Annasaheb Dange College of Engineering and Technology

Ashta, Dist: Sangli-416301 (An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Department of Electrical Engineering

Vision & Mission of Institute

Vision: **To be a Leader in preparing professionally competent engineers**

Mission: **We, at Annasaheb Dange College of Engineering and Technology, Ashta, are committed to achieve our vision by**

Imparting effective outcome based education.

- **Preparing students through skill oriented courses to excel in their profession with ethical values.**
- **Promoting research to benefit the society.**
- **Strengthening relationship with all stakeholders.**

Vision & Mission of Department

Vision: **To be a leader in developing electrical engineering graduate with knowledge, skill & ethics.**

Mission: **We, at department of electrical Engineering, are committed to achieve our vision by,**

- **Facilitating learning through outcomes based education**
- **Cultivating Skills & attitude among graduates to excel in their career**
- **Motivating research approach of graduates to solve real-time problems for benefit of the society**
- **Strengthening relationship with all stakeholders for continues improvement**

Annasaheb Dange College of Engg. & Tech. ASHTA 416301

Head of Department

Head
Electrical Engineering Department
ADCET, Ashta

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Annasaheb Dange College of Engineering and Technology, Ashta

An Autonomous Institute

Department of Electrical Engineering Curriculum Structure

Revision 2

B. Tech.

SEMESTER I – VIII
(To be implemented from 2023-2024 Academic Years onwards)

Annasaheb Dange College of Engineering and Technology, Ashta											
Department of Electrical Engineering											
B. Tech. Program with One Major and One Minor (170 Credits)											
Course Category		**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**	**ADCET**
Basic Sciences	BS	4	9	4	0	0	0	0	0	**17**	**14-16**
Engineering Science	ES	10	3	0	0	0	0	0	0	**13**	**14-12**
Program Core	PC	4	4	13	14	13	9	8	0	**65**	**74-80**
Program / Professional Elective	PE	0	0	0	0	0	4	3	4	**11**	
Minor	**	0	0	0	2	3	3	3	3	**14**	**14**
Open Elective	OE	0	0	0	0	3	3	2	0	**8**	**8**
Humanities and Social Sciences	HS	3	1	4	3	1	0	2	0	**14**	**14**
Vocational and Skill Enhancement Courses	VS	0	2	1	1	1	0	1	0	**6**	**8**
Co-Curricular Courses	CC	0	0	1	1	1	1	0	0	**4**	**4**
Experential Learning Courses	EL	0	0	0	1	1	2	4	10	**18**	**18**
Total		**21**	**19**	**23**	**22**	**23**	**22**	**23**	**17**	**170**	**170**

Head of Department **Dean Academics** **Director** **Executive Director**

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

F. Y. B. Tech, Semester I

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEBS101	Applied Mathematics -I	3	1	0	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEPC102	Basic Electrical Engineering	3	0	0	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEES103	Applied Mechanics	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEES104	Basic Mechanical Engineering	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEES105	Programming for Problem Solving	2	0	2	3	-	-	-	-	-	-	-	50	20	50*	20	100	40	100
2EEHS106	Professional Communication Skills	0	0	4	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEPC107	Basic Electrical Engineering Lab	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEES108	Applied Mechanics Lab	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEES109	Design Thinking	1	0	2	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEHS110	Value Added Course -1	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
Total		13	1	14	21														750
Total Contact Hours		28																	

* Internal Institute Faculty as an Examiner

Head of Department **Dean Academics** **Director** **Executive Director**

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

F. Y. B. Tech, Semester II

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEBS111	Applied Mathematics -II	3	1	0	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEBS112	Applied Physics & Chemistry	4	0	0	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEPC113	Analog Electronics	3	0	0	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEES114	Engineering Graphics	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEVS115	Object Oriented Programming	1	0	2	2	-	-	-	-	-	-	-	50	20	50*	20	100	40	100
2EEBS116	Applied Physics & Chemistry Lab	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEPC117	Analog Electronics Lab	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEES118	Engineering Graphics Lab	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEHS119	Value Added Course - 2	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
Total		13	1	10	19														700
Total Contact Hours		24																	

* Internal Institute Faculty as an Examiner

On exit at the end of first year

Course Code	Course Name	L	T	P	C
2EEEX101	Electrical Wiring	0	0	8	4
2EEEX102	Installation & Maintenance of appliances	0	0	8	4

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Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

S. Y. B. Tech, Semester III

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEBS201	Applied Mathematics -III	3	1	0	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEPC202	Electrical Measurements and Instrumentation	3	0	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEPC203	Electric Circuit Analysis	3	0	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150
2EEPC204	Digital Electronics & Modern Integrated Circuits	4	0	2	5	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEHS205	Universal Human Values	2	0	0	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2EEHS206	Environmental Studies	2	0	0	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2EEVS207	Python Programming Lab	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EECC208	Aptitude and Reasoning Part - I	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
		17	1	10	23														850
Total Contact Hours		28																	

Head of Department | Dean Academics | Director | Executive Director

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

S. Y. B. Tech, Semester IV#

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEPC209	Signal Processing	3	0	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEPC210	DC Machines and Transformers	3	0	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEPC211	Electromagnetic Field Theory	3	0	0	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEPC212	Generation Transmission and Distribution	3	0	0	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EE**2##	Minor Course - I	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEHS215	Psychology	2	0	0	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2EEHS216	Constitution of India	1	0	0	1	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2EEVS217	Simulation Laboratory	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EEEL218	Innovation and Prototype	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2EECC219	Aptitude and Reasoning Part - II	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
Total		**17**	**0**	**10**	**22**														**950**
Total Contact Hours		**27**																	

#	All students should undergo minimum of 15 days Internship / Industrial training during IV semester vacation. The assessment will be carried out in semester V

On exit at the end of second year

Course Code	Course Name	L	T	P	Credits
2EEEX201	PCB Design and Soldering	0	0	8	4
2EEEX202	Solar Technician	0	0	8	4

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

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Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

T. Y. B. Tech, Semester V

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEPC301	Feedback Control Systems	3	1	2	5	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEPC302	AC Machines	3	0	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEPC303	Power System Analysis	3	0	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150
2EEOE3**	Open Elective - I	3	0	0	3	100	40	-	-	-	100	40	-	-	-	-	-	-	100
2EE**3##	Minor Course - II^	3	0	0	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEHS306	Entrepreneurship	0	0	2	1	-	-	-	-	-	-	-	25	-	-	-	25	10	25
2EEVS307	CAD for Electrical Machine Design	0	0	2	1	-	-	-	-	-	-	-	50		-	-	50	20	50
2EEEL308	Industrial Training / Internship*	0	0	0	1	-	-	-	-	-	-	-	50		-	-	50	20	50
2EECC309	Aptitude and Reasoning Part - III	0	0	2	1	-	-	-	-	-	-	-	50		-	-	50	20	50
Total		15	1	12	23														925
Total Contact Hours		28																	

^	Minor courses project work continuously assessed from Semester V. The final submission will be at VIII semester
*	Assessment of Industrial Training / Internship to be completed at the beginning of Semester V

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Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

T. Y. B. Tech, Semester VI

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEPC310	Power Electronics	3	1	2	5	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEPC311	High Voltage Engineering	3	0	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150
2EEPE3**	Professional Elective - I	3	0	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EEOE3**	Open Elective - II	3	0	0	3	100	40	-	-	-	100	40	-	-	-	-	-	-	100
2EE**3##	Minor Course - III	3	0	0	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEEL318	Mini Project	0	0	4	2	-	-	-	-	-	-	-	50	-	-	-	50	20	50
2EECC319	Aptitude and Reasoning Part - IV	0	0	2	1	-	-	-	-	-	-	-	50	-	-	-	50	20	50
Total		**15**	**1**	**12**	**22**														**850**
Total Contact Hours		**28**																	

Professional Elective - I[&@]		
Track	**Course Code**	**Course Name**
Power Engineering	2EEPE312	Switchgear Protection & Industrial Electrical Systems
Control Engineering	2EEPE313	Control System Design
Embedded Systems	2EEPE314	Embedded Systems
E Mobility	2EEPE315	Electric Vehicles

&	Students are permitted to choose all the professional electives from particular track or from different track
@	E Mobility track in Professional Elective, and Honors in E Mobility are same. The students those who are choosing Honors in E mobility are not eligible to choose E Mobility track in Professional Elective and vice versa. Therefore students are advised to opt right choice during the selection of the Professional Elective and Honors in E Mobility.

On exit at the end of third year

Course Code	Course Name	L	T	P	C
2EEEX301	Electric Vehicle Maintenance	0	0	8	4
2EEEX302	Control Panel Design	0	0	8	4

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Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

Final Year. B. Tech, Semester VII

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEPC401	Electrical Drives	3	0	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
2EE**4##	Minor Course - IV	3	0	0	3	40	16	30	30	24	100	-	-	-	-	-	-	-	100
2EEPE4##	Professional Elective - II	3	0	0	3	40	16	30	30	24	100	-	-	-	-	-	-	-	100
2EEPC408	Industrial Automation and SCADA	3	0	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150
2EEOE4**	Open Elective - III	2	0	0	2	100	40	-	-	-	100	40	-	-	-	-	-	-	100
2EEHS409	Project Management and Finance	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEEL410	Project Work	0	0	8	4	-	-	-	-	-	-	-	50	20	50	20	100	40	100
2EEVS411	Smart grid Simulation Using ETAP	0	0	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
Total		**16**	**0**	**14**	**23**														**900**
Total Contact Hours		**30**																	

Professional Elective - II[&]

Track	Course Code	Course Name
Power Engineering	2EEPE404	Utilization and Conservation of Electrical Energy
Control Engineering	2EEPE405	Special Electrical Machines
Embedded System	2EEPE406	Smartgrid
E Mobility	2EEPE407	Battery Management System

& Students are permitted to choose all the professional electives from particular track or from different track

Head of Department **Dean Academics** **Director** **Executive Director**

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Teaching and Evaluation Scheme

Final Year B. Tech, Semester VIII

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2EEPE412	Professional Elective - III (MOOC)+	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EEPE413	Professional Elective - IV (MOOC)+	2	0	0	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2EE**414	Minor Project	0	0	0	3	-	-	-	-	-	-	-	100	-	-	-	100	40	100
2EEEL415	Internship	0	0	20	10	-	-	-	-	-	-	-	100	-	-	-	100	40	100
		4	**0**	**20**	**17**														**400**
	Total Contact Hours	**4 + Internship**																	
+	Based on the availability of the course at the time of offering BoS Chairman & Course Chairman will decide on the course upon student option																		

Head of Department **Dean Academics** **Director** **Executive Director**

Annasaheb Dange College of Engg. & Tech. ASHTA 416 301

Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Details of Minor, Specialization Minor and Honors Program

Minor Courses

Track - 1: Electric Vehicle

Course Code	Course Name	L	T	P	Credits
2EE**213	Fundamentals and Architecture of Electric Vehicles	2	0	0	2
2EE**304	Energy Storage Systems for Electric Vehicles	3	0	0	3
2EE**316	Electric Drives and Controllers for Electric Vehicles	3	0	0	3
2EE**402	Plug in Electric Vehicles in Smartgrid	3	0	0	3
2EE**414	Minor Project	0	0	0	3
Total		**11**	**0**	**0**	**14**

Track -2: Control Engineering

Course Code	Course Name	L	T	P	Credits
2EE**214	Transducers and Signal Conditioning	2	0	0	2
2EE**305	Control Systems	3	0	0	3
2EE**317	Process Control Engineering	3	0	0	3
2EE**403	Industrial Automation	3	0	0	3
2EE**414	Minor Project	0	0	0	3
Total		**11**	**0**	**0**	**14**

Specialization Minor in Sustainable Energy

Course Code	Course Name	L	T	P	Credits
2EE**416	Energy and its Resources	2	0	0	2
2EE**417	Energy Storage Systems for Renewables	3	0	0	3
2EE**418	Electronics for Renewables	3	0	0	3
2EE**419	Solar Energy Technologies and System Design	3	0	0	3
2EEEL420	Specialization Minor Project	0	0	0	3
Total		**11**	**0**	**0**	**14**

Honors with Research

Course Name		L	T	P	Credits
2EEHR421	Research Methodology	4	0	0	4
2EEHR422	Dissertation in Sem VII and Sem VIII	0	0	0	14
Total		**4**	**0**	**0**	**18**

Honors in E Mobility@

Course Name	Course Name	L	T	P	Credits
2EEHN417	Electric Vehicles (MOOC -1)	3	0	0	3
2EEHN418	Battery Management System (MOOC -2)	3	0	0	3
2EEHN419	MOOC - 3	2	0	0	2
2EEHN420	MOOC - 4	2	0	0	2
2EEEL421	Honor Project	0	0	0	8
Total		**10**	**0**	**0**	**18**

@	E Mobility track in Professional Elective, and Honors in E Mobility are same. The students those who are choosing Honors in E mobility are not eligible to choose E Mobility track in Professional Elective and vice versa. Therefore students are advised to opt right choice during the selection of the Professional Elective and Honors in E Mobility.

Head of Department **Dean Academics** **Director** **Executive Director**

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Annasaheb Dange College of Engineering and Technology, Ashta

Department of Electrical Engineering

Professional Elective (III & IV) Buckets - MOOC Courses+

Track - 1: Power Engineering

Course Code	Course Name	L	T	P	Credits
2EEPE412 & 2EEPE413	Power Management Integrated Circuits	0	0	0	2
	Recent Advances in Transmission Insulators	0	0	0	2
	Introduction to Smart Grid	0	0	0	2
	Advances in UHV Transmission and Distribution	0	0	0	2
	Electrical Distribution System Analysis	0	0	0	2
	Artificial Intelligence Applications to Power System	0	0	0	2
	Distributed Generation and Microgrid	0	0	0	2
	EHV AC and DC Transmission	0	0	0	2
	FACTS and HVDC	0	0	0	2
	Power Quality	0	0	0	2

Track -2: Control Engineering

Course Code	Course Name	L	T	P	Credits
2EEPE412 & 2EEPE413	Non-Linear Adaptive Control	0	0	0	2
	Advance Power Electronics & Control	0	0	0	2
	Digital Control Systems	0	0	0	2
	Industrial Instrumentation	0	0	0	2
	Logic and Distributed Control Systems	0	0	0	2
	Sensors and Actuators	0	0	0	2
	Electrical Machine Design	0	0	0	2

Track 3: Embedded Systems

Course Code	Course Name	L	T	P	Credits
2EEPE412 & 2EEPE413	Introduction to Coding Theory	0	0	0	2
	Fuzzy sets, logic, and Systems Applications	0	0	0	2
	Introduction to Robotics	0	0	0	2
	Embedded Processors	0	0	0	2
	Real-Time Systems	0	0	0	2
	Artificial Neural Networks	0	0	0	2

Track 4: E Mobility

Course Name		L	T	P	Credits
2EEPE412 & 2EEPE413	EV Part -I	0	0	0	2
	Physics for Renewable Energy Systems	0	0	0	2
	Intelligent Autonomous Vehicles	0	0	0	2
	Vehicle Dynamics and Control	0	0	0	2
	Electric Vehicle Design	0	0	0	2

+	Based on the availability of the course at the time of offering BoS Chairman & Course Chairman will decide on the course upon student option

Head of Department **Dean Academics** **Director** **Executive Director**

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Annasaheb Dange College of Engineering and Technology, Ashta

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Department of Electrical Engineering Curriculum Structure

B. Tech.

SEMESTER III - IV

Sant Dnyaneshwar Shikshan Sanstha's
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Department of Electrical Engineering

Curriculum

Second Year B.Tech - Semester – III

Sant Dnyaneshwar Shikshan Sanstha's
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Department of Electrical Engineering

Class	S.Y. B. Tech, Semester - III
Course Code and Course Title	2EEBS201 **Applied Mathematics - III**
Prerequisite/s	2EEBS101, 2EEBS111
Teaching Scheme: Lecture / Tutorial	03 / 01
Credits	04
Evaluation Scheme: ISE / MSE / ESE	40 / 30 / 30

Course Outcomes : After successful completion of this course, the students will be able to:	
2EEBS201_1	**Apply** the concept of Vector calculus to calculate area and volume of given surface.**(K^3)**
2EEBS201_2	**Solve** the Electrical engineering problems using Linear Differential Equation.**(K^3)**
2EEBS201_3	**Make use of** Laplace and inverse Laplace transform to solve Electrical problems. **(K^3)**
2EEBS201_4	**Construct** the Fourier Series for the any functions by using Euler's Formulae.**(K^3)**
2EEBS201_5	**Calculate** velocity and area of the given data by using Numerical Differentiation and Integration.**(K^3)**
2EEBS201_6	**Use** of basic knowledge of Z-transforms to solve problems on Signal system. **(K^2)**

Unit	Contents	Hours
1	**Vector Calculus** Introduction, Scalar and vector point functions - vector operator del, Del applied to scalar point functions - gradient, directional derivative, Del applied to vector point functions - Divergence and curl, Line integral.	06
2	**Linear Differential Equations and Its Application** Definitions, Complete solution, Operator D, Rules for finding Complementary function, Inverse operator, Rules for finding the Particular integral, Applications of Linear Differential Equations to Oscillatory Electrical Circuit.	07
3	**Laplace Transform & Inverse Laplace transforms** Introduction, Laplace transform of elementary functions. Properties of Laplace Transforms, Transforms of derivatives, Transforms of integrals, Multiplication by t^n, Division by t, Evaluation of integrals by Laplace Transforms. Inverse Laplace transforms Definition, Inverse Laplace transforms by Partial Fractions, convolution Theorem, Applications of Laplace transform to solve linear differential equations.	06
4	**Fourier Series** Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Expansion of odd or even periodic functions, Half range series.	07
5	**Numerical Differentiation and Integration:** Numerical Differentiation – Newton's Forward Difference, Newton's Backward Difference, Central Difference (Stirling's Formula) Numerical Integration - Trapezoidal Rule, Simpson's $1/3^{rd}$ And $3/8^{th}$ Rule.	07

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6	**Z-Transforms** Introduction, Definition, Properties, Z-transform of basic functions, Z-transform of some standard discrete functions, Evaluation of inverse Z-transfrm, Application to difference Equations.	06

List of Tutorial:

Sr. No.	Title of tutorials
1	Del applied to scalar point functions - gradient, directional derivative
2	Del applied to vector point functions - Divergence and curl, Line integral
3	Rules for finding the Particular integral
4	Properties of Laplace Transforms, Transforms of derivatives, Transforms of integrals
5	Inverse Laplace transforms by Partial Fractions, convolution Change of interval
6	Expansion of odd or even periodic functions
7	Numerical Differentiation & Numerical Integration
8	Properties, Z-transform of basic functions, Z-transform of some standard discrete functions, Evaluation of inverse Z-transform

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publication	44th	2017
02	Higher Engineering Mathematics.	H. K. Das	S. Chand and company ltd.,	1st	2011
03	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley &Sons,Inc.	10th	2017
04	Numerical Methods in Engineering & Science	Dr. B. SGrewal	Khanna Publishers	9th	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics.	B.V. Ramana	Tata McGraw Hill Education Pvt., ltd.	1st	2007
02	Advanced Engineering Mathematics.	Potter Merle C.	Oxford University Press,	3rd	2005
03	A text book of Applied Mathematics Vol. I and Vol. II	P. N. Wartikar J. N. Wartikar	Pune Vidyarthi Griha Prakashan, Pune	9th	Reprint 2010
04	Advanced Engineering Mathematics.	O'Neil Peter V	Cengage Learning India Pvt. Ltd.	1st	2012

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Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Class			S.Y. B. Tech, Semester - III
Course Code and Course Title			2EEPC202 **Electrical Measurements and Instrumentation**
Prerequisite/s			2EEPC102
Teaching Scheme: Lecture / Tutorial / Practical			03/00/02
Credits			04
Evaluation Scheme	**T**	**ISE / MSE / ESE**	40 / 30 / 30
	P	**ISE / ESE**	50 / 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEPC202_1	**Illustrate** mechanism of various measuring instruments by their classification, construction, working and range extension (K^2)
2EEPC202_2	**Formulate** the equations for distinct techniques used in measuring resistance, inductance, and capacitance. (K^2)
2EEPC202_3	**Select and elucidate** proper instrument for measurement of electrical parameters by their construction and operation. (K^2)
2EEPC202_4	**Explain** different analyzers, their types, modern measurement techniques, and **apply** various methods to measure electrical characteristics. (K^2)
2EEPC202_5	**Respond** Effectively in the form of oral and writing journal. (S^2)
2EEPC202_6	**Examine** the observations and determine the result of experiment. (A^2)

Unit	Contents	Hours
1	**Introduction to Measuring Instruments:** Classification - deflection, control and damping torques, Ammeters and Voltmeters – PMMC, Moving Iron type Instruments- Expression for deflecting torque and control torque,- Errors in measurements, Calibration of Ammeter and Voltmeters. Range extension using shunts and multipliers (numerical expected), Instrument Transformers.	07
2	**Measurement of Power and Energy:** Single phase dynamometer type wattmeter, expression for deflection and control torques, active & reactive power measurement in three phase system for balanced and unbalanced load using three wattmeter method, two wattmeter method & one wattmeter method (numerical expected). Single phase induction type energy meter- Construction, working principle, driving and braking torques, errors and adjustments - testing by phantom loading using RSS meters. Three phase energy meter.	06
3	**DC & AC bridges** Measurement of low, medium and high resistance. Wheatstone bridge, Kelvin's double bridge, ammeter-voltmeter method, Megger, Earth tester for earth resistance measurement. Maxwell's Inductance bridge, Maxwell's Inductance &	06

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	Capacitance Bridge, Hay's bridge, Anderson's bridge, Owen's bridge, Schering Bridge.(numerical expected on bridges)	
4	**Digital Measuring Instruments:** Advantages of digital meters over analogue meters. Resolution & sensitivity of digital meters. Working principles of digital voltmeter, ammeter, Multimeter, Construction and working principle of CRO, measurement of voltage, current, period and frequency by CRO. Phase angle & frequency by Lissajous pattern & numerical. Construction and working principle of DSO, advantages and disadvantages of DSO over CRO.	**07**
5	**Transducers:** Transducers: Introduction, classification of transducers. Electrical transducer, Resistive transducer, Inductive transducer, Capacitive transducer, Piezoelectric Transducers, Strain gauge, LVDT and RVDT –construction, working, application.	**07**
6	**Advanced Measurements and Instrumentation:** Wave Analyzers, Power Analyzer, Maximum demand indicator, Tri-vector meter, Smart Sensors, Virtual Instrumentation.	**06**

List of experiments:

Exp. No.	Title of experiments
1	Demonstration of various analog measuring instruments
2	Calibration of Ammeters and Voltmeters
3	Measurement of active power in three phase circuit by using two wattmeter method
4	Measurement of reactive power in three phase circuit by using one wattmeter method
5	Calibration of single phase induction type energy meter.
6	Measurement of resistance by ammeter voltmeter method.
7	Measurement of resistance using Wheatstone's / Kelvin's double bridge.
8	Measurement of inductance and Capacitance using Maxwell's Inductance Capacitance and Schering bridge.
9	Measurement of voltage, current, time period and frequency using CRO & frequency measurement by lissajous pattern.
10	Displacement measurement using Linear Variable Differential Transducer.
11	Measurement of weight using Strain Gauge.

Note: Minimum ten experiments should be performed from the above list

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Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
01	A Course in Electrical and Electronic Measurements & Instrumentation	A. K. Sawhney	Dhanpat Rai& Co.	Nineteenth	2014
02	A Course in Electronics & Electrical Measurements & Instrumentation	J. B. Gupta,	S. K. Kataria & Sons.	Eighth	2012
03	Electronic Instrumentation	H.S.Kalsi	Tata McGraw Hill	Third	2012
04	Electrical Measurement & Instrumentation	U. A. Bakshi V. A. Bakshi	Technical Publication	Third	2015

Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
01	Electrical Measurements & Measuring Instruments	E. W. Golding F. C. Widdies	Reem Publications.	Third	2011
02	Introduction to Measurements and Instrumentation	Arun K. Ghosh	PHI Publication	Fourth	2012
03	Electrical Measurement & Instrumentation	RS Sirohi Radhakrisnan	New Age International	Third	2010
04	Instrumentation Measurement and Analysis	B.. K. C. Nakra K Chaudhari,	Tata McGraw Hill.	Second	2009

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Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Class			S. Y. B. Tech, Semester. - III
Course Code and Course Title			2EEPC203 **Electric Circuit Analysis**
Prerequisite/s			2EEPC102
Teaching Scheme : Lecture/Tutorial/Practical			03/00/02
Credits			04
Evaluation Scheme:	**T**	**ISE / MSE / ESE**	40/30/30
	P	**ISE**	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

2EEPC203_1	**Apply** the concept of fundamental laws, circuit analysis techniques and theorems to solve for circuit parameters of direct current and alternating current circuits. (K^3)
2EEPC203_2	**Solve** differential equations to describe the behaviour of second order time dependent circuit, including the use of initial conditions by Laplace transform. (K^3)
2EEPC203_3	**Determine** the six sets of two-port parameters for any given two-port network to characterize their interrelations and interconnections using circuit analysis techniques. (K^3)
2EEPC203_4	**Use** Laplace transformation to convert linear circuits of time domain into *s*-domain and laplace domain with prescribed initial conditions to solve for complete solution. (K^3)
2EEPC203_5	**Build** linear electrical circuits / two port networks and compute the circuit / network parameters through simulation of DC, AC and Transient analysis using MATLAB software proficiently. (K^3, S^3)
2EEPC203_6	**Develop** skills sets to communicate and work effectively both oral and in writing by sharing responsibilities and collaborating on findings. (A^3)

Unit	Contents	Hours
1	**Methods of Analysis (DC Circuits)** Introduction, Review of Fundamental Laws, Dependent and Independent Sources, Nodal Analysis, Nodal Analysis with Voltage Sources, Mesh Analysis, Mesh Analysis with Current Sources, Nodal & Mesh Analysis by Inspection.	**07**
2	**Circuit Theorems (DC Circuits):-** Introduction, Source Transformation, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem.	**06**
3	**Second Order Circuits:** Introduction, Finding Initial and Final Values, Source Free Series RLC circuit, Source Free Parallel RLC Circuit, Step Response of Series RLC Circuit, Step Response of Parallel RLC Circuit	**06**

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4	**Sinusoidal Steady State Analysis:** Introduction, Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformation, Thevenin and Norton Equivalent Circuits, Maximum Average Power Transfer.	**07**
5	**Two Port Networks:** Introduction, impedance parameters, admittance parameters, hybrid parameters, inverse hybrid parameters, transmission parameters, inverse transmission parameters, relationships between parameters, interconnection of networks.	**07**
6	**Advanced Circuit Analysis:** Introduction, Application of Laplace Transform to linear integro-differential equations, circuit element models for time to s-domain transformation and circuit analysis, transfer functions, State variable method, network stability.	**06**

List of Experiments

S. No	Name of the Experiment
1	Simulation and experimental Verification of Nodal and Mesh Analysis.
2	Simulation and experimental Verification of Superposition Theorem.
3	Simulation and experimental Verification of Thevenin's and Norton's Theorem
4	Simulation and experimental Verification of Maximum Power Transfer Theorem.
5	Simulation and experimental Validation on step response of second order circuits
6	Simulation and experimental Verification of Circuit Transients.
7	Frequency Response of Series and Parallel Resonance Circuit Using MATLAB
8	Compute Z, Y, ABCD and hybrid parameters of two port network using MATLAB.
9	Simulation of three phase balanced and unbalanced star and delta networks using MATLAB.
10	Simulation of State space model of an electric circuits using MATLAB
Note: Expt No 1 to 6 – Hardware implementation is being used for verification, and MATLAB will be used for validation.	

Note: All ten experiments should be performed

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Fundamentals of Electric Circuits	Charles K Alexander, Mathew N O Sadiku	McGraw Hill Education	Fifth	2013
2.	"Circuits & Network Analysis & Synthesis"	A. Sudhakar & Shyammohan S. Palli	McGraw-Hill Co.	Fifth	2015
3.	Networks and Systems	Ashfaq Husain	Khanna Book Publishing Co. (P) Ltd.	Second	2019
4.	Networks and Systems	D.Roy Choudhary	New Age International Publishers	Second	2013

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Problems & Solutions of Electric Circuit Analysis	R.K. Mehta , A.K. Mal	CBS Publishers and distributors Pvt Ltd	Kindle Edition	2015
2.	Circuit Theory (Analysis and Synthesis)	Abhijit Chakrabarti	Dhanpat Rai & Co.	Second	2021
3.	Network Analysis and Synthesis	C.L Wadhwa	New Age International Publishers	Third	2018
4.	Network Analysis and Synthesis	Franklin F Kuo	John Wiley and Sons	Second	2006

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Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Class			S.Y. B. Tech. Semester - III
Course Code and Course Title			2EEPC204 **Digital Electronics & Modern Integrated Circuits**
Prerequisite/s			**2EEPC113, 2EEPC117**
Teaching Scheme: Lecture/Tutorial/Practical			04 / 00 / 02
Credits			05
Evaluation Scheme	**T**	**ISE / MSE / ESE**	40/30/30
	P	**ISE / ESE**	50/50

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2EEPC204_1	**Attempt** conversions among various number systems & operation of logic gates. (K^2)
2EEPC204_2	**Construct** combinational logic circuits and sequential logic circuits. (K^3)
2EEPC204_3	**Illustrate** architecture and working of 8085, 8051 & Arduino and peripherals. (K^3)
2EEPC204_4	**Write** assembly language program for given application of 8085/8051. (K^3)
2EEPC204_5	**Communicate** effectively about laboratory work both orally and in writing. (S^2)
2EEPC204_6	**Work** effectively in groups by sharing responsibilities and collaborating on findings. (A^2)

Unit	Contents	Hours
1	**Number System, Logic Gates and Boolean Algebra** Number systems - Decimal, Binary, Octal, Hexadecimal and its conversions, BCD code, Gray code, Logic gates, Boolean algebra, K- map and it's reduction technique	09
2	**Combinational and Sequential Logic Circuit Design** Half adder, Full adder, Magnitude comparator, Binary to Gray converter, Gray to Binary converter, Multiplexer, De-multiplexer, Latch, Flip flops: Edge-triggered S-R flip flop, D flip flop, J-K flip flop, T- flip flop, Counter- Mod n asynchronous counter, Shift Registers	09
3	**Microprocessor 8085: Architecture, Interfacing, Applications** Architecture, Instruction set, Addressing modes, Memory, Assembly language programming, Interrupt, Interrupt service routine, Address decoding, Memory interfacing, Recent Trends in Microprocessor based system design	08
4	**Microcontroller Architecture** Introduction to microcontroller, comparison of microprocessor and microcontroller, features of microcontroller, block diagram, architecture of 8051, pin configuration of 8051, Special function registers (SFRs), Code memory and data memory, Stack pointer	09

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5	**Addressing modes and instruction set**: Assembler directives, Data transfer, Logical, Arithmetic, Jump and call, Stack and machine cycle control instructions **Assembly language programming:** Square wave, Numbers sorting, I/O port programming, Timer/ counter programming, Interrupts and ISRs programming, ADC 0808, DAC 0809, LCD, 7 segment LED display, DC motor interfacing, Stepper motor Interfacing,	**10**
6	**Arduino** Introduction to Arduino Pin configuration and architecture, Device and platform features, Concepts of digital and analog ports, Familiarizing with the Arduino Interfacing Board, Introduction to Embedded C and Arduino platform	**07**

List of Experiments

Expt. No	Title of the Experiment
1	Identification and verification of truth table of all logic gates
2	Design of combinational logic circuit using SOP or POS equation.
3	Design of Half adder & Full adder.
4	Implementation and verification of 4-bit magnitude comparator using IC-7485.
5	Design of Combinational logic circuit using Multiplexer 74151 & Demultiplexer 74138.
6	Design of mod n asynchronous counter.
7	Assembly language programming of 8085 microprocessor for arithmetic instructions.
8	Assembly language programming of 8085 microprocessor for logical instructions.
9	ADC interfacing to Microcontroller.
10	DAC interfacing to Microcontroller.
11	DC Motor interfacing to Microcontroller.
12	Stepper Motor interfacing to Microcontroller.

Note: Minimum ten experiments should be performed from the above list

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RE-SY-ELE-10

Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	A Textbook of Digital Electronics	R. S. Sedha	S. Chand	Second	2005
2	Fundamentals of Digital Electronics	A. Anand Kumar	PHI	Fourth	2016
3	Advanced Microprocessor & Peripherals	K. M. Bhurchandi A. K. Ray	Tata Mc-Graw Hill	Third	2006
4	Microprocessor 8085 Architecture, Programming Interfacing	Anil Sawarnkar	Genius	Second	2009
5	8051 Microcontroller: Hardware, Software and Applications	V Udayshankara, M S Mallikarjuna Swamy	McGraw- Hill Education India	Eighth	2014
6	8051 Microcontroller: Internal, Instructions, Programming & Interfacing	Subrata Ghoshal	Pearson Publication	First	2014
Reference Books:					
01	Digital Electronics Principles & Applications	Anil Maini	Wiley	Second	2007
02	Digital Design	Morris Mano	Pearson	Fifth	2012
03	Microprocessor and its applications	B.Ram	Tata Mc-Graw Hill	Sixth	2008
04	Microprocessor Architecture, Programming & Application with 8085	Ramesh Gaonkar	Penram International	Third	1997
05	The 8051 Microcontroller	Kenneth Ayala	Cengage Learning	Third	2007
06	The 8051 Microcontroller and Embedded Systems,	M. A. Mazadi,J. G. Mazadi,	Pearson Education, Asia	Fourth	2008

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R2-SY-ELE-II

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Class	B. Tech, Semester III
Course Code and Course Title	2EEHS205 **Universal Human Values**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	2/0/0
Credits	2
Evaluation Scheme: ISE I / ISE II	25/25

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEHS205_1	**Understand** the Harmony in human being, family, society and nature /existence, based on methods to fulfill human aspiration (K^1)
2EEHS205_2	**Integrate** the process of self-exploration to achieve Harmony in the human being's based on Holistic perspective of value education (K^3)
2EEHS205_3	**Apply** the human values for maintaining the relationships with oneself and others using the principals of harmony (K^3)
2EEHS205_4	**Adopt** the methods of maintaining harmony with the society, nature, and its existence by utilizing the human order systems (K^3)

Unit	Contents	Hours
1	**Introduction to Value Education** Introduction , Need, Purpose and motivation for the course, recapitulation from Universal Human Values-I **Self-Exploration**–what is it? - Its content and process; 'Natural Acceptance' and **Experiential Validation**- as the process for self-exploration. **Continuous Happiness and Prosperity**- A look at basic Human Aspirations, **Right understanding**, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.	04
2	**Understanding Happiness and Prosperity** **Understanding Happiness** and Prosperity correctly, **Prevailing sources of happiness,** Prosperity and its implications Method to fulfil the human aspirations: understanding and living in harmony at various levels.	04
3	**Understanding Harmony in the Human Being - Harmony in Myself** **Understanding human** being as a co-existence of the sentient 'I' and the material 'Body', **Understanding the needs of Self ('I') and 'Body'** - happiness and physical facility **Understanding the Body as an instrument of 'I'** (I being the doer, seer and enjoyer) **Understanding the characteristics and activities of 'I' and harmony in 'I'**	05

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	Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.	
4	**Understanding Harmony in the Family - Harmony in Human-Human Relationship** **Understanding values in human-human relationship**; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; **Trust and Respect** as the foundational values of relationship **Understanding the meaning of Trust**; Difference between intention and competence **Understanding the meaning of Respect**, Difference between respect and differentiation; **Peer Pressure** the Concerns and its Resolution the other salient values in relationship.	**06**
5	**Understanding Harmony in the Society** **Understanding the harmony in society**: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals **Human order systems** and dimensions	**04**
6	**Understanding Harmony in the Nature and Existence** **Understanding the harmony in the Nature,** Inter-connectedness and mutual fulfilment among the four orders of nature, recyclability and self-regulation in nature	**03**

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Understanding Human Being, Nature and Existence Comprehensively	UHV Team	UHV	1st	2022
2	A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R Asthana,G P Bagaria	Excel Books	2nd	2019
3	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R Asthana, G P Bagaria	Excel Books	2nd	2019
4	Human Values	A.N Tripathy	New Age International	2nd	2006

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria	Excel Books	3rd	2010
2	Indian Ethos and Modern Management: Amalgam of the Best of the Ideas from the East and the West	B.L. Bajpai	New Royal Book	1st	2004
3	Small Is Beautiful	E. FSchumacher.	Hartley & Marks	1st	1999
4	An Introduction to Ethics	William Lilly	Allied	1st	1967

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R2-SY-ELE-14

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Class	S. Y. B. Tech, Semester.-III
Course Code and Course Title	2EEHS206 **Environmental Studies**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial	2/0
Credits	2
Evaluation Scheme: ISE 1 / ISE II	25/25

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEHS206_1	**Comprehend** the concepts and principles of sustainable development and its importance in environmental preservation. **(K^2)**
2EEHS206_2	**Explain** ethical and legal responsibility of an engineer and his role in effective implementation of sustainable activities through EIA and EMS in the corporate sector. **(K^2)**
2EEHS206_3	**Predict** impact of contemporary issues (Population Explosion, Climate change, Environmental pollution) on the environment. **(K^2)**
2EEHS206_4	**Classify and analyze** different types of environmental pollution, understand their causes and effects, and propose control measures. **(K^4)**
2EEHS206_5	**Prepare** a technical report highlighting importance of environment in human life by using techniques like survey, case studies, mini project. **(K^4)**

Course Contents:

Unit	Contents	Hours
1	**Introduction to Environment and concept of Sustainable development:** Natural and Built Environment, Environmental Education: Definition, Scope, Objectives and importance. Components of the Environment: Atmosphere, Hydrosphere, Lithosphere and Biosphere. Biological Diversity: Introduction, Values of biodiversity, Threats to biodiversity, Conservation of biodiversity. Sustainable development goals, pillars of sustainable development.	04
2	**Energy and Natural Resources** Energy Scenario: Future projections of Energy Demand, Utilization of various Energy Sources, Conventional Energy Sources and Non- Conventional Energy Sources, Urban problems related to energy. Natural Resources: Food, Water, Forest, Geological, Equitable Use of Resources for Sustainable lifestyle. Concept of life cycle analysis, Case studies.	04
3	**Introduction to global environmental issues, Impact of modernization** Climate change: Global warming, Ozone depletion, Acid Rain etc. Environmental Impact: Impact of Modern agriculture on the Environment, Impact of Mining on the Environment, Impact of Large dams on the Environment. Environmental pollution: Air, Water, Soil, Noise, Marine, classification of pollutants, their causes, effects and control measures. Case studies.	04

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4	**Environmental Pollution** Definition: Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste Management: Causes, effects and control measures of urban and industrial wastes. E waste management. Role of an individual in prevention of pollution.	**04**
5	**Environmental Management and Legislation** Environmental ethics: Introduction, Ethical responsibility, issues and possible solutions. Environmental Management: Introduction to Environmental Impact Assessment, Environmental Management System: ISO 14001Standard, Environmental Auditing, National and International Environmental protection agencies pertaining to Environmental Protection. Introduction to Environmental Legislation.	**04**
6	**Cleaner technology:** Consumerism and Waste Products, Green buildings, Green products, Minimization of Hazardous Products, Reuse of Waste, By-products, Rainwater Harvesting, Translocation of trees. Some Success Stories. Role of Information Technology in Environment protection.	**04**

Assessment methods:

01. Mini Project: **15 marks**

02. Seminar : **10 Marks**

Topic should be from the content of the course.

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Environmental Studies	Anindita Basak	PEARSON	First edition	2017
02	Environmental Studies	N.K Uberoi,	Excel Books Publications New Delhi,	First edition	2005.
03	Environmental Studies from crisis to cure	R. Rajagopalan,	Oxford University Press,	Second edition	2011

Reference Books / Handbooks

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Environmental Science: A Global Concern	William Cunningham and Barbara Woodworth Saigo	WCB/McGraw Hill Publication	Fifth Edition	1999

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Reference Books / Handbooks					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
02	Peter. H. Raven, Linda. R. Berg, George. B. Johnson	Environment	McGraw Hill Publication	Second Edition	1998
03	Adaptive Environmental Management	Catherine Allan & George H. Stanley (Editors),	Springer Publications.	--	2009.
04	Elements of Environmental Science and Engineering	P. Meenakshi	Prentice Hall of India Private Limited, New Delhi	-	2006

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R2-54-ELE-17

Sant Dnyaneshwar Shikshan Sanstha's
Annasaheb Dange College of Engineering and Technology, Ashta
An Autonomous Institute
Department of Electrical Engineering

Class	S.Y. B. Tech, Semester - III
Course Code and Course Title	2EEVS207 **Python Programming Lab**
Prerequisite/s	2EEES105, 2EEVS115
Teaching Scheme: Lecture / Tutorial / Practical	0 / 0 / 2
Credits	02
Evaluation Scheme: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEVS207_1	**Apply** the fundamental concepts of python to solve given problems by using IDE (K^3)
2EEVS207_2	**Apply** the concepts of sequence type likes list, set, tuple, dictionary to solve various problems related to linear data structures (K^3)
2EEVS207_3	**Apply** various object oriented features like inheritance, data abstraction, encapsulation to solve given problems using Python IDE (K^3)
2EEVS207_4	**Apply** the concepts of function and modules to develop modular code using IDE (K^3)
2EEVS207_5	**Apply** the concept of File I/O and Exception handling to read and write the data to files using IDE (K^3)

Experiments List	
1.	Installation and Introduction of Python and their data types.
2.	Program based on operators: Arithmetic Operators, Logical Operators, Bitwise Operators
3.	Program based on Control Statements with Python collections
4.	Write Python code to perform operations on Lists
5.	Write Python code to perform operations on Tuples
6.	Write Python code to perform operations on Dictionaries
7.	Write Python code to perform operations on Sets
8.	Develop user defined Python function for given problem:
9.	Develop a program based on the concept of module
10.	Program based on OOP concepts in python
11.	Program based on the concept of file handling in python
12.	Program Based on Exception Handling

Note: Minimum ten experiments should be performed from the above list

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to computing and Problem Solving with Python	Jeeva Jose and SojanLal	Khanna Book Publishing Co. (P) Ltd	1st	2016
02	Programming Python	Mark Lutz	O'reilly	2nd	2001

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introducing Python Modern Computing in Simple Packages	Lubanovic Bil	O'reilly	1st	2014

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Department of Electrical Engineering

Class	S Y B. Tech Semester III
Course Code & Course Title	2EECC208 **Aptitude and Reasoning Part- I**
Prerequisite/s	-
Teaching Scheme (Lecture/Practical/Tutorial)	0/2/0
Total Contact Hours: Theory/Practical/Tutorial)	0/2/0
Credits	1
Evaluation Scheme: ISE	50

Course Outcomes (COs) : The students will be able to:	
2EECC208_1	**Solve** problems based on Vedic Mathematics, Calendar, Average, Age
2EECC208_2	**Solve** problems based on Speed Time distance and equations
2EECC208_3	**Solve** problems based on Blood Relations, Directions, Time Rate Work, Pipes and Tanks, Percentage, Profit and Loss
2EECC208_4	**Solve** Problems based on Spot the Error and Jumbled Para

Course Contents:

Unit No	Unit Name	Contact Hours
Unit 1	Vedic Mathematics, Calendar	4
Unit 2	Average, Ages	4
Unit 3	Speed Time Distance, Equations	4
Unit 4	Blood Relations, Directions, Time Rate Work, Pipes and Tanks	4
Unit 5	Percentage, Profit and Loss	4
Unit 6	Spot the Error, Jumbled Para	4
	Self-Study Module	6

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

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Reference Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
3	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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Sant Dnyaneshwar Shikshan Sanstha's

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Department of Electrical Engineering

Curriculum

Second Year B.Tech - Semester – IV

Sant Dnyaneshwar Shikshan Sanstha's
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Department of Electrical Engineering

Class			S. Y. B. Tech. Semester- IV
Course Code and Course Title			2EEPC209 **Signal Processing**
Prerequisite/s			2EEBS201
Teaching Scheme: Lecture / Tutorial / Practical			03/00/02
Credits			04
Evaluation Scheme	**T**	**ISE / MSE / ESE**	40 / 30 / 30
	P	**ISE / ESE**	50 / 50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEPC209_1	**Classify** the different types of signals using basic operations. (K^2)
2EEPC209_2	**Calculate** total response of linear time invariant system under different conditions(K^3)
2EEPC209_3	**Analyze** the time domain response of system using Laplace and Z- Transform (K^3)
2EEPC209_4	**Analyze** frequency domain response of system using Fourier analysis (K^3)
2EEPC209_5	**Respond** Effectively in the form of oral and writing journal. (S^2)
2EEPC209_6	**Examine** the operations on signal and determine the result of experiment. (A^2)

Unit	Contents	Hours
1	**Introduction to signals and systems** Representation of signals, Basic Operation on Signals, Classification of signals, Classification of Systems	06
2	**Time domain analysis of discrete and continuous time signals** Zero state response, Zero input response, Impulse response, Step response, Convolution sum and convolution integral, Graphical representation of convolution, Linear and Circular convolution	07
3	**System analysis using Laplace and z-transform.** Introduction to Laplace and z transform, Inverse Laplace and Inverse Z transform, Poles & Zeros, Block diagram representation and system realization	06
4	**Frequency domain analysis of CT signals** Periodic representation by trigonometric Fourier series, Fourier spectrum, , exponential Fourier series, Fourier transform	06
5	**Fourier Analysis of Discrete Fourier Transform** Overview of DTFT, Frequency analysis of Signals using DFT and IDFT, Fast Fourier Transform (FFT) algorithm:- DIT and, DIF-FFT Algorithm	07
6	**Digital Signal Processing and its Applications** Basic Digital signal processing operation- Sampling Theorem, Sampling and Reconstructions of signals, Aliasing, Quantization, Introduction to Digital Signal Processing and its applications	07

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List of experiments

Expt. No.	Title of the Experiment
1	Introduction to simulation tools (MATLAB) for Signal Processing Lab
2	Generation of elementary continuous and discrete time signals
3	Performs various operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4	Study of Linear Convolution and circular convolution
5	Compute auto correlation and cross correlation between signals
6	Perform waveform synthesis using Laplace Transform and Z Transform of a given signal
7	Locate the zeros and poles and plotting the pole zero maps in s-plane and Z-plane for the given transfer function
8	Study Fourier Transform of a given signal and plot its magnitude and phase spectrum
9	Calculate Discrete Fourier Transform and Inverse Discrete Fourier Transform of given digital signal.
10	Study of Fast Fourier Transform
11	Verification of sampling signal
12	Introduction of Image Processing toolbox

Note: Minimum ten experiments should be performed from the above list

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Signals and Systems	Babu, R	Scitech Publications Pvt Ltd	Fourth	2011
2	Linear systems and signals	B. P. Lathi	Oxford University Press	Second	2005
3	Signals & Systems	Simon Haykin	Wiley Publications	Second	2007
4	Signals & Systems	M. J. Roberts	Tata McGraw Hill	Second	2012
5	Signals & Systems	Allan V Oppenheim	PHI Learning Pvt. Ltd, New Delhi	Second	1997

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Signals and systems	C. T. Chen	Oxford	Third	2004
2	Analog Signal Processing: Analysis & Synthesis	Alok Barua	Wiley	First	2014
3	Signals and Linear systems	Gabel	Wiley	Third	1986
4	Signals and systems	Krishnaveni	Wiley	First	2012

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Department of Electrical Engineering

Class			S. Y. B. Tech. Semester- IV
Course Code and Course Title			2EEPC210 **DC Machines and Transformers**
Prerequisite/s			2EEES102
Teaching Scheme: Lecture / Laboratory			03/02
Credits			04
Evaluation Scheme	**T**	**ISE / MSE / ESE**	40 / 30 / 30
	P	**ISE / ESE**	50/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEPC210_1	**Explain** the constructional details and working principle of DC machines & Transformer. (K^2)
2EEPC210_2	**Describe** the effects of system parameters on performance of DC machines & Transformer. (K^2)
2EEPC210_3	**Solve** numerical to determine the performance parameters of DC machines & Transformer. (K^3)
2EEPC210_4	**Analyze** the performance of a DC machines & Transformer by using appropriate testing methods. (K^4)
2EEPC210_5	**Perform** different tests on DC machines & Transformer to find performance parameters. (S^2)
2EEPC210_6	**Practice** safety precautions while performing experiments in Laboratory. (A^2)

Unit	Contents	Hours
1	**DC Generator** Construction details, working principle, armature winding, EMF equation, power stages in DC generator, armature reaction and its effects, commutation & methods to improve commutation, applications of DC generator.	06
2	**D.C. Motors** Working principle of DC motor, back EMF & its significance, power stages in DC motor, Voltage equation, power equation, speed equation, torque equation, shaft torque, break horse power, types, characteristics & applications of DC Motors, need & types of starter, speed control methods, reversing direction of rotation and braking methods	08
3	**Testing & Performance of DC machines** Losses and efficiency of DC machines, OCC test of DC generator, Brake test on DC motor, Swinburne's test on DC motor, Regenerative or Hopkinson's test on DC motor, IS standards for testing	05
4	**Single phase Transformer** Construction details, working principle, types, concept of ideal transformer, EMF equation, exact and approximate equivalent circuit referred to either side, general phasor diagrams on no load and load. voltage regulation, transformer rating, Special Purpose Transformers: Autotransformers, Welding Transformer, Isolation Transformer.	08

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5	**Testing & Performance of Single Phase Transformer** Losses & efficiency, maximum efficiency, all day efficiency, IS standards for testing, polarity test, load test, OC and SC test, separation of eddy current & hysteresis losses.	**05**
6	**Three Phase Transformers** Poly-phase Transformers-connecting a bank of three identical single phase transformer for three phase transformation, standard connections for three phase transformers, their voltage phasor diagrams, phasor groups, parallel operation of transformers, conditions to be satisfied, load sharing under various conditions, Open delta or V-V connection, application and vector diagram, applications.	**07**

List of Experiments:

Expt. No.	Title of Experiment
1	Determination of OCC & load characteristics of DC generator.
2	Speed control of D.C shunt motor by armature and field control.
3	Determination of performance of DC shunt Motor by Load test
4	Determination of performance of DC shunt Motor by Swinburne's test
5	Determination of performance of DC Motor by Hopkinson's Test.
6	Determination Polarity and Ratio test on single phase transformer
7	Determination of performance of single phase transformer by Open circuit and short circuit test for finding efficiency & voltage regulation
8	Determination of performance of single phase transformer by Load test
9	Determination of performance of three phase transformer by Load test
10	Parallel operation of single phase transformer.
11	Determination of performance of 1Φ Transformer by Sumpner's Test
12	Mini Project: Working Model of DC machine, Working Model of Transformer, Different hand tools by using DC motor

Note: Minimum ten experiments should be performed from the above list

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Electrical Machines	V. K. Mehta	S. Chand	Second	2009
2	Electric Machinery	Bimbhra P.S	Khanna	Seventh	2011
3	Alternating Current Machines	M. G. Say	Wiley	Fifth	1983
4	Electric Machinery	A.E Fitzgerald Stephen Kingsly	Tata Mcgraw Hill	Fourth	1983

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Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Electric Machines	Ashfaq Husain	Dhanpatrai	Third	2016
2	Generalized Machine Theory	Bimbhra P.S	Khanna	Fourth	1987
3	Electric Machines	M.V. Deshpande	PHI	First	2011
4	Electric Machines	Samarjit Ghosh	Pearson	Second	2012

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Department of Electrical Engineering

Class	S. Y. B. Tech, Semester.- IV
Course Code and Course Title	2EEPC211 **Electromagnetic Field Theory**
Prerequisite	-
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE / MSE / ESE	40 /30 /30

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEPC211_1	**Apply** different technique of vector analysis and appropriate coordinate systems for physical quantities dealt in electromagnetic fields. **(K^3)**
2EEPC211_2	**Derive** the physical quantities of electromagnetic fields in different engineering problems.**(K^3)**
2EEPC211_3	**Determine** the Energy, Potential, Capacitance, Inductance and its energy densities. **(K^3)**
2EEPC211_4	Illustrate the boundary conditions in interfaces of different media **(K^3)**
2EEPC211_5	**Apply** the Maxwell's equations in different forms **(K^3)**
2EEPC211_6	**Examine** the electromagnetic wave propagation in different media and its means for transporting energy or information **(K^4)**

Unit	Contents	Hours
1	**Vector Analysis and Coordinate Systems:** Scalars and vectors, need for 3D coordinate systems, rectangular, cylindrical and spherical coordinate systems, transformation between coordinate systems, vector calculus - gradient, divergence and curl line, surface and volume integrals, divergence theorem, stroke's theorem.	07
2	**Electrostatic Fields** Coulomb's law, electric field intensity, field due to point and continuous charges, electric field due to finite line charge, circular disc and infinite sheet of charge, electric flux density, gauss's law and its applications, energy and potential, potential gradient, potential field of a point charge and system of charges, electric dipole, equipotential surfaces	07
3	**Electric Fields in Material Space** Current density, continuity of current, properties of conductors and dielectric materials-boundary conditions between two dielectric media. Capacitance and Capacitors: parallel plate capacitor with single and two dielectric, cylindrical cable, two-wire transmission line, Energy and Energy density - Poisson's and Laplace's equations.	05

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4	**Magnetostatic Fields** Biot-Savart's law, magnetic field intensity due to infinite long straight conductor, finite length of conductor, circular loop, solenoid and toroid, magnetic flux density, Ampere's circuital law, infinite sheet of current, boundary conditions, Lorentz Force, force and torque on a closed circuit, Inductance of solenoid, toroid and coaxial cable, Energy, and energy density in a magnetic field.	**08**
5	**Time-Varying Fields and Maxwell's Equations:** Faraday's laws, transformer and motional emf, conduction and displacement current, Modified Ampere's law, Maxwell's equations in differential and integral forms, applications	**06**
6	**Electromagnetic Wave Propagation:** Electromagnetic wave equations, uniform plane wave, wave parameters, wave propagation in free space, lossy and lossless dielectrics, wave propagation in conductors, skin depth, Poynting vector, and Poynting theorem.	**06**

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Principle of Electromagnetics	Matthew N.O. Sadiku, S.V. Kulkarni	Oxford University Press	Sixth	2015
2.	Engineering Electromagnetics	William H. Hayt, John A Buck	Tata McGraw-Hill Publication	Eighth	2014
3.	Electromagnetics with Applications	John Kraus Daniel Fleisch	Tata McGraw-Hill Publication	Fifth	2017
4.	Foundation of Electromagnetic Theory	J. R. Reitz, F. J. Milford R. W. Christie	Pearson Education	Fourth	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Electromagnetics	Joseph.A. Edminister	Schaum's Outline Series	Second	2007
2.	Elements of Electromagnetic Fields	S.P.Seth	Dhanpat Rai & Co	First	2004
3.	Electromagnetic Theory & Applications	Ashutosh Pramanik	PHI Learning Private Limited	Fifth	2009
4.	Electromagnetic Field Theory	K A Gangadhar P.M.Ramanathan	Khanna Publishers	Eighth	2015

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Department of Electrical Engineering

Class	S.Y. B. Tech. Semester - IV
Course Code and Course Title	2EEPC212 **Generation, Transmission and Distribution**
Prerequisite/s	2EEPC102
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE / MSE / ESE	40 / 30 / 30

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2EEPC212_1	**Describe** the electrical power generation methods to generate electricity using schematic diagram.(K^2)
2EEPC212 _2	**Relate** the terms involved in generation cost to calculate rate of electricity using tariff methods. (K^3)
2EEPC212_3	**Use** the knowledge of distribution system to calculate voltage drop of distributor for given parameters. (K^3)
2EEPC212_4	**Apply** the conceptual understanding of overhead & underground transmission system elements to correlate the mechanical construction parameters of line. (K^3)
2EEPC212_5	**Analyse** the different electrical parameter of overhead transmission lines(K^4)
2EEPC212_6	**Discuss** the alternate methods of generation, transmission & distribution on the basis of recent trends. (K^2)

Unit	Contents	Hours
1	**Generation of Electrical Power** AC power system Single line diagram, India's electricity scenario, Thermal power plant, hydro power plant, Wind power plant, solar power plant, Tidal power plant schematic diagram, selection of site, advantages & Disadvantages. **Power System elements**: Brief Description of Power system elements such as Synchronous Machine, Transformer, Bus bar, Circuit Breaker, isolator, CT, PT	06
2	**Economics of Generation** Load curve, Load duration curve, Maximum demand, Average Load, load factor, Demand factor, diversity factor, Plant capacity factor, plant use factor (Numerical), Economics of generation-fixed cost, semi fixed cost and running cost, methods of determining depreciation. Tariff, desirable characteristics of tariff, Tariff methods: two part tariff, three part tariff & Power factor tariff methods. Understanding of residential Electricity Bill.	07

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3	**Distribution system** Distribution system introduction, feeder & distributor, classification of distribution systems, connection schemes of distribution schemes, Voltage drop calculation (Derivation & Numerical) to AC distribution systems of radial and ring system, Substation, Indoor & Outdoor substation, Substation layout.	**06**
4	**Mechanical Design of Transmission system** Main elements of transmission lines, Types of Conductors (ACSR, Expanded ACSR, ACAR, Bundle conductor), Line supports, types of line supports, Insulators, types of insulators, potential distribution over suspension insulators, string efficiency, methods to improve string efficiency, Introduction of Sag, Corona, factors affecting the corona, advantages and disadvantages of corona, methods to reduce the corona, skin effect, proximity effect	**07**
5	**Electrical Design of transmission system** Resistances, calculation of resistance, inductance, flux linkage of the single conductor, inductance of single phase two – wire line, three phase line and double circuit line, capacitance, capacitance of two – wire line, three phase line with equilateral space, capacitance of line with unequal spacing, Numerical	**08**
6	**Underground Cables & Trends in Power System** Construction of Underground cable, method of laying underground cables Trends in power system- Alternate Sources of Power Generation, Introduction to Wireless Power Transmission system, Super capacitor, Distributed generation systems	**5**

Industrial Visit to Substation or Generating Station

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Principles of Power system	V K Mehta & Rohit Mehta	S. Chand company Pvt Ltd	Fourth	2007
02	Electrical power systems	Ashfaq Hussain	CBS publications	Fifth	2007
03	Electrical Power Generation, Transmission & Distribution	S N Singh	---	Second	2003
04	Modern Power system Analysis	D P Kothari & I J Nagrath	PHI learning Pvt Ltd	Third	2009
05	Generation of Electrical Energy	B. R. Gupta	S. Chand Publication	Fifth	2007

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Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Electrical Power System	Weedy B M, Cory B J	John Wiley Publication	Fifth	2013
02	Electrical Power Generation, Transmission & Distribution	Leonard L. Grigsby	CRC Press	Third	2012
03	Electrical Power systems	C L Wadhwa	New age International Limited	Sixth	1997
04	Transmission & Distribution	Dr. C R Bayliss Hardy	Newnes	Third	2007

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Minor Course – I : Students can choose either Track 1 or Track 2 course	
Class	S. Y. B. Tech. Semester- IV
Course Code and Course Title	**Track - 1: Electric Vehicle** 2EE**213 **Fundamentals and Architecture of Electric Vehicles**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE / MSE / ESE	40 / 30 / 30

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EE213_1**	**Understand** the basic fundamentals of Electric Vehicle (K^1)
2EE213_2**	**Know** the basic fundamentals of Hybrid EV (K^2)
2EE213_3**	**Learn** the concept of motors and converters (K^2)

Unit	Contents	Hours
1	**Electric Vehicles** History, Components of Electric Vehicle (EV), General Layout of EV, EV classification Comparison with Internal combustion Engine: Technology, Advantages & Disadvantages of EV.	04
2	**Vehicle Fundamentals** Vehicle resistance, Types: Rolling Resistance, grading resistance, Aerodynamic drag vehicle performance, Calculating the Acceleration Force, maximum speed, Finding the Total Tractive Effort, Torque Required on The Drive Wheel, Transmission: Differential, clutch & gear box, Braking performance.	04
3	**Hybrid Electric Vehicles** History, Components of Hybrid Electric Vehicle, General Layout of Hybrid EV, Comparison with Electric Vehicles, Advantages & Disadvantages of Hybrid EV.	05
4	**Vehicle Architecture & Design** Hybrids Based on Architecture, Hybrids Based on Transmission Assembly, Hybrid Based on Degree of Hybridization. Power Train Component Sizing: EV Powertrain sizing, HEV Powertrain Sizing, HEV Powertrain sizing Example.	05
5	**Motors** Principle and working of DC Motor, Characteristics & Types of DC Motors-Overview, Speed Torque characteristics of Permanent magnet Motor, BLDC Motor, Induction motor, Comparison of all motors.	04
6	**Converter** Introduction of DC-DC, AC-AC, AC-DC, DC-AC converters, Four quadrant operation, Driver circuits.	04

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Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Electric Vehicle Technology	John Lowry and James Larminie	John Wiley and Sons,	1st	2012
2	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, External, and Design	Mehrdad Ehsani and Yimin Gao	CRC Press	3rd	2018
3	Electric and Hybrid Vehicles: Design Fundamentals	Iqbal Hussain	CRC Press	2nd	2011
4	Build Your Own Electric Vehicle	Seth Leitman and Bob Brant	Mc Graw Hills	1st	2008

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Electric and Hybrid Electric Vehicles	I.Husain	CRC Press	Second	2003
2	Vehicle Propulsion Systems: Introduction to Modeling and Optimization	L.Guzzella and A. Sciarretta	Springer	Fifth	2007
3	Automotive Transmissions: Fundamentals, Selection, Design and Application	G. Lechner and H. Naunheimer	Springer	Third	1999

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Minor Course – I : Students can choose either Track 1 or Track 2 course	
Class	S.Y. B. Tech. Semester - IV
Course Code and Course Title	**Track - 2: Control Engineering** 2EE**214 **Transducers and Signal Conditioning**
Prerequisite/s	----
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE / MSE / ESE	40 / 30 / 30

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2EE214_1**	**Illustrate** the working of measurement systems using the model of input-output configuration (K^3)
2EE214_2**	**Summarize** the various sensors and transducers by understanding their principle, construction, and accuracy (K^3)
2EE214_3**	**Compare** resistive, capacitive, and inductive type transducers based on the various parameters, such as construction, power requirement, accuracy etc (K^3)
2EE214_4**	**Apply** the knowledge of operational amplifiers to design the signal conditioning circuits for sensors (K^3)
2EE214_5**	**Explain** the role of signal converters, like radiometric, logarithmic, voltage to current and frequency to voltage with sensors and transducers (K^3)

Syllabus

Unit	Contents	Hours
1	**Introduction**: Basic block diagram of generalized instrumentation system, general input- output configuration, definition of transducer, classification of transducers.	04
2	**Resistive transducers**: Potentiometers, metal and semiconductor strain gauges, strain gauge applications, load and torque measurement, digital displacement sensors, Resistance Temperature Detectors (RTDs), Thermistors, Thermocouples	04
3	**Inductive and Capacitive Transducers**: Measurement of self and mutual inductance, Linear Variable Differential Transformer (LVDT), Variable reluctance transducers, capacitive transducers: frequency response, advantages and disadvantages and uses of capacitive transducers Capacitance pick up, Condenser microphones, Differential capacitor pick up.	05
4	**Miscellaneous measurements**: Seismic transducer and its dynamic response, photoelectric transducers, Hall effect sensors, magnetostrictive transducer, optic sensors, eddy current transducers, proximity sensors, tacho-generators and stroboscope.	05
5	**Introduction to signal conditioning:** Concept of signal conditioning, Op-amp circuits used in instrumentation, summer, buffer, integrator, differentiator, instrumentation amplifiers, analogue-digital sampling, signal filtering, averaging	04

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6	**Signal Converters**: Radiometric converters, logarithmic converters, Voltage Controlled Oscilloscope (VCO), Phase Locked Loops (PLL), voltage to frequency converter, frequency to voltage converter, voltage to current converter, and current to voltage converter.	04

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	A Course on Electrical and Electronic Measurements and Instrumentation	A.K. Sawhney and Puneet Sawhney	Dhanpat Rai	--	2012
2	Electronic Instrumentation and Measurement	David A Bell	Oxford University Press	Third	--
3	A Course in Electronic and Electrical Measurements & Instrumentation	J.B Gupta	S K Kataria and Sons	--	--
4	Semiconductors Sensors	S.M Sze	John Wiley & Sons Inc	Third	2006

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Sensors and Transducers	Patranabis	Prentice Hall	Second	2003
02	Electronic Instrumentation	H. S. Kalsi	Tata McGraw Hill	--	2006
03	Elements of electronic instrumentation and measurement	Joseph J Carr	Pearson Education	--	2005

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Class	S. Y. B. Tech. Semester- IV
Course Code and Course Title:	2EEHS215 **Psychology**
Prerequisite/s:	-
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits:	02
Evaluation Scheme: ISE I/ISE II	25/25

Course Outcomes:	
2EEHS215_1	**Explain** using psychology theories, the necessity and significance of various parts of psychology (K^2)
2EEHS215_2	**Describe** importance of psychology in the organization and human nature that takes place in a group or individually within an organization (K^2)
2EEHS215_3	**Apply** emotional intelligence, time management, and stress management techniques in their daily activities (K^3)
2EEHS215_4	**Analyze** different case studies that use different leadership styles and approaches (K^3)

Course Contents:

Unit	Contents	Hours
1	**Psychology** – Introduction and Need of psychology in the organization, Organizational Behavior	02
2	**Emotional Intelligence (EI)** – Definition of EI, components of EI, Activities	05
3	**Time Management**– Need and importance of Time management for an individual, Effective steps of Time Management, role of procrastination in Time management, Types of Procrastination, Effects of Procrastination, Techniques to stop procrastination, activities	06
4	**Leadership** – importance of leadership, styles of leadership, The Leader Trait Approach, The Behavior Approach, Path-Goal Theory: How Leaders Motivate Followers, Leader and Mood, Gender and Leadership, Ethical Leadership	05
5	**Attitude and Job Satisfaction** – Components of Attitude, Relationship between Attitude and Behavior, Job attitude, Causes of Job satisfaction, outcomes of Job satisfaction, Impact of Job dissatisfaction, activities	02
6	**Stress Management** – meaning of stress, sources and consequences of stress nature of stressors, Stress Management Techniques, activities	06

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Organizational Behavior- An Evidence-Based Approach	Fred Luthan	McGraw-Hill/Irwin	12th	2011
2	Essentials of Organizational Behavior	Stephen P. Robbins Timothy A. Judge Katherine E. Breward	Pearson	-	2018
3	Essentials of organizational Behavior	Stephen P. Robbins	Prentice Hall	7th	2002
4	Understanding and Managing Organizational Behavior	Jennifer M. George Gareth R. Jones	Pearson	6th	2012
5	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books: A division of Sage Publications	3rd	2006

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books A division of Sage Publications	3rd	2006
2	Positive Psychology Applications in Work, Health and Well-being	Updesh Kumar Archana Vijay Parkash	Pearson India Education	-	2016

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Class	S. Y. B. Tech. Semester- IV
Course Code and Course Title	2EEHS216 **Constitution of India**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	01/00/00
Credits	01
Evaluation Scheme: ISE I / ISE II	25/25

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2EEHS216_1	**Explain** the meaning, important acts and history related to Indian constitution (K^2)
2EEHS216_2	**Illustrate** the features of Indian constitution and interpretation of Preamble (K^2)
2EEHS216_3	**Interpret** fundamental rights and duties of the Indian Citizen to inculcate morality and their social responsibilities (K^3)
2EEHS216_4	**Identify** different laws and regulations based upon Information Acts (K^3)
2EEHS216_5	**Distinguish** the functioning of Indian parliamentary system and legislative system at the centre and state level (K^3)

Unit	Contents	Hours
1	**Constitution: Basic Structure** Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947.	02
2	**Making of Indian Constitution :** Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.	02
3	**Fundamental Rights:** Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies.	03
4	**Fundamental Duties:** Directive Principles-Definition and Meaning, 42nd Constitutional Amendment Act, List and Importance of Fundamental Duties.	02
5	**Regulation to Information :** Introduction, Right to Information Act:2005, Information Technology Act 2000, Electronic Governance in India, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Limitations of an Information Technology Act	02

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6	**Government of The Union and States:** President of India – Election and Powers, Prime Minister of India - Election and Powers, Loksabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.	**02**

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Indian Polity	M.Laxmikanth	Mc Graw Hill Publications Delhi	7th	2023
2	The Constitution of India	P.M. Bakshi	Lexis Nexis	19th	2023
3	Introduction to the Constitution of India	Durga Das Basu	Lexis Nexis	26th	2022
4	Governance in India	M. Laxmikanth	Mc Graw Hill Publications Delhi	3rd	2021

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Constitution of India	V.N.Shukla	EBC	14th	2022
2	The Constitutional Law of India,	J.N. Pandey	Allahabad; Central Law Agency	59th	2022
3	Constitution of India	V.N.Tripathi	Premier Publishing Company	9th	2021
4	India's Constitution	M.V.Pylee	S. Chand Publications New Delhi	18th	2020

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Class	S. Y. B. Tech. Semester- IV
Course Code and Course Title	2EEVS217 **Simulation Lab**
Prerequisite/s	2EEES105, 2EEVS115, 2EEVS207
Teaching Scheme: Lecture/Tutorial /Practical	00/00/02
Credits	01
Evaluation Scheme: ISE	50

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

2EEPC217_1	**List** various features of simulation software tools to perform basic operations related to electrical engineering.
2EEPC217_2	**Apply** the knowledge of electrical engineering systems to implement simulations for given specifications.
2EEPC217_3	**Demonstrate** the circuital laws to calculate electrical parameters using network theorems.
2EEPC217_4	**Simulate** the electrical engineering systems to analyze system performance with the help of measurement blocks.
2EEPC217_5	**Perform** individually or in a team to provide solution to electrical engineering problems and communicate effectively to represent.

List of Experiments:

Expt. No.	Title of the Experiment
1	Introduction to simulation tools for Electrical Engineering (LabVIEW, ETAP)
2	Study of Logic Gates using LabVIEW
3	Water level detector using LabVIEW
4	Temperature Conversion in LabVIEW
5	DC Motor Speed control using LabVIEW
6	Simulation of RLC series circuit using LabVIEW
7	Load Characteristics of a Self-excited DC shunt Generator in LabVIEW
8	To design single line diagram of power system using ETAP
9	Modelling and simulation of power flow in ETAP
10	Sizing of Capacitor using ETAP
11	Short Circuit analysis using ETAP
12	Study of built-in library examples of electrical engineering with ETAP

Note: Minimum ten experiments to be performed from the above list

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Lecture Notes in LabVIEW and Data Acquisition	Fadhil Ali	Kindle	Reprint	2021
2.	LabVIEW for Electrical Engineers and Technologists	Stephen P. Tubbs	Stephen P. Tubbs	First	2011
3.	SKM, ETAP, & EDSA Power System Analysis Tutorials	Stephen Philip Tubbs	Stephen P. Tubbs	First	2009
4.	Virtual Instrumentation using LabVIEW	Sanjay Gupta, Joseph John	McGraw-Hill Education India	Second	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Virtual Instrumentation Using LabVIEW	Jovitha Jerome ·	PHI	First	2010
2.	LabVIEW: A Flexible Environment for Modeling and Daily Laboratory USE	Riccardo de Asmundis	Intech Open	First	2021
3.	Learning with LabView	Robert H. Bishop	Blackwell North America, Inc.	First	1997
4.	Power Systems Analysis Illustrated With MATLAB And ETAP	Hemchandra M. Shertukde	Taylor & Francis Inc	First	2019

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Class	S.Y. B. Tech. Semester.-IV
Course Code and Course Title	2EEEL218 **Innovation and Prototype**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE	50

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2EEEL218_1	**Discriminate** the design process and its stage (K^2)
2EEEL218_2	**Analysis** the design process, function and its stage (K^4)
2EEEL218_3	**Design** the Plan of prototyping activities considering factors such as time, cost, and resources, utilizing appropriate technologies (K^6)
2EEEL218_4	**Develop** a prototype and design report (K^6)
2EEEL218_5	**Formulate** the value proposition views of different stake holders (K^5)

LIST OF EXPERIMENTS

Expt. No	Title of the Experiment
1	Identification of Problem, design process and conceptualization
2	Functional Analysis (Function, Constraints, Functional Decomposition)
3	Concept Development (Appropriate Investigation and Selection)
4	Project Development (Project Planning, Cost Estimation, Managing Property Issues)
5	Prototype culminating and Ideation
6	Model Building Making
7	Testing of the Model
8	Customer product unveiling and report
9	Pros Cons of Model identification and scope Analysis
10	Effective Report Making

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Product Design: Technique in Reverse Engineering and New Product Development	Kevin Otto, Kristin Wood	Prentice Hall Edition	First	2013
2	Product design and development.	Eppinger, S., & Ulrich, K	Mc Graw-Hill Higher Education.	Fifth	2017
3	Engineering Design Process	Yousef Haik	Florida State University	Fourth	2010
4	Product design and Manufacturing	A.K. Chitale, R. C. Gupta	PHI Publication	Fourth	2009
5	Engineering Design Process	Yousef Haik, T. M. M. Shahin	Cengage Learning	Second	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Product Design	Kevin Otto, Kristin Wood	Pearson Education Indian Reprint	--	2004
2	Engineering Design	George E.Dieter, Linda C.Schmidt	McGraw-Hill International	Fourth	2009
3	Engineering Design: A Project-based Introduction	Clive L.Dym, Patrick Little	John Wiley & Sons	Third	2009
4	Product Design and Development	Anita Goyal, Karl T Ulrich, Steven D Eppinger	Tata McGraw-Hill Education	Fourth	2009

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Class	S Y B. Tech Semester - IV
Course Code & Course Title	2EECC219 **Aptitude and Reasoning Part- II**
Prerequisite/s	2EECC208
Teaching Scheme (Lecture/Practical/Tutorial)	0/2/0
Credits	1
Evaluation Scheme: ISE	50

Course Outcomes (COs) : The students will be able to:	
2EECC219_1	**Solve** problems based on HCF, LCM, Interest, Clock, Cubes and Puzzles
2EECC219_2	**Solve** problems based on Coding and Decoding, Seating Arrangements and Venn diagrams.
2EECC219_3	**Solve** problems based on Ratio Proportion, Partnership, Allegation, Divisibility and Number Theory
2EECC219_4	**Demonstrate** presentations using concepts delivered on confidence building and time management skills.

Unit No	**Unit Name**	**Contact Hours**
1	HCF LCM, Simple Interest, Compound Interest	4
2	Coding- Decoding, Seating Arrangement Venn Diagrams	4
3	Clocks, Cubes, Puzzles,	4
4	Ratio Proportion, Partnership	4
5	Confidence Building, Time Management	4
6	Allegation, Divisibility and Number Theory	4
	Self-Study Module	6

Text Books:

Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
3	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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