



Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology
(Autonomous Institute Affiliated to University of Mumbai)
[Knowledge is Nectar]

Liberal, Pi-Model of Engineering Education @ SPIT

CURRICULUM STRUCTURE FOR UNDERGRADUATE ACADEMIC PROGRAMS

W.E.F. A.Y. 2026-27 [2026-2030 And 2025-29 BATCH]

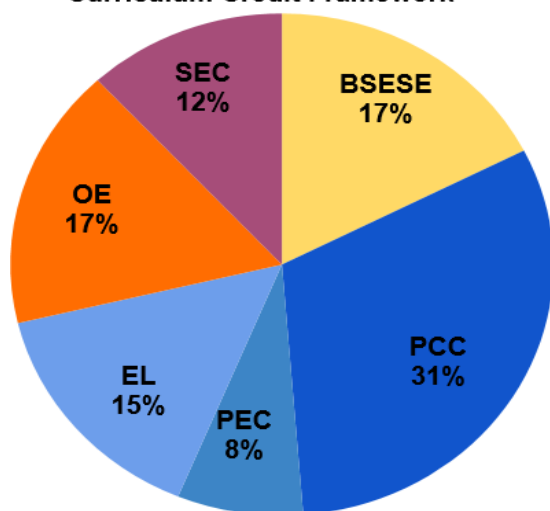
Preamble: SPIT commits itself to the effective and fruitful implementation of NEP 2020 in its spirit. The holistic development of learners has always been the priority and center of focus for “Bharatiya Vidya Bhavan’s”. Therefore, we started implementing the philosophy of NEP in the year 2020 itself, before the formal announcement of NEP in Nov. 20. We have in fact graduated the first batch of our holistic curriculum in 2023. Now, based on our learnings from the implementation and recent recommendations of the State Government, we are pleased to offer a 3rd iteration of our holistic curriculum, a Liberal “Pi-Model” of Engineering Education for the batches admitted in 2025 and 2026. This curriculum emphasizes outcome-based education, **flexibility in learning pathways**, multidisciplinary exposure, design thinking, digital competency, sustainability awareness, and collaborative learning. It integrates strong theoretical foundations with practical applications through laboratory work, **project-based learning**, **self-learning components**, and industry engagement. The program structure promotes **holistic development** by balancing professional engineering competencies with liberal learning, critical thinking, communication skills, creativity, **human values** and a compulsory minor program of besides chosen major.

Passionate learners can also opt for “Honours by Research” through very structured additional research internship during summer breaks. The most salient feature of curriculum is the unique flexibility it offers, particularly for selecting “Multidisciplinary Minor”. This curriculum has 42% choice-based component and 15% learners’ engagement in experiential learning (Learning by doing). Thus, the choice-based component amounts to 57% and a compulsory component to 43%. It ensures that the learners engagement in theory classes is lesser than their engagement in laboratories and experiential learning. While it allows learners to study 8 Mathematics courses throughout the programme, it also permits some other learner to take 6—8 courses from different domain. Thus, it offers a unique, liberal “**Pi-Model**” of Engineering Education.

Abbreviations			
L	Lecture Hour	SE	Self-Engagement in Hours
T	Tutorial Hour	TE	Total Engagement in Hours
P	Laboratory Hour	C	Credit Assigned

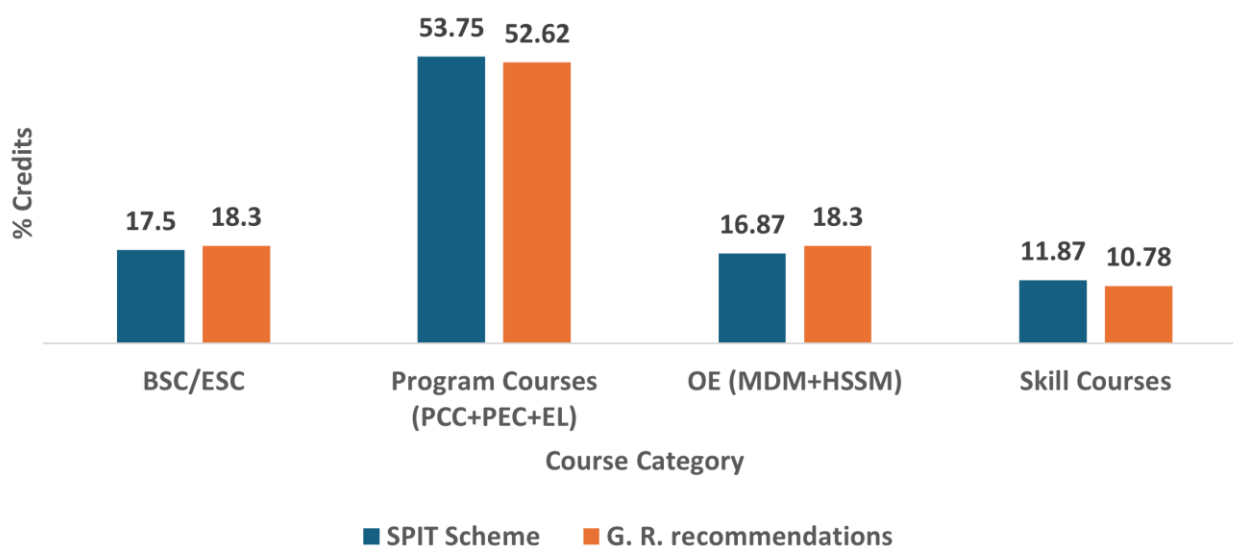
S.P.I.T. Credit Structure										
Course Category	SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI	SEM VII	SEM VIII	Total	%
BSESE	11	11	3	3					28	17.5
PCC			12	14	16	8			50	31.25
PEC						6	6		12	7.5
EL					3	3	6	12	24	15
OE	3	3	3	3	3	3	3	6	27	16.87
SEC	6	6	3	2		2			19	11.87
Total	20	20	21	22	22	22	15	18	160	100

Curriculum Credit Framework



Program Courses
(PCC+PEC+EL): 54%

Comparison of SPIT Credit Structure with G.R. recommendations



SEM I										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Basic & Engg. Sciences	BSES	MA101	Engineering Calculus	3	1	-	4	8	4
2	Basic & Engg. Sciences	BSES	EC102	Basic Electrical Engineering	3	0	2	3	8	4
3	Basic Sciences & Engg. Sciences Elective	BSESE	AS1XX		2/3	-	2/0	4/5	8	3
4	Open Elective	HSSM-1	HSMXX		2	-	2	2	6	3
5	Skill Enhancement Course	SEC	AS101	Design Thinking/ Engineering Exploration	1	-	2	3	6	2
6	Skill Enhancement Course	SEC	CE101	Imperative Programming Lab	0	0	4	2	6	2
7	Skill Enhancement Course	SEC	AS102	Professional Communication	1	0	2	3	6	2
8	Liberal Learning Courses	LLC (Audit)	LLC27/ LLC54	Art of Living/ Leadership for Youth	-	-	2	-	2	NC
Total					12/13	1	16/14	21/22	50	20

SEM II										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Basic & Engg. Sciences	BSES	MA102	Differential Equations and Complex Analysis	3	1	-	4	8	4
2	Basic & Engg. Sciences	BSES	EC101	Digital Systems and Microprocessors	3	-	2	3	8	4
3	Basic Science & Engg. Sciences Elective	BSESE	AS1XX		2	-	2	4	8	3
4	Open Elective	HSSM -II	HSMXX		2	-	2	2	6	3
5	Skill Enhancement Course	SEC	AS103	Design Thinking/ Engineering Exploration	1	-	2	3	6	2
6	Skill Enhancement Course	SEC	CE103	Data Structure Lab	0	-	4	2	6	2
7	Skill Enhancement Course	SEC	AS104	Corporate Communication	1	-	2	3	6	2
8	Liberal Learning Courses	LLC (Audit)	LLC27/ LLC54	Art of Living/ Leadership for Youth	-	-	2	-	2	NC
Total					12	1	16	21	50	20

SEM III										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Basic & Engg. Sciences	BSES	MA201	Linear Algebra	2	1	0	5	8	3
2	Basic & Engg. Sciences *	FOM-I	MA202	Foundation of Mathematics-I*	2	1	0	5	8	3*
3	Program Core Courses (12)	PCC	EC201	Electromagnetic Wave Engineering (EWE)	3	-	-	4	7	3
4		PCC	EC202	Signal, Network and System (SNS)	3	-	2	4	9	4
5		PCC/PCC (SM)	EC203	Electronic Devices and Circuits (EDC)	3	-	2	4	9	4
		PCC	EC204	Computer Organization & Architecture (COA)	2	-	-	2	4	2
6	Open Elective	OE	OE3XX		3	-	-	3	6	3
7	Skill Enhancement Course	SEC	EC205	Hardware Description Language Programming (HDL)	-	1	2	3	6	2
8	Liberal learning Course	LLC (Audit)	LLC03	LLCXX	1	-	-	-	1	NC
Total					17	2	6	25	50	21

*Only for Lateral Entry Students and not included in CGPA

Winter Term (For Lateral Entry Students)										
Sr. No	Course Category	Abbreviation	Course Code	Course Name	L	T	P	SE	TE	C
1	Basic & Engg. Sciences	BSES	MA201	Linear Algebra	2	1	0	5	8	3
2	Basic & Engg. Sciences *	FOM-II	MA204	Foundation of Mathematics-II*	2	1	0	5	8	3*
SEM IV										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Basic & Engg. Sciences	BSES	MA203	Probability and Stochastic Process (PSP)	3	-	-	4	7	3
2	Program Core Courses (14)	PCC	EC206	Digital Communication (DC)	2	-	2	2	6	3
3		PCC	EC207	Mixed Signal Integrated Circuit (MSIC)	3	-	2	4	9	4
4		PCC	EC208	Microcontroller	3	-	2	4	9	4
5		PCC/ PCC (SM)	EC209	Control Systems	3	-	-	4	7	3
6	Open Elective	OE	OE4XX		3	-	-	3	6	3
7	Skill Enhancement Course	SEC	CE 201	Real life problem solving using AI	1	-	2	1	4	2
8	Humanities	HSSM	AS117	Constitution of India	1	-	-	1	2	NC
Total					19	-	8	23	50	22

Summer Term for Students opted for Honors through Research										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Experiential Learning	ELC	HR1	Research Stage- I	-	-	-	6	-	6

SEM V										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Program Core Courses (16 credits)	PCC	EC301	Digital Signal Processing (DSP)	3	-	2	5	10	4
2		PCC	EC302	Mobile Wireless Communication (MWC)	2	-	2	5	9	3
3		PCC	EC303	Computer Communication Networks (CCN)	2	-	2	5	9	3
4		PCC/PCC (SM)	EC304	Power Electronics (PE)	3	-	2	5	10	4
5	Open Elective	OE	OE5XX		3	-	-	3	6	3
6	Experiential Learning	ELC	ECPRI	Mini Project I	-	-	-	6	6	3
Total					13	-	8	29	50	22

SEM VI										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Program Core Courses (8 credits)	PCC	EC306	Radiating Systems	3	-	2	4	9	4
2		PCC/PCC (SM)	EC307	Basics of VLSI	3	-	2	4	9	4
3	Program Elective Courses	PEC	EC3X1	PE-I	2	-	2	3	7	3
4	Program Elective Courses	PEC	EC3X2	PE-II	2	-	2	3	7	3
5	Open Elective	OE	OE6XX		3	-	-	3	6	3
6	Experiential Learning	ELC	ECPRII	Mini Project- II	-	-	-	6	6	3
7	Skill Enhancement Course	SEC	EC307	Lab related to Embedded domain	-	1	2	3	6	2
Total					13	1	10	26	50	22

Summer Term for Students opted for Honors through Research										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Experiential Learning	ELC	HR2	Research Stage- II	-	-	-	6	-	6

SEM VII: Option A										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Open elective	OE	OENP		3	-	-	3	6	3
2	Program Elective Courses	PEC	EC4X1	PE-III	2	-	2	3	7	3
3	Program Elective Courses	PEC	EC4X2	PE-IV	2	-	2	3	7	3
4	Experiential Learning	ELC	ECPR-I	Main Project	-	-	-	8	8	6
Total					7	-	4	17	28	17

SEM VII: Option B (Research/ Industry Internship)										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Open elective	OE**	OENP		3	-	-	3	6	3
2	Open elective	OE**	OENP		3	-	-	3	6	3
3	Experiential Learning	ELC	INTR/INTI	Research /Industry Internship	-	-	-	8	8	12
Total					6	-	-	14	20	18

SEM VII: Option C (Only for Honors by Research)										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Open elective	OE**	OENP		3	-	-	3	6	3
2	Open elective	OE**	OENP		3	-	-	3	6	3
3	Experiential Learning	ELC	HR03	Research - III	-	-	-	8	8	12
Total					6	-	-	14	20	18

** To be completed from MOOCS

SEM VIII: Option A										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Open Elective	OE**	OENP		3	-	-	3	6	3
2	Open Elective	OE**	OENP		3	-	-	3	6	3
3	Experiential Learning	ELC	INTR/INTI	Research / Industry Internship	-	-	-	8	8	12
Total					6	-	-	14	20	18

SEM VIII: Option B										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Program Elective Courses	PEC	EC4X1	PE-III	2	-	2	3	7	3
2	Program Elective Courses	PEC	EC4X2	PE-IV	2	-	2	3	7	3
3	Open elective	OE	OENP		3	-	-	3	6	3
4	Experiential Learning	ELC	ECPR-I	Main Project	-	-	-	8	8	6
Total					7	-	4	17	28	17

SEM VIII: Option C (Only for Honors by Research)										
Sr. No	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Program Elective Courses	PEC	EC4X1	PE-III	2	-	2	3	7	3
2	Program Elective Courses	PEC	EC4X2	PE-IV	2	-	2	3	7	3
3	Open elective	OE	OENP		3	-	-	3	6	3
4	Experiential Learning	ELC	ECPR-I	Main Project	-	-	-	10	10	8
5	Experiential Learning	ELC	HR4	Research- IV	-	-	-	6	6	6
Total					7	-	4	25	36	23

** To be completed from MOOCS

Sem VI and Sem VII or Sem VIII										
Course Category	Abbr.	Course Name				L	T	P	O	E Credits
		PE-I (Sem VI)	PE-II (Sem VI)	PE-III (Sem VII or Sem VIII)	PE-IV (Sem VII or Sem VIII)					
Program Elective Courses (Communication)	PEC	EC311: Optical Fiber Communication	EC312: Error Coding and Cryptography	EC413: Microwave Communication	EC414: Space Communication Technologies	2	-	2	3	7 3
		EC321: Cyber Security and Digital Forensic	EC322: Wireless Networks	EC423: Remote Sensing and GIS	EC424: Telecom Network Management	2	-	2	3	7 3
Program Elective Courses (Embedded Systems & IoT)	PEC	EC331: Embedded Systems	EC332: Real Time Operating System	EC433: IoT Protocols	EC434: IoT Applications and Analytics	2	-	2	3	7 3
Program Elective Courses (Signal Processing)	PEC	EC341: Advanced Signal Processing	EC342: Image and Video Processing	EC443: Speech and Audio Processing	EC444: DSP based System Design	2	-	2	3	7 3
Program Elective Courses (VLSI)	PEC	EC351: Semiconductor Technologies	EC352: Analog CMOS VLSI Design	EC453: Mixed Signal VLSI Design	EC454: ASIC Verification	2	-	2	3	7 3

Table 1: Nomenclature of the courses in the curriculum

Groups	Abbreviation	Course Category
Basic Sciences and Engineering Sciences Courses (BSES)	BSESC	Basic Science & Engineering Science Courses
	BSESEC	Basic Science & Engineering Science Elective Courses
Skill Based Courses (SBC)	SEC	Skill Enhancement Course
	LLC	Liberal Learning Courses
Humanities	HSSMC	Humanities, Social Science and Management Courses
Program Related Courses (PRC)	PCC	Program Core Courses
	PEC	Program Elective Courses
	ELC	Experiential Learning Courses
Multi-Cross-Trans disciplinary courses (MCTD)	OEC	Open Elective Courses
	MDM	Multidisciplinary Minor

Table 2: Basic Sciences & Engg. Sciences Elective Courses (BSESEC)

Indicative List of BSESEC										
Sr. No.	Course Category	Abbr.	Course Code	Course Name	L	T	P	SE	TE	C
1	Basic Sciences & Engg. Sciences Elective	BSESE	AS105	Engineering Physics						3
2			AS106	Industrial Chemistry						3
3			AS107	Engineering Mechanics						3
4			AS108	Computer Aided Engineering Drawing						3
5			AS109	Materials for EEE						3
6			AS110	Biology for Engineers						3
7			AS111	Computational Electromagnetics						3
8			AS112	Signals & Systems (for CSE/CE)						3
9			AS113	Algorithms (for ECE)						3
10			AS114	Thermal and Fluid Engineering						3
11			AS115	System Engineering						3
12			AS116	Industrial Measurement						3

Table 3: Humanities, Social Science and Management Courses (HSSMC)

Indicative List of HSSMC		
Course Code	Course Title	Prerequisite if any
HSM01	Introduction of Microeconomics	
HSM02	Foundations of Law for Engineers	
HSM03	Psychology of Human behavior	
HSM04	Sanskrit Parichay	
HSM05	Basic German	
HSM06	Basic Japanese	
HSM07	Basic French	
HSM08	Foundations of Indian History	
HSM09	Foundations of Political Science	
HSM10	Foundations of Project Management	
HSM11	Foundations of Philosophy	
HSM12	Advanced of Microeconomics	HSM01
HSM13	Advanced Law for Engineers	HSM02
HSM14	Industrial and organizational Psychology	HSM03
HSM15	Sanskrit Pragat	HSM04
HSM16	Advanced German	HSM05
HSM17	Advanced Japanese	HSM06
HSM18	Intermediate French	HSM07
HSM19	Advanced Indian History	HSM08
HSM20	Advanced Political Science	HSM09
HSM21	Advanced Project Management	HSM10
HSM22	Advanced Philosophy	HSM11
HSMNP	Any course approved by Dean Academics from NPTEL/ SWAYAM/ EDX	

**It is compulsory to take Indian Knowledge and Values Systems course in any one semester for 3 credits.*

Table 4: Open Elective Baskets

Indicative List of Open Electives			
Course Code	Course Title (SEM III)	Course Code	Course Title (SEM IV)
	MDM P1-A		MDM P1-B
	MDM P2-A		MDM P2-B
	-----		-----
	MDM Pn-A		MDM Pn-B
HSM27	#Indian Knowledge and Values Systems	HSM27	#Indian Knowledge and Values Systems
	#Any course from HSSMC Basket		#Any course from HSSMC Basket
	#Any course from BSESE Basket		#Any course from BSESE Basket

If not register earlier

Table 5: Liberal Learning Courses (LLC) Basket

Indicative List of LLC for SEM III and SEM IV			
Course Code	Course Title	Course Code	Course Title
LLC04	Basics of Fire Safety	LLC29	Yoga I
LLC07	Film Appreciation	LLC36	Introduction to Bhagavad Geeta
LLC08	First Aid	LLC38	Dance - Kathak
LLC09	Fundamentals of Photography	LLC40	Mentoring to peers
LLC11	Integrated Personality Development I	LLC43	Dance - Bollywood
LLC12	Mentoring (Volunteering) to school Children (Abhyudaya)	LLC45	Innovation and Entrepreneurship
LLC15	Read a book	LLC48	Rangoli
LLC24	Wall Painting	LLC49	Understanding Theatres
LLC25	Working with NGO	LLC52	Interpersonal Effectiveness and Team Building
LLC28	Yes Plus AOL Advanced	LLC53	Yoga II

Table 6: Open Elective Baskets

Indicative List of Open Elective			
Course Code	Course Title (SEM V)	Course Code	Course Title (SEM VI)
	MDM P1-C		MDM P1-D
	MDM P2-C		MDM P2-D
	-----		-----
	MDM Pn-C		MDM Pn-D
HSM27	#Indian Knowledge and Values Systems	HSM27	#Indian Knowledge and Values Systems
	#Any course from HSSMC Basket		#Any course from HSSMC Basket
	#Any course from BSESE Basket		#Any course from BSESE Basket

If not register earlier

Indicative List of Open Elective			
Course Code	Course Title	Course Code	Course Title
	#Indian Knowledge and Values Systems		Battery Management Systems
	Mechatronic systems		Advance Linear Algebra
	PLC and Automation		Numerical Methods
	Entrepreneurship and IPR		Optimization Techniques
	Economics for Engineers		Drone Technology
	Bioinformatics		Research Methodology
	Quantum Materials		Quantum Computing
	Nanomaterials and Engineering		Herbal Science & Technology
	Nuclear Science		Introduction to Digital Health
	Quantum Chemistry and Computation		Project Management
	Finance Management		Any course approved by Dean Academics

If not register earlier

Notes

- 1 Learners who earn a minimum 160 credits will be awarded **“B. Tech in Engg. /Tech. with Multidisciplinary Minor”** degree.
- 2 Learners who earn 18 additional credits through additional “Research Stages” during summer breaks, as mentioned in the scheme, are eligible for the degree: **“B. Tech in Engg. /Tech. with Multidisciplinary Minor” and “Honors by Research”**, subject to earning CGPA of 8.25.
- 3 Learners will be allowed to earn **B. Tech. in Engg. /Tech. degree with MDM, and earn additional Honors Certification, if they secure top grade in any 10 Program core courses and score 80 percentile in Gate exam.**
- 4 **Learner can earn the certificates based on his/her exit from the program as follows:**
 - a. After a one-year (40 credits to be earned) and 8-week summer workshop: Certificate in Engineering.
 - b. After two-years (80 credits to be earned) and 8-week summer workshop: Diploma in Engineering.
 - c. After three-years (120 credits to be earned) and 8-week summer workshop: B. Sc. Engineering.