

B. Tech. Honors/ Research Degree in Electronics and Electrical Engineering

B. Tech in Electronics and Electrical Engineering Program Educational Objectives (PEOs):

The B. Tech Program in Electronics and Electrical Engineering aims to prepare the graduates with the following objectives:

1. Lead a successful career in industries or undertake entrepreneurial endeavors and provide solutions in the areas of electronic system design for power system, power electronic drives and allied areas of Electronics and Electrical engineering or pursue advanced studies.
2. Utilize their knowledge, skills and resources to design, invent and find creative and innovative solutions to engineering problems in a multidisciplinary work environment following appropriate ethical practices.
3. Develop attitude in lifelong learning, apply and adapt new ideas as the technology evolves.

Program Outcomes (POs)

The program outcomes are:

- a) **Engineering knowledge:** Ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- b) **Problem analysis:** Ability to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c) **Design/Development of solutions:** Ability to 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.
- d) **Conduct investigations on complex problems:** Ability to 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.
- e) **Modern tool usage:** Ability to 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.
- f) **The engineer and society:** Ability to 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.
- g) **Environment and sustainability:** Ability to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h) **Ethics:** Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i) **Individual and team:** Ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- j) **Communication:** Ability to 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.
- k) **Project management and finance:** Ability to 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.
- l) **Life-long learning:** Ability to 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.

Program Specific Outcomes (PSOs)

The program specific outcomes are:

- a) Ability to design, and implement electrical and electronic circuits, electrical drives and power system control for industrial applications.
- b) Ability to conduct research in automation & control, embedded system and related technologies.
- c) Ability to design and develop complex products using suitable tools for societal and engineering needs with skills to communicate effectively in groups.

CURRICULUM

The total minimum credits required for completing the B. Tech. programme in Electronics and Electrical Engineering is 162

PROFESSIONAL ELECTIVE COURSES

Professional elective-I, II, III are offered during semester five and six. Professional elective IV and V are offered during semester seven and eight. List of electives to be offered during an academic year is announced at the beginning of respective semesters. An elective will be offered only if ten or more students are interested in it. Not that all the electives will be offered in every academic year. Some electives may have seat limitations and will be offered in first cum first serve basis. In order to accommodate more aspiring students, electives having high demand may be offered twice, that is during autumn as elective-I or II and again as elective-III during spring semester.

Students can select electives based on their interest in a domain. Areas of specialization or domain are optional, however electives can be grouped to provide learning around a functional area. Students may qualify for a maximum of one area of Specialization. Completion of the specialization will not be reflecting on transcripts or degree certificate.

Electronics and Electrical Engineering SEMESTER III

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.	MA21001	Probability and Statistics	3	1	0	4	4
2.	EC20001	Signals and Systems	3	0	0	3	3
3.	EC21001	Electronic Circuits	3	1	0	4	4
4.	EE20001	Network Theory	3	0	0	3	3
5.	CS20001	Concepts of Data Structures and Algorithms	3	0	0	3	3
6.	EX20003	Scientific and Technical Writing	2	0	0	2	2
Total of Theory						19	19
Practical							
1.	EC29001	Electronic Circuits Lab	0	0	4	4	2
2.	CS29001	Data Structures Lab	0	0	2	2	1
Sessional							
1.		Vocational Electives	0	0	2	2	1
Total Credit (Practical and Sessional Subjects)			0	0	8	8	4
Semester Total						27	23

SEMESTER IV

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.	MA21006	Vectors, Differential Equations and Complex Analysis	3	1	0	4	4
2.	EC20003	Electromagnetic Theory and Antennas	3	0	0	3	3
3.	EE20010	Electrical Machines	3	0	0	3	3
4.	EL20002	Instrumentation and Control Systems	3	0	0	3	3
5.	EX20001	Industry 4.0 Technologies	2	0	0	2	2
6.		HASS Elective II	3	0	0	3	3
Total of Theory						18	18
Practical							
1.	EC29003	Signal Processing Lab	0	0	2	2	1
2.	EE29002	Electrical Machines Laboratory	0	0	2	2	1
3.	EL29002	Instrumentation and Control System Lab	0	0	2	2	1
Total of Practical						6	3
Semester Total						24	21

SEMESTER V

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.	EC20002	Microprocessors and Embedded Systems	3	0	0	3	3
2	EE30007	Power Transmission and Distribution	3	0	0	3	3
3.	HS30401	Universal Human Values	3	0	0	3	3
4.		HASS Elective III	3	0	0	3	3
5.		Professional Elective – I	3	0	0	3	3
6.		Professional Elective – II	3	0	0	3	3
Total of Theory						18	18
Practical							
1.	EC29006	Microprocessors and Embedded System Lab	0	0	2	2	1
2.	EE39007	Programmable Logic Control Lab	0	0	2	2	1
Sessional							
1.	EC38001	Electronics Product Development	0	0	2	2	1
2	EE28002	Electrical System Modeling using MATLAB	0	0	2	2	1
3.	SAxxxxx	K-Explore Open Elective – I	0	0	2	2	1
Total Credit (Practical and Sessional Subjects)						10	5
Semester Total						28	23

SEMESTER VI

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.	EC20008	Communication Engineering	3	0	0	3	3
2.	EE30005	Power Electronics and Drives	3	0	0	3	3
3.	EE30006	Power System Operation and Control	3	0	0	3	3
4.	HS30101	Engineering Economics	3	0	0	3	3
5.		Professional Elective III	3	0	0	3	3
6.		Open elective – II (MI – I)	3	0	0	3	3
Total of Theory						18	18
Practical							
1.	EC39004	Electronics Design Lab	0	0	4	4	2
2.	EE39001	Power Electronics Lab	0	0	2	2	1
3.	EE39002	Power Systems Lab	0	0	2	2	1
Sessional							
1.	EL37002	Minor Project	-	-	-	-	2
Total Credit (Practical and Sessional Subjects)							6
Semester Total						26	24

SEMESTER VII (B.Tech (Hons))

Theory							
Sl. No		Course Title	L	T	P	Total	Credit
1	EX40003	Engineering Professional Practice	2	0	0	2	2
2.		Professional Elective-IV	3	0	0	3	3
3.		Open Elective – III (MI – II)	3	0	0	3	3
4.		MI – III (Optional)	3	0	0	3	3
5		MI IV (Optional)	3	0	0	3	3
Total of Theory						8	8
Practical							
1.	EL47001	Project - I/ Internship	-	-	-	-	5
2.	EL48001	Practical Training	-	-	-	-	2
3.		MI-Lab / MI Project (optional)	-	-	-	-	2
Total Credit (Sessional Subjects)							7
Semester Total						8	15

SEMESTER VIII (B.Tech (Hons))

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.		Professional Elective-V	3	0	0	3	3
2.		Open Elective-IV (MI - V)	3	0	0	3	3
3.		MI - VI (Optional)	3	0	0	3	3
Total of Theory						6	6
Sessional							
1.	EL47002	Project- II	-	-	-	-	9
Total Credit (Sessional Subjects)						-	9
Total						6	15

SEMESTER VII (B.Tech (Research))

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.	EX40001	Research Methods and Ethics	3	0	0	3	3
2.	EX40003	Engineering Professional Practice	2	0	0	2	2
3.		Research Elective-I	3	0	0	3	3
4.		MI-II (Optional)	3	0	0	3	3
5.		MI-III (Optional)	3	0	0	3	3
6.		MI-IV (Optional)	3	0	0	3	3
Total of Theory						8	8
Sessional							
1.	EL47001	Project – I/ Internship	-	-	-	-	5
2.	EL48001	Practical Training	-	-	-	-	2
3.		MI-Lab/ MI-Project (Optional)	-	-	-	-	2
Total Credit (Sessional Subjects)						-	7
Total						8	15

SEMESTER VIII (B.Tech (Research))

Theory							
Sl. No	Course Code	Course Title	L	T	P	Total	Credit
1.		Research Elective-II	3	0	0	3	3
2.		MI-V (Optional)	3	0	0	3	3
		MI-VI(Optional)	3	0	0	3	3
Total of Theory						3	3
Sessional							
1.	EL47004	Project- II	-	-	-	-	12
Total Credit (Sessional Subjects)							12
Total						3	15

PROFESSIONAL ELECTIVES – I/II/III

Sl. No	Course Code	Course Title	L	T	P	Total	Credits
1.	CS20006	Database Management Systems	3	0	0	3	3
2.	CS30011	Computational Intelligence	3	0	0	3	3
3.	CS30029	Computer Vision and Pattern Recognition	3	0	0	3	3
4.	EC30004	Data Communication and Networking	3	0	0	3	3
5.	EC30007	ARM and Advanced Processor	3	0	0	3	3
6.	EC30011	Digital System Design with Verilog	3	0	0	3	3
7.	EC30013	Optical & Satellite Communication	3	0	0	3	3
8.	EC30015	Hardware and Software Co-Design of Embedded System	3	0	0	3	3
9.	EC30019	Information Theory & Coding	3	0	0	3	3
10.	EC30021	Industrial IoT	3	0	0	3	3
11.	EC30027	Autonomous Mobility and Battery Technologies for EV	3	0	0	3	3
12.	EC40011	Advanced Automotive Systems: Traction, Vision, and Connectivity	3	0	0	3	3
13.	EE30012	Sensors and Actuators	3	0	0	3	3
14.	EE30013	Industrial Applications of Electric Energy	3	0	0	3	3
15.	EE30014	Power Generation and Control	3	0	0	3	3
16.	EE30015	IoT for Electrical Engineering	3	0	0	3	3
17.	EE30016	Renewable Energy Resource	3	0	0	3	3
18.	EE30020	Energy Audit and Accounting	3	0	0	3	3
19.	EE30024	Electric Drives and Control	3	0	0	3	3
20.	EE30045	Switch Gear and Protecting Devices	3	0	0	3	3
21.	EE30047	Power Electronics Circuits	3	0	0	3	3
22.	EL30001	Industrial Automation	3	0	0	3	3
23.	EM30007	Machine Learning Based Signal Processing	3	0	0	3	3
24.	EM30008	Deep Learning: Algorithms & Implementation	3	0	0	3	3

PROFESSIONAL ELECTIVE IV/V

Sl. No	Course Code	Course Title	L	T	P	Total	Credits
1.	CS40015	Cryptography and Network Security	3	0	0	3	3
2.	EC30008	Wireless Sensor Network	3	0	0	3	3
3.	EC40001	Optimization Techniques in Engineering	3	0	0	3	3
4.	EC40004	Quantum Communication	3	0	0	3	3
5.	EC40005	Analog and Mixed Signal IC Design	3	0	0	3	3
6.	EC40006	Advanced VLSI and SoC	3	0	0	3	3
7.	EC40007	Low Power VLSI Design	3	0	0	3	3
8.	EC40008	Advanced Computer Architecture and RISC-V Processor Design	3	0	0	3	3
9.	EC40009	Biomedical Signal Processing	3	0	0	3	3
10.	EE40010	Electric Vehicles Technology	3	0	0	3	3
11.	EE40012	Smart Grid	3	0	0	3	3
12.	EE40013	Wind and Biomass Energy	3	0	0	3	3
13.	EE40014	Energy Management and SCADA	3	0	0	3	3
14.	EE40017	Tidal and Small Hydro Power	3	0	0	3	3
15.	EL40001	Process Control and Robotics	3	0	0	3	3
16.	EL40003	Advanced Control System	3	0	0	3	3
17.	EM40006	Cybersecurity	3	0	0	3	3
18.	EM40010	Optimization Methods in Machine Learning	3	0	0	3	3

Suggested Bucket of Professional Electives

PE I	PE II	PE III	PE IV	PE V	Specialization
CS20006	CS30011 / CS30019 / EM30007	EC30004 / EM30008 / EM30009 / EM30011	CS40015 (PR-EC30004) / EC40009 /	EM40006 / EM40010	Computer Science &ML
EC30019	EC30013	EC30004	EC30008	EC40004	Communication & Networking
EC30015	EC30011	EC30007	EC40005 / EC40007	EC40006 EC40008	VLSI and Embedded System
EC30021 / EC30027 / EE30015	EL30001	EC40011 (PR-EC30027) / EE30012 / EE30024 (PR-EE30047)	EC40001 / EL40003	EL40001 / EE40010	Automation
EE30013 / EE30020	EE30016	EE30014 / EE30045	EE40013 (PR-EE30016) / EE40017 (PR-EE30016)	EE40012 / EE40014	Energy

LIST OF HASS ELECTIVES

HASS Elective-II

Sl. No	Course Code	Subjects	L	T	P	Total	Credit
1.	HS20120	Economics of Development	3	0	0	3	3
2.	HS20122	International Economic Cooperation	3	0	0	3	3
3.	HS20220	Organizational Behaviour	3	0	0	3	3
4	HS20222	Human Resource Management	3	0	0	3	3

HASS Elective-III

Sl. No	Course Code	Subjects	L	T	P	Total	Credit
1.	HS30125	Market Structure and Pricing Policies	3	0	0	3	3
2.	HS30127	Pragmatic Inquiry	3	0	0	3	3
3.	HS30129	Economic Analysis of Decision Rules	3	0	0	3	3
4.	HS30131	Economics of Health and Education	3	0	0	3	3
5.	HS30223	Business Ethics and Corporate Governance	3	0	0	3	3
6.	HS30225	Leadership and Team Effectiveness	3	0	0	3	3
7.	HS30421	Gender Studies	3	0	0	3	3
8.	HS30423	Tribal Resource Management	3	0	0	3	3
9.	HS30425	Indian Knowledge System	3	0	0	3	3

RESEARCH ELECTIVE - I (OFFERED BY SCHOOL OF ELECTRONICS ENGINEERING)

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	EC30009	Compound Semiconductor Basics	3	0	0	3	3
2.	EC40007	Low Power VLSI Design	3	0	0	3	3
3.	CS30023	Software Defined Networking	3	0	0	3	3
4.	EC40015	5G Supportive Technologies	3	0	0	3	3
5.	EC40017	Planner Antenna	3	0	0	3	3
6.	EC40019	Solar Cell Device and Material Technology	3	0	0	3	3

RESEARCH ELECTIVE – II (OFFERED BY SCHOOL OF ELECTRONICS ENGINEERING)

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	EC40003	Cognitive Radio and Cooperative Communication	3	0	0	3	3
2.	EC40006	Advanced VLSI and SoC	3	0	0	3	3
3.	EC40010	Massive MIMO Technology	3	0	0	3	3
4.	EC40014	RF CMOS VLSI	3	0	0	3	3
5.	EC40016	VLSI Signal Processing	3	0	0	3	3
6.	EC40018	Smart Antennas	3	0	0	3	3

VOCATIONAL ELECTIVES**Vocational courses offered by School of Civil Engineering**

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	CE28001	Building Drawing, Estimation & Costing (for Civil Engineering Students)	0	0	2	1	1
2.	CE28003	GIS & GPS Applications (For other branch students)	0	0	2	1	1

Vocational courses offered by School of Computer Science Engineering

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	CS28001	Web Design	0	0	2	1	1

Vocational courses offered by School of Electrical Engineering

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	EE28011	Industrial wiring and control panel design	0	0	2	1	1
2.	EE28013	Installation, operation and maintenance of solar power system	0	0	2	1	1
3.	EE28015	Domestic wiring and home automation	0	0	2	1	1
4.	EE28017	Cyber physics application in industrial IOT	0	0	2	1	1
5.	EE28019	Industrial Control and Remote Monitoring	0	0	2	1	1

Vocational courses offered by School of Electronics Engineering

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	EC28001	Computational Photography	0	0	2	1	1
2.	EC28003	Sound Engineering	0	0	2	1	1
3.	EC28005	Sensors for Automation	0	0	2	1	1
4.	EC28007	PCB Design	0	0	2	1	1

Vocational courses offered by School of Mechanical Engineering

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1	ME28011	Additive Manufacturing(3-D Printing)	0	0	2	1	1
2	ME28013	Die development by CNC milling	0	0	2	1	1
3	ME28015	Concept Car Manufacturing	0	0	2	1	1
4	ME28017	Development of Autonomous Wheeled Robots	0	0	2	1	1
5	ME28019	Modelling of Micro-Wind turbine by 3D CAD	0	0	2	1	1

K-EXPLORE OPEN ELECTIVE - I

Sl. No.	Course Code	Subjects	L	T	P	Total	Credit
1.	SA38001	Robotics	0	0	2	2	1
2.	SA38003	Web Designing	0	0	2	2	1
3.	SA38005	Civil-Tech	0	0	2	2	1
4.	SA38007	Circuit Design & Control	0	0	2	2	1
5.	SA38009	Indian Classical, Folk & Bollywood Dance	0	0	2	2	1
6.	SA38011	Indian Classical & Western Music	0	0	2	2	1
7.	SA38013	Graphic Designing & Editing	0	0	2	2	1
8.	SA38015	Art & Craft	0	0	2	2	1
9.	SA38017	Theatre & Street Play	0	0	2	2	1
10.	SA38019	Film Making	0	0	2	2	1
11.	SA38021	Debating,Public Speaking& Anchoring	0	0	2	2	1
12.	SA38023	Creative Writing	0	0	2	2	1
13.	SA38025	Photography & Videography	0	0	2	2	1
14.	SA 38027	Fashion Styling	0	0	2	2	1
15.	SA 38029	Culinary Arts	0	0	2	2	1
16.	SA 38031	Quiz Activity	0	0	2	2	1
17.	SA 38033	Social Outreach	0	0	2	2	1
18.	SA 38035	Health & Emergency Care	0	0	2	2	1