# **B.Tech. in Electrical Engineering Specialization: Electric Vehicle**



Department of Faculty of Engineering and Technology, Sri Sri University. Cuttack, India

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	B.Tech. EE (Specialization :EV)					
	1 <sup>st</sup> Year					
Course code	Semester – 1	L	T	P	Cr	
	Major Courses					
TEC101	Basic Electronics Engg.	2	0	0	2	
TEC102	Basic Electronics Engg. Lab	0	0	1	1	
TEE101	Basic Electrical	2	0	0	2	
TEE102	Basic Electrical lab	0	0	1	1	
TCS101	Computational Thinking and Problem Solving for Software Development (IBM)	2	0	0	2	10
TCS102	Computational Thinking and Problem Solving for Software Development (IBM) Lab	0	0	1	1	
TEC103	Engineering Graphics & Design	0	0	1	1	
	Minor Courses					
TMN101	Innovation Management(Ex)	3	0	0	3	4
TMN102	Innovation Management lab	0	0	1	1	4
	Multidisciplinary Co	urses				
	Engineering Mathematics-1	2	0	0	2	
	Engineering Mathematics-1 Lab.	0	0	1	1	
	Engineering Chemistry	2	0	0	2	6
	Engineering Chemistry Lab.	0	0	1	1	
	Ability enhancement of	course	e		Π	T
	Communicative English-1	2	0	0	2	3
	Communicative English-1 Lab.	0	0	1	1	
	Skill enhancement co	ourse				
TSE105	Engineering workshop (Solar panel installation technician certificate from NSDC and Assistant electrician certification from snider electric.)	0	0	1	3	3
	Value added cours	se				
	Happiness Connect program	0	0	2	2	3
TVA101	Sustainable Development Goal	1	0	0	1	3
	General Proficience	су				
TGP101	General Proficiency-I	0	0	0	1	1

Total Credit in 1<sup>st</sup> Semester – 30

Course code	Semester – 2	L	Т	P	Cr	
	Major Courses					
TEE103	Circuit Theory and Network Theory	2	0	0	2	
TEE104	Circuit Theory and Network Theory Lab	0	0	1	1	
TEC104	Introduction to Digital Systems	2	0	0	2	
TEC105	Digital System Lab	0	0	2	1	11
TEE105	Introduction to Sensor & Transducer	2	0	0	2	
TCS110	Programing in C	2	0	0	2	
TCS111	Programing in C Lab	0	0	1	1	
	Minor Courses					
TMN103	Entrepreneurship Development(Ex)	3	0	0	3	
TMN104	Entrepreneurship Development lab	0	0	1	1	4
	Multidisciplinary Cou	rses				
	Engineering Mathematics-2	2	0	1	3	
	Engineering Physics	2	0	0	2	6
	Engineering Physics Lab.	0	0	1	1	
	Ability enhancement co	ourse				
TAE103	Design Thinking	2	0	2	4	4
	Skill enhancement co	ırse				
TSE111	Advance Solar cell manufacturing process	0	0	1	3	3
	Value added course	e				
	Green governance	1	0	0	1	1
	General Proficience	y				
TGP102	General Proficiency-II	0	0	0	1	1
Students exiting the Certificate in the re work based vocation Apprenticeship in a first and second Sen						

Total Credit in 2<sup>nd</sup> Semester – 30

	B.Tech. EE (Specialization :EV)					
	2 <sup>nd</sup> Year					
Course code	Semester – 3	L	Т	P	Cr	
	Major Courses					
TEE203	Control System-1	2	0	0	2	
TEE204	Control System-1 Lab	0	0	1	1	
TEC201	Fundamentals of Microprocessor and microcontroller	2	0	0	2	
TEC202	Fundamentals of Microprocessor and microcontroller Lab	0	0	1	1	12
TEE201	Introduction to Measurement	2	0	0	2	12
TEE202	Measurement Lab	0	0	1	1	
TEE205	Foundations of EV & Hybrid Vehicles	2	0	0	2	
TEE206	Foundations of EV & Hybrid Vehicles Lab	0	0	1	1	
	Minor Courses					
TMN201	Python Programming	3	0	0	3	4
TMN202	Python Programming Lab	0	0	1	1	
	Multidisciplinary Co	urses				
	Engg. Mathmatics-3	3	0	0	3	3
	Skill enhancement co					
TSE205	EV Circuit debugging and Troubleshooting	0	0	1	3	3
	Value Added					
TVA201	Disaster Management	0	0	1	1	1
	Summer Internsh	p	ı	ı	ı	
TSI201	Internship	0	0	2	2	2
	General Proficience	су				
TGP201	General Proficiency-III	0	0	0	1	1

Total Credit in 3<sup>rd</sup> Semester - 26

Course code	urse code Semester – 4 L T P Cr						
	Major Courses						
TEE207	Advance Control System	3	0	0	3		
TEE208	Advance Control System Lab	0	0	1	1		
TEE209	Power System protection and switchgear	3	0	0	3		
TEE210	Power System protection and switchgear	0	0	1	1	14	
TEE211	EV Battery Technology and Power train Development	2	0	0	2	14	
TEE212	EV Battery Technology and Power train Development Lab	0	0	1	1		
TEC205	Digital Signal Processing	2	0	0	2		
TEC206	Digital Signal Processing Lab	0	0	1	1		
	Minor Courses						
TMN203	Introduction to AIML (RD-2)	3	0	0	3	4	
TMN204	Introduction to AIML Lab	0	0	1	1		
	Skill Enhancement Cou	ırses					
TSE206	Minor Project	0	0	2	2	2	
	Value Added						
TVA202	Constitution of India	0	0	1	1	1	
	General Proficiency	y					
TGP202	General Proficiency-IV	0	0	0	1	1	
awarded UG diplo credits in work bas	Students exiting the programme after securing minimum 80 credits will be awarded UG diploma in the relevant Discipline /Subject provided they secure 4 credits in work based vocational courses offered during summer term or internship / Apprenticeship during 1st year or second year summer term						

**Total Credit in 4<sup>th</sup> Semester - 22** 

	3 <sup>rd</sup> Year					
Course code	Semester – 5	L	Т	P	Cr	
	Major Courses					
TEE303	Power Electronics	3	0	0	3	
TEE304	Power Electronics Lab	0	0	1	1	
TEE301	Electro Magnetic Field theory	2	0	0	2	
TEE302	Electro Magnetic Field theory lab	0	0	1	1	
TEE305	EV Charging Infrastructure, Vehicle Testing & Homologation	3	0	0	3	14
TEE306	EV Charging Infrastructure, Vehicle Testing & Homologation Lab	0	0	1	1	
TEE307	Design of VehicleComponents	2	0	0	2	
TEE308	Vehicle ServicingLaboratory lab	0	0	1	1	
	Minor Courses					
TMN301	Deep Learning	3	0	0	3	4
TMN302	Deep Learning Lab	0	0	1	1	4
	Value Added					
	Vedic Mathematics	0	0	1	1	1
	Internship					
TSI301	Internship	0	0	2	2	2
	Ability enhancement of	ourse	:			
TAE301	Employability planning and preparation – 1	0	0	1	1	1
	General Proficience	ey -				
TGP301	General Proficiency-V	0	0	0	1	1

Total Credit in 5<sup>th</sup> Semester – 23

Course code	Semester – 6	L	Т	Р	Cr	
	Major Courses					
TEE309	EV Vehicle Design & Analysis	3	0	0	3	
TEE310	EV Vehicle Design & Analysis Lab	0	0	1	1	
TEE311	Industrial Automation and Control	3	0	0	3	
TEE312	Industrial Automation and Control Lab	0	0	1	1	14
TEE313	EV Power Electronics & Embedded Systems	3	0	0	3	
TEE314	EV Power Electronics & Embedded Systems Lab	0	0	1	1	
TEE315	Mathematical Modelling of an Electric Vehicle	2	0	0	2	
	Minor Courses					
TMN303	Computational linguistics & NLP	3	0	0	3	4
TMN304	Computational linguistics & NLP Lab	0	0	1	1	
	Skill Enhancement Cour	se				
TSE301	Major Project	0	0	2	2	2
	Ability enhancement cou-	rse				
TAE302	Employability planning & preparation – II	0	0	1	1	1
	Value Added					
TVA301	Universal Human Value	0	0	0	1	1
	General Proficiency					
TGP302	General Proficiency	0	0	0	1	1

Total Credit in 6<sup>th</sup> Semester - 23

	4 <sup>th</sup> Year					
Course code	Semester – 7	L	Т	P	Cr	
	Major Courses					
	HONs Degree					
TEE401	Vehicle Dynamics	3	0	0	3	
TEE402	Vehicle Dynamics Lab	0	0	1	1	
TEE403	Automotive Electrical and Electronics System	3	0	0	3	
TEE404	Automotive Electrical and Electronics System Lab	0	0	1	1	12
TEE405	EV Power Electronics & Embedded Systems	3	0	0	3	
TEE406	EV Power Electronics & Embedded Systems Lab	0	0	1	1	
	Minor Courses					
TMN401	Opportunity Spotting and evaluation(Ex)	3	0	0	3	4
TMN402	Opportunity Spotting and evaluation lab	0	0	1	1	4
	Ability Enhancemen	nt				
RM1	Research Methodology	2	0	0	2	2
	Internship					
TSI401	Summer Internship	0	0	3	3	3
	Value Added					
	Indian Knowledge System	1	0	0	1	1
	Skill Enhancement					
TSE403	Power Electronics & Motors for Electric Vehicles Certificate by IIT Bombay	0	0	3	3	3
	General Proficiency	У				
TGP401	General Proficiency-VII	0	0	0	1	1

Total Credit in 7<sup>th</sup> Semester – 26

Course code	Semester – 8	L	Т	P	Cr	
	Major Courses					
TEE407	High Voltage Engineering	3	0	1	4	
	Research project in relevant specialization (The research outcomes of their project work may be published in peer-reviewed journals or may be presented in conferences/seminars or may be patented)				12	16
	Minor Courses					
TMN403	Industry and Market Research (Ex)	3	0	0	3	4
TMN404	Industry and Market Research LAB	0	0	1	1	4
	General Proficiency					
TGP402	General Proficiency	0	0	0	1	1
	B.Tech. (Honours with research) in Electrical Engg. (Specialization: EV)					

**Total Credit in 8<sup>th</sup> Semester - 21** 

- **1. Generic Elective** can also be opted from Swayam Portal and students should produce Grade certificate on successful completion of the course but the content should not match with the courses offered under the curriculum.
- **2. General Proficiency** (General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, participation in events(conferences/Worksop/training/webinar/seminar) ,competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.)

# **General Course Structure of B. Tech. (Electrical Engg.) Major Courses**

Sl. No	Course Code	Core Course	L	T	P	Cr
1	TEC101	Basic Electronics Engg.	2	0	0	2
2	TEC102	Basic Electronics Engg. Lab	0	0	1	1
3	TEE101	Basic Electrical	2	0	0	2
4	TEE102	Basic Electrical lab	0	0	1	1
5	TCS101	Computational Thinking and Problem Solving for Software Development (IBM)	2	0	0	2
6	TCS102	Computational Thinking and Problem Solving for Software Development (IBM) Lab	0	0	1	1
7	TEC103	Engineering Graphics & Design	0	0	1	1
8	TEE103	Circuit Theory and Network Theory	2	0	0	2
9	TEE104	Circuit Theory and Network Theory Lab	0	0	1	1
10	TEC104	Introduction to Digital Systems	2	0	0	2
11	TEC105	Digital System Lab	0	0	2	1
12	TEE105	Introduction to Sensor & Transducer	2	0	0	2
13	TCS110	Programing in C	2	0	0	2
14	TCS111	Programing in C lab	0	0	1	1
15	TEC201	Fundamentals of Microprocessor and microcontroller	2	0	0	2
16	TEC202	Fundamentals of Microprocessor and microcontroller Lab	0	0	1	1
17	TEE201	Introduction to Measurement	2	0	0	2
18	TEE202	Measurement Lab	0	0	1	1
19	TEC205	Digital Signal Processing	2	0	0	2
20	TEC206	Digital Signal Processing Lab	0	0	1	1

Sl. No	Course Code	Elective Courses	L	T	P	Cr
1	TEE207	Advance Control System	3	0	0	3
2	TEE208	Advance Control System Lab	0	0	1	1
3	TEE209	Power System protection and switchgear	3	0	0	3
4	TEE210	Power System protection and switchgear	0	0	1	1
5	TEE211	EV Battery Technology and Power train Development	2	0	0	2
6	TEE212	EV Battery Technology and Power train Development Lab	0	0	1	1
7	TEE205	Foundations of EV & Hybrid Vehicles	2	0	0	2
8	TEE206	Foundations of EV & Hybrid Vehicles Lab	0	0	1	1
9	TEE303	Power Electronics	3	0	0	3
10	TEE304	Power Electronics Lab	0	0	1	1
11	TEE301	Electro Magnetic Field theory	2	0	0	2
12	TEE302	Electro Magnetic Field theory lab	0	0	1	1
13	TEE305	EV Charging Infrastructure, Vehicle Testing & Homologation	3	0	0	3
14	TEE306	EV Charging Infrastructure, Vehicle Testing & Homologation Lab	0	0	1	1
15	TEE307	Design of Vehicle Components	2	0	0	2
16	TEE308	Vehicle Servicing Laboratory lab	0	0	1	1
17	TEE309	EV Vehicle Design & Analysis	3	0	0	3
18	TEE310	EV Vehicle Design & Analysis Lab	0	0	1	1
19	TEE311	Industrial Automation and Control	3	0	0	3
20	TEE312	Industrial Automation and Control Lab	0	0	1	1

21	TEE313	EV Power Electronics & Embedded Systems	3	0	0	3
22	TEE314	EV Power Electronics & Embedded Systems Lab	0	0	1	1
23	TEE315	Mathematical Modelling of an Electric Vehicle	2	0	0	2
24	TEE407	High Voltage Engineering	3	0	1	4
25						
Sl. No	Course Code	Honours Courses	L	Т	P	Cr
1	TEE401	Vehicle Dynamics	3	0	0	3
2	TEE402	Vehicle Dynamics Lab	0	0	1	1
3	TEE403	Automotive Electrical and Electronics System	3	0	0	3
4	TEE404	Automotive Electrical and Electronics System Lab	0	0	1	1
5	TEE405	EV Power Electronics & Embedded Systems	3	0	0	3
6	TEE406	EV Power Electronics & Embedded Systems Lab	1	0	0	1

# **Minor courses**

**Minor (Relevant Discipline Baskets)** 

Sl.	Course Code	Minor Course	L	T	P	Cr
No						
		AIML Basket				
1	TAI103	Foundations to AI-ML	3	0	1	4
2	TAI201	Machine learning	3	0	1	4
3	TAI303	Computational lingustics & NLP	3	0	1	4
4	TAI405	Pattern recognition & Anamoly detection	3	0	1	4
		Data science Basket				
1	TDS103	Python for Data science and visualization	3	0	1	4
2	TDS301	Descriptive analytics	3	0	1	4
3	TDS203	Data Warehousing and Multidimensional Modeling	3	0	1	4
4	TDS401	Social and web analytics	3	0	1	4
		Cyber Security Basket				
1	TCC103	Network security	3	0	1	4
2	TCC201	Practical approah to cyber security	3	0	1	4
3	TCC403	Current trends in technology & its security & forensics aspects	3	0	1	4
4	TCC305	Cryptography	3	0	1	4
		Java Full stack Basket				
1	TFS203	UI/UX	3	0	1	4
2	TFS301	Backend Framework and API (Spring Boot & Micro Services)	3	0	1	4
3	TFS303	Adv Js framework using React.js (	3	0	1	4
4	TFS403	Android App Development	3	0	1	4

# **Minor (General Discipline Basket)**

S1. No	Course Code	Minor Course	L	T	P	Cr
		Innovation and Entrepreneurship				
	TMN103	Entrepreneurship Development(Ex)	3	0	1	4
	TMN101	TMN101 Innovation Management 3		0	1	4
	TMN401	Opportunity Spotting and evaluation(Ex)	3	0	1	4
	TMN403	Industry and Market Research (Ex)	3	0	1	4
		HR Management				
		Human Resource Management: HR for People Managers	3	0	1	4
		Senior Professional in Human Resources	3	0	1	4
		HR Management and Analytics	3	0	1	4
		Urban Environmental Governance (Smart and Ecocities )	3	0	1	4
		Financial Management				
		Principles of Accounting	3	0	1	4
		Financial Modeling	3	0	1	4
		Business Intelligence	3	0	1	4
		Managerial Economics	3	0	1	4
		Marketing Management				
		Principles of Marketing Management	3	0	1	4
		Digital and social media Marketing	3	0	1	4
		Business strategy	3	0	1	4
		Social media management	3	0	1	4

#### **General Proficiency**

(General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, participation in events(conferences/Worksop/training/webinar/seminar), competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.)

1	TGP101	General Proficiency	0	0	1	1
2	TGP102	General Proficiency	0	0	1	1
3	TGP201	General Proficiency	0	0	1	1
4	TGP202	General Proficiency	0	0	1	1
5	TGP301	General Proficiency	0	0	1	1
6	TGP302	General Proficiency	0	0	1	1
7	TGP401	General Proficiency	0	0	1	1
8	TGP402	General Proficiency	0	0	1	1

#### **Skill courses**

Sl. No	Course Code	Skill Course	L	T	P	Cr
1	TSE105	Engineering workshop (Solar panel installation technician certificate from NSDC and Assistant electrician certification from snider electric.)	0	0	1	3
2	TSE111	Advance Solar cell manufacturing process	0	0	1	3
3	TSE205	EV Circuit debugging and Troubleshooting	0	0	1	3
4	TSE206	Minor Project	0	0	2	2
5	TSE301	Major Project	0	0	2	2
6	TSE403	Power Electronics & Motors for Electric Vehicles Certificate by IIT Bombay	0	0	3	3
7	TSE112	Engineering workshop (Soldering of PCB with Design and Fabrication)	0	0	3	3
8	TSE113	Engineering Graphics and Design	0	0	3	3
9	TSE114	Digital Literacy and Computational Thinking	0	0	3	3
10	TSE115	Foundation Course on MATLAB	0	0	3	3
11	TSE116	Prototyping and Bread boarding	0	0	3	3
12	TSE117	Circuit Debugging and Troubleshooting	0	0	3	3
13	TSE207	Microcontroller Programming and Interfacing	0	0	3	3
14	TSE208	Wireless Communication Protocols:	0	0	3	3
15	TSE209	Digital Embedded System (Foundation)	0	0	3	3
16	TSE210	Digital Embedded System (Advanced)	0	0	3	3

#### **Multi-disciplinary courses**

Sl. No	Course Code	Multidisciplinary Course	L	T	P	Cr
1		Engineering Mathematics-1	2	0	0	2
2		Engineering Mathematics-1 Lab.	0	0	1	1
3		Engineering Physics	2	0	0	2
4		Engineering Physics Lab.	0	0	1	1
5		Engineering Mathematics-2	2	0	0	2
6		Engineering Physics (Electromagnetic theory)	2	0	0	2
7		Engineering Physics (Electromagnetic theory) Lab.	0	0	1	1
8		Engg. Chemistry	2	0	1	3
9		General Biology	2	0	1	3

#### **Ability courses**

Sl. No.	Course Code	Ability Enhancement Course	L	T	P	Cr
1	TAE101	Communicative English	1	0	1	2
3		Arabic Language	1	0	1	2
4		French	1	0	1	2
5		German	1	0	1	2
6	TAE103	Design Thinking	0	0	1	1
7	TAE301	Employability planning & preparation – I	0	0	1	1
8	TAE302	Employability planning & preparation – II	0	0	1	1

#### Value-added courses

S1. No	Course Code	Value-added Courses	L	T	P	Cr
1		Essence of Indian knowledge and Tradition (Happiness Connect program)	0	0	2	2
2		Induction program	0	0	0	1
3	TVA101	Sustainable Development Goal	1	0	0	1
4	TVA201	Disaster Management	0	0	1	1
5		Entrepreneurship development	2	0	0	2
6		Environmental Science	2	0	0	2
7		Indian Knowledge system	0	0	1	1
8		Green governance	1	0	0	1
9	TVA202	Constitution of India	0	0	1	1
10	TVA301	Universal Human Value	0	0	0	1
11		Circular Economy	1	0	0	1
12		Vedic mathematics	1	0	0	1

## **Optional (Any one can be opted)**

## Second Major

#### (Computer science and Engineering)

Sl. No.	Course Code	Courses	L	Т	P	Cr
1	TCS103	Python Programming	3	0	1	4
2	TCS104	Data structure using 'C'	3	0	1	4
3	TCS201	Computer Organization and Architecture	3	0	1	4
4	TCS203	Object oriented programming using java	3	0	1	4
5	TDS101	Data Analytics	3	0	1	4
6	TCS305	Database Engineering	3	0	1	4
7	TCS207	Computer Networks	3	0	1	4
8	TCS209	Operating Systems	3	0	1	4
9	TCS301	Internet and web technology	3	0	1	4
10	TCS303	Theory Of Computation	3	0	1	4
11	TCS205	Algorithm design and analysis	3	0	1	4
12	TCS307	Project management for professionals	3	0	1	4
13	TAI103	Foundations to AI-ML (IBM)	3	0	1	4
14	TAI201	Machine learning	3	0	1	4
15	TDS203	Datawarehouse and multi-dimentional modeling	3	0	1	4
16	TDS303	Predictive analytics	3	0	1	4

Second major ( Mechatronics)										
Sl. No	Course Code	Courses	L	T	P	Cr				
1	TMC203	Machine Design and Manufacturing Processes	3	0	1	4				
2	TMC205	Applied Thermodynamics,	3	0	1	4				
3	TMC301	Fluid Mechanics and Kinematics & Dynamics of Machines	3	0	1	4				
4	TMC303	Theory of Finite Element Methods,	3	0	1	4				
5	TMC101	Engg. Mechanics	3	0	1	4				
6	TEE209	Digital Control System-I	3	0	1	4				
7	TMC401	EV Data Analytics & Cyber Security	3	0	1	4				
8	TMC403	Industrial Automation & Robotics	3	0	1	4				
9	TMC314	Automotive Chassis	3	0	1	4				
10	TMC315	Basic Concepts of Mechatronics	3	0	1	4				
11	TMC316	Strength of Materials	3	0	1	4				
12	TMC317	Electrical Machines	3	0	1	4				
13	TMC318	Embedded Systems	3	0	1	4				
14	TMC309	Kinematics and Theory of Machines	3	0	1	4				
15	TMC406	Design of Machine Elements	3	0	1	4				
16	TMC407	Computer Aided Manufacturing	3	0	1	4				

Second major ( Electronics and communication Engineering)										
Sl. No	Course Code	Core Course	L	Т	P	Cr				
1	TEC213	Signals and Systems	3	0	1	1				
2	TEC214	Analog Communication technique	3	0	1	1				
3	TEC215	Digital Communication Technique	3	0	1	1				
4	TEC216	Telecommunication Network and Optimization	3	0	1	1				
5	TEC217	VLSI Design	3	0	1	1				
6	TEC314	Mobile Communication and Networks	3	0	1	1				
7	TEC315	Microwave Theory and Techniques	3	0	1	1				
8	TEC316	Fiber Optic Communications	3	0	1	1				
9	TEC317	Digital Audio Processing	3	0	1	1				
10	TEC318	Adaptive Signal Processing	3	0	1	1				
11	TEC408	Antennas and Propagation	3	0	1	1				
12	TEC409	Advanced Mobile Communications	3	0	1	1				
13	TEC410	Digital Image Processing	3	0	1	1				
14	TEC411	Satellite Communication	3	0	1	1				
15	TEC412	High Speed Electronics	3	0	1	1				
16	TEC413	Nanoelectronics	3	0	1	1				

#### **Breakup of Credits**

Sl. No	Category	Breakup of Credits
1	Major Elective	103
2	Minor Elective	32
3	Multidisciplinary	15
4	Ability Enhancement Courses (AEC)	11
5	Skill Enhancement Courses (SEC)	16
6	Value Added Courses common for all UG	9
7	Summer Internship	7
8	General Proficiency	8
	Total	201

General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.