

**SHREE VENKATESHWARA HI-TECH ENGINEERING
COLLEGE
(Autonomous)
Gobichettipalayam, Erode-638455**



**Regulation 2023 (Autonomous)
Curriculum and Syllabus
Choice Based Credit System (CBCS)
B.TECH – PHARMACEUTICAL TECHNOLOGY**



SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE
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Regulation 2023 (UG)
Curriculum and Syllabus
B.Tech. Pharmaceutical Technology

I. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1: Career Avenues:** To prepare students for prosperous spectrum of career avenues in academia, advanced research, industries of pharmaceutical technology, biomedicine, biotechnology, law, business and government and other pharmaceutical pursuits through dissemination of knowledge and proficiency in engineering and technology fundamentals related to pharmaceutical technology and the ability to solve problems
- PEO2: Professional Endeavors:** To transfuse in students the sense of confidence in professional endeavors by application of the derived knowledge and appreciation of economical impact in a societal context
- PEO3: Health and Welfare:** To provide collegial and nurturing environment for the students to realize the professional, ethical obligations and their concern to protect the health and welfare of the public, and to be accountable for the social and environmental impact of their practice
- PEO4: Multi-disciplinary Function:** To create an enjoyable educational environment in which students participate in multi-disciplinary, team oriented, open-ended curricular and co-curricular activities that prepare them to work either individually and as an integrated team member
- PEO5: Interdisciplinary Research :** To facilitate the students to gain the wisdom of fundamentals and advances to practice pharmaceutical technology and interdisciplinary research as career of constructive service to society and higher learning

II. Program Outcomes (POs)

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.

III. PROGRAMME SPECIFIC OBJECTIVES

After successful completion of the program the graduate will be able to

- PS01: Product Development:** Develop active pharmaceutical ingredients, drug intermediates and pharmaceutical products.
- PS02: Analytical Tools:** Apply data driven decisions and predictive analytical tools in smaller and larger molecule producing industries.
- PS03: Interdisciplinary Solutions:** Identify technical issues related to the design, manufacturing of chemicals & pharmaceuticals and provide effective interdisciplinary solutions.
- PS04: Sustainable Development:** Adapt continuously changing technologies and play pivotal professional role in sustainable societal development.

Mapping of Course Outcome and Programme Outcome

Year	Sem	Course name	PO												PSO			
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
I	I	Professional English - I	-	-	-	2	-	1	-	-	2	3	-	3	-	-	-	
		Matrices and Calculus	3	3	1	1	-	-	-	-	2	-	2	3	-	-	-	
		Engineering Physics	3	3	2	1	2	-	-	-	-	-	-	1	-	-	-	
		Engineering Chemistry	3	2	2	1	1	2	3	-	-	-	-	1	-	-	-	
		Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	2	2	3	3	3	
		தமிழர் மரபு /Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Problem Solving and Python Programming Laboratory	2	3	3	3	2	-	-	-	-	-	2	2	3	3	3	
		Physics and Chemistry Laboratory	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
			3	2	1	-	1	3	2	1	-	-	-	1	-	-	-	
	English Laboratory	-	-	-	-	-	-	-	1	3	3	-	2	-	-	-		
	II	Professional English - II	-	1	1	-	-	-	1	1	2	3	-	2	-	-	-	
		Numerical Methods and Statistics	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-	
		Physics for Electronics Engineering	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
		Basic Electrical and Electronics Engineering	3	3	2	2	-	-	-	-	-	1	-	-	-	-	-	
		Engineering Graphics	3	1	2	-	2	-	-	-	-	3	-	-	3	3	2	
		தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	-	-	-	
		Basic Electrical and Electronics Engineering Laboratory	3	3	2	2	-	-	-	-	-	1	-	-	-	-	-	
		Communication Laboratory	-	-	2	-	-	-	-	1	3	3	-	3	-	-	-	

1 - Low, 2 - Medium, 3 - high, '-' - no correlation

SUMMARY OF CREDITS

S. No	Course Category	Credits per Semester								Total Credits	Credits in %	Credits as per AU Curriculum
		I	II	III	IV	V	VI	VII	VIII			
1	HSS	4	3	-	-	-	-	5	-	12	7.23	12
2	BS	12	7	4	2	-	-	-	-	25	15.06	25
3	ES	5	11	-	-	-	-	-	-	16	9.64	16
4	PC	-	-	18	18	13	10	6	-	65	39.16	65
5	PE	-	-	-	-	9	9	-	-	18	10.84	18
6	OE	-	-	-	-	-	3	9	-	12	7.23	12
7	EEC	1	2	1	-	2	-	2	10	18	10.84	18
8	MC		√		√	√	√					
Total Credits / Semester		22	23	23	20	24	22	22	10	166	100	166

CATEGORIZATION OF COURSES

- i. Humanities and Social Sciences including Management Courses (HSS)
- ii. Basic Science Courses (BS)
- iii. Engineering Science Courses (ES)
- iv. Professional Core Courses (PC)
- v. Professional Elective Courses (PE)
- vi. Open Elective Courses (OE)
- vii. Mandatory Courses (MC)
- viii. Employability Enhancement Courses (EEC)
- ix. Other Courses (OC)

ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.



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SEMESTER I

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Induction Program											
1.	23IPA11	Induction Programme	-	-	-	-		0	-	-	-
Theory											
2.	23ENT11	Professional English - I	HSS	3	0	0	3	3	40	60	100
3.	23MAT11	Matrices and Calculus	BS	3	1	0	4	4	40	60	100
4.	23PHT11	Engineering Physics	BS	3	0	0	3	3	40	60	100
5.	23CYT11	Engineering Chemistry	BS	3	0	0	3	3	40	60	100
6.	23CST11	Problem Solving and Python Programming	ES	3	0	0	3	3	40	60	100
7.	23TAT11	தமிழர் மரபு /Heritage of Tamils	HSS	1	0	0	1	1	40	60	100
Practicals											
8.	23CSL11	Problem Solving and Python Programming Laboratory	ES	0	0	4	4	2	60	40	100
9.	23PCL11	Physics and Chemistry Laboratory	BS	0	0	4	4	2	60	40	100
10.	23ENL11	English Laboratory	EEC	0	0	2	2	1	60	40	100
Total				16	1	10	27	22			



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SEMESTER II

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23ENT21	Professional English - II	HSS	2	0	0	2	2	40	60	100
2.	23MAT21	Numerical Methods and Statistics	BS	3	1	0	4	4	40	60	100
3.	23PHT23	Physics for Electronics Engineering	BS	3	0	0	3	3	40	60	100
4.	23EET22	Basic Electrical and Electronics Engineering	ES	3	0	0	3	3	40	60	100
5.	23MET21	Engineering Graphics	ES	2	0	4	6	4	40	60	100
6.	23TAT21	தமிழரும் தொழில்நுட்பமும் / Tamil and Technology	HSS	1	0	0	1	1	40	60	100
Practicals											
7.	23MEL21	Engineering Practices Laboratory	ES	0	0	4	4	2	60	40	100
8.	23EEL22	Basic Electrical and Electronics Engineering Laboratory	ES	0	0	4	4	2	60	40	100
9.	23ENL21	Communication Laboratory	EEC	0	0	4	4	2	60	40	100
Mandatory Courses											
10.	23MCL21	Mandatory Course - I&	MC	0	0	1	1	0	100	-	100
Total				14	1	17	32	23			

& Mandatory Course-I

Yoga for Human Excellence

Non-credit Course



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SEMESTER III

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MAT32	Transform and Partial Differential Equations	BS	3	1	0	4	4	40	60	100
2.	23PTT31	Chemical Process Calculations	PC	2	1	0	3	3	40	60	100
3.	23PTT32	Microbiology	PC	3	0	0	3	3	40	60	100
4.	23PTT33	Pharmaceutical Chemistry	PC	3	0	0	3	3	40	60	100
5.	23PTT34	Biochemistry	PC	3	0	0	3	3	40	60	100
6.	23PTT35	Human Anatomy and Physiology	PC	3	0	0	3	3	40	60	100
Practicals											
7.	23PTL31	Microbiology Laboratory	PC	0	0	3	3	1.5	60	40	100
8.	23PTL32	Biochemistry and Physiology Laboratory	PC	0	0	3	3	1.5	60	40	100
9.	23PDL31	Professional Development	EEC	0	0	2	2	1	100	-	100
Total				17	2	8	27	23			



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SEMESTER IV

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23PTT41	Applied Chemical Engineering Thermodynamics	PC	2	1	0	3	3	40	60	100
2.	23PTT42	Fluid Mechanics	PC	3	0	0	3	3	40	60	100
3.	23PTT43	Cell and Molecular Biology	PC	3	0	0	3	3	40	60	100
4.	23PTT44	Physical Pharmaceutics	PC	3	0	0	3	3	40	60	100
5.	23PTT45	Pharmaceutical Analysis	PC	3	0	0	3	3	40	60	100
6.	23CYT41	Environmental Sciences and Sustainability	BS	2	0	0	2	2	40	60	100
Practicals											
7.	23PTL41	Pharmaceutical Chemistry Laboratory	PC	0	0	3	3	1.5	60	40	100
8.	23PTL42	Physical Pharmaceutics Laboratory	PC	0	0	3	3	1.5	60	40	100
Mandatory Courses											
9.	23SAT41	Soft and Analytical Skills - I&	MC	1	0	0	1	0	-	-	-
Total				16	1	6	23	20			

& Soft and Analytical Skills - I is a Non-credit Course

@ The students individually undergo training in reputed firms/ Research institutes / laboratories for the specified duration (04 Weeks) during IV semester summer vacation. After completion of training, a detailed report should be submitted within ten days from the commencement of V semester.



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SEMESTER V

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23PTT51	Pharmaceutical Dosage Forms	PC	3	0	0	3	3	40	60	100
2.	23PTT52	Unit Operations in Pharmaceutical Industries	PC	3	1	0	4	4	40	60	100
3.	23PTT53	Pharmacology	PC	3	0	0	3	3	40	60	100
4.		Professional Elective I*	PE	3	0	0	3	3	40	60	100
5.		Professional Elective II*	PE	3	0	0	3	3	40	60	100
6.		Professional Elective III*	PE	3	0	0	3	3	40	60	100
Practicals											
7.	23PTL51	Dosage Forms Laboratory	PC	0	0	3	3	1.5	60	40	100
8.	23PTL52	Pharmacology Laboratory	PC	0	0	3	3	1.5	60	40	100
9.	23PTL53	Industrial Training/Internship I [@]	EEC	0	0	0	0	2	100	-	100
Mandatory Courses											
10.		Mandatory Course – II ^{&}	MC	3	0	0	3	0	100	-	100
11.	23SAT51	Soft and Analytical Skills – II ^{&&}	MC	1	0	0	1	0	-	-	-
Total				21	1	6	28	24			

* Professional Elective – I to III shall be chosen from the list of Professional electives (Verticals) offered by same Programme

& Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)

&& Soft and Analytical Skills – II is a Non-credit Course

@ The students undergone industrial training/internship during IV semester summer vacation and same will be evaluated in V semester.



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SEMESTER VI

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23PTT61	Heat and Mass Transfer Operations	PC	3	1	0	4	4	40	60	100
2.	23PTT62	Instrumental Techniques in Drug Analysis	PC	3	0	0	3	3	40	60	100
3.		Open Elective - I**	OE	-	-	-	-	3	40	60	100
4.		Professional Elective IV *	PE	3	0	0	3	3	40	60	100
5.		Professional Elective V *	PE	3	0	0	3	3	40	60	100
6.		Professional Elective VI *	PE	3	0	0	3	3	40	60	100
Practicals											
7.	23PTL61	Heat and Mass Transfer Operations Laboratory	PC	0	0	3	3	1.5	60	40	100
8.	23PTL62	Instrumental Techniques In Drug Analysis Laboratory	PC	0	0	3	3	1.5	60	40	100
Mandatory Courses											
9.		Mandatory Course-III&	MC	3	0	0	3	0	100	-	100
Total				-	-	-	-	22			

**** Open Elective - I shall be chosen from the list of open electives offered by other Programmes**

*** Professional Elective - IV to VI shall be chosen from the list of Professional electives (Verticals) offered by same Programme**

& Mandatory Course-III is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-III)

@ The students individually undergo training in reputed firms/ Research institutes / laboratories for the specified duration (04 Weeks) during VI semester summer vacation. After completion of training, a detailed report should be submitted within ten days from the commencement of VII semester.



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SEMESTER VII

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23PTT71	Regulatory requirements in Pharmaceutical Industries	PC	3	0	0	3	3	40	60	100
2.	23PTT72	Biopharmaceutics and Pharmacokinetics	PC	3	0	0	3	3	40	60	100
3.	23UHV71	Human values and Ethics	HSS	2	0	0	2	2	40	60	100
4.		Elective - Management #	HSS	3	0	0	3	3	40	60	100
5.		Open Elective - II**	OE	-	-	-	-	3	40	60	100
6.		Open Elective - III**	OE	-	-	-	-	3	40	60	100
7.		Open Elective - IV**	OE	-	-	-	-	3	40	60	100
Practicals											
8.	23PTL71	Industrial Training/Internship II@	EEC	0	0	0	0	2	100	-	100
Total				-	-	-	-	22			

Elective - Management shall be chosen from the list of Elective Management courses

** Open Elective - II to IV shall be chosen from the list of open electives offered by other Programmes

@ The students undergone industrial training/internship during VI semester summer vacation and same will be evaluated in VII semester.

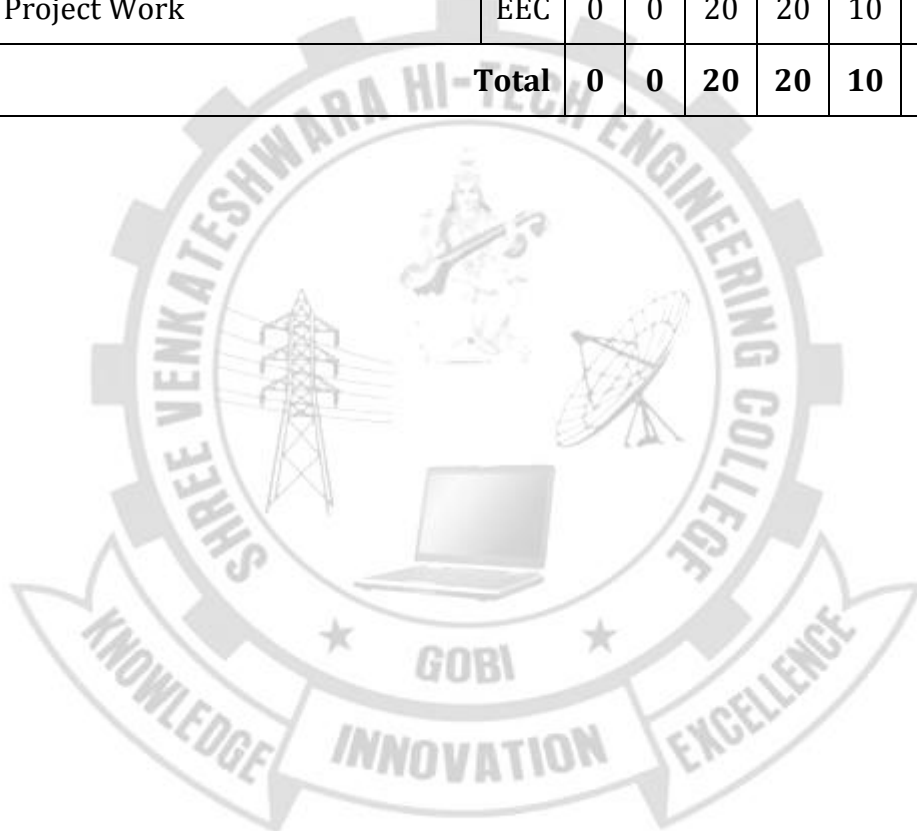


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SEMESTER VIII

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Practicals											
1.	23PTL81	Project Work	EEC	0	0	20	20	10	60	40	100
Total				0	0	20	20	10			



MANDATORY COURSES II

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MCT51	Introduction to Womenand Gender Studies	MC	3	0	0	3	0	100	-	100
2.	23MCT52	Elements of Literature	MC	3	0	0	3	0	100	-	100
3.	23MCT53	Film Appreciation	MC	3	0	0	3	0	100	-	100
4.	23MCT54	Disaster Risk Reduction and Management	MC	3	0	0	3	0	100	-	100

MANDATORY COURSES III

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MCT61	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0	100	-	100
2.	23MCT62	History of Science and Technology in India	MC	3	0	0	3	0	100	-	100
3.	23MCT63	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0	100	-	100
4.	23MCT64	State, Nation Building and Politics in India	MC	3	0	0	3	0	100	-	100
5.	23MCT65	Industrial Safety	MC	3	0	0	3	0	100	-	100

ELECTIVE – MANAGEMENT COURSES

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MSE71	Principles of Management	HSS	3	0	0	3	3	40	60	100
2.	23MSE72	Total Quality Management	HSS	3	0	0	3	3	40	60	100
3.	23MSE73	Engineering Economics and Financial Accounting	HSS	3	0	0	3	3	40	60	100
4.	23MSE74	Human Resource Management	HSS	3	0	0	3	3	40	60	100
5.	23MSE75	Knowledge Management	HSS	3	0	0	3	3	40	60	100
6.	23MSE76	Industrial Management	HSS	3	0	0	3	3	40	60	100

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Drug Design & Development	Vertical II Formulation and Manufacturing Technology	Vertical III Quality Control and Quality Assurance	Vertical IV Pharmaceutical Industrial Management
Medicinal Chemistry	Technology of Fine Chemicals and Bulk drugs	Biological spectroscopic techniques	Pharmaceutical Production Management
Bioinformatics and Cheminformatics	Pre formulation Technology	Quality Assurance in Pharmaceutical Industries	Pharmaceutical Supply Chain Management
Protein Structure, Function and Proteomics	Manufacturing Technology of Dosage Forms	Audits and regulatory compliance	Safety and Disaster Management
Computer Aided Drug Design	Industrial Process and Scale up Techniques	Validation in Pharmaceutical Industries	Management Information System
Regulatory Toxicology	Novel Drug Delivery Systems	Quality Management system	Industrial Psychology And Human Resource Management
Clinical Research and Pharmacovigilance	Pharmaceutical Packaging Technology	Product development and technology transfer	Project Management for Pharmaceutical Technology

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise).

However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI. The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E./B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2023 [Clause 12].

PROFESSIONAL ELECTIVE COURSES: VERTICALS**VERTICAL I: DRUG DESIGN & DEVELOPMENT**

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23PTE11	Medicinal Chemistry	PE	3	0	0	3	3	40	60	100
2.	23PTE12	Bioinformatics and Cheminformatics	PE	3	0	0	3	3	40	60	100
3.	23PTE13	Protein Structure, Function and Proteomics	PE	3	0	0	3	3	40	60	100
4.	23PTE14	Computer Aided Drug Design	PE	3	0	0	3	3	40	60	100
5.	23PTE15	Regulatory Toxicology	PE	3	0	0	3	3	40	60	100
6.	23PTE16	Clinical Research and Pharmacovigilance	PE	3	0	0	3	3	40	60	100

VERTICAL II: FORMULATION AND MANUFACTURING TECHNOLOGY

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23PTE21	Technology of Fine Chemicals and Bulk drugs	PE	3	0	0	3	3	40	60	100
2.	23PTE22	Pre formulation Technology	PE	3	0	0	3	3	40	60	100
3.	23PTE23	Manufacturing Technology of Dosage Forms	PE	3	0	0	3	3	40	60	100
4.	23PTE24	Industrial Process and Scale up Techniques	PE	3	0	0	3	3	40	60	100
5.	23PTE25	Novel Drug Delivery Systems	PE	3	0	0	3	3	40	60	100
6.	23PTE26	Pharmaceutical Packaging Technology	PE	3	0	0	3	3	40	60	100

VERTICAL III: QUALITY CONTROL AND QUALITY ASSURANCE

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23PTE31	Biological spectroscopic techniques	PE	3	0	0	3	3	40	60	100
2.	23PTE32	Quality Assurance in Pharmaceutical Industries	PE	3	0	0	3	3	40	60	100
3.	23PTE33	Audits and regulatory compliance	PE	3	0	0	3	3	40	60	100
4.	23PTE34	Validation in Pharmaceutical Industries	PE	3	0	0	3	3	40	60	100
5.	23PTE35	Quality Management systems	PE	3	0	0	3	3	40	60	100
6.	23PTE36	Product Development and Technology Transfer	PE	3	0	0	3	3	40	60	100

VERTICAL IV: PHARMACEUTICAL INDUSTRIAL MANAGEMENT

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23PTE41	Pharmaceutical Production Management	PE	3	0	0	3	3	40	60	100
2.	23PTE42	Pharmaceutical Supply Chain Management	PE	3	0	0	3	3	40	60	100
3.	23PTE43	Safety and Disaster Management	PE	3	0	0	3	3	40	60	100
4.	23PTE44	Management Information System	PE	3	0	0	3	3	40	60	100
5.	23PTE45	Industrial Psychology And Human Resource Management	PE	3	0	0	3	3	40	60	100
6.	23PTE46	Project Management for Pharmaceutical Technology	PE	3	0	0	3	3	40	60	100

OPEN ELECTIVES - OFFERED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23PT011	Nutraceuticals	OE	3	0	0	3	3	40	60	100
2.	23PT012	IPR for Pharma Industry	OE	3	0	0	3	3	40	60	100
3.	23PT013	Pharmaceutical Nanotechnology	OE	3	0	0	3	3	40	60	100
4.	23PT014	Basics of Human Anatomy and physiology	OE	3	0	0	3	3	40	60	100

OPEN ELECTIVES

Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM

OFFERED BY DEPARTMENT OF CIVIL ENGINEERING

1	23CE011	Civil and Infrastructure Engineering	OE	3	0	0	3	40	60	100
2	23CE012	Environmental Pollution and waste management	OE	3	0	0	3	40	60	100
3	23CE013	Environmental Impact Assessment	OE	3	0	0	3	40	60	100
4	23CE014	Building Services	OE	3	0	0	3	40	60	100
5	23CE015	Water, Sanitation and Health	OE	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1	23CS011	Foundation of AR/VR	OE	2	0	2	3	50	50	100
2	23CS012	Web Designing	OE	2	0	2	3	50	50	100
3	23CS013	Block Chain fundamentals	OE	2	0	2	3	50	50	100
4	23CS014	Knowledge Management	OE	2	0	2	3	50	50	100
5	23CS015	Cloud Computing Essentials	OE	2	0	2	3	50	50	100

Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM
OFFERED BY DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING										
1	23EC011	Basics of electronics in automation	OE	3	0	0	3	40	60	100
2	23EC012	Optical engineering	OE	3	0	0	3	40	60	100
3	23EC013	E-waste management	OE	3	0	0	3	40	60	100
4	23EC014	Consumer electronics	OE	3	0	0	3	40	60	100
5	23EC015	Principles of communication engineering	OE	3	0	0	3	40	60	100
OFFERED BY DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING										
1	23EE011	Renewable Energy Sources	OE	3	0	0	3	40	60	100
2	23EE012	Electrical Vehicle	OE	3	0	0	3	40	60	100
3	23EE013	Energy Auditing and Conservation	OE	3	0	0	3	40	60	100
4	23EE014	Domestic and Industrial Electrical Installations	OE	3	0	0	3	40	60	100
5	23EE015	Microcontroller Based System Design	OE	3	0	0	3	40	60	100
OFFERED BY DEPARTMENT OF MECHANICAL ENGINEERING										
1	23ME011	Industrial Instrumentation	OE	3	0	0	3	40	60	100
2	23ME012	Energy Technology	OE	3	0	0	3	40	60	100
3	23ME013	Reverse Engineering	OE	3	0	0	3	40	60	100
4	23ME014	Fire Safety Engineering	OE	3	0	0	3	40	60	100
5	23ME015	Nano Technology	OE	3	0	0	3	40	60	100
OFFERED BY DEPARTMENT ARTIFICIAL INTELLIGENCE AND DATA SCIENCE										
1	23AD011	Introduction to Big Data	OE	2	0	2	3	50	50	100
2	23AD012	Principles of Data Science	OE	2	0	2	3	50	50	100
3	23AD013	Data Visualization and its Applications	OE	2	0	2	3	50	50	100
4	23AD014	Data Warehousing and Mining	OE	2	0	2	3	50	50	100
5	23AD015	Principles of Cyber Security	OE	2	0	2	3	50	50	100

Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM
OFFERED BY DEPARTMENT INFORMATION TECHNOLOGY										
1	23IT011	Basics of Java Programming	OE	2	0	2	3	50	50	100
2	23IT012	Ethical Hacking	OE	2	0	2	3	50	50	100
3	23IT013	E-Commerce and Applications	OE	2	0	2	3	50	50	100
4	23IT014	Basics of Android Application Development	OE	2	0	2	3	50	50	100
5	23IT015	Introduction to Web Design	OE	2	0	2	3	50	50	100
OFFERED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY										
1	23PT011	Nutraceuticals	OE	3	0	0	3	40	60	100
2	23PT012	IPR for Pharma Industry	OE	3	0	0	3	40	60	100
3	23PT013	Pharmaceutical Nanotechnology	OE	3	0	0	3	40	60	100
4	23PT014	Basics of Human Anatomy and physiology	OE	3	0	0	3	40	60	100
OFFERED BY DEPARTMENT BIOMEDICAL ENGINEERING										
1	23BM011	Biomedical Instrumentation	OE	3	0	0	3	40	60	100
2	23BM012	Medical Optics	OE	3	0	0	3	40	60	100
3	23BM013	Biometric systems and their applications	OE	3	0	0	3	40	60	100
4	23BM014	Healthcare Management systems	OE	3	0	0	3	40	60	100
5	23BM015	IOT in Medicine	OE	3	0	0	3	40	60	100