0	3	Nil
5	38125G02	BIOENERGY CONVERSION TECHNOLOGY	BTE	MIN	4	0	0	4	Nil
6	38125G01	BIOFUELS AND BIO REFINERY	BTE	MIN	3	0	0	3	Nil
7	38125G08	SUSTAINABLE ENERGY AND ENTREPRENEURSHIP	BTE	MIN	3	0	0	3	Nil

8	38125G01	BIOENERGY AND ITS IMPACT ON GDP	BTE	MIN	3	0	0	3	Sustainable energy and entrepreneurs hip
9	38125G82	BIOENERGY PRODUCTION LAB	BTE	MIN	0	0	4	2	Nil
10	38125G81	ANALYTICAL BIOENERGY TECHNIQUE LAB	BTE	MIN	0	0	4	2	Nil

B. TECH BIOTECHNOLOGY- HONOURS DEGREE									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	38125A06	PHYTO CHEMISTRY	BTE	HON	3	0	0	3	NIL
2.	38125A04	MEDICAL PHARMACOLOGY AND DRUG DELIVERY	BTE	HON	3	0	0	3	NIL
3.	38125A05	PHARMACEUTICAL PROCESS CHEMISTRY AND INDUSTRIAL PRACTICES	BTE	HON	3	0	0	3	NIL
4.	38125A02	HERBAL PHARMACOLOGY	BTE	HON	3	0	0	3	NIL
5.	38125A01	ETHANO MEDICINE	BTE	HON	3	0	0	3	NIL
6.	38125A03	INDUSTRIAL MANAGEMENT AND PHARMACEUTICAL MARKETING	BTE	HON	3	0	0	3	NIL
7.	38125A82	PHARMACEUTICAL ANALYSIS LAB	BTE	HON	0	0	4	2	NIL
8.	38125A84	PHYTOCHEMISTRY LAB	BTE	HON	0	0	4	2	NIL
9.	38125A83	PHARMACEUTICAL MICROBIOLOGY LAB	BTE	HON	0	0	4	2	NIL
10.	38125A81	INDUSTRIAL PHARMACEUTICS LAB	BTE	HON	0	0	4	2	NIL
MICRO CREDENTIAL									
1.	38125J82	GMP FOR BIOTECHNOLOGY AND PHARMACEUTICAL INDUSTRIES	BTE	MCC	1	0	0	1	NIL
2.	38125J81	FUNDAMENTALS OF ENVIRONMENTAL IMPACT ASSESSMENT	BTE	MCC	1	0	2	2	NIL
3.	38125J84	PROTEIN STUCTURE PREDICTION	BTE	MCC	1	0	2	2	NIL

4.	38125J85	SUSTAINABLE DEVELOPMENT GOALS (SDGs) FOR ENGINEERS	BTE	MCC	1	0	2	2	NIL
5.	38125J83	HERBAL PRODUCTS FOR NATURAL CARE	BTE	MCC	1	0	2	2	NIL
EXIT OPTION - SKILL DEVELOPMENT PROGRAMME									
SL. NO	**CODE**	**COURSE**	**OFFERING DEPT.**	**CATEGORY**	**L**	**T**	**P**	**C**	**PREREQUISITE**
1.	38125S82	BASICS OF MICROBIAL TECHNIQUES	BTE	EC (SDC)	0	0	4	2	NIL
2.	38125S86	INTRODUCTION TO BIOCHEMICAL DIAGNOSTIC TECHNIQUES	BTE	EC (SDC)	0	0	4	2	NIL
3.	38125S84	FOOD PROCESSING TECHNIQUES	BTE	EC (SDC)	0	0	4	2	NIL
4.	38125S85	HERBAL NUTRACEUTICALS AND FUNCTIONAL FOODS	BTE	EC (SDC)	0	0	4	2	NIL
5.	38125S83	BIOENERGY GENERATION USING ORGANIC WASTE	BTE	EC (SDC)	0	0	4	2	NIL
6.	38125S81	APPLIED TRAINING IN COMPUTER-AIDED DRUG DISCOVERY (CADD) USING OPEN PLATFORMS	BTE	EC (SDC)	0	0	4	2	NIL
B. TECH – BIOTECHNOLOGY HCL (DATA ENGINEERING AND VISUALISATION)									
ENGINEERING SCIENCE COURSES INCLUDING WORKSHOP, DRAWING, BASICS OF ELECTRICAL / MECHANICAL/COMPUTER ETC. (3)									
1		EMERGING TRENDS IN IT INFRASTRUCTURE	BTE/HCL	FC-ES	2	0	0	2	NIL
1		DATA ENGINEERING AND PYTHON PROGRAMMING FUNDAMENTALS	BTE/HCL	EC-SE	3	0	2	4	NIL
2		ADVANCED PYTHON LIBRARIES, WORKING WITH SQL AND NOSQL	BTE/HCL	EC-SE	3	0	2	4	NIL
1		DATA WAREHOUSE AND MODELLING (THEORY AND PRACTICALS)	BTE/HCL	EC - SE	3	0	2	4	NIL

1		DATA VISUALIZATION CONCEPT AND WORKING WITH VISUALIZATION TOOL (THEORY AND PRACTICALS)	BTE/HCL	EC-IE	3	0	2	4	NIL
	BVERSITY – R2025 CURRICULUM								

B.TECH – BIOTECHNOLOGY -BVERSITY – R2025 CURRICULUM									
1.		INTRODUCTION TO BIOINFORMATICS TOOLS AND COMPUTATIONAL TECHNIQUES	BTE/BVERSITY	EC-SE	3	0	0	3	NIL
2.		AI-POWERED HEALTHCARE ANALYTICS	BTE/BVERSITY	EC-SE	3	0	0	3	NIL
3.		GENOMICS AND PRECISION MEDICINE	BTE/BVERSITY	EC-SE	3	0	0	3	NIL
4.		HEALTH INFORMATICS	BTE/BVERSITY	EC-SE	3	0	0	3	NIL
5.		COMPUTATIONAL DRUG DISCOVERY	BTE/BVERSITY	EC-SE	3	0	0	3	NIL
6.		BIOTECH ENTREPRENEURSHIP AND INNOVATION	BTE/BVERSITY	EC-IE	3	0	0	3	NIL