

# **Kalinga Institute of Industrial Technology**

## **Deemed to be University U/S 3 of the UGC Act 1956**

---

### **M. Tech in Electrical Engineering**

#### **Aims of the Programme:**

Postgraduates from this program will be able to:

- acquire in-depth knowledge in the domain of power systems, power electronics, renewable energy and electric drives and to pursue successful career in academia and industry.
- carry out research in the field of electrical engineering and its interdisciplinary areas and engage themselves in lifelong learning to continuously evolving technological and global challenges in their field of expertise
- work with others and demonstrate social and ethical responsibility as an individual.

#### **Specializations under the Programme:**

- Specialization 1: Power Electronics and Drives
- Specialization 2: Power and Energy System
- Specialization 3: Power System Engineering

#### **Program Outcomes:**

There are 4 Program Outcomes (POs) which are common to all specializations and 2 additional specialization Specific Outcomes (SSOs) for each specialization:

##### **Program Outcomes (Specialization: Power Electronics and Drives)**

**PO1:** Ability to independently carry out research/ investigation and developmental work to solve practical problems.

**PO2:** Ability to write and present a substantial technical report/document.

**PO3:** Ability to demonstrate a degree of mastery in the area of electrical engineering at a level higher than the requirements in the appropriate bachelor program.

**PO4:** Ability to apply advanced knowledge, techniques, skills and modern tools in the area of Electrical Engineering.

**PO5 (SSO):** Ability to analyze and design power converters/inverters for applications like renewable energy generations, electrical vehicles etc.

**PO6 (SSO):** Ability to apply basic control systems for designing control loops for power converter and electric drives.

##### **Program Outcomes (Specialization: Power and Energy System)**

**PO1:** Ability to independently carry out research/ investigation and developmental work to solve practical problems.

**PO2:** Ability to write and present a substantial technical report/document.

# **Kalinga Institute of Industrial Technology**

## **Deemed to be University U/S 3 of the UGC Act 1956**

---

**PO3:** Ability to demonstrate a degree of mastery in the area of electrical engineering at a level higher than the requirements in the appropriate bachelor program.

**PO4:** Ability to apply advanced knowledge, techniques, skills and modern tools in the area of Electrical Engineering.

**PO5 (SSO):** Ability to explore the use of renewable energy such as solar and wind power for a sustainable future of power generations.

**PO6 (SSO):** Ability to provide transmission corridors to support renewable energy resources, integration of storage devices and data interoperability in smart grid.

### **Program Outcomes (Specialization: Power System Engineering)**

**PO1:** Ability to independently carry out research/ investigation and developmental work to solve practical problems.

**PO2:** Ability to write and present a substantial technical report/document.

**PO3:** Ability to demonstrate a degree of mastery in the area of electrical engineering at a level higher than the requirements in the appropriate bachelor program.

**PO4:** Ability to apply advanced knowledge, techniques, skills and modern tools in the area of Electrical Engineering.

**PO5 (SSO):** Ability to acquire in-depth knowledge in design, and to integrate distributed energy resources, communication and information/intelligent systems in power systems, considering Indian and global perspective to improve the quality and reliability of power supply.

**PO6 (SSO):** Ability to apply appropriate techniques, resources and advanced intelligent devices including prediction and modeling to complex power system problems by considering its limitations.

# Kalinga Institute of Industrial Technology

## Deemed to be University U/S 3 of the UGC Act 1956

### Course Structure for specialization in Power Electronics and Drives

1 <sup>st</sup> Semester						
Sl. No.	Course Code	Course Name	Teaching Hours			Credit
		<b>Theory</b>	L	T	P	
1	RS 6001	Fundamentals of Research Methodology	3	0	0	3
2	EE 6105	Power Converters	3	0	0	3
3	EE 6107	Power Electronic Drives	3	0	0	3
4	EE 6109	Power Quality Issues and Mitigation	3	0	0	3
5	EE 6111	Control Techniques in Power Electronics	3	0	0	3
6		Department Elective-I	3	0	0	3
		<b>Practical</b>				
7	EE 6197	Power Electronics Converter and Drives Lab	0	0	3	1.5
8	EE 6199	Modeling and Control Laboratory	0	0	3	1.5
		<b>Total Semester Credits</b>				21

2 <sup>nd</sup> Semester						
Sl. No.	Course Code	Course Name	Teaching Hours			Credit
		<b>Theory</b>	L	T	P	
1	EE 6130	Non Linear Control Theory	3	0	0	3
2	EE 6110	Design of SMPS and PWM converters	3	0	0	3
3	EE6108	Vector Control of Electric Drives	3	0	0	3
4		Department Elective-II	3	0	0	3
5		Department Elective-III	3	0	0	3
		<b>Practical</b>				
6	EE 6196	Industrial Automation Laboratory	0	0	3	1.5
		<b>Sessional</b>				
7	EE 6182	Seminar	2			1
8	EE 6184	Comprehensive Viva-Voce	-			1.5
		<b>Total Semester Credits</b>				19

3 <sup>rd</sup> Semester				
SL. No.	Course code	Course Name		Credits
1	EE 6185	Thesis Part-I	-	14
		<b>Total Semester Credit</b>		<b>14</b>

4 <sup>th</sup> Semester				
SL. No.	Course code	Course Name		Credits
1	EE 6186	Thesis Part-II	-	16
		<b>Total Semester Credit</b>		<b>16</b>

**Kalinga Institute of Industrial Technology**  
**Deemed to be University U/S 3 of the UGC Act 1956**

---

**Department electives:**

SL.No.	Course Code	Course Name	Credit
<b>Options for Department Elective I</b>			
1	EE 6303	Computer Analysis in Power System	3
2	EE 6211	Integration and Control of Renewables	3
3	EE 6141	Microcontroller Applications	3
4	EE 6235	Discrete and Digital Signal Processing	3
<b>Options for Department Elective II</b>			
1	EE 6154	Flexible AC Transmission Systems	3
2	EE 6142	Soft Computing Techniques	3
3	EE 6206	Energy Auditing and Management	3
4	EE 6144	Analysis and Design of Power Converters	3
<b>Options for Department Elective III</b>			
1	EE 6146	Electric Hybrid Vehicles	3
2	EE 6148	Harmonics Elimination in Power System	3
3	EE 6150	Switch Mode Power Conversion	3
4	EE 6152	DC- AC Conversion Systems	3

# Kalinga Institute of Industrial Technology

## Deemed to be University U/S 3 of the UGC Act 1956

### Course Structure for specialization in Power and Energy System

1 <sup>st</sup> Semester						
Sl. No.	Course Code	Course Name	Teaching Hours			Credit
		<b>Theory</b>	L	T	P	
1	RS 6001	Fundamentals of Research Methodology	3	0	0	3
2	EE 6211	Integration and Control of Renewables	3	0	0	3
3	EE 6213	Electrical System Management and Control	3	0	0	3
4	EE 6105	Power Converters	3	0	0	3
5	EE 6109	Power Quality Issues and Mitigation	3	0	0	3
6		Department Elective-I	3	0	0	3
		<b>Practical</b>				
7	EE 6295	Renewable Energy Laboratory	0	0	3	1.5
8	EE 6199	Modeling and Control Laboratory	0	0	3	1.5
		<b>Total Semester Credit</b>				21

2 <sup>nd</sup> Semester						
Sl. No.	Course Code	Course Name	Teaching Hours			Credit
		<b>Theory</b>	L	T	P	
1	EE 6130	Non Linear Control Theory	3	0	0	3
2	EE 6208	Renewable Power Generation Technology	3	0	0	3
3	EE 6206	Energy Auditing and Management	3	0	0	3
4		Department Elective-II	3	0	0	3
5		Department Elective-III	3	0	0	3
		<b>Practical</b>				
7	EE 6196	Industrial Automation Laboratory	0	0	3	1.5
		<b>Sessional</b>				
8	EE 6282	Seminar	2			1
9	EE 6284	Comprehensive Viva-Voce	-			1.5
		<b>Total Semester Credit</b>	20			19

3 <sup>rd</sup> Semester				
SL. No.	Course code	Course Name		Credits
1	EE 6285	Thesis Part-I	-	14
		<b>Total Semester Credit</b>		<b>14</b>

4 <sup>th</sup> Semester				
SL. No.	Course code	Course Name		Credits
1	EE 6286	Thesis Part-II	-	16
		<b>Total Semester Credit</b>		<b>16</b>

**Kalinga Institute of Industrial Technology**  
**Deemed to be University U/S 3 of the UGC Act 1956**

---

**Department Electives:**

Sl. No.	Course Code	Course Name	Credit
<b>Options for Department Elective I</b>			
1	EE 6303	Computer Analysis in Power System	3
2	EE 6141	Microcontroller Applications	3
3	EE 6313	Reactive power control and Management	3
4	EE 6111	Control Techniques in Power Electronics	3
<b>Options for Department Elective II</b>			
1	EE 6154	Flexible AC Transmission Systems	3
2	EE 6142	Soft Computing Techniques	3
3	EE 6144	Analysis and Design of Power Converters	3
4	EE 6322	Distributed Generation	3
<b>Options for Department Elective III</b>			
1	EE 6306	Digital Protection in Power System	3
2	EE 6132	Solar Power Engineering	3
3	EE 6136	Wind Power Engineering	3
4	EE 6328	Restructuring of Power System	3

# Kalinga Institute of Industrial Technology

## Deemed to be University U/S 3 of the UGC Act 1956

### Course Structure for specialization in Power System Engineering

1 <sup>st</sup> Semester						
Sl. No.	Course Code	Course Name	Teaching Hours			Credit
		<b>Theory</b>	L	T	P	
1	RS 6001	Fundamentals of Research Methodology	3	0	0	3
2	EE 6301	Power System Stability and Control	3	0	0	3
3	EE 6303	Computer Analysis in Power System	3	0	0	3
4	EE 6313	Reactive Power Control and Management	3	0	0	3
5	EE 6305	Planning and Automation of Distribution System	3	0	0	3
6		Department Elective-I	3	0	0	3
		<b>Practical</b>				
7	EE 6395	Power System and Distributed Generation Laboratory	0	0	3	1.5
8	EE6199	Modeling and Control Laboratory	0	0	3	1.5
		<b>Total Semester Credit</b>				21

2 <sup>nd</sup> Semester						
Sl. No.	Course Code	Course Name	Teaching Hours			Credit
		<b>Theory</b>	L	T	P	
1	EE 6130	Non Linear Control Theory	3	0	0	3
2	EE 6308	High Voltage DC Transmission	3	0	0	3
3	EE 6306	Digital Protection in Power System	3	0	0	3
4		Department Elective-II	3	0	0	3
5		Department Elective-III	3	0	0	3
		<b>Practical</b>				
6	EE 6196	Industrial Automation Laboratory	0	0	3	1.5
		<b>Sessional</b>				
7	EE 6382	Seminar	2			1
8	EE 6384	Comprehensive Viva-Voce	-			1.5
		<b>Total Semester Credit</b>	20			19

3rd Semester				
SL. No.	Course code	Course Name		Credits
1	EE 6385	Thesis Part-I	-	14
		<b>Total Semester Credit</b>		14

4th Semester				
SL. No.	Course code	Course Name		Credits
1	EE 6386	Thesis Part-II	-	16
		<b>Total Semester Credit</b>		16

**Kalinga Institute of Industrial Technology**  
**Deemed to be University U/S 3 of the UGC Act 1956**

---

**Department Electives**

Sl. No.	Course Code	Course Name	Credit
<b>Options for Department Elective I</b>			
1	EE 6211	Integration and Control of Renewables	3
2	EE 6128	Power System Transients	3
3	EE 6109	Power Quality Issues and Mitigation	3
4	EE 6105	Power Converters	3
<b>Options for Department Elective II</b>			
1	EE 6154	Flexible AC Transmission Systems	3
2	EE6142	Soft Computing Techniques	3
3	EE 6206	Energy Auditing and Management	3
4	EE 6322	Distributed Generation	3
<b>Options for Department Elective III</b>			
1	EE 6311	State Estimation and Security Analysis	3
2	EE 6336	Smart Grid	3
3	EE 6328	Restructuring of Power System	3
4	EE 6148	Harmonics Elimination in Power System	3