

2025

Curriculum
Bachelor of Technology (B.Tech.)
Electronics and Communication Engineering
(Specialization: Rail Engineering)



SCHOOL OF TECHNOLOGY

GATI SHAKTI VISHWAVIDYALAYA

Central University, Sponsored by Ministry of Railways

गति शक्ति विश्वविद्यालय
GATI SHAKTI VISHWAVIDYALAYA
(A Central University under the Ministry of Railways, Government of India)

GSV VISION

Innovation-led, Industry-driven University for creating, assimilating and imparting excellence of knowledge and actions accelerating development in the transport and logistics sectors.

GSV MISSION

- “Best in the world” futuristic education and research built on credibility, rigor and relevance.
- Effective collaboration with industry and stakeholders for GSV to be the “focal-point” of the transport and logistics ecosystem.
- Imbibe and internalize professional work ethics and culture to foster lifelong learning paradigms for a developed India.

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**B. Tech. in Electronics and Communication Engineering with specialization in
Rail Engineering**

PROGRAM OBJECTIVE

To equip students with advanced knowledge and skills in electronics and communication engineering, specialized for the rail sector, fostering innovation, industry collaboration, and professional ethics to contribute effectively to the development and enhancement of modern rail transportation systems globally.

PROGRAM DELIVERABLES

- Graduates will acquire advanced knowledge in electronics and communication engineering principles, with a specialized focus on rail engineering technologies, including signaling, communication systems, and automation.
- Students will engage in practical, industry-driven projects and internships in collaboration with leading organizations in the rail and logistics sectors, providing hands-on experience and industry exposure.
- The program will instill strong professional ethics and lifelong learning paradigms, preparing graduates to effectively address challenges and drive innovation in the transport and logistics ecosystem

TEACHING PEDAGOGY

- Interactive Lectures and Tutorials
- Hands-on Laboratory Sessions
- NPTEL/SWAYAM courses/lectures
- Assessment and Feedback
- Internships and Visits to Railway Establishments
- Workshops and Seminars
- Mentorship
- Case studies and Projects related to the Program, Railways and Transportation/Logistics Domains.

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General Information and Credit Distribution

The B. Tech. in Electronics and Communication Engineering program is of four years each containing two semesters making a total of 8 semesters. The total number of credits proposed for the four-year B. Tech. program is 160.

Definition of Credits

1-hour theory (L) class per week	1 credit
1-hour of tutorial (T) class per week	1 credit
2-hours practical (P) per week	1 credit

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PROGRAMME CURRICULUM

YEAR-I

SEMESTER-I

Sr. No.	Category	Course Title	L	T	P	C
1.	ES	Introduction to Mechanical and Civil Engineering	3	0	0	3
2.	ES	Engineering Graphics & Workshop Practices Lab	1	0	2	2
3.	PSD	Computer Programming - I (C Programming)	2	0	2	3
4.	ES	Design Thinking	2	0	0	2
5.	RE	Introduction to Rail Systems Engineering	2	0	0	2
6.	BS	Engineering Mathematics-I	3	1	0	4
7.	BS	Engineering Physics	3	0	0	3
8.	BS	Engineering Physics Lab	0	0	2	1
9.	HS	Health, Wellness and Yoga	0	0	2	1
TOTAL			16	1	8	21

SEMESTER-II

Sr. No.	Category	Course Title	L	T	P	C
1.	ES	Engineering Mechanics	2	1	0	3
2.	ES	Engineering Mechanics Lab	0	0	2	1
3.	ES	Introduction to Electrical and Electronics Engineering	2	1	0	3
4.	ES	Basic Electrical and Electronics Engineering Lab	0	0	2	1
5.	PSD	Computer Programming - II (Python Programming)	1	0	2	2
6.	RE	Introduction to Multimodal Transportation Ecosystem	1	0	0	1
7.	BS	Engineering Mathematics-II (Including Statistics)	3	1	0	4
8.	BS	Engineering Chemistry	3	0	0	3
9.	BS	Engineering Chemistry Lab	0	0	2	1
10.	SI	Summer Internship - I (2 - 3 Weeks)	0	0	2	1
TOTAL			12	3	10	20

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PROGRAMME CURRICULUM

YEAR-II

SEMESTER-III

Sr. No.	Category	Course Title	L	T	P	C
1.	RE	Fundamentals of Railway Signalling Systems	3	0	0	3
2.	PC	Digital Electronics	2	1	0	3
3.	PC	Digital Electronics Lab	0	0	2	1
4.	PC	Signals and Systems	2	1	0	3
5.	PC	Electronic Devices	2	1	0	3
6.	PC	Electronic Devices Lab	0	0	2	1
7.	PC	Network Theory	2	1	0	3
8.	BS	Numerical Methods	2	0	0	2
9.	PSD	MATLAB Programming	0	0	2	1
10.	HS	Entrepreneurship and Innovation	2	0	0	2
TOTAL			15	4	6	22

SEMESTER-IV

Sr. No.	Category	Course Title	L	T	P	C
1.	RE	Principles of Railway Operations	2	0	0	2
2.	PC	Linear Control System	2	1	0	3
3.	PC	Computer Architecture and Organization	2	0	0	2
4.	PC	Microprocessors and Embedded Systems	2	1	0	3
5.	PC	Embedded Systems Lab	0	0	2	1
6.	PC	Digital Signal Processing	2	1	0	3
7.	PC	Signal Processing Lab	0	0	2	1
8.	PC	Analog Electronics	2	1	0	3
9.	PC	Analog Electronics Lab	0	0	2	1
	HS	Personality Development and Communication Skills	1	1	0	2
10.	SI	Summer Internship - II (4 to 6 Weeks)	0	0	4	2
TOTAL			13	5	10	23

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PROGRAMME CURRICULUM

YEAR-III
SEMESTER-V

Sr. No.	Category	Course Title	L	T	P	C
1.	RE	Advanced Railway Signalling systems-I (Interlocking)	3	1	0	4
2.	RE	Fundamentals of Railway Control Engineering	3	0	0	3
3.	PC	Electromagnetics Theory	3	0	0	3
4.	PC	Robotics	2	0	2	3
5.	PC	VLSI Design	2	1	0	3
6.	PC	VLSI Design Lab	0	0	2	1
7.	PC	Communication Systems	2	1	0	3
8.	PC	Ethics in Engineering Practice	2	0	0	2
TOTAL			17	3	4	22

SEMESTER-VI

Sr. No.	Category	Course Title	L	T	P	C
1.	RE	Advanced Railway Signalling systems-II (EI, Axle Counter, Automatic Signaling, KAVACH, ETCS, CBTC)	4	0	0	4
2.	RE	Railway Signalling Lab	0	0	2	1
3.	PC	Computer Networks	3	0	0	3
4.	ES	Artificial Intelligence and Machine Learning	3	0	0	3
5.	PC	Antenna & Wave Propagation	3	0	0	3
6.	PC	Antenna Design Lab	0	0	2	1
7.	PC	Digital Communication	3	0	0	3
8.	PC	Communication Lab	0	0	2	1
9.	PE	Elective-I	2	0	0	2
10.	SI	Summer Internship - III (6 to 8 Weeks)	0	0	6	3
TOTAL			18	0	12	24

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PROGRAMME CURRICULUM

YEAR-IV

SEMESTER-VII

Sr. No.	Category	Course Title	L	T	P	C
1.	RE	Urban Rail Transport System, Maglev & Hyperloop	3	0	0	3
2.	RE	Railway Safety and Systems Engineering	3	0	0	3
3.	HS	Wireless and Mobile Communications	3	0	0	3
4.	PC	Information, Cryptography and Coding Theory	3	0	0	3
5.	ES	Operation Research	2	1	0	3
6.	RE	Logistics and Supply Chain Management	2	0	0	2
7.	ES	Engineering Economics, Costing, Estimation, and Tendering	2	0	0	2
8.	PE	Elective-II	2	0	0	2
9.	PR	B.Tech. Project-I	0	0	4	2
TOTAL			20	1	4	23

SEMESTER-VIII

Sr. No.	Category	Course Title	L	T	P	C
1.	PR	B.Tech. Project-II	0	0	24	12
TOTAL			0	0	24	12

Summary of Credit Distribution

Sr. No.	Total Credits in Odd Semester (Nos.)	Total Credits in Even Semester (Nos.)	Year	Total Credits in Year
1	I Semester: 21	II Semester: 20	Year -I	41
2	III Semester: 22	IV Semester: 23	Year -II	45
3	V Semester: 22	VI Semester: 24	Year -III	46
4	VII Semester: 23	VIII Semester: 12	Year -IV	35
Total number of credits for the Programme				167

1 Credit = 15 Hrs. for Theory courses and 1 Credit = 30 Hrs. for practical courses