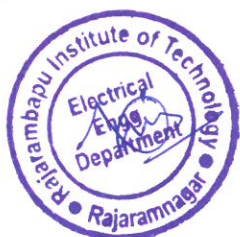**K.E. Society's**
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

B.Tech. in Electrical Engineering with Multidisciplinary Minor

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
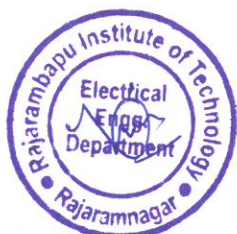
Class: S. Y. B. Tech   **Semester:** III

Course Code	Course	Teaching Scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory (%Marks)		Practical (%Marks)		
							Max	Min. for passing		Max.	Min. for passing
EE2014	DC Machines and Transformer	3	-	-	3	ISE	20			----	----
						UT1	15	40	40	----	----
						UT2	15			----	---
						ESE	50	40		----	----
EE2034	Electrical Circuit Analysis	3	1	-	4	ISE	20			----	----
						UT1	15	40	40	----	----
						UT2	15			----	----
						ESE	50	40		----	----
EE211	Mathematics for Electrical Engineers	3	-	-	3	ISE	20			----	----
						UT1	15	40	40	----	----
						UT2	15			----	----
						ESE	50	40		----	----
EE213	Power Transmission and Distribution Systems	3	-	-	3	ISE	20			----	----
						UT1	15	40	40	----	----
						UT2	15			----	----
						ESE	50	40		----	----
	Multidisciplinary Minor-I	3	-	-	3	ISE	20			----	----
						UT1	15	40	40	----	----
						UT2	15			----	----
						ESE	50	40		----	----
SH2174	Environmental Science	1	-	2	2	ISE	50	40	40	--	---
						ESE	50	40		--	--
EE2514	DC Machines and Transformer Lab	-	-	2	1	ISE	----	----		50	50
						ESE	----	----		50	50
EE2574	Computer Programming Lab	-	-	2	1	ISE	----	----		50	50
						ESE	--	--		50	50
EE261	Electrical Maintenance and Troubleshooting	-	-	2	1	ISE	----	----		100	50
	Professional Skills Development and Foreign Languages	-	-	2	1	ISE	-	-	-	100	50
	TOTAL	**16**	**1**	**10**	**22**						
	TOTAL CONTACT HOURS	**27**									

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam

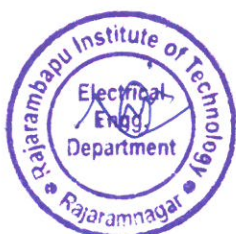**Total Contact Hours/week** : 27
Total Credits : 22

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Sr. No.	Subject Name		Course Code
1.	Professional Skills Development and Foreign Languages	Professional Leadership Skills	SH2634
2.		Interpersonal Skills	SH2614
3.		Innovation Tools and Methods for Entrepreneurs	SH2694
4.		Personal Effectiveness and Body Language	SH2594
5.		German Language – Level III	SH2734
6.		Japanese Language – Level III	SH2714

Note:

1. A student has to complete any two courses out of six choices offered under Choice Based Professional Skills Development Programme. A course in each semester will be allocated without any repetition.
2. Foreign Language course selected in F. Y. B. Tech Sem-I will remain the same with next levels in Sem-III & IV. (No new entries in S. Y. B. Tech Sem-III)

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: S. Y. B. Tech   **Semester:** IV
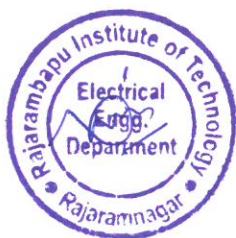
Course Code	Course	L	T	P	Credits	Scheme	Theory (%Marks) Max	Theory (%Marks) Min. for passing		Practical (%Marks) Max	Practical (%Marks) Min. for passing
EE2064	Analog and Digital Electronics	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE2024	AC Machines	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE214	Electrical Measurement and Instrumentation	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			--	---
						UT2	15			---	---
						ESE	50	40		---	---
EE2084	Signals and Systems	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			--	---
						UT2	15			---	---
						ESE	50	40		---	---
	Multidisciplinary Minor-II	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE216	Advanced Programming Language for Electrical Engineering	2	-	-	2	ISE	20	40	40	---	---
						UT1	15			--	--
						UT2	15			--	--
						ESE	50	40		--	--
EE2524	AC Machines Lab	-	-	2	1	ISE	---	----	--	50	50
						ESE	--	--	--	50	50
EE2544	Analog and Digital Electronics Lab	-	-	2	1	ISE	---	----	--	50	50
						ESE	---	----	--	50	50
EE262	Electrical Measurement and Instrumentation Lab	-	-	2	1	ISE	---	----	--	100	50
EE264	Electrical Installation	-	-	2	1	ISE	---	----		100	50
EE266	Advanced Programming Language for Electrical Engineering Lab	-	-	2	1	ISE	---	----		100	50
	Professional Skills Development and Foreign Languages	-	-	2	1	ISE	-	-	--	100	50
	TOTAL	17	-	12	23						
	TOTAL CONTACT HOURS		29								

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam

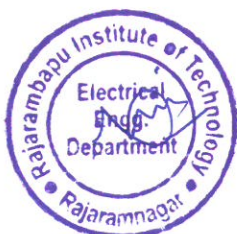**Total Contact Hours/week**   : 29
Total Credits   : 23

Note: Students are required to undergo industrial / field training of minimum two weeks in the vacation of Semester-IV and its evaluation will be carried out in the Semester-V.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Sr. No.		Subject Name	Course Code
1.	Professional Skills Development and Foreign Languages	Professional Leadership Skills	SH2634
2.		Interpersonal Skills	SH2614
3.		Innovation Tools and Methods for Entrepreneurs	SH2694
4.		Personal Effectiveness and Body Language	SH2594
5.		German Language – Level IV	SH2644
6.		Japanese Language – Level IV	SH2624

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: T. Y. B. Tech   **Semester: V**

Course Code	Course	Teaching Scheme				Evaluation Scheme				
							Theory (%Marks)		Practical (%Marks)	
		L	T	P	Credits	Scheme	Max	Min. for Passing	Max	Min. for passing
EE3034	Power System Analysis	3	-	-	3	ISE	20	40	---	---
						UT1	15		---	---
						UT2	15	40	---	---
						ESE	50	40	---	---
EE313	Feedback Control System	3	-	-	3	ISE	20	40	---	---
						UT1	15		---	---
						UT2	15	40	---	---
						ESE	50	40	---	---
EE315	Microcontroller & Its Applications	3	-	-	3	ISE	20	40	---	---
						UT1	15		---	---
						UT2	15	40	---	---
						ESE	50	40	---	---
	Program Elective -I	2	-	-	2	ISE	20	40	---	---
						UT1	15		---	---
						UT2	15	40	---	---
						ESE	50	40	---	---
	Open Elective-I	3	-	-	3	ISE	20	40	---	---
						UT1	15		---	---
						UT2	15	40	---	---
						ESE	50	40	---	---
	Multidisciplinary Minor-III	3	-	-	3	ISE	20	40	---	---
						UT1	15		---	---
						UT2	15	40	---	---
						ESE	50	40	---	---
	Multidisciplinary Minor-IV	1	-	2	2	ISE	--	--	50	50
						ESE	--	--	50	50
SH3035	Scholastic Aptitude-I	2*			Audit	ISE	100	50 (P/NP)	--	--
EE361	Feedback Control System Lab	-	-	2	1	ISE	--	--	50	50
						ESE	--	--	50	50
EE363	Microcontroller Lab	-	-	2	1	ISE	---	---	50	50
						ESE	--	--	50	50
EE359	Advanced Software Lab	-	-	2	1	ISE	---	---	100	50
EE3574	Summer Internship	-	-	-	2	ISE	---	---	100	50
	TOTAL	18+2* = 20*	-	08	24					
	TOTAL CONTACT HOURS	28*								

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam, P = Pass, NP = Not Pass

Total Contact Hours/week   : 28*
Total Credits   : 24

Note*: Students should complete 5 days (30 Hours) of Scholastic Aptitude training program organized by the Institute.
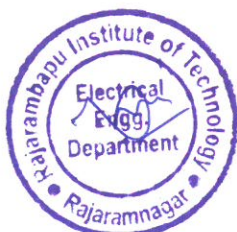
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Program Elective-I

Sr. No	Course Code	Domain	Course
1	EE3094	**Power and Energy Systems**	Energy Storages Technologies
2	EE3114		Restructured Power System
3	EE3134	**Drives and Control**	Digital Signal Processing
4	EE3154		Electrical Utilization and Traction

| Open Elective I			
Sr. No.	Course Code	Open Elective Subject Name	Offered by the department
1	OE3044	Renewable Energy Sources	Robotics & Automation
2	OE3064	Environmental Impact Assessment	Civil Engineering
3	OE3104	Network Administration	Computer Science and Engineering
4	OE3381	Disaster Management	Civil Engineering
5	OE341	Energy Audit and Management	Electrical Engineering
6	OE343	Data Science	Computer Science & Engineering (Artificial Intelligence and Machine Learning)
7	OE365	Distributed Systems	Computer Science and Information Technology
8	OE347	New Product Design & Development	Mechanical Engineering
9	OE349	Non-Conventional Energy Sources	Mechanical Engineering
10	OE351	Hydrogen & Fuel Cell Technology	Mechanical Engineering
11	OE353	Factory Automation	Mechatronics Engineering Dept.
12	OE355	Cyber Physical System	Mechatronics Engineering Dept.
13	OE357	Internet of things	Electronics & Telecommunication Engineering

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Open Elective I			
Sr. No.	Course Code	Open Elective Subject Name	Offered by the department
14	OE359	Drone technology	Electronics & Telecommunication Engineering
15	OE361	Object Oriented Modeling and Design	Computer Science and Information Technology
16	OE363	Robotics Engineering & Applications	Robotics & Automation
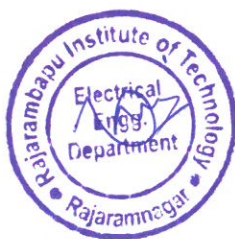
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: T. Y. B. Tech   **Semester:** VI

Course Code	Course	L	T	P	Credits	Scheme	Theory (%Marks) Max	Theory Min. for passing		Practical (%Marks) Max	Practical Min. for passing
EE314	Power System Protection	2	-	-	2	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE3044	Power Electronics	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE316	Research Methodology	2	-	-	2	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE320	Control System Design	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
	Program Elective-II	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
	Open Elective-II	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
	Multidisciplinary Minor-V	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
SH3065	Scholastic Aptitude-II	2*			Audit	ISE	100	50 (P/NP)	--	--	--
EE3544	Power Electronics Lab	-	-	2	1	ISE	--	--		50	50
						ESE	--	--		50	50
EE360	Automation and Control Lab	-	-	2	1	ISE	---	--		100	50
EE362	Power System Protection Lab	-	-	2	1	ISE	--	--		50	50
						ESE	--	--		50	50
EE3584	Capstone Project Phase I	-	-	2	1	ISE	--	---		100	50
	TOTAL	19+2* = 21*	-	08	23						
	TOTAL CONTACT HOURS	29*									

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam, **P = Pass, NP = Not Pass**

Total Contact Hours/week   : **29***
Total Credits   : **23**

Note*: Students should complete 5 days (30 Hours) of Scholastic Aptitude training program organized by the Institute.
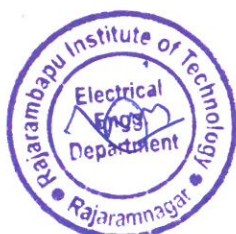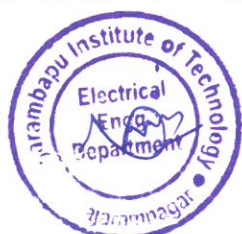
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Program Elective – II

Sr. No.	Course Code	Discipline	Course
1	EE3064	**Power and Energy Systems**	Electrical Energy Conservation and Auditing
2	EE318		Battery Management Systems
3	EE3104	**Drives and Control**	Advanced Control Systems
4	EE3124		Application of Microcontrollers in Electrical Engineering

| Open Elective II			
Sr. No.	Course Code	Open Elective Subject Name	Offered by the department
1	OE3024	Reliability Engineering	Robotics & Automation
2	OE3084	Materials Management	Civil Engineering
3	OE3182	Industrial Drives	Electrical Engineering
4	OE3284	Supply Chain Management	Mechanical Engineering
5	OE3324	Entrepreneurship Development	Mechanical Engineering
6	OE3401	Cyber Security	Computer Science and Information Technology
7	OE342	Data Mining	CSE(AI&ML)
8	OE344	Supply Chain Analytics	Mechatronics Engineering Dept.
9	OE346	Mobile Robotics	Mechatronics Engineering Dept.
10	OE348	Information Technology Foundation Program	Computer Science and Engineering
11	OE350	Operations Research	Civil Engineering
12	OE352	Image Processing	Electronics & Telecommunication Engineering

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Open Elective II			
Sr. No.	Course Code	Open Elective Subject Name	Offered by the department
13	OE354	Fuzzy logic and Neural Network	Electronics & Telecommunication Engineering
14	OE356	Project Management	Mechanical Engineering
15	OE358	Plumbing (Water and Sanitation)	Civil Engineering
16	OE362	Flexible Manufacturing System	Robotics & Automation
17	OE364	AI for Manufacturing	Computer Science and Information Technology
18	OE366	AI for Cybersecurity	Computer Science and Engineering
19	OE368	AI for Agriculture	CSE(AI&ML)
20	OE370	AI for Sustainability	Electronics & Telecommunication Engineering
21	OE3242	Marketing for Engineers	MBA
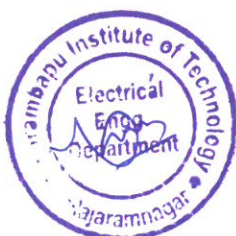
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: Final Year B. Tech   **Semester: VII**

Course Code	Course	Teaching Scheme			Credits	Scheme	Evaluation Scheme				
							Theory (%Marks)			Practical (%Marks)	
		L	T	P			Max.	Min. for passing		Max.	Min. for passing
EE429	Power System Operation and Control	2	-	-	2	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE413	Electrical Vehicle	3	-	-	3	ISE	20	40	40	---	---
						UT1	15			---	---
						UT2	15			---	---
						ESE	50	40		---	---
EE4034	Electrical Drives	3	-	-	3	ISE	20	40		---	---
						UT1	15		40	---	---
						UT2	15			---	---
						ESE	50	40		---	---
	Program Elective-III	3	-	-	3	ISE	20	40	40	—	—
						UT1	15			—	---
						UT2	15			---	---
						ESE	50	40		—	—
	Program Elective-IV	3	-	-	3	ISE	20	40	40	—	—
						UT1	15			—	---
						UT2	15			---	---
						ESE	50	40		—	—
	Program Elective-IV Lab	-	-	2	1	ISE	--	---	----	100	50
EE473	Solar and Wind Energy Systems Lab	-	-	2	1	ISE	--	---	----	100	50
EE475	Electrical Vehicle and Drives Lab	-	-	2	1	ISE	--	—	----	50	50
						ESE	--	—	----	50	50
EE4594	Capstone Project Phase-II	-	-	6	3	ISE	--	---		50	50
						ESE	--	---		50	50
	TOTAL	14	-	12	20						
	TOTAL CONTACT HOURS		26								

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE = End Semester Exam

Total Contact Hours/week : 26
Total Credits : 20
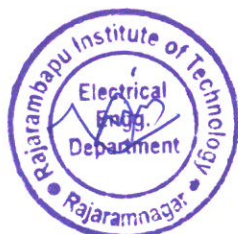
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Program Elective-III

Sr. No.	Course Code	Discipline	Course
1	EE4054	Power and Energy Systems	Power System Dynamics and Control
2	EE4074		HVDC Transmission Systems
3	EE4094	Drives and Control	Nonlinear Control Systems
4	EE411		Solar and Wind Energy Systems

Program Elective-IV Theory

Sr. No.	Course Code	Discipline	Course
1	EE4134	Power and Energy Systems	High Voltage Engineering
2	EE4154		Power Quality and Harmonics
3	EE4114	Drives and Control	FACTS Controllers
4	EE4174		Smart Grids

Program Elective-IV Lab

Sr. No.	Course Code	Discipline	Course
1	EE465	Power and Energy Systems	High Voltage Engineering Lab
2	EE467		Power Quality and Harmonics Lab
3	EE469	Drives and Control	FACTS Controllers Lab
4	EE471		Smart Grids Lab
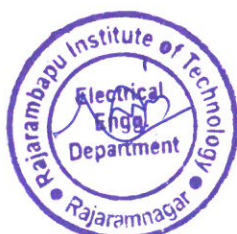
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Choice based Internship Model
Model I: Industry Internship (II)

Class: Final Year B. Tech   **Semester:** VIII

Course Code	Course	Teaching Scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory (%Marks)			Practical (%Marks)	
							Max.	Min. for passing		Max.	Min. for passing
OE4382	Finance for Engineers (Online Course)	2	-	-	2	ISE	25	40	40	---	---
						ESE	75	40		---	---
OE4362	Engineering Management & Economics (Online Course)	2	-	-	2	ISE	25	40	40	---	---
						ESE	75	40		---	---
IP4024	Industry Internship & Project	-	-	-	12	ISE	---	----		50	50
						ESE	---	---		50	50
	TOTAL	-	-	-	16						

ISE: In Semester Evaluation,   UT-I: Unit Test-I,   UT-II: Unit Test-II, ESE: End Semester Exam

Total Contact Hours/week   : --
Total Credits   : 16

Note:
1] Weekly Contact hours are not mentioned as student is expected to be in industry regularly for 20 weeks. However, student needs to report to Institute mentors as and when required.
2] For online course, lecture videos of each unit will be made available through college platform to the students. For each unit there will be separate assignment. Students need to submit all assignments within specified time.
Weightage: 25% weightage for unit wise assignments + 75% weightage for final exam. Final exam will be held at college campus.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Model II: Research Internship (RI)

Class: Final Year B. Tech   **Semester:** VIII

Course Code	Course	Teaching Scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory (%Marks)			Practical (%Marks)	
							Max.	Min. for passing		Max.	Min. for passing
OE4382	Financial Management (Online Course)	2	-	-	2	ISE	25	40	40	---	---
						ESE	75	40		---	---
OE4362	Engineering Management & Economics (Online Course)	2	-	-	2	ISE	25	40	40	---	---
						ESE	75	40		---	---
RE4044	Research Internship	-	-	-	12	ISE	---	----		50	50
						ESE	---	---		50	50
	TOTAL	-	-	-	**16**						

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam

Total Contact Hours/week   : -
Total Credits   : **16**

Note:
1] Weekly Contact hours are not mentioned as student is expected to be in outside research organization regularly for 20 weeks. However, student needs to report to Institute mentors as and when required.
2] For online course, lecture videos of each unit will be made available through college platform to the students. For each unit there will be separate assignment. Students need to submit all assignments within specified time.
3] Students who opt for a research internship need to undergo a minimum of one month of research internship in outside research organizations or laboratories.

Weightage: 25% weightage for unit wise assignments + 75% weightage for final exam. Final exam will be held at college campus.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Model III: Entrepreneurial Internship (EI)

Class: Final Year B. Tech   **Semester:** VIII

Course Code	Course	L	T	P	Credits	Scheme	Theory (%Marks) Max	Theory Min. for passing	Practical (%Marks) Max	Practical Min. for passing
ED4104	Project Management (Online Course)	2	-	-	2	ISE	25	40	-	-
						ESE	75	40	-	-
ED4044	Commercial Aspects of the Project (Online Course)	2	-	-	2	ISE	25	40	-	-
						ESE	75	40	-	-
ED4064	Entrepreneurship Development Program (EDP)	-	-	-	1	ISE	--	--	100	50
ED4084	Entrepreneurial Internship	-	-	-	11	ISE	---	--	50	50
						ESE			50	
	Total	-	-	-	**16**					

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam
Total Contact Hours/week : -
Total Credits : 16

Note:
1] Weekly Contact hours are not mentioned as student is expected to be in outside research organization regularly for 20 weeks. However, student needs to report to Institute mentors as and when required.
2] For online course, lecture videos of each unit will be made available through college platform to the students. For each unit there will be separate assignment. Students need to submit all assignments within specified time.
Weightage: 25% weightage for unit wise assignments + 75% weightage for final exam. Final exam will be held at college campus.
3] A one week Entrepreneurship Development Program (EDP) will be conducted after completion of 7th semester and before start of 8th semester.
4] Students who opt for an entrepreneurial internship need to undergo a one-month internship at an outside reputed organization or firm

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Multidisciplinary Minor

- Student should choose any one specialization given by the department and complete all the five courses under the specialization to earn 170 Credits.
- Following are the baskets of multidisciplinary minor courses

Multidisciplinary Minor Baskets					
MDM Basket Name	Sr. No.	Course Code	Course Name	Semester	Offered by Department
Construction Engineering	1	CEMD201	Building Construction and Planning	III	Civil Engineering
	2	CEMD202	Building Estimation and Valuation	IV	
	3	CEMD301	Infrastructure Engineering	V	
	4	CEMD303	Smart Cities and Sustainable Development	V	
	5	CEMD302	Environmental Engineering	VI	
Software Programming	1	CSMD201	Introduction to Data Structures	III	Computer Science & Engineering
	2	CSMD202	Problem solving using JAVA	IV	
	3	CSMD301	Fundamentals of Database Systems	V	
	4	CSMD303	Object-oriented Programming in Python	V	
	5	CSMD302	Artificial Intelligence	VI	
Electrical Power System	1	EEMD201	Electrical Power Generation	III	Electrical Engineering
	2	EEMD202	Power System	IV	
	3	EEMD301	Electrical Machines	V	
	4	EEMD303	Electrical Technology	V	
	5	EEMD302	Smart Grid	VI	
Electronics System Design	1	ECMD201	Electronics Devices and Applications	III	Electronics &Telecommunication Engineering
	2	ECMD202	Electronics Communication Systems	IV	
	3	ECMD301	Advanced Communication Systems	V	
	4	ECMD303	Electronic Product Design	V	
	5	ECMD302	Industrial Electronics	VI	
Software Development	1	CIMD201	Data Structures	III	Computer Science &
	2	CIMD202	Computer Algorithms	IV	

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

MDM Basket Name	Sr. No.	Course Code	Course Name	Semester	Offered by Department
Multidisciplinary Minor Baskets					
	3	CIMD301	Introduction to DBMS	V	Information Technology
	4	CIMD303	OOP using Java	V	
	5	CIMD302	Software Engineering	VI	
Product Design and Development	1	MEMD203	Design Thinking	III	Mechanical Engineering
	2	MEMD204	Behavioral Engineering and Design	IV	
	3	MEMD305	Product Design Tools and Techniques	V	
	4	MEMD307	Design and Prototyping	V	
	5	MEMD304	Marketing and Business Fundamentals for New Products	VI	
Mechatronics Engineering	1	MCMD201	Fundamentals of Mechatronics	III	Mechatronics Engineering
	2	MCMD202	Industrial Fluid Power	IV	
	3	MCMD301	Sensor and Instrumentation	V	
	4	MCMD303	Industrial Automation	V	
	5	MCMD302	Industrial Robotics	VI	
Artificial Intelligence	1	AIMD201	Object Oriented Programming	III	Computer Science & Engineering (AI-ML)
	2	AIMD202	Data Structures and Algorithms	IV	
	3	AIMD301	Machine Learning	V	
	4	AIMD303	Business Intelligence	V	
	5	AIMD302	Principles of AI	VI	
Robtocis & Automaiton	1	RAMD201	Fundamentals of Robotics & Automation	III	Robtocis & Automaiton
	2	RAMD202	Sensors and Actuators	IV	
	3	RAMD301	Kinematics & Dynamics for Robots	V	
	4	RAMD303	Robot Programming Lab.	V	
	5	RAMD302	Industrial Automation & Control	VI	

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

B.Tech. in Electrical Engineering with Double Minor (Multidisciplinary and Specialization Minor)

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
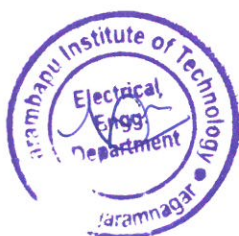
B.Tech. in Electrical Engineering with Double Minor degree

1. It is required to complete SIX courses (each of 3 credits) from ONLINE platform to earn total of 18 credits under Double Minor (DM) certification.
2. Student must complete and earn the credits for all the six courses starting from Second Year First semester (3rd semester) to Final Year Second Semester (8th semester).
3. Basket of the DM courses and respective semester is mentioned in the following table.

Sr. No.	Semester	Course	Code
1	III	DM – I	EEDM3XXX
2	IV	DM – II	EEDM4XXX
3	V	DM – III	EEDM5XXX
4	VI	DM – IV	EEDM6XXX
5	VII	DM – V	EEDM7XXX
6	VIII	DM – VI	EEDM8XXX

4. To select course platform, first preference must be given to NPTEL.
5. Other than NPTEL, courses from COURSERA and UDEMY platforms are allowed to register only in following cases,
   a. If timeline of NPTEL course is not in line with timeline of academic calendar.
   b. The suitable succeeding course in line with previous course is not available on NPTEL.
   c. If any other unavoidable circumstances occurs.
6. Platform and course selection must be as per recommendation of BOS of the department.
7. Student will get the credits of respective DM course in following conditions,
   a. In case of course selected from NPTEL platform, student have to complete the timely assignments, PASS the exam and secure the certificate.
   b. In case of course selected from COURSERA or UDEMY, student have to secure the certificate and appear for VIVA(oral) exam.
8. While selecting online course, following points must be taken care of,
   a. Selected course must be of basic or fundamental level.
   b. Contents of the course should not be covered in any of the course offered in regular curriculum or not listed in any elective (open or program elective) or in Multidisciplinary Minor (MDM)
   c. Duration of each online course must be of EIGHT weeks for NPTEL and 30+ hours for UDEMY, COURSERA courses.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

B.Tech. in Electrical Engineering with Honor and Multidisciplinary Minor

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
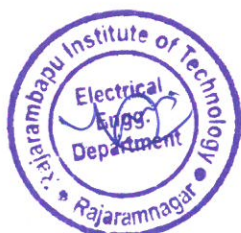
B.Tech. in Electrical Engineering with Honor and Multidisciplinary

Minor degree

1. It is required to complete SIX courses (each of 3 credits) from ONLINE platform to earn total of 18 credits under Honor certification.
2. Student must complete and earn the credits for all the six courses starting from Second Year First semester (3rd semester) to Final Year Second Semester (8th semester).
3. Basket of the Honor courses and respective semester is mentioned in the following table.

Sr. No.	Semester	Course	Code
1	III	Honor - I	EEH3XXX
2	IV	Honor - II	EEH4XXX
3	V	Honor - III	EEH5XXX
4	VI	Honor - IV	EEH6XXX
5	VII	Honor - V	EEH7XXX
6	VIII	Honor - VI	EEH8XXX

4. To select course platform, first preference must be given to NPTEL.
5. Other than NPTEL, courses from COURSERA and UDEMY platforms are allowed to register only in following cases,
   a. If timeline of NPTEL course is not in line with timeline of academic calendar.
   b. The suitable succeeding course in line with previous course is not available on NPTEL.
   c. If any other unavoidable circumstances occurs.
6. Platform and course selection must be as per recommendation of BOS.
7. Student will get the credits of respective Honor course in following conditions,
   a. In case of course selected from NPTEL platform, student have to complete the timely assignments, PASS the exam and secure the certificate.
   b. In case of course selected from COURSERA or UDEMY, student have to secure the certificate and appear for VIVA (oral) exam.
8. While selecting online course, following points must be taken care of,
   a. Selected course must be of advanced level and not basic or fundamental level.
   b. Contents of the course should not be covered in any of the course offered in regular curriculum or not listed in any elective (open or program elective)
   c. Duration of each online course must be of EIGHT weeks for NPTEL and 30+ hours for COURSERA, UDEMY courses.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

B.Tech. in Electrical Engineering-Honors with Research and Multidisciplinary Minor

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Curriculum Structure and Evaluation Scheme
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
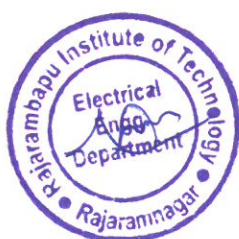
Honors with Research and Multidisciplinary Minor

The student will work on Research Project or Dissertation for 18 Credits in the Fourth Year in respective discipline. The distribution of 18 Credits for Research project in Sem-VII and Sem-VIII is given below. To get B.Tech. in Electrical Engineering-Honors with Research and Multidisciplinary Minor degree Student need to earn total 188 Credits which consist 170 credits of regular Multidisciplinary Minor courses and 18 credits of Research courses.

Class: Final Year B. Tech   **Semester:** VII

Course Code	Course	Teaching Scheme				Evaluation Scheme						
		L	T	P	Credits	Scheme	Theory (Marks %)			Practical (Marks %)		
							Max.	Min. for passing		Max.	Min. for passing	
REH401	Intellectual Property Rights	-	-	-	2	ISE	50	40	40	---	---	
						ESE	50	40		---	---	
REH403	Research project (Synopsis) phase - I	-	-	-	2	ISE	--	--	--	50	50	
						ESE	--	--		50	50	
REH405	Research Specific core course - I (Online NPTEL course)	-	-	-	3	ISE	50	40	40	--	--	
						ESE	50	40		--	--	
	TOTAL	-	-	-	7							

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam

Note: For Evaluation of Online NPTEL course ISE Marks will be marks obtained by students in the assignments given by NPTEL, students who will secure NPTEL certification will be only eligible for ESE of the same course which will be conducted at institute

Class: Final Year B. Tech   **Semester:** VIII

Course Code	Course	Teaching Scheme				Evaluation Scheme						
		L	T	P	Credits	Scheme	Theory (Marks %)			Practical (Marks %)		
							Max.	Min. for passing		Max.	Min. for passing	
REH402	Research project phase - II	-	-	-	11	ISE	--	--	--	50	50	
						ESE	--	--		50		
	TOTAL	-	-	-	11							

ISE: In Semester Evaluation, UT-I: Unit Test-I, UT-II: Unit Test-II, ESE: End Semester Exam

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **III**		**L**	**T**	**P**	**Credits**
Course Code : **EE2014**	Course Name : **DC Machines and Transformer**		**3**	**--**	**--**	**3**

Course Description:
The course aimed at acquiring an understanding on basic principles, operation, performance, control, testing and maintenance of dc machine and transformer. These transformers are used in power system for generation, transmission & distribution, utilization systems and also Machines are used in traction systems. Knowledge gained by the students will be used in the study of subjects such as power system operation & control, utilization system, switchgear & protection, testing and maintenance of electrical equipment and modern electric traction. The knowledge and skill gained by the student will be used while working as electrical supervisor, testing engineer and procurement engineer.

s

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Explain working principle and operation of single-phase and three-phase transformers.
2. Analyze performance with different applications of three-phase transformers.
3. Evaluate performance of the DC Machine.
4. Interpret characteristics of DC machines.
5. Identify suitable DC Machine and transformer for industrial applications.

Prerequisite: Basic Electrical Engineering, Engineering mathematics and Engineering physics.

Course Content		
Unit No	**Description**	**Hrs**
1	**Single Phase Transformers:** Single-phase Transformer-EMF equation, equivalent circuit refer to either sides, transformer on different loads, phasor diagram, voltage regulation, losses, efficiency, maximum efficiency, energy efficiency, performance characteristics, testing.	06
2	**Three Phase Transformers:** Construction, working principle, connections, factors affecting the choice of connection, voltage phasor diagram, vector groups, open delta or V-V connection, performance characteristics.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Applications, Standards and Troubleshooting of Transformers:** Applications of various transformers, Scott connections, auto transformers, troubleshooting of various transformers and, study of relevant Indian Standard Specifications, transformer cooling, parallel operation of transformer, testing.	06
4	**D.C. Machine:** Electromechanical Energy conversion- Principle of energy conversion, Magnetic system, Construction details, working principle, back EMF, generated EMF, methods of excitation, types of DC Machines, armature reaction, effect of armature reaction, commutation, magnetizing and demagnetizing ampere turns, torque equation, speed equation.	06
5	**Characteristics and Testing of DC Machine:** Open circuit characteristics of DC generator, DC motor: break test, Swinburne test, Hopkinson's test, losses and efficiency, types of starters, speed control and braking methods of DC Motors,	06
6	**Special purpose machines and Trouble Shooting of DC Machines:** Permanent Magnet DC Motor (PMDC), Brushless DC Motor (BLDC), Steeper Motor, Servo Motor, SRM, Universal motor. Applications of various, DC motors, various equipment's used to diagnose fault, troubleshooting of various DC motors and study of relevant Indian Standard Specifications.	06

References -
Text Books:
- B. L. Theraja, A. K. Theraja, "Electrical Technology", S. Chand Publications, Volume - II, AC and DC Machines.
- Ashfaq Hussain, "Electric Machines", Dhanpat rai & Co. ltd.

Reference Books:
- Bimbhra.P.S, Electrical Machinery, Khanna Publishers, IL Kosow, "Electrical Machines & Transformers", Prentice Hall of India.
- Kothari.D.P and Nagrath.I.J., "Electrical Machines", Tata McGraw Hill Publishing Co.Ltd, New Delhi.
- Hill Stephen, Chapman.J, "Electric Machinery Fundamentals", McGraw Hill Book Co., New Delhi.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S. Y. B. Tech.**	Semester- **III**	**L**	**T**	**P**	**Credits**
Course Code : **EE2034**	Course Name : **Electrical Circuit Analysis**	3	1	--	4

Course Description:
The course has been designed to introduce fundamental principles of circuit theory which is commonly used in engineering research and scientific applications. Techniques and principles of electrical circuit analysis includes concepts such as voltage, current, resistance, impedance, Ohm's and Kirchoff's laws. Also, it deals with different techniques for the analysis of electric circuits under transient and steady-state conditions. The course gives emphasis on DC sources, sinusoidal sources, steady-state power and three-phase balanced systems, two port networks and filter design.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Apply fundamental laws to analyze DC and AC circuits.
2. Make use of different theorems to evaluate steady state parameters of AC and DC circuits.
3. Analyze the electrical two port networks.
4. Evaluate the circuit under transient conditions.
5. Design basic passive filters.

Prerequisite: Basic Electrical Engineering, Engineering Mathematics.

Course Content		
Unit No.	**Description**	**Hrs**
1	**Network Topology:** Graph Theory, Incidence Matrix, Fundamental Loop Matrix, Fundamental Cut set Matrix, Mesh and Nodal Analysis, Star-Delta Transformation, source transformation, Duality.	06
2	**Network Theorems:** Superposition, Thevenin's, Norton's, Maximum power transfer, Tellengen's Theorem (AC and DC). Time and Frequency domain analysis of circuits for step, ramp, exponential and damped exponential inputs.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Three Phase System and Resonance:** Introduction to Balanced and Unbalanced Three phase systems, Analysis of three phase systems, calculation of real and reactive powers. Resonant Circuits: Analysis of simple series RLC and parallel RLC circuits under resonances. Resonant frequency, Bandwidth and Quality factor at resonance.	06
4	**Two Port Network:** Open circuit impedance, Short circuit admittance and Transmission parameters and their evaluation (Z, Y, H, ABCD). Relationship among these different parameters, Network functions for two port network.	06
5	**Transient Analysis:** Review of ordinary linear non-homogeneous first and second order differential equations with constant coefficients. Transient analysis of dc circuits by classical method for unit step input only. Behavior of circuit elements under switching action. Evaluation of initial conditions. software based simulation studies	06
6	**Elements of Filter Design:** Low-Pass, high pass, band-pass and band stop filters; Butter worth and Chebyshev approximations; Design of 1st order and 2nd order low-pass filters; Elementary synthesis techniques.	06

References -
Text Books:
- Alexander and Sadiku, Electric Circuits, McGraw Hill Education,
- M. E. Van Valkenburg, Network Analysis, Prentice Hall,.
- K.V.V. Murthy and M.S.Kamath, Basic Circuit Analysis, Jaico, Publishing

Reference Books:
- Thomas L. Floyd, Principles of Electric Circuits, Pearson Prentice Hall.
- William H. Hayt, Jack E. Kemmerly, Engineering Circuit Analysis, McGrawHill International.
- A. Sudhakar and Shyammohan s palli, Circuits and Networks: Analysis and Synthesis McGrawHill.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S. Y. B. Tech**.	Semester-**III**	**L**	**T**	**P**	**Credits**
Course Code : **EE211**	Course Name : **Mathematics for Electrical Engineers**	**3**	**-**	**-**	**3**

Course Description:
Engineering Mathematics - III is offered at the third semester of second year of four-year engineering degree course. This course intends to build the competency in the students to apply the concepts learnt in respective modules to various engineering problems. It contains six units which accomplish the fundamentals of mathematics required for Engineers.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Solve Linear Differential equations related to engineering application in electrical Engineering.
2. Find and represent periodic functions using Fourier series.
3. Apply rules of vector differential calculus to evaluate gradient, divergence and conservative vector field.
4. Identify an appropriate probability distribution and use its properties to calculate probabilities
5. Apply Laplace transform and Z-transform by using properties to various functions to solve electrical engineering problems.

Prerequisite: Higher Secondary Mathematics, Engineering Mathematics-I & II

Course Content		
Unit No.	Description	Hrs
1	**Linear Differential Equations and Its Applications:** Introduction and definition, Complete solution of Differential Equations with constant coefficient, and application of LDE to RL, RC, & RLE circuits.	06
2	**Fourier Series:** Euler's Formula, Fourier series of periodic function with period function with period 2c, Fourier series of even & odd function, Fourier series of periodic functions with arbitrary periods, half range Fourier series, Applications of Fourier analysis of voltage and current wave forms.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
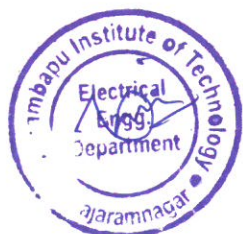
3	**Vector Analysis and its Interpretation:** Differentiation of vectors, Scalar and Vector point function, Gradient, Divergence, Directional derivative, Curl, Solenoidal and Irrotational vector fields, Application of Coulombs law and Gauss law for divergence, curl and Gradient.	06
4	**Probability Distributions:** Probability of Random Variable, Discrete and Continuous Probability Distributions, binomial, Poisson and Normal Distributions, Application in communication to find rate error probability.	06
5	**Laplace Transform and Its Applications:** Definition, Laplace transforms of Standard Functions, Properties of Laplace Transforms and Inverse Laplace Transforms, Laplace Transforms of Periodic Functions, Applications of Laplace Transform to solve ODE For Electrical Circuits	06
6	**Z –Transform:** Definition, Z-transform of standard functions, properties of Z- transform, inverse Z- transform. Use of Z- Transform in Electrical Engineering problems.	06

References -

Textbook:
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- N. P. Bali, Ashok Saxena and N. Ch. S. N. Iyengar, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi

Reference Books:
- Erwin Kreyszig, Advanced engineering mathematics, 9th edition, Wiley.
- Raman B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi.
- S. S. Sastry, Introductory Methods of Numerical Analysis.
- Peter V. O'Neil, Advanced Engineering Mathematics, Cole publishing house
- P. N. Wartikar and 1.N. Wartikar, A Text book of Applied Mathematics, Vol. I, Vol. II, Vidyarthi Griha Prakashan, Pune.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
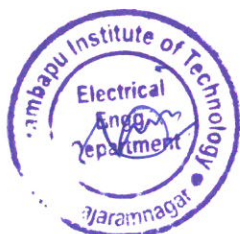
Class:- **S.Y. B. Tech.**	Semester- **III**	L	T	P	Credits
Course Code : **EE213**	Course Name : **Power Transmission and Distribution System**	3	--	--	3

Course Description:
The power system comprises of generation, transmission and distribution of electric power
This course covers economics of power generation different types of tariffs, various parameters
associates with transmission and distribution in terms of overhead and underground system
through use of different types of cables. Moreover, this course covers importance of power factor
in power system and minimization of voltage drop in distribution system.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Compare different tariffs for economic generation
2. Calculate different transmission line parameters
3. Select different components of overhead transmission lines and cables
4. Explain various phenomena occurring in power system
5. Identify importance of power factor and choose distribution system with minimum power loss.

Prerequisite: Basic Electrical Engineering, Basic Mathematics and Physics.

	Course Content	
Unit No	**Description**	**Hrs**
1	**Economics of Power Generation :** Structure of power system, types of loads, load curves and selection of generating units, important terms and factors, Economics of power generation, different types of tariff's used by utilities.	07
2	**Mechanical design of overhead lines:** Main components of overhead lines, different conductor materials, different insulators, string efficiency, methods of improving string efficiency, Corona and factors affecting corona, sag in overhead lines.	05
3	**Electrical Design of overhead lines:** Resistance of a transmission line, inductance of a single/three phase lines, capacitance of a single/three phase lines. Skin, proximity and Ferranti effects in power system	07

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Cables and Power Factor:** Construction and classification of cables, cable laying and grading of cables. Power triangle, power factor and its improvement techniques. Most economical power factor.	05
5	**Supply systems:** AC and DC transmission systems and its comparison. Different systems of power transmission, comparison of conductor material required in AC and DC system. Economics of power transmission.	06
6	**Distribution System:** Classification of distribution system, types of DC distributors, distributors fed at one / both end with equal and unequal voltages, Power loss calculations. AC distribution system and its voltage/ power loss calculation.	06

References -
Text Books:
- V.K Mehta, Principles of Power Systems, S. Chand
- Ashfak Husain, Electrical Power System, CBS Publication

Reference Books:
- S.Sivanagaraju and S. Satyanarayana Electric Power Transmission and Distribution, Pearson
- W.D. Stevenson (Jr.), Elements of Power System Analysis, McGraw Hill International

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
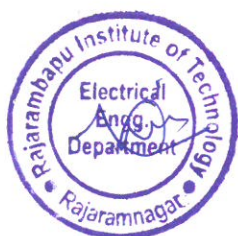
Class: **S. Y. B. Tech.**	Semester-**III**	**L**	**T**	**P**	**Credits**
Course Code: **CEMD201**	Course Name: **Building Construction and Planning**	3	-	-	3

Course Description:
The content of the course 'Building Construction and Planning' provides an overview of properties and applications of various building materials. The course offers an insight into the functional design of building components. It enables the students in planning of the buildings. It also deals with various services and finishes employed in buildings.

Course Outcomes:
After successful completion of the course, student will be able to,
1. Suggest appropriate materials for building construction applications.
2. Prepare a functional design of components of the building.
3. Design and draw residential building using principles of planning and bye-laws.
4. Prepare plumbing and electrification plan for the building.
5. Explain properties of building finishing materials and application procedure.

Prerequisite: Basic knowledge of mathematics.

	Course Content	
Unit No.	**Details of Content**	**Hrs.**
1	**Construction Materials:** Properties and applications of Various materials viz. Stone, Aggregate, Brick, Steel, Aluminium, Timber, Glass, Flooring materials, Roofing materials, Cladding materials, Plumbing materials. Mortar, Plain Cement Concrete, Reinforced Cement Concrete and pre-stressed concrete.	05
2	**Components of Building I:** Types of structures: Load Bearing Structure and Framed Structure, Preparation of sectional view drawing of load bearing and framed structure showing different building components, Concept of Soil Bearing Capacity, Substructure of a building, Components of Substructure of a building, Types of foundation and their suitability, Types of Masonry: Types of brick and stone masonry, bonds in brickwork and stone masonry.	05

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
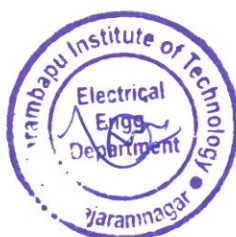**Department of Electrical Engineering**

3	**Components of Building II:** Building components in superstructure: Column, Beam, Wall, Sill, Lintel, Chajja, Slab, Ventilator, Roofing, Parapet wall, Ramp, ladder, lift and escalator. Doors, Windows and Staircase: Technical terms, classification, functional design and drawing.	06
4	**Planning of Buildings and Bye-laws:** Types of buildings, Site Selection criteria, Concept of Planning, Principles of planning. Bye-laws: Definition, Necessity, Procedure for obtaining Development permission/Building permission /Commencement permission, General land development requirements, General building requirements: Setback, Marginal distance, height and FSI as per Unified Development Control and Promotion Regulations for Maharashtra State. Introduction and necessity of building drawings, concept of scale, Types of building drawings-layout plan, site plan, measured, submission, working and perspective drawing. Preparation of building plans using principles of planning and bye-laws.	07
5	**Building Services:** Concept of Plumbing & Drainage plan, Plumbing systems, Types of traps, Fittings, Septic Tank, Soak pit, Rainwater harvesting, and Plumbing layout for buildings, Preparation of Plumbing and Electrification layouts for building.	07
6	**Building Finishes:** Plastering and pointing. Paints-Characteristics of ideal paints, constituents, classification, suitability, applying procedure and applications, defects. Varnishes- Characteristics of good varnish, ingredients, types, suitability, applying procedure and applications. Distemper- ingredients, applying procedure and applications. White washing and colour washing.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References –
Text Books:
- S. P. Arora, S. P. Bindra, "A Text Book of Building Construction", Dhanpat Rai Publications
- B. C. Punmia, "A Text Book of Building Construction", Laxmi Publications.
- **Government Rules & Regulations:**
- Unified Development Control and Promotion Regulations for Maharashtra State (UDCPR 2020), Urban Development Department, Government of Maharashtra.

References Books: -
- V. B. Sikka, "A Course in Civil Engineering Drawing", S. K. Kataria and Sons.
- W.B Macay, "Building Construction", Pearson Education
- S.Mantri, "The A to Z of Practical Building Construction and its Management", Satya Prakashan.
- C.M. Kale, M.G. Shah, S.Y. Patki, "Building Drawing And Planning With An Integrated Approach To BuiltEnvironment", Tata McGraw-Hill Education Pvt. Ltd.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S. Y. B. Tech.**	Semester-**III**	**L**	**T**	**P**	**Credits**
Course Code : **CSMD201**	Course Name : **Introduction to Data Structures**	3	-	-	3

Course Description:

The Introduction to Data Structures is a comprehensive study of fundamental concepts and techniques essential for efficient problem-solving in computer science. Students will explore various data structures, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables, and learn how to analyze their time and space complexity. The course extensively explores the design and analysis of algorithms, encompassing various topics such as sorting, searching, and graph traversal. Emphasis is placed on understanding algorithmic paradigms and their applications. Through programming assignments and theoretical exercises, students will gain practical experience in implementing algorithms and solving real-world problems. This course serves as a foundation for algorithmic thinking and prepares students for advanced computer science topics.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Describe the characteristics of various data structures such as stacks, queues, trees, and graphs.
2. Explain the operations and applications of linear data structures.
3. Compare linear and non-linear data structures with respect to their structure, operations, and applications.
4. Determine and justify appropriate data structures for solving real-world problems effectively.

Prerequisite: Basic knowledge of C programming, Knowledge of basic mathematical concepts.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Course Content		
Unit No.	**Description**	**Hrs.**
1	**Introduction to Data Structures:** Primitive and non-primitive data structures, Operations on data structures, Algorithms, Abstract Data Types (ADT).	06
2	**Stack:** Definition & Concepts, Operations on Stack, Applications of Stack, Polish expressions, Reverse Polish Expression and conversions, Recursion.	06
3	**Queue:** Queue and its sequential representation, Simple Queue, Circular Queue, Double Ended Queue, Priority Queue, Applications of Queue.	06
4	**Linked List:** Definition and structure of singly linked list, doubly linked list and circular linked list. Operations: creation, traversal, insertion, deletion.	06
5	**Tree:** Definitions and concepts, Terminology, Binary trees, Binary Tree Representations, Binary Tree Traversals, Binary Search Tree, Insertion and Deletion in BST, Applications of Tree.	06
6	**Graph:** Definition and concepts, Graph Representation, Graph Terminology, Graph Traversals – Depth First Search and Breadth First Search. Applications of Graph.	06

References -
Text Books:
- Data structures , Seymour Lipschutz (MGH), Schaum's Outlines.
- Data Structures using C, A Practical Approach for Beginners by Amol M. Jagtap & Ajit S. Mali.

Reference Books:
- Data structures and Algorithms -- Alfred V. Aho, John E. Hopcroft, J. D. Ullman (Addision- Wesely Series).
- Data Structure using C -- ISRD Group (TMH) ACE series.
- Introduction to Data Structures in C – Ashok N. Kamthane (Pearson Education).

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
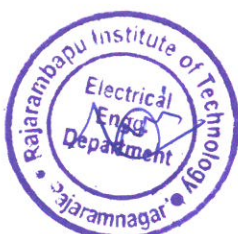
Class:- **S.Y. B. Tech.**	Semester- **III**	**L**	**T**	**P**	**Credits**
Course Code : **EEMD201**	Course Name: **Electrical Power Generation**	3	--	--	3

Course Description:
In this course provides fundamentals of energy sources. Energy is one of the most important components of economic infrastructure. Energy will be generated by conventional and non-conventional energy sources such as thermal, hydro, nuclear, solar energy, and wind energy etc. Processes to harness energy are therefore constantly becoming more technological and significant economically on a global scale. In electrical energy sources, students require theoretical knowledge in order to grasp the entire concept of conventional and non-conventional energy sources.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Explain the fundamental concepts of energy sources like conventional and non-conventional energy.
2. Describe various advantages and disadvantages of energy sources.
3. Illustrate different technology associate with thermal, hydro and nuclear power energy sources.
4. Illustrate different technology associate with solar, wind, biomass and other renewable energy sources.
5. Describe the working of micro/mini hydropower system.

Prerequisite: None.

	Course Content	
Unit No	**Description**	**Hrs**
1	**Energy Scenario:** Present energy scenario worldwide and Indian perspective. concept of energy services, forms and characteristics of energy sources, energy classification, India's production, reserves of commercial energy sources, need for non-conventional energy sources, advantages and disadvantages.	06
2	**Thermal Power Plant:** Law of thermodynamics, Analysis of steal cycle-Carnot, Reheat cycle and Regenerative cycle, Layout of power plant and coal handling plant, selection of site, boiler, impulse turbine and reaction turbine, economizer, air preheater, super heater, condenser and cooling tower.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Hydro Power Plant:** Rainfall, run off and its measurement hydrograph, flow duration curve, reservoir storage capacity, layout of hydroelectric power plant, selection of site, classification of hydro plant, construction and working of turbine-Pelton, Kaplan and Francis.	06
4	**Nuclear Power:** Fundamentals of nuclear power, layout of nuclear power plant, selection of site, radioactivity & nuclear reactions, nuclear fission chain reaction in reactors, reactor thermal hydraulics, thermal reactors, breeder reactors, biological effects of radiation, reactor safety & security.	06
5	**Solar Energy:** Solar radiation, flat plate collectors, solar concentration, thermal applications of solar energy, photovoltaic technology and applications, energy storage.	06
6	**Wind Energy:** Wind characteristics, resource assessment, horizontal and vertical axis wind turbines, principle of wind energy conversion, wind energy economics, electricity generation and water pumping.	06

References -
Text Books:
- Rao, S. and Parulekar, B.B., Energy Technology: Non-Conventional, Renewable and Conventional, Khanna Publishers.
- Rai, G.D., Non-Conventional Energy Sources, Khanna Publishers.

Reference Books:
- Twidell, J. and Tony W., Renewable Energy Resources, Taylor & Francis.
- Prabir Basu, Biomass Gasification, Pyrolysis and Torrefaction, Academic Press, Elsevier.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class : **S. Y. B. Tech.**	Semester : **III**	**L**	**T**	**P**	**Credits**
Course Code : **ECMD201**	Course Name : **Electronics Devices and Applications**	**3**	**-**	**--**	**3**

Course Description:

This course introduces analog and digital electronics devices along with their circuits and applications. It deals with fundamentals of analog electronic devices such as R-L-C components, Diodes and its applications, BJT and FET. It focuses on working principles of operational amplifiers, electrical parameters of Op-Amp and its applications. This course also consists of number system, their conversions, logic gates, combinational and sequential logic circuits.

Course Learning Outcomes:

After successful completion of the course, students will be able to,
1. Describe the fundamental concepts of electronics and working principles of different devices.
2. Analyze different analog and digital electronics circuits.
3. Design digital electronics circuits with truth table and logic diagram.

Prerequisite: Fundamental concepts of Mathematics and Physics.

	Course Content	
Unit No.	**Description**	**Hrs**
1	**Introduction to Electronic components** Resistor, Inductor, Capacitor, Transformer, Diodes: P-N Junction Diode, Zener diode, LED, Photo diode. Applications of diodes: Rectifiers, Clippers and Clampers.	06
2	**Bipolar Junction Transistor & Field Effect Transistor** Introduction to transistors, BJT characteristics, Common Emitter configuration of BJT. Application of BJT: Transistor as a switch, Transistor as an amplifier. Introduction & types of FET.	06
3	**Operational Amplifiers** Block Diagram of Op-Amp, Characteristics of Op-Amp, Virtual ground concept, Inverting and Non-inverting amplifier. Linear Applications of Op-Amp: Adder, Subtractor. Non-linear Applications of Op-Amp: Schmitt Trigger, Comparator.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Fundamentals of Digital System** Number systems: Decimal, Binary, Octal, Hexadecimal, Binary coded decimal (BCD), Number system conversions, Binary Arithmetic, 1's and 2's complements, Logic gates.	06
5	**Combinational Logic Circuits** Standard representation for logic functions, K-map, Minimization of logic functions using K-map, Half Adder, Full Adder, Half Subtractor, Full Subtractor, 1-Bit Comparator, Multiplexer, Demultiplexer, Encoder, Decoder.	06
6	**Sequential Logic Circuits:** S-R flip-flop, D flip-flop, J-K flip-flop, T flip-flop. Applications of flip-flops: Shift registers, Counters: Ripple/asynchronous counters, Synchronous counters, Counters design using flip flops, Ring counter & Twisted ring/ Johnson counter.	06

References
Text Books:
- Boylestad, Robert & Louis, Nashelsky, "Electronics Devices and Circuit Theory", Pearson.
- Ramakant Gayakwad, Op-Amps and Linear Integrated Circuits, PHI
- Anand Kumar, "Fundamentals of Digital Circuits", PHI.

Reference Books:
- Sergio Franco, Design with Operational Amplifiers and Analog Integrated Circuits, Tata McGraw Hill.
- R. P. Jain, Modern Digital Electronics, Tata McGraw Hill.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester-**III**		**L**	**T**	**P**	**Credits**
Course Code : **CIMD201**	Course Name : **Data Structures**		3	--	--	3

Course Description:

This course considers common data structures that are used in various computational problems. Students will explore various data structures, including arrays, linked lists, stacks, queues, trees, and graphs. This course serves as a foundation for algorithmic thinking and prepares students for advanced computer science topics. The course covers various applications of data structures. The course also focuses on typical use cases for these data structures.

Course Learning Outcomes:

After successful completion of the course, students will be able to,
1. Describe the basic terminologies of data structures.
2. Examine the linear data structure array with its types.
3. Demonstrate the working of stack, queue performed on data structures.
4. Illustrate the working of linked list.
5. Discuss Tree terminologies and their Applications.
6. Elaborate Graph terminologies with their types.

Prerequisite: Basics of C language

Course Content		
Unit No	**Description**	**Hrs**
1	**Introduction to Data Structures** Introduction to data structures, basic terminologies in data structure, Need and Applications, classification of data structures, Operations on data structures, Abstract Data Types.	06
2	**Array Data Structures** Introduction of Array, Representation of Array, Memory allocation of Array, types of array, operation in array, Applications of Array, Advantages and Disadvantages of Array	04
3	**Stack and Queue** Stack: Definition, Representation, Operations and Applications of Stack. Queue: Definition, Representation, Operations and Applications of Linear Queue, Circular queue, Deque, Priority Queue.	07

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Linked Lists**	07
	Definition, Terminologies, Representation, Operations, Singly linked list, Doubly linked list, Circular linked list, Stack using linked list, Queue using linked list.	
5	**Trees Terminology in data Structure**	06
	Tree definition, Terminologies and Applications, Binary trees and types. Binary tree traversals, Binary search trees, AVL tree, B tree.	
6	**Graphs Terminology in data Structure**	06
	Graph Definition, Terminologies and Applications, Types of graphs, Representation of graph using adjacency matrix and adjacency list, Graph traversal Techniques: Depth first and Breath first search.	

References –

Text Books:

- G. S. Baluja, "Data Structure Through C: A Practical Approach", Dhanpat Rai Publications.
- S. Tanenbaum, Y. Langsam, M. J. Augenstein, "Data Structure using C", (PHI).

Reference Books:

- Alfred V. Aho, John E. Hopcroft, J. D. Ullman, "Data structures and Algorithms", Addision, Welsely Series.
- Ashok N. Kamthane, "Introduction to Data Structures in C", Pearson Education.
- Yashwant P. Kanetkar, "Data Structures through C", BPB Publications.
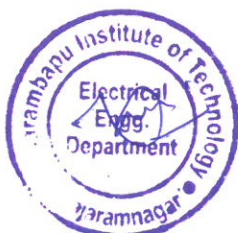
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester-**III**	**L**	**T**	**P**	**Credits**
Course Code : **MEMD203**	Course Name : **Design Thinking**	3	--	--	3

Course Description:

Maximizing the success of new products and services can drive growth and shareholder value, lead to significant competitive advantage and leapfrog a company ahead of its competitors. However, innovation is risky and most new products fail in the marketplace. Often, failure is due to an ineffective process. Thus, expertise in the design and marketing of new products is a critical skill for all managers, inside and outside of the marketing department. In this course, we first focus on the tools and techniques associated with analyzing market opportunities and then focus on designing new products and services. This course will introduce the new product development process and cover the two main areas of focus:

- Discovery - opportunity identification
- Design - concept and product design, development and evaluation

Course Learning Outcomes:

This course is designed to familiarize students with the principles and practices in the development, design, Development and introduction of new products and services. After successful completion of the course, student will be able to:

1. Identify the new product opportunities and sources of new product ideas.
2. Elaborate the product life cycle and product design process.
3. Integrate the customer and end-consumer needs into design process.
4. Assimilate the various product characteristics to design a novel product
5. Participate effectively in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success.

Prerequisite: Course is open to all Students. The course demands application of creativity, sensitivity towards solving problems and liking for doing something new and creative.

	Course Content	
Unit No.	**Description**	**Hrs**
1	**Discovery- Opportunity Identification for New products:** Product life cycle, need for new products, strategic planning and new product opportunity, sources of new product ideas, S curves and technology forecasting. Product idea generation, Product Design Process steps.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

2	**Creativity and Innovation:** Definition, relevance of Creativity and Innovation in new product design, Improving creativity and innovation, hindrances to creative thinking, importance and formation of teams.	**06**
3	**Identifying Customer Needs:** Understanding customer needs, Voice of the customer, Gathering customer needs, organizing and prioritizing needs, Product mission statement, establishing product function.	**06**
4	**Establishing Product Specification:** Product Teardown and Experimentation, Benchmarking, Quality Function Deployment (QFD)	**06**
5	**Product Portfolios and Portfolio Architecture:** Product Architecture-types, establishing architecture, Modular design-basic clustering method, advanced functional methods	**06**
6	**Product Concept Generation, Selection and Testing:** Concept generation process and methods, Concept selection mechanism and techniques, Concept Testing-Purpose, process and methods.	**06**

References: -
- Ulrich, Eppinger, Anita Goel, Product Design and Development, McGraw Hill Publishing
- Otto & wood, Product Design, Pearson Education, reprint
- Charles Flurscheim, Industrial Design in Engineering, the Design Council, London,
- Devdas Shetty, Design for product success, Society for Manufacturing Engineering,

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: **S. Y. B. Tech.**	Semester: **III**	**L**	**T**	**P**	**Credits**
Course Code: **MCMD201**	Course Name: **Fundamentals of Mechatronics**	3	-	--	3

Course Description:

This course aims at providing fundamental understanding about the basic elements of a mechatronics system, interfacing, and its practical applications.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify various elements of mechatronics systems.
2. Select appropriate sensor/Actuator/controller/control algorithm for different applications.
3. Develop PLC/ microcontroller-based applications.

Prerequisite: The students should have knowledge of basic electronics.

	Course Content	
Unit No.	**Description**	**Hrs.**
1	**Introduction:** Introduction to Mechatronics, Key elements of Mechatronics, Block diagram of mechatronics system, Control systems and Modes of control, Difference between traditional and concurrent design process.	02
2	**Sensors and transducers:** **Transducers-** classification, Development in Transducer technology **Sensors -** Introduction, Need of Sensors, Classification, Working and Application of- Potentiometer Sensors, Strain Gauge Elements. Capacitive Elements, Eddy Current, Proximity Sensors, Inductive, Proximity Sensors, Light Sensors, Pressure Sensors, Pneumatic Sensors, Pyro electrical Sensors, Piezoelectric Sensors, Shaft Encoders. Selection of Sensors.	08
3	**Drives and Actuators:** Introduction and Classification of Actuators. Need and Scope. Hydraulic Actuation systems – Linear, Single and Double Acting system, Pneumatic Actuation systems- Gear Motors and Vane Motors. Electrical Actuation Systems – solenoid type Devices, Stepper Motors, and Servo Motor. Selection of Actuators.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Controllers:** **PLC-** Introduction, definitions, PLC block diagram, Difference between Relay panel and PLC, Selection of PLC, Programming formats, Ladder logic programming. **Microcontroller and Microprocessor-** Introduction, Comparison of Microcontroller and Microprocessor, Architecture – Pin configuration of 8051 Microcontroller, Assembly programming	08
5	**Signal Conditioning:** Operational amplifier circuits, filtering circuits, Analog, and Digital signal conversion.	06
6	**Advanced applications in mechatronics:** Mechatronics in automated manufacturing, Artificial intelligence in mechatronics, Fuzzy logic in mechatronics, Case studies of mechatronics systems.	06

References -
Textbooks:
- Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.).
- Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education.
- A Textbook of Mechatronics, R.K. Rajput, S. Chand & Company Private Limited
- Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, William Bolton, Prentice Hall.

Reference Books:
- Introduction to Mechatronics & Measurement System, David G. Alciatore, Michael B. Histand, McGraw Hill Education.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **III**	**L**	**T**	**P**	**Credits**
Course Code : **AIMD201**	Course Name : **Object Oriented Programming**	3	--	--	3

Course Description:
This course introduces object-oriented programming using the Java programming language. Students will learn how to program in Java and use some of its most important APIs. Special importance will be assigned to the object-oriented nature of Java and its use of polymorphism. Hands-on labs and exercises will enable students toward becoming highly skilled Java Application developers.

Course Learning Outcomes:
The course should enable the students to:
1. Understand the basic object oriented programming concepts and apply them in problem solving.
2. Illustrate inheritance concepts for reusing the program.
3. Implement program using loops, decision statements and functions in Python.
4. Plot data using appropriate Python visualization libraries.

Prerequisite: Basic Programming Skills

	Course Content	
Unit No	**Description**	**Hrs**
1	**Oops Concepts and Java Programming:** OOP concepts: Procedural and object oriented programming paradigm, Classes and objects, data abstraction, encapsulation, constructors, inheritance, polymorphism and overloading, Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, control flow statements, arrays, console input and output, garbage collection, exploring string class.	06
2	**Multiple Inheritance, Interfaces and Packages:** Inheritance: Inheritance hierarchies, super and subclasses, preventing inheritance, Polymorphism: dynamic binding, method overriding, Interface: Interfaces VS Abstract classes, implement interfaces, accessing implementations through interface references, Packages: Defining, creating and accessing a package, importing packages.	06
3	**Introduction to Python fundamentals:** Python introduction, Python syntax, Python comments, Python variables, Python data types, Python numbers, Python casting, Python strings, Python Booleans, Python operators.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Lists, Tuples, Sets, Dictionaries:** Access, change, add and remove list elements, loop lists, list comprehension, list methods, access, update, unpack tuples, loop tuples, tuple methods, Access, add, remove set items, set methods, access, add, change, remove dictionary items, nested dictionaries, dictionary methods.	06
5	**Python conditional statements:** If-else, while, for, lambda, arrays, Python Iterators, Python scope **Python classes and objects:** Classes, objects, parameterized and non-parameterized init constructor, object methods, self-parameter, association, aggregation and inheritance using python.	06
6	**Python for Machine Learning:** Numpy, Pandas, Matplotlib and Seaborn,	06

References -
Text Books:
- Herbert Schildt and Dale Skrien, "Java Fundamentals – A comprehensive Introduction", McGraw Hill.
- Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne.
- Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India
- ReemaThareja, "Python Programming using problem solving approach", Oxford University press

Reference Books:
- P. RadhaKrishna , "Object Oriented programming through Java", CRC Press.
- Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", Shroff Publishers

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: **S.Y. B. Tech.**	Semester - **III**	L	T	P	Credits
Course Code: **RAMD201**	Course Name: **Fundamentals of Robotics & Automation**	3	-	--	3

Course Description:

This course provides an in-depth understanding of the fundamental concepts and applications of robotics and automation. It provides an introduction to robotics, it's history and development, various types of end effectors, grippers, kinematic and dynamics of robotics, robot drive systems, sensors and actuators and fundamentals of robot programming and applications. This course also introduces the need for automation, its types and various applications of automation technology in industries.

Course Outcomes:

After successful completion of the course, students will be able to -
1. Differentiate various robotic configurations and performance metrics.
2. Compare various end effectors, sensors, and drive systems in robotic applications.
3. Illustrate kinematic and dynamic principles applied to robotic systems.
4. Outline robot programming solutions for diverse applications.
5. Distinguish various types and aspects of automation.
6. Relate the knowledge of Programmable Logic Controllers (PLCs) to industrial automation tasks.

Prerequisite: Engineering Science Courses, Engineering Mathematics, Basic Mechanics, Programming Fundamentals

Course Content		
Unit No.	Description	Hrs
1	**Introduction to Robots:** Definition - Historical background - Various generations of robots – Robot Anatomy - Robot configuration: Polar, Cylindrical, Cartesian coordinate, Joint-arm configuration - Degree of freedom - Work volume and Dead zone - Dynamic performance: Speed of response and Stability - Precision of movement: Spatial Resolution, Accuracy, Repeatability and Compliance.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

2	**Robot End Effectors, Sensors and Drive Systems:** **End Effectors**: Characteristic features - Types: Mechanical grippers, Magnetic grippers, Vacuum cups, Adhesive gripper, Hooks and Scoops - Tools as end effectors - Robot / End-effectors interface - Consideration in Gripper selection and Design **Sensors**: Transducers and Sensors - Sensors in Robotics: Tactile, Proximity and Range Sensors, Miscellaneous sensors and sensor based systems - Robot Vision System. **Robot Drive System**: Hydraulic, Electric and Pneumatic.	06
3	**Robot Kinematics & Dynamics:** Representation of objects in 3-D space-position and orientation, representation of orientation using roll, pitch and yaw angles, representation of orientation using Euler angles. Denavit - Hartenberg notations- link and joint parameters-rules for coordinate assignments, forward and inverse kinematics, Introduction to inverse and forward dynamics, determination of inertia tensor, Lagrange-Euler formation for joint torque	06
4	**Robot Programming and Its Applications:** Lead-through Programming, Walk-through Programming, Use of Teach pendants - Capabilities and limitations. Textural Programming: requirements of robot programming language, problems pertaining to robot programming languages, Common languages/Software used- - Robot program as a path in space Applications: Factors influencing the selection of Robots - Robots for Materials handling, Assembly, Agriculture and Chemical Plants - Advanced applications. Intelligent Robots - Introduction to Mobile Robots, Legged Robots and Remote Controlled Robots, Automated Guided Robots, Micro Robots - Control and Safety Issues.	06
5	**Introduction to Automation:** Mechanization and Automation - History of Automation - Reasons for automation - Merits and limitations - Automation systems - Types of Automation: Fixed, Flexible and Programmable Automation - Intelligent Industrial Automation - Automation and Robotics.	06
6	**Introduction to Programmable Logic Controller (PLCs):** Principles of operation of Programmable Logic Controller (PLC), PLC verses computer, PLC hardware components, Scan time of a cycle, Industrial PLC, Application of PLCs.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
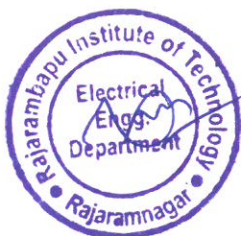**Department of Electrical Engineering**

References-
Text Books:

- Mittal R K & Nagrath, "Robotics and Control", 2nd Edition, McGraw Hill Publication TMH.
- S. K. Saha, "Introduction to Robotics", 2nd Edition, TMH, 2014.
- Groover, M.P. Weiss, M. Nagel, R.N. & Odrey, N.G., Ashish Dutta, "Industrial Robotics, Technology, Programming & Applications", Tata McGraw Hill Education Pvt. Ltd. New Delhi.

Reference Books:

- John J Craig, "Introduction to Robotics", Pearson Edu. 2005.
- Fu K.S, "Robotics", McGraw Hill, 2004.
- Niku SB, "Introduction to Robotics – Analysis, Control, Applications", 3rd Edition, John Wiley & Sons Ltd., 2020.

NPTEL Course on Robotics:

- https://onlinecourses.nptel.ac.in/noc19_me74/preview
- https://onlinecourses.nptel.ac.in/noc20_de11/preview

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **III**	**L**	**T**	**P**	**Credits**
Course Code : **SH2174**	Course Name: **Environmental Science**	1	--	2	2

Course Description:

The syllabus of Environmental Science provides an integrated, quantitative and interdisciplinary approach to the study of environmental systems. The students of Engineering undergoing this course would develop a better understanding of human relationships, perceptions and policies towards the environment and focus on design and technology for improving environmental quality. Project has been incorporated to enhance high potential in the student and built research and positive attitude towards environment related issues, which will help them in their social and technical life ahead. The project is designed to make them apply practical knowledge with relevant tools and techniques to solve real life problems related to the environment and industry. This course will help students in developing eco-friendly approach to achieve sustainable development.

Course Outcomes:

After successful completion of the course, students will be able to,

1. Apply interdisciplinary knowledge in environmental science by integrating concepts and principles from various fields of science and engineering to address environmental issues.
2. Evaluate environmental impacts of human activities on ecosystems and on the environment.
3. Use scientific approach to identify and solve environment related problems.
4. Design sustainable solutions to address environmental challenges by considering renewable energy sources, waste management strategies conservation measures, and environmental policies.
5. Participate in group work to become acquainted with the importance of teamwork, collaboration
6. Develop presentation and report writing skills.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

**Course Content**		
Unit No	**Description**	**Hrs**
1	**Natural Resources and Ecosystem:** Renewable and Non-renewable resources, Forest resources, water resources, Mir resources, food resources, Energy resources, alternative energy resources I resources, Structure and Functions of ecosystem, biotic and abiotic components, chains, food web Biodiversity, types of biodiversity, conservation of biodiversity.	04
2	**Environmental Pollution and Health:** Environmental Pollution, types of pollution, Air pollution, Water Pollution, Noise Pollution, Soil Pollution, Marine Pollution, Radioactive Pollution, Thermal Pollution (Causes, sources and effects, abatement methods), Pollution Case studies- Bhopal Gas Tragedy, Chernobyl Accident: A nuclear Disaster, Ganga Water Pollution. Solid Waste management (Causes, sources, effects & control measures), Hazardous waste management, Plastic waste management, E-waste management. Disaster management and risk analysis.	04
3	**Climate change and Sustainable development:** From unsustainable to sustainable development, Urban problems related to energy, Water conservation: Rainwater harvesting, Watershed management, Climate change, Global Warming, Ozone layer depletion, Acid Rain, Consumerism & waste Products, Concepts of Eco-labeled products, Eco-mark, Awareness of Environmental Legislation.	04

Guidelines for Project:
1. The distribution of project group will be done by project coordinator and respective head of the department to the faculty.
2. Project will be the team work consisting min 3 to max 5 students.
3. Project topic should be application oriented and with consideration to Environmental science problems in their respective stream. Selection and finalization will be through project guide.
4. Prepare project report as per guidelines.
5. Project group must provide complete solution to the selected problem with conceptual clarity.
6. The project will be evaluated by respective branch HOD and project guide and senior faculty.
7. The project should be presented before the committee, which shall evaluate for 50 marks.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
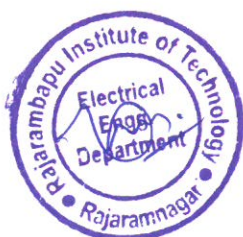**Department of Electrical Engineering**

References –
Text Books:

- D.K.Asthana, Meera Asthana, A Textbook of Environmental Studies, S.Chand Publication.
- S. Deswal & A. Deswal, Basic course in environmental Studies, Dhanpat Rai & Co ltd., Delhi.

Reference Books:

- Eldon D Enger, Bradley F. Smith, Environmental science – a study of inter-relationships Wm C Brown Publishers
- Francois Ramade Ecology of Natural resources, John wiley & Sons
- Robert Leo Smith, Ecology and field biology, Harper Collins Publishers
- Gilbert M. Masters, Introduction to Environmental Engineering & Science, Prentice Hall International Inc. Second Edition

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **III**		L	T	P	**Credits**
Course Code : **EE2514**	Course Name : **DC Machines and Transformer Lab**		--	--	2	1

Course Description:
This laboratory course emphasis on imparting the practical knowledge and understanding of basic principles, characteristic, performance and testing of DC Machines. The course orient student to understand the theoretical and practical dimensions. In this lab course, students will be familiar with the use of different equipment's and safety precautions on work place.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Perform polarity and O.C. S.C. test on transformer.
2. Interpret load characteristics of transformer.
3. Demonstrate speed control characteristics of DC Machines.
4. Identify characteristics of various machines along with their efficiencies.
5. Analyze various parameters of the DC machines.

Expt. No.	Description	Hrs
1	Polarity test of single-phase transformer.	02
2	Equivalent circuit of single ph. transformer by O C, S C Test	02
3	Efficiency of a single-phase Transformer by Direct loading	02
4	Parallel operation of single-phase transformers.	02
5	Load characteristics of three phase transformer	02
6	Magnetizing characteristics of self-excited and separately excited DC shunt generator.	02
7	Speed control of self-excited DC shunt motor by field, armature control method.	02
8	Speed control of separately excited DC shunt motor by field, armature and voltage control method.	02
9	Performance characteristics of DC Motor by break load test.	02
10	Performance of DC Motor by Swinburne test.	02
11	Performance of two identical DC Machines by Hopkinson's (regenerative) Test.	02
12	Load characteristics of shunt, cumulative, and differential compound motor.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: **S. Y. B. Tech**	Semester-**III**	L	T	P	Credits
Course Code : **EE2574**	Course Name : **Computer Programming Lab**	-	-	2	1

Course Description:

Object Oriented Programming (OOP) has become the preferred programming approach by the software industries, as it offers a powerful way to cope with the complexity of real-world problems. This course gives basic concepts of OOPs to the students, which makes them capable to develop secured program for designing mechanical components, for storing data/result in files and for drawing simple geometric shapes.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Analyze the problem to find the objects and build Object Oriented Program.
2. Elaborate the concepts of "Inline function", "Friend Function", "Function Overloading" and "Operator Overloading".
3. Modify/Extend the program by using Inheritance.
4. Use of memory management technique "Constructors" &"Destructors" to increase speed of program execution.
5. Perform different operation of file like "Create", "Open", "Close" files and perform "Read", "Write" and "Append".

Exp. No.	Description	Hrs.
1	Basics of Structure: Definition, Declaration , Initialization (Compile and run time), Array of Structure variables	02
2	Storage Classes: Automatic, Static, External, Register, Mutable	02
3	Class & Object	02
4	Constructor (Default constructor, Parameterized constructor) and Destructor	02
5	This pointer and static Keyword	02
6	Inline function & Friend function	02
7	Inheritance-single, multilevel, multiple	02
8	Inheritance -hierarchical, hybrid, virtual base class	02
9	Polymorphism : Function & Operator overloading	02
10	Polymorphism : Virtual Function	02
11	Abstraction: Abstract Class and Interface	02
12	File Handling-Open ,Read, Write and Append	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **III**	**L**	**T**	**P**	**Credits**
Course Code : **EE261**	Course Name : **Electrical Maintenance and Troubleshooting**	--	--	2	1

Course Description:

This course covers the fundamentals and techniques of troubleshooting and maintenance of electrical equipment and connections. Electrical Power system consists of a number of transformers, circuit breakers and other equipment which require installation, commissioning and regular maintenance to prevent permanent breakdown. Many times an engineering graduates has to carry out/supervise installation, commissioning and maintenance of various electrical equipment in power stations, substations and industry. This course will enable the engineering graduates to understand the concepts, principles and acquire basic skills of installation, commissioning and maintenance of electrical equipment in power stations, substations and industry.

Course Learning Outcomes:

1. Demonstrate safe practice to prevent electrical accidents while handling electrical tools/equipment.
2. Use tools/instruments for installation and to generate technical reports.
3. Conduct various tests as per IS on electrical equipment/machines.
4. Prepare maintenance schedule of different equipment/machines.
5. Develop trouble shooting chart for various electrical equipment, machines & domestic appliances.

Prerequisite: Theory and hands on practice with: Basic Electrical Engineering, Fundamentals of Electrical Machines, Fundamentals of Electronics, Analog and Digital Electronics, Electrical Measurements

Course Content		
Expt. No	**Description/ Title**	**Hrs**
1	Introduction to electrical instruments used in maintenance and troubleshooting.	02
2	Demonstration of the action to be taken during an electrical accident.	02
3	Undertake Mook drill Operation Using fire extinguisher and demonstration of Fire extinguishing system.	02
4	Measure insulation resistance of winding/cables/electrical equipment.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

5	Prepare plate/pipe/rod earthing and conduct earth testing as per IS.	02
6	Troubleshooting of ceiling fan & fluorescent and LED tube light.	
7	Prepare plate/pipe earthing as per IS.	02
8	Perform various tests on insulating oil.	02
9	Cutting copper and aluminum cable and crimping lug to them from 4mm^2 to 25mm^2 cross section.	02
10	Troubleshooting DC generator, repair and test it to run.	02
11	Study battery charger and make charging of lead acid battery.	02
12	Prepare maintenance schedule of induction motor & power transformer.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Choice Based Professional Skills Development and Foreign Languages Programme
for
Second Year B. Tech.
(Sem. III and IV)

Professional Skills Development and Foreign Languages Courses

1. Professional Leadership Skills (SH2634)

2. Interpersonal Skills (SH2614)

3. Innovation Tools and Methods for Entrepreneurs (SH2694)

4. Personal Effectiveness and Body Language (SH2594)

5. German Language - Level III (SH2734)

6. Japanese Language - Level III (SH2714)

An Important Notes:
- *A student has to complete any two courses out of six choices offered under Choice Based Professional Skills Development Programme. A course in each semester will be allocated without any repetition.*
- *Foreign language course selected in F.Y. Sem-I will remain the same with next levels in Sem-III and IV. (No new entries in S.Y. B.Tech Sem.-III)*

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech .**	Semester-**III/IV**	**L**	**T**	**P**	**Credits**
Course Code : **SH2634**	Course Name : **Professional Leadership Skills**	-	-	2	1

Course Description: This course is one of various courses offered under Choice Based Professional Skills Development programme. This course guides those special students who want to be entrepreneurs and professional leaders. This course covers various aspects of Leadership which includes Team formation, conflict management, motivation and presentation skills.

Course Outcomes:

After successful completion of the course, students will be able to,
1. Explain the traits of a leadership through real life examples.
2. Exhibit the ability to work effectively in team.
3. Prepare a presentation as per the audience and context requirements.

Prerequisite: A Student, who is going to enroll for this course should have -
1. Adequate knowledge of basic grammar of English language.
2. Intermediate level vocabulary of English language.
3. Ability to communicate moderately in English.

Minimum 12 sessions will be conducted from the following list.

Course Content		
Experiment No	**Description**	**Hrs**
1.	**SMART Goal Setting, SWOT/C Analysis and Action Plan:** Discussion on Dos and Don'ts, Advantages, and Generation of the Document by Students and its Assessment	02
2.	**Assertiveness and Positive Thinking:** Types of Behaviour, Benefits of Being Assertive and Positive Thinking, Developing Positive Attitude, Case Studies and Presentations	02
3.	**Self Management:** Need of Self Management, Developing Self Acceptance, Steps of Self Management, Individual Classroom Activity and its Assessment	02
4.	**Leadership Styles and Change Management:** Introduction to Different Types of Leaderships, Effective Organizational Change Management, Individual Classroom Activity and its Assessment	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
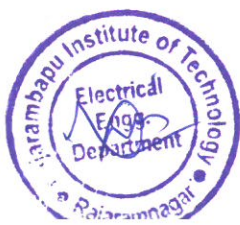**S. Y. B. Tech. Syllabus**
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

5.	**Team Formation and Leading a Team-I:** Why Teams? Roles and Responsibilities in Teams, Strategies for Team Development, Barriers to Teams, Steps of Team Development	02
6.	**Team Formation and Leading a Team – II:** Case Studies of Teams and Student Presentations	02
7.	**Business Meetings and Decision Making – I:** Preparing for the Meeting, Role of Chairperson and Participants in Meetings	02
8.	**Business Meetings and Decision Making – II:** Mock Meetings, Decision Making Case Studies and Feedback	02
9.	**Conflict Management:** Types of Personalities, Possible Reasons of Conflicts at Work Place, Conflict Resolution Strategies, Conflict Management Case Studies and Feedback	02
10.	**Time Management:** Time Management Techniques, Introduction to Time Management Tools, Benefits of Time Management, Case Studies and Presentations	02
11.	**Presentation Skills – I:** Preparation, Types of Presentations - Informative, Instructional, Arousing, Persuasive, Decision-making, Presentation Tools	02
12.	**Presentation Skills – II:** Body Language, Managing Questions and Student Presentations Student Presentations and Feedback, Student Presentations and Feedback	02
13.	**Creative and Critical Thinking:** Approaches to Creative Thinking, Strategies for Creative Thinking, Characteristics and Strategies of Critical Thinking	02
14.	**Motivating People:** Types of Motivation, Components of Motivation, Steps in Keeping Motivation Level High	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
1. Krishna Mohan and Meera Banerji; *Developing Communication Skills*, Macmillan India Ltd., New Delhi
2. Masters, L. Ann et al. *Personal Development for Life and Work*, New Delhi: Cengage Learning.
3. Jeff Butterfield, *Soft Skills for Everyone*, Cengage Learning India Private Limited.
4. John Seely, *Oxford Guide to Effective Writing and Speaking*; Oxford University Press.
5. UNLESH the power within... Soft Skills – Infosys Training Manual *Module 1 to 5* (Infosys Campus Connect Programme)

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)
Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-III/IV	L	T	P	Credits
Course Code : SH2614	Course Name : **Interpersonal Skills**	-	-	2	1

Course Description: This course offers the tips and techniques to lead a life full of success, prosperity and happiness by changing the current mind set to that of positive and harmonious thinking. It further teaches upon important aspects such as priorities in life, how to manage stress, teamwork , laws of nature , human body as a divine computer , power of mind etc.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Exhibit interpersonal communication skills.
2. Demonstrate decision-making skills.
3. Apply conflict resolution styles appropriate in different situations.
4. Demonstrate skills to manage balance in work and life.

Prerequisite: A Student, who is going to enroll for this course, should have following English language abilities:
1. Adequate knowledge of basic grammar of English language.
2. Intermediate level vocabulary of English language.
3. Communicate moderately using English language.

Course Content		
Experiment No	**Description**	**Hrs**
1.	**Importance of Universal Laws of Nature in Human Life.-** Overview, scientific, universal, secular, usefulness in every walk and phase of life, overview of Universal Laws of Nature, determining factor in human life, important laws of nature and its influence on life of individual, family, society and world at large. wisdom, living life in tune with laws of nature	02
2.	**'You are the Architect of your Destiny' -** This unit will make you aware that none else but you alone are responsible and accountable for what you achieve in your life , freedom of decisions, choices to make up your future, guiding powers to make the choices in your life, achieving life full of health, wealth , success , peace and happiness for yourself and all	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3.	**Setting and Achieving Goals** – Defining your own goals in life , Concept of power of mind , concepts of interaction of conscious and subconscious levels of mind, tips and techniques to harness the amazing power of subconscious mind to achieve goals, Visualization and auto-suggestion techniques, real life examples	02
4.	**Work-life Balance** – What is means by work-life balance, priorities in life, time management, its importance, practical tips that enable to achieve work-life balance	02
5.	**Art of Harmonious Thinking.** – Importance , concept of harmonious thinking, Wishful Thinking, Positive Thinking, difference between Harmonious Thinking and Positive Thinking, powerful techniques to inculcate the habit of Harmonious Thinking, concept of Spiritual Thinking , Divine Universal Prayer – the life changer, Bless All technique, benefits of chanting the prayer	02
6.	**Spirituality in Day-to-day Life** – Concept of Love Work, 7 dimensions of Love Work, benefits us as individual, family, society and entire human race, important to be a good human being, usefulness to become successful, tools to apply the different 'Lifeskills ' in day-to-day life, simple but powerful and useful techniques such as attitude of gratitude , attitude of win-all	02
7.	**Human Values** – Ethics and Human values, difference in ethics and values, Qualities of human values	02
8.	**Communication Skills** – Ability to commendably read, write, speak and listen by conforming knowledge and presenting in a structured, cohesive fashion, Understanding and demonstrating workplace communication in the context of organization's business, understanding one's core skills for job	02
9.	**Interpersonal Skills** – Presenting interpersonal skills by amiable and respecting individuals, effective listening to stakeholders, bonding and developing rapport, Team success	02
10.	**Decision Making** – Importance of correct decision making, Analytical thinking / mind, Information processing ability, Making sound judgment and confident decision	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

11.	**Cross cultured sensitizations & Adaptability** – Adapting multinational & multicultural environment, embracing diversity, culturally sensitive and bonding to colleagues and stakeholders, sense of belongings and promotion of unity at work place	02
12.	Evaluation of Students for their Understanding of Various Concepts Discussed.	02

References -

1. Spiritual Wisdom in Day-to-day life – Blogs by Mr. Pralhad Wamanrao Pai
2. Towards the goal of beautiful life – Book by Satguru Shri Wamanrao G. Pai
3. Power of your subconscious mind – Dr. Murphy
4. Seven people of highly effective people – Stephen Covey
5. How to win friends and influence people – Dale Carnegie
6. S. Hariharan, et al; *Soft Skills*, MJP Publishers, Chennai (2010)
7. Gopalaswamy Ramesh et al. *The ACE of Soft Skills: Attitude, Communication and Etiquette for Success*, New Delhi: Pearson Education, 2012. Print.
8. Masters, L. Ann et al. *Personal Development for Life and Work*, New Delhi: Cengage Learning, 2012. Print.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)
Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-III/IV	L	T	P	Credits
Course Code : SH2694	Course Name : **Innovation Tools and Methods for Entrepreneurs**	-	-	2	1

Course Description: This course helps students to identify different tools for developing the solution that student has already learned to ideate in the previous course "Creativity and Design Thinking". Further, students get information about various tools to carry out competitor analysis and user journey map. It would help him to come up with detailed specifications and USP of the product based on the competitor survey.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them
2. Apply User Journey Map to the selected problem to show user interaction at various stages
3. Analyze the solutions provided by competitors for effectiveness and gaps if any.

Prerequisite: A Student who is going to enroll for this course should have following abilities:
1. Creativity and Innovativeness
2. Problem identification
3. Apply design thinking approach to develop working prototype
4. Structured approach to problem solving

Minimum 12 sessions will be conducted from the following list.

	Course Content	
Expt. No	**Description**	**Hrs**
1.	**Systematic Innovation:** Define the problem in depth with all details, Trend prediction, Modeling the problem to identify tradeoffs and contradictions	02
2.	**TRIZ:** Theory of Inventive problem solving (TRIZ), HIT Matrix, Scamper, Algorithms of brain storming and innovation, Functional analysis	02
3.	**Frugal and Disruptive Innovation:** Biomimicry and frugal innovation for prototyping, Disruptive innovation.	02
4.	**User Journey Map:** Map showing user interaction at every stage of product/service. Step-by step process of UJM creation	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
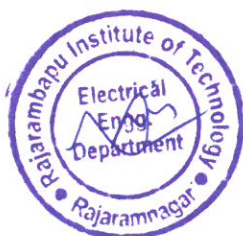**S. Y. B. Tech. Syllabus**
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

5.	**Competitor analysis:** Analysis of competitor and users for similar products, effectiveness of existing solutions and identifications of gaps	02
6.	**Product/Software Design Specifications:** Detailed specifications for better product design, detailed UI for software for clarity on user interaction, specify USPs of the product in comparison to the competitors	02

7.	**Business Canvas:**
	A. Definition of a Business Model
	B. The 9 Building Blocks:
	  1. Customer 2. Value Propositions
	  3. Channels, distribution, 4. Customer relationships
	  5. Revenue 6. Key Resources
	  7. Key Activities 8. Key Partnerships
	  9. Cost Structure
		02

8.	**Design Thinking (Part I):** Customer Insights, Ideation, Visual Thinking.	02

9.	Design Thinking (Part II):
	  A. Prototyping.
	  B. Storytelling.
	  C. Scenarios
		02

10.	**Institutional arrangement for Entrepreneurship Development:** Institutional arrangement for Entrepreneurship Development – DIC, ITCOT, SIDCO, NSIC, SISI, TIIC, SIDBI, Commercial Banks	02

11.	**Project Report:**
	  a) Economic Aspects b) Technical Aspects
	  c) Financial Aspects d) Production Aspects
	  e) Managerial Aspects
		02

12.	**Investor Pitch Tool:**
	  a) Introduction b) Helpful Tips about preparation, pitching and content sharing
	  c) Does and Don'ts d) Introduction
	  e) Problem f) Solution/Product/Service
	  g) Traction h) Market Opportunities/ Size
	  i) Competition j) Go To Market Strategies
	  k) Financials l) Team
		02

13.	**Revision -I**	02
14.	**Revision-II**	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
1. J. Knapp. Design Sprint, Simon & Schuster Publisher.
2. D. Silverstein. The Innovator's Toolkit, Wiley Publishing House.
3. M. A. Orloff. ABC-TRIZ: Introduction to creative design thinking with modern TRIZ modeling, Springer Publication.
4. M. Laverty. Entrepreneurship, OpenStax Publication.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)

Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-III/IV	L	T	P	Credits
Course Code : SH2594	Course Name : **Personal Effectiveness and Body Language**	-	-	2	1

Course Description: This course is one of various courses offered under Choice Based Professional Skills Development programme. The course with its interactive and need based sessions helps students in knowing and managing self, set and pursue meaningful goals, and develop positive personal qualities for sustainability in today's global world.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Develop skills to build self-esteem and positive attitude.
2. Develop interpersonal skills characterized by effective communication and conflict resolution.
3. Demonstrate responsiveness towards time, stress, and health issues.
4. Interpret the non-verbal behaviour of a person.

Prerequisite: A Student, who is going to enroll for this course, should have following English language abilities:
1. Adequate knowledge of basic grammar of English language.
2. Intermediate level vocabulary of English language.
3. Communicate moderately using English language.

Minimum 12 sessions will be conducted from the following list.

Experiment No	Course Content	
	Description	**Hrs**
1.	**Self-awareness and Self Esteem** Meaning, Factors influencing self-esteem- environmental and social factors Developing self-esteem- strategies for building self-esteem	02
2.	**Goal Setting** Long term and short-term goals, Steps in goal setting (SMART)- - identify strategies - consider possible blocks and ways to deal with them - outline the steps - set deadlines	02
3.	**Self-Analysis** SWOT Analysis, who am I, Attributes, Importance of Self Confidence	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4.	**Personality Typing** Extraversion, Introversion, Sensing, Intuition, Thinking, Feeling, Judging Perceiving	02
5.	**Life Skills for Personal Effectiveness** Values: Punctuality, Honesty, Loyalty, Dependability, Reliability- Application of Life Skills in day - to- day life - Life Skills for Adolescents and Youth	02
6.	**Time Management** Strategies for effective time management (Principles, Planning, Identify & Control time stealers, Prioritize, Problems and Solutions, learn to say NO	02
7.	**Stress Management** Sources of stress, types, signs and symptoms of stress - positive aspects of stress - negative aspects of stress	02
8.	**Stress Management Techniques** Coping mechanisms, Deep Breathing Exercise, Meditation and Visual Imagery techniques, Muscle Relaxation, Peer Sharing, Emotional Intelligence	02
9.	**Decision-making** Definition, Informed Decision Making, Consequences of Decision Making and Models of Decision Making	02
10.	**Creative Thinking** Out-of-the box thinking, Stages of Creative Thinking, Factors hindering creative thinking, Characteristics of Creative thinkers	02
11.	**Interpersonal skills** Meaning, need to develop interpersonal skills, components of interpersonal skills, techniques to improve skills, benefits with real life examples/case studies	02
12.	**Art of Communication** Verbal & Non-Verbal Communication, 7'Cs of Effective Communication Importance of Effective Communication	02
13.	**Body Language – I** Non-verbal codes: Kinesics, Proxemics	02
14.	**Body Language – II** Vocalics, Haptics, Appearance	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
1. S. Hariharan, *Soft Skills*, MJP Publishers, Chennai.
2. Gopalaswamy Ramesh, *The ACE of Soft Skills: Attitude, Communication and Etiquette for Success*, New Delhi: Pearson Education.
3. Jeff Butterfield, *Soft Skills for Everyone*, cengage Learning India Private Limited.
4. UNLESH the power within... Soft Skills – Infosys Training Manual *Module 1 to 5* (Infosys Campus Connect Programme)
5. Masters, L. Ann, *Personal Development for Life and Work*, New Delhi: Cengage Learning.
6. Covey, Stephen R., *Seven Habits of Highly Effective People*: *Powerful Lessons in Personal Change*
7. Barun K. Mitra, *Personality Development & Soft Skills*, Oxford Publishers, Third impression.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)

Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-**III**	L	T	P	Credits
Course Code : **SH2734**	Course Name : : **German Language – Level III**	-	-	2	1

Course Description: This course meets the requirements of student's overall personality development. The course helps the student in learning German as a foreign language. Vocabulary building activities, grammar, reading skills and basic conversational skills are addressed in this course.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Interpret the language if the next person is speaking slowly and clearly.
2. Make use of the language in routine life with the routing topics like family, shopping, work etc.
3. Demonstrate the language by self-introduction in German with simple sentences.

Prerequisite: A Student, who is going to enroll for this course, should have following German language abilities:
1. Adequate knowledge of basic grammar of German language.
2. Intermediate level vocabulary of German language.
3. Communicate moderately using German language.

	Course Content	
Experiment No	**Description**	**Hrs**
1.	Professions and their workplace Getting acquainted with different professions, usual tasks in particular profession , likes, dislikes etc.	02
2.	Job advertisements reading and understanding. To express oneself about his preferences for part time jobs. his likes and dislikes	02
3.	Short texts about finding jobs(for understanding the short paragraphs) & telephonic conversation Grammar- conjunctions and ,or, but (und ,oder ,aber)	02
4.	Grammar-Present Perfect Tense Exercises based on present perfect tense	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

5.	Present perfect tense with helping verb haben and sein. Difference between these two verbs and related exercises	02
6.	Vocabulary of clothes and conversation while buying the clothes	02
7.	Grammar- 'W' questions related to clothes(welche und diese) Exercises related to welche und diese in nominative and accusativ	02
8.	Grammar- present perfect tense of separable and non-separable verbs	02
9.	Dativ verbs Exercises related to dativ verbs	02
10.	Dialog between shopkeeper and customer Personal Pronomen in Dativ	02
11.	Orientation in the shopping mall. Understanding the floors and information on notice boards.	02
12.	Revision of the grammar and doubts clearing	02
13.	Test and presentations assigned to students during semester	02

References -
- Studio D – A 1, Cornelsen Verlag, Goyal Publishing House, New Delhi.
- Tangram Aktuell – A 1, Goyal Publishing House, New Delhi.
- Language A 1, Goyal Publishing House, New Delhi.
- Network A 1, Goyal Publishing House, New Delhi.
  The extra notes will be provided to the students to complete the required syllabus.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)
Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
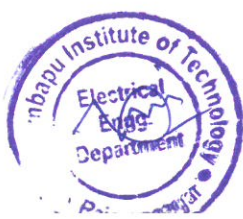
Class: - S.Y. B. Tech.	Semester- III	L	T	P	Credits
Course Code : **SH2714**	Course Name : **Japanese Language – Level III**	-	-	2	1

Course Description: This course is designed to introduce students to the everyday language of Japan. Lessons are organized around natural conversational topics, leading students from fundamental aspects of grammar to readings in simple texts.

Course Outcomes:
After successful completion of the course, students will be able to,
1) Make use of basic conversations in various situations.
2) Identify the sentence patterns.
3) Explain insights about the communication required for living in Japan.
4) Interpret Japanese work ethics required in their professional career.

Prerequisite: A Student, who is going to enroll for this course, should have following Japanese language abilities:
1) Knowledge of basic grammar of Japanese Language.
2) Communicate moderately using Japanese Language.

All the 15 lab sessions will be conducted to meet the needs of following content delivery.

Course Content		
Experiment No	**Description**	**Hrs**
1	Polite way of request for something, using て forms of the verbs.	02
2	Expressions used for offering to do something.	02
3	To ask for permission to do something.	02
4	Pattern used to express prohibition.	02
5	Use of て forms of the verbs to express sequence in action.	02
6	How to join two or more than two sentences together.	02
7	How to express something done after something.	02
8	Introduction of interrogative pronouns used to specify one item out of list of 2 or more than 2 things.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

9	Rules for adjective – adjective combinations in one sentence.	02
10	How to make ない forms of the verbs.	02
11	Use of ない forms of the verbs to ask or to tell someone not to do something.	02
12	Must do pattern using なければ なりません。	02
13	How to make dictionary forms of the verbs.	02
14	Uses Potential form できる	02
15	How to express the hobby.	02

Note:* Words written phonetically using the Latin alphabet (*romaji*) will be only used in the very initial stage to aid learning pronunciations.

References -
  1. Minna No Nihongo I (3A Corporation, Japan), Publications: Goyal publishers.
  2. Nihongo shouhou, Publication: JALTAP
  Other reference material, practice papers & CDs for listening practice.
  The extra notes will be provided to the students as per the requirement of the syllabus.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)
Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S. Y. B. Tech.**	Semester- **IV**		L	T	P	**Credits**
Course Code : **EE2064**	Course Name : **Analog and Digital Electronics**		3	--	--	3

Course Description:
The course has been designed to introduce fundamental principles of analog and digital electronics. This course focuses on construction, working & characteristics of electronic devices such as Diode, Zener Diode, BJT and FET. Also, it contains number system, boolean algebra, combinational circuits and sequential logic circuits. The students completing this course will understand basic analog and digital electronics, including semiconductor properties, operational amplifiers, combinational and sequential logic and analog-to-digital digital-to-analog conversion techniques.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Interpret characteristics of diodes, transistors, and MOSFET.
2. Analyze various analog circuits.
3. Design operational amplifier-based circuits.
4. Describe the fundamental concepts and techniques used in digital electronics.
5. Design combinational and sequential logic circuits.

Prerequisite: Mathematics, Physics, and Boolean Algebra.

	Course Content	
Unit No	**Description**	**Hrs**
1	**Diode & Its Applications:** P-N junction diode, I-V characteristics of a diode, half-wave and full- wave rectifiers, Clipper and clamper circuits, zener diode, mathematical modeling of diode.	06
2	**BJT & MOSFET:** BJT- Construction & operation of transistor, BJT configuration, I-V characteristics of a BJT, biasing circuits, BJT as a switch, BJT as an amplifier: mathematical modeling of BJT. MOSFET- Construction & operation of MOSFET, drain & transfer characteristics, biasing circuits, MOSFET as a switch.	06
3	**Operational Amplifiers & its Applications:** Ideal op-amp. Linear amp- Idealized analysis of op-amp circuits, inverting and non-inverting amplifier, Integrator & differential amplifiers, adders, subtractor, V to I converters. Nonlinear amp- Comparator, Zero Crossing Detector, Schmitt trigger, Square & triangular-wave generators	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Fundamentals of Digital System & Logic Families:** Digital signals, number systems, number system conversion, boolean algebra, binary arithmetic, 1's and 2's complements arithmetic, codes, digital logic families, logic gates.	**06**
5	**Combinational Logic Circuits:** Standard representation for logic functions SOP & POS form, K-map representation, minimization of logic functions using K-map, Adders, Subtractors, comparator, Multiplexer, De-Multiplexer, encoder/ decoder, code converter.	**06**
6	**Sequential Logic Circuits:** Sequential- 1-bit memory, latch, S-R flip-flop, J-K flip-flop, T flip-flop, D flip-flops, Master slave J-K flip flop, characteristic equation and application of flip-flop, serial to parallel converter, parallel to serial converter, universal shift register.	**06**

References –
Text Books:
- Robert L. Boylestad, Louis Nashelsky, Electronic devices & circuit theory, Pearson.
- Ramakant Gaikwad, OP-AMP and linear integrated circuits, PHI.
- R. P. Jain, Modern Digital Electronics, Tata McGraw Hill

Reference Books:
- Donald Neamen, Electronic Circuits: Analysis and Design, McGraw Hill
- Sergio Franco, Design with Operational Amplifiers and Analog Integrated Circuits, McGraw Hill.
- Leach & Malvino, Digital Principles & Application", McGraw Hill.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
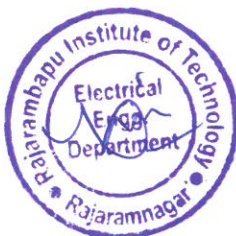
Class:- **S. Y. B. Tech.**	Semester-**IV**	**L**	**T**	**P**	**Credits**
Course Code : **EE2024**	Course Name : **AC Machines**	3	--	--	3

Course Description:
The course will provide strong foundation on A. C. Machines which will be useful for understanding foundation of operation, working, analysis, testing and applications of Synchronous and asynchronous machines. Equivalent steady-state circuits are developed for common in rotating machines. Practical information relating to general machine characteristics and nominal ratings is provided. The skills acquired after studying this subject will be helpful to operate & control the machines and also to find various operating parameters of machines.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Describe behavior of three phase and single phase induction motors.
2. Interpret various characteristics of three phase induction motor.
3. Identify various industrial applications for single phase and three phase Induction Motor.
4. Evaluate winding parameters of Synchronous Generator.
5. Analyze performance characteristics and testing of Synchronous Machine.

Prerequisite: Basic Electrical Engineering, Engineering mathematics and Engineering physics

	Course Content	
Unit No.	**Description**	**Hrs**
1	**Three Phase Induction Motor:** Construction, types, production rotating field, working principle, torque-slip curves, equivalent circuit, starters, deep bar and double cage induction motor, effects of harmonics on 3 phase induction motor, speed control methods.	06
2	**Application and Testing of Three Phase Induction Motor:** Industrial applications, induction generator No load Blocked rotor test, Circle diagram.	06
3	**Single Phase Induction Motor:** Double revolving field theory, starting & running performance of 1-phase induction motor, equivalent circuit of 1phase induction motor, Types of single phase motors, principle and operation of split phase, resistance start, capacitor start and capacitor start & run induction motor, shaded pole induction motor, fractional horse power motors.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	**Synchronous Generator:** Construction, types, applications, working principle, equation of induced EMF, pitch factor and distribution factor, MMF of distributed windings, torque equation, efficiency, armature reaction and its compensation, effect of change in excitation, effect of change in torque and speed, Hunting of synchronous machines and its prevention.	06
5	**Performance and testing of Synchronous Generator:** Determination of voltage regulation by Synchronous impedance method, MMF method, ZPF method, Synchronization: importance and methods, parallel operation, load sharing between parallel connected	06
6	**Synchronous Motor:** Methods of starting of synchronous motors, different torques in synchronous motor, stability, synchronous condenser, synchronous phase modifiers, V-curves and inverted V-curves of synchronous motors.	06

References –
Text Books:
- Ashfaq Husain, Electric Machines, Dhanpat Rai & Co
- V K Mehta, Principle of Electric Machines, S Chand Publication
- D.P. Kothari, I Nagrath , Electric Machines, Tata McGraw-Hill Education

Reference Books:
- P. S. Bimbhra , Electrical Machinery, Khanna Publishers
- B.L.Theraja and A.K.Theraja, Electrical Technology, S Chand Publication
- Charles I. Hubert, Electric Machines: Theory, Operating Applications, and Controls, Pearson publication

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S. Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **EE214**	Course Name : **Electrical Measurement and Instrumentation**	3	--	--	3

Course Description:
This course deals with the working of instruments used for measurement of various electrical quantities. It introduces various measurement techniques available for measurement of power, energy and deals with various types of signal generators, oscilloscopes, computer controlled measurement and test systems, instrumentation of non- electrical quantities and characteristics of measuring devices. Also, it deals with different industrial process controllers and signal condition devices used in industries.

Course Learning Outcomes:
After completion of this course student will be able to
1. Analyze different electrical measuring instrument.
2. Identify the various parameters in electrical measuring instruments.
3. Design measuring schemes for various electronic instrument applications.
4. Select appropriate transducer for various measuring applications.
5. Describe different non-electrical measuring instruments.

Prerequisite: Basic Electrical Engineering, Engineering Physics, Electrical Circuit Analysis

	Course Content	
Unit No	**Description**	**Hrs**
1	**Basic Concept of Measuring Instruments** Characteristics of measuring instruments, International Standards, Primary Standards, secondary Standards, Working Standards., Types of Errors, Analog indicating instruments –Moving Coil, Moving Iron and Rectifier type Instruments, Multi range ammeter and voltmeter, Synchro scope.	06
2	**Measurement of Electrical parameters** Dynamometer wattmeter, power factor measurement, power measurement in single phase circuit, active and reactive power measurement in three phase circuit using wattmeter, Construction and working principle of single phase and three phase energy meter, Error and their compensation, Power Analyzer, methods of measurement of low, medium and high range resistance, measurement of inductance, capacitance and frequency measurement.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Electronic Instruments**	06
	Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multi-meter, Basic concept of CRO, Measurement of voltage, current, frequency & phase by oscilloscope, Frequency limitation of CRO, sampling and storage oscilloscopes.	
4	**Instrument Transformers**	06
	Construction and working principle of Current Transformer (CT) and Potential Transformer (PT), phasor diagram, transformation ratio and phase angle error, classes of C.T and P.T., application of C.T. and P.T., capacitive potential transformer, Potentiometers.	
5	**Instrumentation Systems and Transducers**	06
	Specifications of instruments, their static and dynamic characteristics of measuring devices. Transducers: Definition, various types of transducers, selection factors and applications of transducers, Resistance type: potentiometer, strain gauge; inductive type: LVDT, RVDT; temperature transducers, capacitive type: piezo-electric transducers, speed resolver, encoders, Hall effect transducers, types and applications.	
6	**Measurement of Non-Electrical Quantities**	06
	Pressure sensing elements: manometers, elastic elements, bourdon tube, diaphragm, bellows, McLeod gauge, Pirani gauge; Flow sensing type: head meters (orifice, venture), area meters, rotameters, electromagnetic flow meter, coriolis flow meter, ultrasonic flow meter; Temperature sensing type: thermistors, thermocouple; Analytical sensors: pH measurement, Measurement circuit: deflection bridge, instrumentation amplifier.	

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
**Department of Electrical Engineering**

References
Text Books:
- K. Sawhney. Electrical & Electronic Measurement & Instruments. Dhanpat Rai & Co. Publications.
- R.K.Rajput. Electrical and Electronic Measurements and instrumentation. S. Chand

Reference Books:
- Rangan, Mani, Sharma. Instrumentation Devices & Systems, Tata McGraw-Hill Education.
- Johnson. Process Control Instrumentation Technology, Pearson/Prentice Hall, 8th Edition.
- S.K.Singh. Industrial Instrumentation and Control, Tata McGraw- Hill Education, 2nd Edition.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
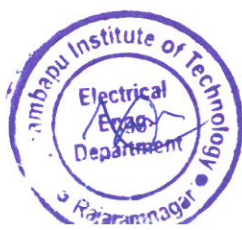
Class:- **S.Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code: **EE2084**	Course Name: **Signals and Systems**	3	--	--	3

Course Description:
The course covers standard test signals and various system types. It introduces mathematical tools necessary for the analysis and characterizations of signals and systems. It also familiarizes time and frequency domain representation of linear time-invariant systems. Fourier representations, Laplace, Z transform and sampling are introduced which are prerequisites for Control Systems and Digital Signal Processing courses.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Represent the various signals mathematically
2. Classify the systems and infer their properties
3. Compute the Fourier series and Fourier Transforms for given signals
4. Apply Laplace and Z-transforms to solve the systems.
5. Appreciate the significance of Sampling

Prerequisite: Linear ordinary differential equations; Fundamentals of calculus; Basics of electrical engineering.

	Course Content	
Unit No	**Description**	**Hrs**
1	**Signals in Natural Domain** Introduction, standard test signals, classifications, real-time examples. Basic mathematical operations on dependent and independent signals.	06
2	**Systems:** Introduction to systems, Classifications, Continuous LTI systems and their properties. Time domain representation of LTI systems. LTI systems governed by differential/difference equations. Convolutions and properties.	06
3	**Signals in Frequency Domain:** Introduction to Fourier series & Fourier transform and their properties.	06
4	**Discrete Signals in Frequency Domain:** Introduction to discrete Fourier series, Discrete Time Fourier Transform and Properties and DTFT spectrum.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

5	**Laplace and Z-Transform:** Introduction to Laplace transform - Region of Convergence, properties, inverse. Z-transform - Region of Convergence, properties, inverse. Applications of Laplace and Z-transform to electrical systems.	06
6	**Signal Conditioning and Sampling:** Signal conditioning circuits, Zero-crossing detection methods. Sampling theorem, sampling-reconstruction of signals, concept of aliasing. Introduction to Digital Signal Processing (DSP), use of signal processing in power analyzers and other applications.	06

References –
Text Books:
- P. Rameshbabu and R. Anandnatarajan, Signals and Systems, SCITECH
- Nagoorkani, Signals and Systems, Tata McGraw-Hill
- C.T. Chen, Signals and Systems, Oxford

Reference Books:
- V. Oppenheim, A. Willsky and S H Nawab, Signals and Systems, Pearson
- P. Lathi, Linear Systems and Signals, Oxford University Press
- Simon Haykin, Signals and Systems, Wiley Publication

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: **S. Y. B. Tech.**	Semester-**IV**	**L**	**T**	**P**	**Credits**
Course Code: **CEMD202**	Course Name: **Building Estimation and Valuation**	**3**	**--**	**--**	**3**

Course Description:
Building Estimation and Valuation course intends to develop the proficiency and confidence of the students so that they can prepare estimate of different civil engineering structures. The students will be able to analyze the rate of different building items. Thus, by studying this course, students will be more comfortable to prepare different bills on construction site.

Course Outcomes:
After successful completion of the course, student will be able to,
1. Explain the types and basic requirements of the estimate.
2. Explain measurement sheet, abstract sheet, and detailed specifications of different construction items.
3. Prepare detailed estimate of load bearing structure and framed structure.
4. Prepare rate analysis and bar bending schedule of different construction items.
5. Explain the tenders and contracts.
6. Describe basic terms of valuation.

Prerequisite: Unit conversions and the fundamental information of different construction materials with their rates.

	Course Content	
Unit No.	**Description**	**Hrs.**
1	**Introduction SSR:** General introduction to Quantity surveying, Purpose of estimates, Types of Estimates- Approximate and Detailed, Various items to be included in estimates of building, road and culvert with their modes of measurement, I.S. 1200, Prime cost, Provisional sums , Provisional quantities, Administrative approval and technical sanction to estimates. Introduction to S.S.R., General notes and guide lines.	06
2	**Specifications:** Specification- purpose and types, General specifications for different class of buildings, Detailed specifications of building items like PCC, RCC, brick and stone masonry, plastering, flooring. Measurement sheet, Abstract sheet, Long wall-short wall and center line method for finding quantities and problems.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Detailed estimate of building, road and culvert:** Detailed estimate of load bearing structures and RCC structures.	**06**
4	**Rate Analysis and Schedule of Reinforcement:** Importance of rate analysis, Factors affecting the cost of materials, labour, Task work, Transports, Overhead charges, market rates of various materials, labours. Rate analysis preparation of PCC, RCC, brick and stone masonry, plastering, pointing, flooring. Preparation of bar bending schedule for isolated footings, pile footings, beams, columns, slabs, staircase, lintel, chajja.	**06**
5	**Introduction of Tender and Contracts:** Tender- Notice, Documents, Procedure and Types, Contract- Types, Conditions, Earnest money, Security deposit, Validity period, Defect liability period, Liquidated and liquidated damage, Arbitration, Escalation of cost, Daily reports maintained on site.	**06**
6	**Valuation:** Definition, Necessity, Cost, Price, Value, Types of values, Depreciation and obsolescence, Sinking fund, Methods of calculating depreciation, Annuity, Year purchase, Land valuation, Methods of land and building valuation, Methods of valuation, Freehold and leasehold property, types of lease, Mortgage, Mortgage deed and Precautions, Problems based on valuation.	**06**

References –
References Books: -

- B. N. Dutta, "Estimating and Costing in Civil Engineering", USB Publishers, Distributors Pvt. Ltd. Delhi-110 002.
- M. Chakroborty, "Estimating, Costing, Specification and Valuation in Civil Engineering", USB Publishers, Bhabananda Road, Kolkata-700026.
- B. S. Patil, "Civil Engineering Contracts and Estimates", Universities Press Private Ltd. Hyderguda, Hyderabad. 500029, (A.P), India.
- S. C. Rangwala, "Elements of Estimating and Costing", Charotar Publishing House - opposite Amul dairy, court Road Anand. 388001.India

I. S. Code:-

- Updated I. S. 1200
- Updated S. S. R.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **CSMD202**	Course Name : **Problem Solving Using JAVA**	**2**	**-**	**2**	**3**

Course Description:
This lab course provides practical exposure to the fundamentals of Java programming and object-oriented principles such as classes, objects, inheritance, and polymorphism. Students will gain hands-on experience in implementing concepts such as abstraction, interfaces, packages, exception handling, and file operations. By practicing structured problem-solving using Java, students will be able to write modular, reusable, and robust code. The course promotes skill development through real-world coding exercises and mini-projects.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Describe the fundamental concepts of Java programming including variables, data types, control structures, arrays, and memory management.
2. Apply object-oriented principles such as classes, objects, constructors, access modifiers, and static members to develop Java programs.
3. Implement Inheritance, Polymorphism, Interfaces, Abstraction, and Nested Classes to build modular Java applications.
4. Manage packages and handle runtime errors using exception handling mechanisms.
5. Design and develop file-based Java applications using file handling classes and methods to perform basic CRUD operations.

Prerequisite: Basics of C programming, Fundamentals of Data Structures

Unit No	Description	Hrs
	Course Content	
1	**Fundamentals of Java:** Java: Overview, Features, JVM, JDK, JRE, Environmental Setup, Hello World Program, User Input, Comments, Variables, Data Types, Type Casting, Operator, Expression, Control loops and Statements, Arrays, Garbage Collection	04
2	**Introduction to Object Oriented Programming:** Introduction to OOP, Class & Object, Methods and Variables, Constructor, this keyword, Access Modifiers, static keyword	04
3	**Inheritance & Polymorphism:** Inheritance, super keyword, Polymorphism: Method Overloading and Overriding	04

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
**Department of Electrical Engineering**

4	**Interfaces & Abstraction:** Abstraction, Encapsulation, Interface, Final keyword, Nested Classes	04
5	**Package and Exception Handling:** **Package**: Organizing Classes and Interfaces in Packages, CLASSPATH setting for Packages, Naming Convention for Packages, **Exception Handling**: Exception and Errors, Types of Exception, Try-Catch Block, finally, throw and throws keyword, Java Built Exception and Custom Exception	04
6	**File Handling:** **File Handling**: CRUD Operations on File, File Methods	04

It should consist of 10 to 12 experiments based on the syllabus and experiment list mentioned below.

Experiment List		
Experiment No	**Description**	**Hrs**
1.	Write a program using input, data types, type casting, loops, and arrays.	02
2.	Implement a class with methods, constructor.	02
3.	Demonstrate the use of access modifiers, static and this keyword in a program.	02
4.	Write a program for inheritance and its types.	02
5.	Demonstrate method overloading and overriding in Java.	02
6.	Create a program using abstract classes and encapsulated attributes.	02
7.	Implement interface and final keyword in a real-time use case.	02
8.	Create user-defined packages and access them with correct classpath settings.	02
9.	Handle built-in and custom exceptions using try-catch-finally.	02
10.	Perform file creation, read, write, and delete operations using File class.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
Text Books:
- Balagurusamy, Programming with Java, , McGraw Hill
- Herbert Schildt, Java: The Complete Reference, , McGraw Hill

Reference Books:
- Kathy Sierra and Bert Bates, Head First Java, O'Reilly
- Joshua Bloch, Effective Java, Addison-Wesley
- Official Oracle Java Documentation – https://docs.oracle.com

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
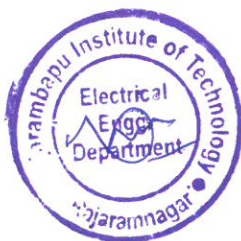
Class:- **S. Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **EEMD202**	Course Name : **Power System**	3	--	--	3

Course Description:
The power system comprises of generation, transmission and distribution of electric power
This course covers economics of power generation using different types of generating sources.
Different types of loads in power system, Moreover, this course covers importance of power
factor in power system and different types of tariffs. Overview of transmission and distribution
systems.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Write the basic working principles of different generating sources.
2. Analyze different types of loads
3. Explain importance of power factor and tariffs in power system.
4. Identify various components in power transmission and distribution system.
5. Select substation equipments as per requirement.

Prerequisite: Basic Electrical Engineering, Basic Mathematics and Physics.

	Course Content	
Unit No	**Description**	**Hrs**
1	**Power Generation :** Structure of power system, generating stations – operation and working of conventional and nonconventional energy sources. Comparison between them	06
2	**Variable load on power stations:** Load curves and types of loads – base and peak loads, cost of electrical energy, depreciation and its methods.	06
3	**Power factor and Electric Tariff:** Power triangle, power factor and causes of low power factor and methods of power factor improvement. Tariff and its characteristics.	06
4	**Electrical and Mechanical Design of Transmission lines:** Construction of transmission lines and its components, line resistance, inductance and capacitance. Sag and its calculation, String efficiency	06
5	**Supply systems:** AC and DC transmission systems and comparison. Overhead and underground system, Construction of cables and types.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

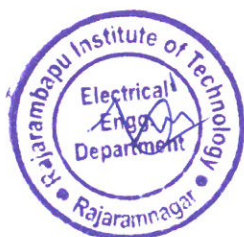| 6	**Substation:** Classification of substations, outdoor and indoor substations. Symbols for equipments in substations and their functions	06

References -
Text Books:
- V.K Mehta, Principles of Power Systems, S. Chand
- Ashfak Husain, Electrical Power System, CBS Publication

Reference Books:
- S.Sivanagaraju and S. Satyanarayana Electric Power Transmission and Distribution, Pearson
- W.D. Stevenson (Jr.), Elements of Power System Analysis, McGraw Hill International

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **ECMD202**	Course Name: **Electronics Communication Systems**	**3**	**-**	**-**	**3**

Course Description:
Analog and Digital Communication are the fundamental and core subjects in Electronics and Telecommunication Engineering. The course provides knowledge of basic principles of communication, modulation and demodulation techniques, transmission and reception methods in analog as well as digital communication.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Describe different communication systems.
2. Explain applications of analog and digital modulation techniques.
3. Analyze different modulation and demodulation techniques.
4. Explain the use of satellite communication.

Prerequisite: Fundamental concepts of engineering and Mathematics

	Course Content	
Unit No	**Description**	**Hrs**
1	**Amplitude Modulation & Demodulation** Electromagnetic spectrum, Introduction to communication system, Need for modulation. Amplitude Modulation, Definition, Time domain and frequency domain description, power relations in AM waves. Generation of AM waves, Detection of AM Waves.	**06**
2	**Frequency Modulation & Demodulation** Introduction of FM, Description of systems, Mathematical representation of FM, Frequency Spectrum of FM wave, Phase modulation, Intersystem comparisons, Pre-emphasis and de-emphasis, Generation of Frequency Modulation and Demodulation methods, Angle Modulation.	**06**
3	**Radio Receivers** Function of AM receiver, receiver parameters: Sensitivity, Selectivity, Dynamic Range, Tracking, Fidelity, Receiver Types- Tuned Radio Frequency(TRF) receiver, AM Receiver- RF section, Mixer, IF Frequencies and Amplifiers, FM Receivers- Common circuits, Comparison with AM receivers, Amplitude Limiting.	**06**

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

4	Digital Modulation Techniques And Data Formats Data Formats, ASK, FSK, PSK, coherent and non-coherent reception, BPSK, DPSK, QPSK, 16-QAM, MSK, Waveforms and Comparison of digital modulation	06
5	**Satellite Communication:** Basic concepts of Satellite Communications, Satellite subsystems, Satellite Link design, Orbital Mechanics,	06
6	**Satellite Application:** DBS, VSAT, GPS, Case Studies – Mars Mission, Chandrayan.	06

References:
Text Books:
- K.Sam Shanmugan, Digital & Analog Communication Systems, Wiley India
- RP Singh, S D Sapre, Communication System-Analog & Digital, Tata Mc-Graw Hill
- Kennedy, Davis, Electronics Communication Systems, Tata McGraw Hill

Reference Books:
- Bernard Sklar, Digital Communication-Fundamentals and Applications, Pearson Education
- Tomasi, Electronic Communication Systems Pearson Education.
- Taub, Schilling, Principles of communication systems, Tata McGraw Hill.
- Louis E Frenzel, Communication Electronics Principles & Applications, Tata McGraw Hill

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering
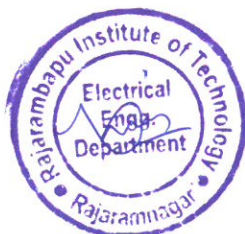
Class:- **S.Y. B. Tech.**	Semester-**IV**		**L**	**T**	**P**	**Credits**
Course Code : **CIMD202**	Course Name : **Computer Algorithms**		3	--	--	3

Course Description:
This course introduces students to the design of computer algorithms, as well as analysis of sophisticated algorithms. It contains design and analysis of algorithms to solve wide variety of problems including searching, sorting and graph algorithms. It covers various techniques that can be used to solve new problems you face, like divide and conquer, greedy algorithms, dynamic programming etc.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Analysing asymptotically the performance of algorithms.
2. Compare and analyse searching and sorting algorithms.
3. Apply different algorithm design techniques to solve problems like job sequencing, knapsack, TSP, finding shortest path etc.
4. Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc.
5. Describe computational complexity theory to classify computational problems according to their inherent difficulty.

Prerequisite: Basic knowledge of Mathematics

	Course Content	
Unit No	**Description**	**Hrs**
1	**Introduction:** Introduction, Characteristics of algorithm, Pseudocode conventions, Recursive algorithms, Performance analysis – time and Space complexity, asymptotic notations.	05
2	**Searching and Sorting Methods:** Linear Search, Binary Search, Bubble sort, Quick Sort, Merge Sort, Selection Sort, Insertion sort, Radix Sort, Bucket Sort. Divide and Conquer- General method, Finding the maximum and minimum, Strassen's matrix multiplication.	07

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Greedy Method:** General method, Knapsack problem, Job sequencing with deadlines, Minimum-cost spanning trees – Prim's And Kruskal's algorithms, Optimal storage on tapes, Single source shortest paths.	05
4	**Dynamic Programming:** General method, Multistage graphs, All pair shortest paths, 0/1 Knapsack problem, Reliability design, Traveling sales person problem.	07
5	**Backtracking:** General method, n-Queens problem, Subset sum problem, Graph coloring problem, Travelling sales person problem.	06
6	**Introduction to Complexity Theory:** The P and NP Classes, Polynomial, time reductions, NP- Hard and NP-Complete classes. NP-Hard graph problems- Clique decision problem, Vertex cover problem, Travelling sales person decision problem, Randomized algorithms.	06

References -
Text Books:
- Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran, "Fundamentals of Computer Algorithms", Universities Press.
- Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms" The MIT Press.

Reference Books:
- Sara Baase & Allen VanGelder "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
- Alfred V. Aho , "The design and analysis of computer algorithms", Addison-Wesley Pub.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester-IV	L	T	P	Credits
Course Code : **MEMD204**	Course Name : **Behavioral Engineering and Design**	3	--	--	3

Course Description:

This course delves into the principles and practices of behavioral engineering and design as applied to the creation of new products, encompassing physical consumer goods as well as software and mobile applications. Through theoretical exploration and hands-on projects, students will learn how to design products that effectively influence user behavior and enhance user experience.

Course Learning Outcomes:

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

1. Explain key concepts and theories related to influencing user behavior in product design.
2. Utilize psychological principles to develop product designs that effectively address user needs and preferences.
3. Create products that demonstrate high levels of user engagement, measured through metrics such as adoption rates, user interaction patterns, user satisfaction and usability.
4. Incorporate aesthetic appeal into product designs, assessed through objective criteria such as visual appeal ratings.
5. Incorporate ergonomic considerations into product designs assessed through objective criteria such as user comfort.

Prerequisite: Course on Design Thinking

	Course Content	
Unit No.	**Description**	**Hrs**
1	**Behavioral Engineering and Design for Product Innovation:** Overview of behavioral engineering and its relevance in product design, Key concepts and theoretical frameworks, Understanding the role of psychology in product development, Ethical considerations in designing products for behavior change	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

2	**Human Behavior and Product Design:** Psychological principles influencing user behavior, Factors affecting consumer decision-making, User experience (UX) design principles for physical and digital products, Designing for emotional engagement and user satisfaction	06
3	**Applying Behavioral Insights in New Product Development:** Integrating behavioral research into the product design process, Behavioral design techniques for enhancing product adoption and usage, Case studies of successful products leveraging behavioral engineering principles, Hands-on exercises in applying behavioral insights to product ideation and prototyping	06
4	**Persuasive Design for Consumer Products:** Principles of persuasive design in consumer product development, Creating compelling product experiences through persuasive techniques, Designing for habit formation and behavior change, Ethical considerations in persuasive product design.	06
5	**Aesthetics:** Principles of aesthetic design and its impact on user perception, Integrating aesthetics with functional design requirements	06
6	**Ergonomics in Product Design:** Understanding anthropometrics and ergonomics in product design, Case studies of products exemplifying successful integration of aesthetics and ergonomics	06

References:-

- Nir Eyal, "Hooked: How to Build Habit-Forming Products", Penguin Books Limited
- Don Norman, "The Design of Everyday Things", Basic Books Publication
- Stephen Anderson, "Seductive Interaction Design: Creating Playful, Fun, and Effective User Experiences", New Riders Publication
- William Lidwell, Kritina Holden, and Jill Butler, "Universal Principles of Design", Rockport Publishers
- Mark S. Sanders and Ernest J. McCormick, "Human Factors in Engineering and Design", McGraw-Hill Publication

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: **S. Y. B. Tech.**	Semester: **IV**	**L**	**T**	**P**	**Credits**
Course Code: **MCMD202**	Course Name: **Industrial Fluid Power**	3	-	--	3

Course Description:

Fluid power has the highest power density of all conventional power-transmission technologies. Learn the benefits and limitations of fluid power, how to analyse fluid power components and circuits, and how to design and simulate fluid power circuits using Automation Studio for applications.

In this course, you will be introduced to the fundamental principles and analytical modelling of fluid power components, circuits, and systems. You will learn the benefits and limitations of fluid power compared with other power transmission technologies; the operation, use, and symbols of common hydraulic & pneumatic components; how to formulate and analyse models of hydraulic & pneumatic components and circuits; and how to design and predict the performance of fluid power circuits.

Course Learning Outcomes:

After successful completion of the course, students will be able to,
1. Describe the structure and function of common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors etc.
2. Model and analyze common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors.
3. Create & simulate basic hydraulic and pneumatic circuit diagrams for different applications.
4. Design, develop & analyze simple hydraulic and pneumatic systems for given task.

Prerequisite: Fundamental concepts of fluid mechanics, basic electrical engineering, and engineering mechanics.

Course Content		
Unit No.	**Description**	**Hrs.**
1	**Fluid Power Systems and Fundamentals:** 1. Introduction to fluid power, Advantages of fluid power. 2. Application of fluid power system. 3. Types of fluid power systems, Properties of hydraulic fluids, General types of fluids. 4. Fluid power symbols. (ISO/JIC) 5. Use of Automation studio to draw circuits.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

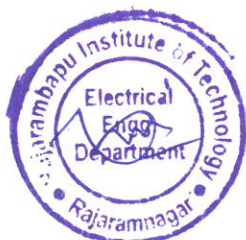| 2	**Hydraulic System and Components (Pumps and Actuators):** 1. Pumping theory, Pump classification. 2. Gear pump, Vane Pump, construction and working of pumps, pump performance, piston pump 3. Variable displacement pumps. 4. Linear hydraulic actuators, Types of hydraulic cylinders, Single acting, Double acting cylinders. 5. Special cylinders like tandem, Rod less, Telescopic - Construction and application. 6.Cushioning mechanism, Mounting of actuators 7. Rotary actuators - Gear, Vane and Piston motors.	06
3	**Hydraulic Valves, Accumulators and Circuits:** 1. Directional control valve .4/2, 4/3, 5/3-way valves. 2. Shuttle valve check valve 3. Pressure control valve,4. Flow control valve (Fixed and adjustable) 5. Electrical control solenoid valves 6. Types of accumulators, Accumulators circuits 7. Intensifier Circuit and Application, 8. Speed control circuits, synchronizing circuit and industrial application circuits copying circuit and press circuit, regenerative circuit.	06
4	**Pneumatic Systems, Components and Circuits:** 1.Properties of air Compressors. 2.Filter, Regulator, and Lubricator Unit 3. Air control valves, Quick exhaust valves and pneumatic actuators 4. Pneumo-hydraulic circuit 5. Time delay circuits 6. Sequential circuit design for simple applications using cascade method.	06
5	**Fluid Logic Control System:** 1. Hydro Mechanical servo systems. 2 Electro-hydraulic and Electro- pneumatic systems and proportional valves 3. Electro-hydraulic and Electro- pneumatic systems and proportional valves 4. Introduction to fluidic devices, simple circuits 5. PLC applications in fluid power control 6. Failure and troubleshooting in fluid power systems 8. Pneumatic positioning and servo systems, air hydro boosters.	06
6	**Hydraulic/Pneumatic Circuit Design:** 1. Steps in hydraulic circuit design, and simulation using Automation Studio. 2. Steps in pneumatic circuit design, and simulation using Automation Studio.	06

References -
Textbooks:
- Fluid Power, Anthony Esposito, Prentice Hall Publications.
- Industrial Hydraulics and Pneumatics, Stewart
- Industrial Hydraulics and Pneumatics, H.P. Garg.
- Oil Hydraulic Systems: Principles and Maintenance by S. R. Mujumdar.

Reference Books:
- Industrial Hydraulics, Vickers Handbook.
- Hydraulics-Basic level TP501 handbook by FESTO.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **AIMD202**	Course Name : **Data structures and Algorithms**	3	--	--	3

Course Description:
The Data Structures and Algorithms course is a comprehensive study of fundamental concepts and techniques essential for efficient problem-solving in computer science. Students will explore various data structures, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables, and learn how to analyze their time and space complexity. The course extensively explores the design and analysis of algorithms, encompassing various topics such as sorting, searching, and graph traversal. Emphasis is placed on understanding algorithmic paradigms and their applications. Through programming assignments and theoretical exercises, students will gain practical experience in implementing algorithms and solving real-world problems. This course serves as a foundation for algorithmic thinking and prepares students for advanced computer science topics.

Course Learning Outcomes:
The course should enable the students to:
1. Compare between linear and nonlinear data structures
2. Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables.
3. Analyze various searching and sorting algorithms and apply it to solve particular problem.
4. Determine a suitable data structure and algorithm to solve a real world problem

Prerequisite: Basic knowledge of C programming, Knowledge of basic mathematical concepts

Course Content		
Unit No	Description	Hrs
1	**Introduction to Data Structures:** Primitive and non-primitive data structures, Operations on data structures, Algorithms, Abstract Data Types, Complexity Analysis	05
2	**Linear Data Structures:** **Stack:** Definition, Representation and Applications of Stack. **Queue:** Definitions, Representation and Applications of Linear Queue, Circular Queue, and Priority Queue.	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Linked Lists:** Definition, Representation, Operations and Applications of singly linked list, doubly linked list, circular linked list, Application of linked list-Stack & queue, Introduction to Sparse matrix, representation of sparse matrix using linked list.	07
4	**Searching ,Sorting and Hashing Techniques** : Linear search, Binary search, Bubble sort, insertion sort, Merge sort, Quick sort, Selection sort, Radix sort, Heap sort, Complexity of algorithms **Hashing**: Definition, Hash functions, Overflow, Collision, Open Hashing, closed hashing, Rehashing Techniques.	07
5	**Trees:** Basic Technology, Binary Tree, Traversal methods, Binary search tree, AVL Tree, B tree, B+ tree, Heaps - operations and their applications.	06
6	**Graphs:** Basic concepts of graph theory, Storage representation, Operations on graphs, Traversing a graph, Shortest path algorithm.	05

References -
Text Books:
- Data structures -- Seymour Lipschutz (MGH) Schaum's Outlines.

Reference Books:
- Data structures and Algorithms -- Alfred V. Aho, John E. Hopcroft, J. D. Ullman (Addision- Wesely Series)
- Introduction to Data Structures in C – Ashok N. Kamthane (Pearson Education).

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: **S. Y. B. Tech.**	Semester: **III**	**L**	**T**	**P**	**Credits**
Course Code: **RAMD202**	Course: **Sensors and Actuators**	3	-	-	3

Course Description:
The goal of this course is to give senior and graduate students in engineering a hands-on introduction to the fundamental technology and practical applications of sensors. Various sensors, including capacitive, inductive, ultrasonic, accelerometers, image sensors and others will be covered in the course. Instrumentation techniques incorporating computer control, sampling, and data collection and analysis are reviewed in the context of real-world scenarios. There will be weekly laboratory assignments where students will have hands on experience with various sensors.

The course is based around a custom board equipped with various sensors, such as a high speed camera, touch sensor, humidity sensor, temperature sensor, pressure sensor, accelerometer and position sensor. Additional peripheral sensors using the PMOD interface standard can also be attached to the sensor board. The board interfaces with these sensors via an FPGA device and it can also communicate with a PC via USB 3.0 interface. Students will use Verilog language to program the FPGA and communicate with various sensors and PC.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Explain the functioning of various sensors and transducers
2. Calibrate the transducers such as accelerometers, microphones and strain gauges.
3. Explain the characteristics of various sensors and transducers
4. Describe the process and need for calibration.
5. Choose the sensor for measurement of few parameters.
6. Use the appropriate sensor and calibrate

Prerequisite: A basic course on Automotive engineering and Electrical machines is recommended as pre-requisites for this course.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

	Course Content:	
Unit No.	**Description**	**Hrs.**
1	**Sensors:** Difference between sensor, transmitter and transducer - Primary measuring elements - selection and characteristics: Range; resolution, Sensitivity, error, repeatability, linearity and accuracy, impedance, backlash, Response time, Dead band. Signal transmission - Types of signal: Pneumatic signal; Hydraulic signal; Electronic Signal. Principle of operation, construction details, characteristics and applications of potentiometer, Proving Rings, Strain Gauges, Resistance thermometer, Thermistor, Hot-wire anemometer, Resistance Hygrometer, Photo-resistive sensor	06
2	**Inductive & Capacitive Transducer:** Inductive transducers: - Principle of operation, construction details, characteristics and applications of LVDT, Induction potentiometer, variable reluctance transducer, Capacitive transducers:- Principle of operation, construction details, characteristics of Capacitive transducers – different types & signal conditioning- Applications:- capacitor microphone, capacitive pressure sensor, proximity sensor	06
3	**Intelligent Sensors:** General Structure of smart sensors & its components, Characteristic of smart sensors: Self calibration, Selftesting & self-communicating, Application of smart sensors: Automatic robot control & automobile engine control.	06
4	**Micro Sensors and Micro Actuators:** Micro Sensors: Principles and examples, Force and pressure micro sensors, position and speed micro sensors, acceleration micro sensors, chemical sensors, biosensors, temperature micro sensors and flow micro sensors. Micro Actuators: Actuation principle, shape memory effects-one way, two way and pseudo elasticity. Types of micro actuators- Electrostatic, Magnetic, Fluidic, Inverse piezo effect, other principles	06
5	**Sensor Materials and Processing Techniques:** Materials for sensors: Silicon, Plastics, metals, ceramics, glasses, nano materials Processing techniques: Vacuum deposition, sputtering, chemical vapour deposition, electro plating, photolithography, silicon micro machining, Bulk silicon micro machining, Surface silicon micro machining, LIGA process	06

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

6	**Actuators:** Definition, types and selection of Actuators; linear; rotary; Logical and Continuous Actuators, Pneumatic actuator- Electro-Pneumatic actuator; cylinder, rotary actuators, Mechanical actuating system: Hydraulic actuator - Control valves; Construction, Characteristics and Types, Selection criteria. Electrical actuating systems: Solid-state switches, Solenoids, Electric Motors- Principle of operation and its application: D.C motors - AC motors - Single phase & 3 Phase Induction Motor; Synchronous Motor; Stepper motors - Piezoelectric Actuator.	06

References –

Text Book:
- DVS Murthy, Transducers and Instrumentation, PHI 2nd Edition 2013
- D Patranabis, Sensors and Transducers, PHI 2nd Edition 2013.
- S. Gupta, J.P. Gupta / PC interfacing for Data Acquisition & Process Control, 2nd ED / Instrument Society of America, 1994.
- Gary Johnson / Lab VIEW Graphical Programing II Edition / McGraw Hill 1997.
- Patranabis. D, "Sensors and Transducers", Wheeler publisher, 1994.
- Sergej Fatikow and Ulrich Rembold, "Microsystem Technology and Microbotics", First edition, Springer –Verlag NEwyork, Inc, 1997.
- Jacob Fraden, "Hand Book of Modern Sensors: Physics, Designs and Application" Fourth edition, Springer, 2010.

Reference Books:
- Arun K. Ghosh, Introduction to measurements and Instrumentation, PHI, 4th Edition 2012.
- A.D. Helfrick and W.D. cooper,Modern Electronic Instrumentation & Measurement Techniques, PHI – 2001
- Hermann K.P. Neubert, "Instrument Transducers" 2nd Edition 2012, Oxford University Press.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **III**	**L**	**T**	**P**	**Credits**
Course Code : **EE216**	Course Name : **Advanced Programming Language for Electrical Engineering**	**2**	**-**	**-**	**2**

Course Description:

This course introduces object-oriented programming using java programming language, database concepts and structured-procedural query language. Students will learn how to program in Java, use some of its important applications. The course is designed to develop a object-oriented nature of its use of polymorphism and solid foundation in organizing, storing retrieving, and managing data efficiently.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Apply the object-oriented programming concepts in problem solving
2. Apply the concept of inherent for code reusability
3. Develop programs using multithreading
4. Describe the purpose and nature of the data base system for storing and fast access to the data
5. Draw E-R models to represent sample data base application scenarios

Prerequisite: Concepts of C programming language

Course Content		
Unit No	**Description**	**Hrs**
1	**OOPS Concepts and Java Programming:** OOP Concept: Classes and Objects, data abstractions, encapsulation, Java programming: History of Java, comments data types, variables, constants, scope and life time of variables, operator, type of conversion and casting, simple java standalone programs, array, console input and output, methods, parameters passing, static field and methods, access control, garbage collection	04
2	**Interfaces and Packages:** Interface: Interfaces vs Abstract classes, defining an interface, implement interface, accessing implementation through interface references, extending interface, Packages: defining, creating and accessing a package, understanding CLASSPATH, importing packages.	04

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3	**Exception Handling and Multithreading:** Exception Handling: benefits of exception handling, classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throw and finally, re-throwing exceptions, exception specification, Multithreading: difference between multiple processes and multiple threads, thread state, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.	04
4	**Database Concepts and Data Model:** Purpose of Data base System, Data abstraction, Data models, Entities and Entity sets, Mapping Constraints, E-R Diagram, Specialization and Aggregation, Relational Algebra, Tuple Calculus.	04
5	**Structured-Procedural Query Language:** Introduction to SQL and PL/SQL, Set Operations, Aggregate operation, Nested queries, etc., PL/SQL Cursor, stored procedure and Trigger.	04
6	**Relational Database Design:** Domain Constraints, Referential Integrity, Functional Dependencies, Canonical Cover, Pitfalls in Relational Database Design, Decomposition and Normalization using Functional Dependencies.	04

References -
Text Books:
- Herbert Schildt and Skrien, "Java Fundamentals- A comprehensive Introduction", McGraw Hill.
- T. Budd, "Understanding Object-Oriented Programming with Java", Pearson Education.
- Abraham Silberschatz, Henry F. Korth and S. Sudarshan "Database System Concepts", McGraw Hill.

Reference Books:
- P. RadhaKrishna, "Object-Oriented Programming through Java", CRC Press
- P. J. Dietel and H. M. Dietel, "Java How to program", Prentice Hall
- Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", Benjamin Cummings.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- S. Y. B. Tech.	Semester-IV	L	T	P	Credits
Course Code : **EE2524**	Course Name : **AC Machines Lab**	--	--	2	1

Course Description: This laboratory course emphasis on imparting the practical knowledge and understanding of basic principles, characteristic, performance and testing of AC Machines. The course will orient student to understand the theoretical and practical dimensions. In this lab course, students will be familiar with the use of different equipment's and safety precautions on work place.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Evaluate parameters of AC machines (Asynchronous and Synchronous)
2. Plot the characteristics of various AC machines and solving engineering problems.
3. Demonstrate speed control characteristics of AC Machines.
4. Analyze the parameters and predict the efficiency of the AC machines.
5. Analyze the voltage regulation of Synchronous Generator.

Exp. No.	Description	Hrs
1	Performance characteristics of 3-phase IM by break load test	02
2	Equivalent circuit parameters of 3-phase IM by no load and blocked rotor test	02
3	Performances of three phase IM by circle/Locus diagram	02
4	Speed control of 3-phase wound IM by rotor resistance	02
5	To study and verify Speed control of 3-phase IM from stator end	02
6	To Study of different starters of 3- ph. IM	02
7	Determination of equivalent circuit parameters of 1-phase IM	02
8	Voltage regulation of 3-phase alternator by direct load test	02
9	Voltage regulation of 3-phase alternator by EMF method	02
10	Voltage regulation of 3-phase alternator by MMF method	02
11	To plot the V-Curves of synchronous motor	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S. Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **EE2544**	Course Name : **Analog and Digital Electronics Lab**	--	--	2	1

Course Description:
This laboratory course emphasizes imparting the practical knowledge and understanding of basic principles, characteristics, performance, and testing of analog and digital circuits. This course also develops the capacity to analyze and interpret different electronic circuits like diode circuits, BJT amplifiers, Op-Amp circuits, analog to digital (AD) & digital to analog (DA) conversion. In this lab course, students will be familiar with the use of different electronics devices.

Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Illustrate input-output response of analog electronic.
2. Build diode circuits like rectifier, clipper & clamper.
3. Design various applications of Op-Amp.
4. Design sequential and combinational circuits.
5. Simulate and validate Analog and Digital circuits using simulation tools.

Expt. No.	Description	Hrs
1	Plot V-I characteristics of P-N junction diode.	02
2	Build & test of Half wave & Full wave rectifier.	02
3	Build & analyze various types of clipper circuits and clamper circuits.	02
4	Plot input & output characteristics of transistor.	02
5	Design transistor as switch.	02
6	Design inverting and non-inverting configurations of Op-Amp.	02
7	Build & test comparator circuit.	02
8	Verify truth table of various logic gates.	02
9	Implementation of different logic gates using universal gates (NAND & NOR)	02
10	Implementation of Half adder & full adder	02
11	Implementation of Half subtractor & full subtractor	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Expt. No.	Description	Hrs
12	Implementation of Code converters & comparator circuit	02
13	Implementation of BCD to 7-segment decoders	02
14	Verify the truth table of various flip-flops.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- S. Y. B. Tech.	Semester- IV	L	T	P	Credits
Course Code : EE262	Course Name : **Electrical Measurement and Instrumentation Lab**	--	--	2	1

Course Description:
This course provides the basic techniques to measure electrical and non – electrical parameters using electrical measuring and instrumentation techniques.

Course Learning Outcomes:
After completion of this course student will be able to
1. Determine the measurement of electrical parameters using various measurement techniques.
2. Examine AC bridges for the measurement of inductance, capacitance and frequency.
3. Identify different measuring instruments for the measurement of various electrical and non-electrical parameters.
4. Demonstrate various digital measuring instruments.
5. Draw the characteristics of solar panel, earth resistance and temperature transducers.

List of Experiments

Exp. No.	Description	Hrs
1	Measurement of three phase active power by single wattmeter method	02
2	Measurement of three phase active, and reactive power and power factor by two wattmeter method	02
3	Calibration of single phase and three phase Energy meter	02
4	Measurement of resistance using Wheatstone bridge	02
5	Measurement of inductance and capacitance by using AC bridges	02
6	Measurement of displacement using LVDT	02
7	Measurement of displacement using strain gauge based displacement transducer	02
8	Measurement of power and energy using power analyzer	02
9	To study of Digital Storage Oscilloscope.	02
10	To study of Digital Multimeter.	02
11	To study of Wave and Spectrum Analyzer	02
12	To study net metering for rooftop based solar PV	02
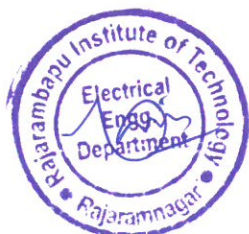
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **IV**	L	T	P	Credits
Course Code : **EE264**	Course Name: **Electrical Installation**	--	--	2	1

Course Description:
Electrical installation refers to the process of setting up electrical systems, equipment, and devices to ensure safe and efficient electrical power distribution within a building, facility, or any other environment. It involves the planning, designing, assembling, and connecting various electrical components to create a functional and reliable electrical network. This course makes students be able to design various electrical installation by using different software.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Elaborate electrical Safety, Installation Codes, and Standards
2. Determine a suitable size of wires and switchgears
3. Design various electrical installation diagrams
4. Estimate component requirements of electrical installation
5. Prepare quotation, tender and other related documents

Prerequisite: Basic Electronics Engineering, Basic Electrical Engineering

	Course Content	
Exp. No.	**Description**	**Hrs.**
1	Introduction to Electrical Safety, Installation Codes, and Standards.	02
2	Selection of switchgear and wires for electrical installation.	02
3	Learn software to design basic electrical installation layouts.	02
4	Design electrical installations for residential unit and prepare list of material required.	04
5	Design electrical installations for commercial unit and determine rating of main and sub distribution board.	04
6	Design electrical installations for industrial unit and determine type and rating of starter and relays.	04
7	Design electrical installation system for (11kV) scheme	02
8	Design pole mounted substation for secondary distribution.	02
9	Prepare tender documents, quotations, and bill for specific work	02
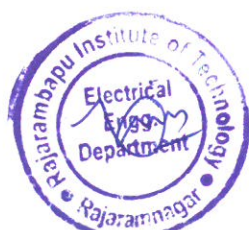
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
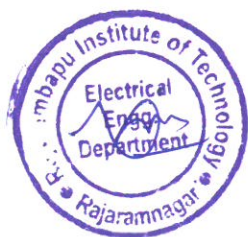**Department of Electrical Engineering**

References:
Text Books:

- J B Gupta, Electrical Installation Estimation and Costing, S K Kataria and Sons publication
- Uppal S L, Garg C G, Electrical Wring Estimation and Costing, Khanna Publisher

Reference Books:

- Raina K B, Dr. Bhattacharya, Electrical Design Estimation and Costing, New age international publisher
- SP- 30:2011, National Electrical Code, Bureau of Indian Standard
- IS- 732:1989, Code of practice for Electrical Installation, Bureau of Indian Standard

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class:- **S.Y. B. Tech.**	Semester- **IV**	**L**	**T**	**P**	**Credits**
Course Code : **EE266**	Course Name: **Advanced Programming Language for Electrical Engineering Lab**	--	--	2	1

Course Description:
This course introduces object-oriented programming using java programming language, database concepts and structured-procedural query language. Students will learn how to program in Java, use some of its important applications. The course is designed to develop a object-oriented nature of its use of polymorphism and solid foundation in organizing, storing retrieving, and managing data efficiently.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Apply fundamental programming constructs such as arrays, control structures, and looping in Java to build basic applications.
2. Demonstrate object-oriented programming concepts including inheritance, polymorphism, abstraction, inner classes, interfaces, and exception handling.
3. Design and model relational databases using ER diagrams and schema diagrams with open-source tools.
4. Implement SQL DDL and DML operations to create, manipulate, and query relational databases using constraints, views, indexes, and sequences.
5. Develop and execute PL/SQL blocks to implement procedural logic and exception handling in database applications.

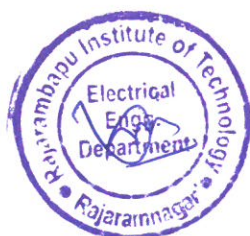**Prerequisite:** Concepts of C programming language

It should consist of minimum 10 experiments based on the syllabus and experiment list mentioned below

	Course Content	
Exp. No	**Description**	**Hrs**
1	Implement Arrays, Control and Looping Statements	02
2	Implement Access Control and Inheritance	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
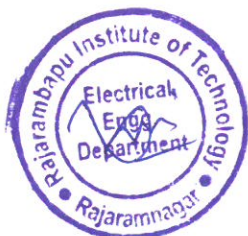**Department of Electrical Engineering**

3	Implement Polymorphism, Abstraction and Inner Class	02
4	Implement Creating Package for Custom Exception Interfaces and Vectors	02
5	Implement Class, Object and String Classes	02
6	Develop the ER diagram & scheme diagram using an open-source tool	02
7	Design and develop SQL DDL statements to demonstrate the use of SQL object such as Table, View, Index, Sequence, Synonym, different constraints etc.	02
8	Write at least 10 SQL queries on the suitable database applications using SQL DML statements	02
9	Design road way travel table and implement the quires based on primary key, foreign key, not null, unique & check constraints	02
10	Write PL/SQL code of block	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Choice Based Professional Skills Development and Foreign Languages Programme
for
Second Year B. Tech.
(Sem. III and IV)

Professional Skills Development and Foreign Languages Courses

1. Professional Leadership Skills (SH2634)

2. Interpersonal Skills (SH2614)

3. Innovation Tools and Methods for Entrepreneurs (SH2694)

4. Personal Effectiveness and Body Language (SH2594)

5. German Language - Level IV (SH2644)

6. Japanese Language - Level IV (SH2624)

An Important Notes:
- *A student has to complete any two courses out of six choices offered under Choice Based Professional Skills Development Programme. A course in each semester will be allocated without any repetition.*

- *Foreign language course selected in F.Y. Sem-I will remain the same with next levels in Sem-III and IV. (No new entries in S.Y.B.Tech Sem.-III)*

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-III/IV	L	T	P	Credits
Course Code : SH2634	Course Name : **Professional Leadership Skills**	-	-	2	1

Course Description: This course is one of various courses offered under Choice Based Professional Skills Development programme. This course guides those special students who want to be entrepreneurs and professional leaders. This course covers various aspects of Leadership which includes Team formation, conflict management, motivation and presentation skills.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Explain the traits of a leadership through real life examples.
2. Exhibit the ability to work effectively in team.
3. Prepare a presentation as per the audience and context requirements.

Prerequisite: A Student, who is going to enroll for this course should have -
1. Adequate knowledge of basic grammar of English language.
2. Intermediate level vocabulary of English language.
3. Ability to communicate moderately in English.

Minimum 12 sessions will be conducted from the following list.

	Course Content	
Experiment No	**Description**	**Hrs**
1.	**SMART Goal Setting, SWOT/C Analysis and Action Plan:** Discussion on Dos and Don'ts, Advantages, and Generation of the Document by Students and its Assessment	02
2.	**Assertiveness and Positive Thinking:** Types of Behaviour, Benefits of Being Assertive and Positive Thinking, Developing Positive Attitude, Case Studies and Presentations	02
3.	**Self Management:** Need of Self Management, Developing Self Acceptance, Steps of Self Management, Individual Classroom Activity and its Assessment	02
4.	**Leadership Styles and Change Management:** Introduction to Different Types of Leaderships, Effective Organizational Change Management, Individual Classroom Activity and its Assessment	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

5.	**Team Formation and Leading a Team-I:** Why Teams? Roles and Responsibilities in Teams, Strategies for Team Development, Barriers to Teams, Steps of Team Development	02
6.	**Team Formation and Leading a Team – II:** Case Studies of Teams and Student Presentations	02
7.	**Business Meetings and Decision Making – I:** Preparing for the Meeting, Role of Chairperson and Participants in Meetings	02
8.	**Business Meetings and Decision Making – II:** Mock Meetings, Decision Making Case Studies and Feedback	02
9.	**Conflict Management:** Types of Personalities, Possible Reasons of Conflicts at Work Place, Conflict Resolution Strategies, Conflict Management Case Studies and Feedback	02
10.	**Time Management:** Time Management Techniques, Introduction to Time Management Tools, Benefits of Time Management, Case Studies and Presentations	02
11.	**Presentation Skills – I:** Preparation, Types of Presentations - Informative, Instructional, Arousing, Persuasive, Decision-making, Presentation Tools	02
12.	**Presentation Skills – II:** Body Language, Managing Questions and Student Presentations Student Presentations and Feedback, Student Presentations and Feedback	02
13.	**Creative and Critical Thinking:** Approaches to Creative Thinking, Strategies for Creative Thinking, Characteristics and Strategies of Critical Thinking	02
14.	**Motivating People:** Types of Motivation, Components of Motivation, Steps in Keeping Motivation Level High	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
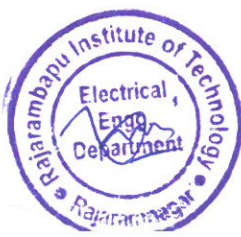**S. Y. B. Tech. Syllabus**
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
1. Krishna Mohan and Meera Banerji; *Developing Communication Skills*, Macmillan India Ltd., New Delhi
2. Masters, L. Ann et al. *Personal Development for Life and Work*, New Delhi: Cengage Learning.
3. Jeff Butterfield, *Soft Skills for Everyone*, Cengage Learning India Private Limited.
4. John Seely, *Oxford Guide to Effective Writing and Speaking*; Oxford University Press.
5. UNLESH the power within... Soft Skills – Infosys Training Manual *Module 1 to 5* (Infosys Campus Connect Programme)

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)
Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-**III/IV**	**L**	**T**	**P**	**Credits**
Course Code : SH2614	Course Name : **Interpersonal Skills**	-	-	2	1

Course Description: This course offers the tips and techniques to lead a life full of success, prosperity and happiness by changing the current mind set to that of positive and harmonious thinking. It further teaches upon important aspects such as priorities in life, how to manage stress, teamwork , laws of nature , human body as a divine computer , power of mind etc.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Exhibit interpersonal communication skills.
2. Demonstrate decision-making skills.
3. Apply conflict resolution styles appropriate in different situations.
4. Demonstrate skills to manage balance in work and life.

Prerequisite: A Student, who is going to enroll for this course, should have following English language abilities:
1. Adequate knowledge of basic grammar of English language.
2. Intermediate level vocabulary of English language.
3. Communicate moderately using English language.

	Course Content	
Experiment No	**Description**	**Hrs**
1.	**Importance of Universal Laws of Nature in Human Life.-** Overview, scientific, universal, secular, usefulness in every walk and phase of life, overview of Universal Laws of Nature, determining factor in human life, important laws of nature and its influence on life of individual, family, society and world at large. wisdom, living life in tune with laws of nature	02
2.	**'You are the Architect of your Destiny'** - This unit will make you aware that none else but you alone are responsible and accountable for what you achieve in your life , freedom of decisions, choices to make up your future, guiding powers to make the choices in your life, achieving life full of health, wealth , success , peace and happiness for yourself and all	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

3.	**Setting and Achieving Goals** – Defining your own goals in life , Concept of power of mind , concepts of interaction of conscious and subconscious levels of mind, tips and techniques to harness the amazing power of subconscious mind to achieve goals, Visualization and auto-suggestion techniques, real life examples	02
4.	**Work-life Balance** – What is means by work-life balance, priorities in life, time management, its importance, practical tips that enable to achieve work-life balance	02
5.	**Art of Harmonious Thinking.** – Importance , concept of harmonious thinking, Wishful Thinking, Positive Thinking, difference between Harmonious Thinking and Positive Thinking, powerful techniques to inculcate the habit of Harmonious Thinking, concept of Spiritual Thinking , Divine Universal Prayer – the life changer, Bless All technique, benefits of chanting the prayer	02
6.	**Spirituality in Day-to-day Life** – Concept of Love Work, 7 dimensions of Love Work, benefits us as individual, family, society and entire human race, important to be a good human being, usefulness to become successful, tools to apply the different 'Lifeskills ' in day-to-day life, simple but powerful and useful techniques such as attitude of gratitude , attitude of win-all	02
7.	**Human Values** – Ethics and Human values, difference in ethics and values, Qualities of human values	02
8.	**Communication Skills** – Ability to commendably read, write, speak and listen by conforming knowledge and presenting in a structured, cohesive fashion, Understanding and demonstrating workplace communication in the context of organization's business, understanding one's core skills for job	02
9.	**Interpersonal Skills** – Presenting interpersonal skills by amiable and respecting individuals, effective listening to stakeholders, bonding and developing rapport, Team success	02
10.	**Decision Making** – Importance of correct decision making, Analytical thinking / mind, Information processing ability, Making sound judgment and confident decision	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
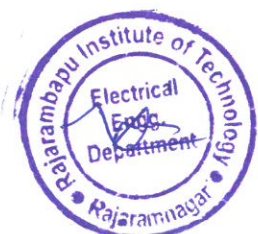**Department of Electrical Engineering**

11.	**Cross cultured sensitizations & Adaptability** – Adapting multinational & multicultural environment, embracing diversity, culturally sensitive and bonding to colleagues and stakeholders, sense of belongings and promotion of unity at work place	**02**
12.	Evaluation of Students for their Understanding of Various Concepts Discussed.	**02**

References -

1. Spiritual Wisdom in Day-to-day life – Blogs by Mr. Pralhad Wamanrao Pai
2. Towards the goal of beautiful life – Book by Satguru Shri Wamanrao G. Pai
3. Power of your subconscious mind – Dr. Murphy
4. Seven people of highly effective people – Stephen Covey
5. How to win friends and influence people – Dale Carnegie
6. S. Hariharan, et al; *Soft Skills*, MJP Publishers, Chennai (2010)
7. Gopalaswamy Ramesh et al. *The ACE of Soft Skills: Attitude, Communication and Etiquette for Success*, New Delhi: Pearson Education, 2012. Print.
8. Masters, L. Ann et al. *Personal Development for Life and Work*, New Delhi: Cengage Learning, 2012. Print.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)
Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-III/IV	L	T	P	Credits
Course Code : SH2694	Course Name : **Innovation Tools and Methods for Entrepreneurs**	-	-	2	1

Course Description: This course helps students to identify different tools for developing the solution that student has already learned to ideate in the previous course "Creativity and Design Thinking". Further, students get information about various tools to carry out competitor analysis and user journey map. It would help him to come up with detailed specifications and USP of the product based on the competitor survey.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them
2. Apply User Journey Map to the selected problem to show user interaction at various stages
3. Analyze the solutions provided by competitors for effectiveness and gaps if any.

Prerequisite: A Student who is going to enroll for this course should have following abilities:
1. Creativity and Innovativeness
2. Problem identification
3. Apply design thinking approach to develop working prototype
4. Structured approach to problem solving

Minimum 12 sessions will be conducted from the following list.

	Course Content	
Expt. No	**Description**	**Hrs**
1.	**Systematic Innovation:** Define the problem in depth with all details, Trend prediction, Modeling the problem to identify tradeoffs and contradictions	02
2.	**TRIZ:** Theory of Inventive problem solving (TRIZ), HIT Matrix, Scamper, Algorithms of brain storming and innovation, Functional analysis	02
3.	**Frugal and Disruptive Innovation:** Biomimicry and frugal innovation for prototyping, Disruptive innovation.	02
4.	**User Journey Map:** Map showing user interaction at every stage of product/service. Step-by step process of UJM creation	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

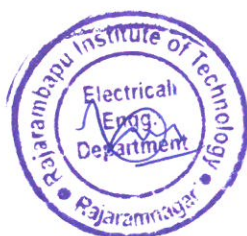|		
5.	**Competitor analysis:** Analysis of competitor and users for similar products, effectiveness of existing solutions and identifications of gaps	02
6.	**Product/Software Design Specifications:** Detailed specifications for better product design, detailed UI for software for clarity on user interaction, specify USPs of the product in comparison to the competitors	02

7.	**Business Canvas:**
	C. Definition of a Business Model
	D. The 9 Building Blocks:
	  10. Customer 11. Value Propositions
	  12. Channels, distribution, 13. Customer relationships
	  14. Revenue 15. Key Resources
	  16. Key Activities 17. Key Partnerships
	  18. Cost Structure
		02

8.	**Design Thinking (Part I):** Customer Insights, Ideation, Visual Thinking.	02

9.	Design Thinking (Part II):
	  D. Prototyping.
	  E. Storytelling.
	  F. Scenarios
		02

10.	**Institutional arrangement for Entrepreneurship Development:** Institutional arrangement for Entrepreneurship Development – DIC, ITCOT, SIDCO, NSIC, SISI, TIIC, SIDBI, Commercial Banks	02

11.	**Project Report:**
	  f) Economic Aspects g) Technical Aspects
	  h) Financial Aspects i) Production Aspects
	  j) Managerial Aspects
		02

12.	**Investor Pitch Tool:**
	  m) Introduction n) Helpful Tips about preparation, pitching and content sharing
	  o) Does and Don'ts p) Introduction
	  q) Problem r) Solution/Product/Service
	  s) Traction t) Market Opportunities/ Size
	  u) Competition v) Go To Market Strategies
	  w) Financials x) Team
		02

13.	**Revision -I**	02
14.	**Revision-II**	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
1. J. Knapp. Design Sprint, Simon & Schuster Publisher.
2. D. Silverstein. The Innovator's Toolkit, Wiley Publishing House.
3. M. A. Orloff. ABC-TRIZ: Introduction to creative design thinking with modern TRIZ modeling, Springer Publication.
4. M. Laverty. Entrepreneurship, OpenStax Publication.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)

Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester-III/IV	L	T	P	Credits
Course Code : SH2594	Course Name : **Personal Effectiveness and Body Language**	-	-	2	1

Course Description: This course is one of various courses offered under Choice Based Professional Skills Development programme. The course with its interactive and need based sessions helps students in knowing and managing self, set and pursue meaningful goals, and develop positive personal qualities for sustainability in today's global world.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Develop skills to build self-esteem and positive attitude.
2. Develop interpersonal skills characterized by effective communication and conflict resolution.
3. Demonstrate responsiveness towards time, stress, and health issues.
4. Interpret the non-verbal behaviour of a person.

Prerequisite: A Student, who is going to enroll for this course, should have following English language abilities:
1. Adequate knowledge of basic grammar of English language.
2. Intermediate level vocabulary of English language.
3. Communicate moderately using English language.

Minimum 12 sessions will be conducted from the following list.

	Course Content	
Experiment No	**Description**	**Hrs**
1.	**Self-awareness and Self Esteem** Meaning, Factors influencing self-esteem- environmental and social factors Developing self-esteem- strategies for building self-esteem	02
2.	**Goal Setting** Long term and short-term goals, Steps in goal setting (SMART)- - identify strategies - consider possible blocks and ways to deal with them - outline the steps - set deadlines	02
3.	**Self-Analysis** SWOT Analysis, who am I, Attributes, Importance of Self Confidence	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

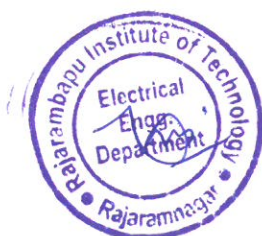|		
4.	**Personality Typing** Extraversion, Introversion, Sensing, Intuition, Thinking, Feeling, Judging Perceiving	02
5.	**Life Skills for Personal Effectiveness** Values: Punctuality, Honesty, Loyalty, Dependability, Reliability-Application of Life Skills in day - to- day life - Life Skills for Adolescents and Youth	02
6.	**Time Management** Strategies for effective time management (Principles, Planning, Identify & Control time stealers, Prioritize, Problems and Solutions, learn to say NO	02
7.	**Stress Management** Sources of stress, types, signs and symptoms of stress - positive aspects of stress - negative aspects of stress	02
8.	**Stress Management Techniques** Coping mechanisms, Deep Breathing Exercise, Meditation and Visual Imagery techniques, Muscle Relaxation, Peer Sharing, Emotional Intelligence	02
9.	**Decision-making** Definition, Informed Decision Making, Consequences of Decision Making and Models of Decision Making	02
10.	**Creative Thinking** Out-of-the box thinking, Stages of Creative Thinking, Factors hindering creative thinking, Characteristics of Creative thinkers	02
11.	**Interpersonal skills** Meaning, need to develop interpersonal skills, components of interpersonal skills, techniques to improve skills, benefits with real life examples/case studies	02
12.	**Art of Communication** Verbal & Non-Verbal Communication, 7'Cs of Effective Communication Importance of Effective Communication	02
13.	**Body Language – I** Non-verbal codes: Kinesics, Proxemics	02
14.	**Body Language – II** Vocalics, Haptics, Appearance	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

References -
1. S. Hariharan, *Soft Skills*, MJP Publishers, Chennai.
2. Gopalaswamy Ramesh, *The ACE of Soft Skills: Attitude, Communication and Etiquette for Success*, New Delhi: Pearson Education.
3. Jeff Butterfield, *Soft Skills for Everyone*, cengage Learning India Private Limited.
4. UNLESH the power within... Soft Skills – Infosys Training Manual *Module 1 to 5* (Infosys Campus Connect Programme)
5. Masters, L. Ann, *Personal Development for Life and Work*, New Delhi: Cengage Learning.
6. Covey, Stephen R., *Seven Habits of Highly Effective People: Powerful Lessons in Personal Change*
7. Barun K. Mitra, *Personality Development & Soft Skills*, Oxford Publishers, Third impression.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)

Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester- IV	L	T	P	Credits
Course Code : **SH 2644**	Course Name : **German Language - Level IV**	-	-	2	1

Course Description: This course exposes a learner to LSRW skills of German language. The course takes a student's German language skills to advanced level with situational conversations. The course helps learners in creating cross-cultural sensitization and adaptability skills. Here, a student prepares himself for German language examination.

Course Outcomes:
After successful completion of the course, students will be able to,
1. Interpret the language if the next person is speaking slowly and clearly.
2. Make use of the language in routine life with the routing topics like family, shopping, work etc.
3. Demonstrate the language by self-introduction in German with simple sentences.

Prerequisite: A Student, who is going to enroll for this course, should have following German language abilities:
1. Adequate knowledge of basic grammar of German language.
2. Intermediate level vocabulary of German language.
3. Communicate moderately using German language.

Course Content		
Experiment No	**Description**	**Hrs**
1.	Body parts and Krankheiten(diseases) and home remedies	02
2.	Grammar- Imperative for du ,ihr, Sie	02
3.	Health tips and conversation at clinic Modal verbs - dürfen & sollen	02
4.	Professions related to health	02
5.	Vocabulary of vacation and activities in vacation	02
6.	Writing a postcard Grammar- Pronoun - man	02
7.	Topic- Weather Reading texts related to vacation and formation of "W" questions	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

|		
8.	Grammar revision for the entire book	02
9.	Explaining the pattern of the exam and explanation of each skill's exam requirement	02
10.	Practice for Skill "Writing" and " Speaking"	02
11.	Practice for skill "Reading" and "Listening"	02
12.	Solving exam set 1 Speaking practice	02
13.	Solving exam set 2 speaking practice	02

References -
- Studio D – A 1, Cornelsen Verlag, Goyal Publishing House, New Delhi.
- Tangram aktuell A 1, Goyal Publishing House, New Delhi.
- Lagune A 1, Goyal Publishing House, New Delhi.
- Netzwerk A 1, Goyal Publishing House, New Delhi.

The extra notes will be provided to the students to complete the required syllabus.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)

Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.
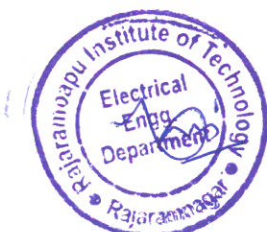
K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

Class: - S.Y. B. Tech.	Semester- IV	L	T	P	Credits
Course Code : **SH2624**	Course Name : **Japanese Language - Level IV**	-	-	2	1

Course Description: This course is designed to introduce students to the everyday language of Japan. Lessons are organized around natural conversational topics, leading students from fundamental to advanced aspects of grammar to readings in simple texts.

Course Outcomes:
After successful completion of the course, students will be able to,
1) To be able to make basic conversations in various situations.
2) To recognize the sentence patterns.
3) To improve Japanese Language proficiency.
4) To give students insights about the communication required for living in Japan.
5) To expose students to the Japanese work ethics required in their professional careers.

Prerequisite: A Student, who is going to enroll for this course, should have following Japanese language abilities:
1) Knowledge of basic grammar of Japanese Language.
2) Communicate moderately using Japanese Language.

All the 15 lab sessions will be conducted to meet the needs of following content delivery.

Course Content		
Experiment No	**Description**	**Hrs**
1	How to make た forms of the verbs.	02
2	To express "have the experience of " using た forms of the verbs.	02
3	To express two or more than two actions in one list using た forms of the verbs.	02
4	Polite forms & plain forms (Style of speech)	02
5	Conversation in plain forms & polite forms.	02
6	To express ideas or judgements.	02
7	Report speech.	02
8	To express recommendation, suggestion.	02

K.E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to Shivaji University, Kolhapur)
S. Y. B. Tech. Syllabus
To be implemented for 2024-28 NEP Batch
Department of Electrical Engineering

9	How to seek agreement or confirmation from the listener.	02
10	Noun modification.	02
11	Describing an appointment, errand.	02
12	Rules while using とき	02
13	Verbs used for giving & receiving of things (polite & plain forms)	02
14	Conditional forms of verbs, adjectives & nouns.	02
15	Subject of subordinate clause.	02

Note:* Words written phonetically using the Latin alphabet (*romaji*) will be only used in the very initial stage to aid learning pronunciations.

References -
1. Minna No Nihongo I (3A Corporation, Japan), Publications: Goyal publishers.
2. Nihongo shouhou, Publication: JALTAP
Other reference material, practice papers & CDs for listening practice.
The extra notes will be provided to the students as per the requirement of the syllabus.

Evaluation Scheme: ISE – 100% (Minimum Passing: 50%)

Evaluation Method: In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.