REVISED COURSE CURRICULUM FOR

(4th) FOURTH SEMESTER

(ELECTRICAL ENGINEERING)

W.E.F. 2023-24

BOARD OF TECHNICAL EDUCATION

MUNI MAYA RAM MARG
PITAMPURA, DELHI-
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Curriculum Revision for 4th sem(Electrical Engg.) with credits

FOURTH SEMESTER: (ELECTRICAL ENGINEERING)

Sr. No.	Code No.	Course Title	Hours per week			Marking Scheme		Credits
			L	T	P	Internal	External (3hr.)	
1	23-EEPC-202	Electrical Machines -II	3	1	0	50	100	4
2	23-EEPC-204	Control System	3	0	0	50	100	3
3	23-EEPC-206	Industrial Electronics	3	0	0	50	100	3
4	23-EEPC-208	Electric Power Transmission and Distribution	4	0	0	50	100	4
5	23-AU-250	Essence of Indian knowledge and tradition	1	0	0	50	-	1
6	23-EEPC-252	Electrical Machines -II Lab	0	0	2	50	50	1
7	23-EEPC-254	Control System Lab	0	0	2	50	50	1
8	23-EEPC-256	Industrial Electronics Lab	0	0	2	50	50	1
9	23-EEPR-258	Minor Project	0	0	4	50	50	2
	Total					**450**	**600**	**20**

Summer Internship : After 4th semester, students shall undergo Summer Internship of 4 -6 weeks whose credit will be evaluated in Fifth semester

Course Name: **Electrical Machines -II**	
Semester-IV (Electrical Engineering)	
Course Code:	23-EEPC-202
Course Title:	Electrical Machines -II
Number of Credits:	Total:4(L=3, T=1, P=0)

Rationale:

The purpose of including electrical machines in this diploma course is already explained under Electrical Machines – I. the remaining topics of electrical machines namely, synchronous machines, three-phase induction motor and single-phase motors are included here.

Learning Outcome:

After learning this subject student will be able to demonstrate the following activities:

- Explain the operation of three phase induction motors.
- Demonstrate starters and speed control methodsof three phase induction motor.
- Interprets three phase alternators and understands its operation.
- Comprehend three phase synchronous motors.
- Select single phase induction motorsfor different applications.

Detailed Content:

Unit I. Synchronous Generators

1.1 Introduction, advantages of rotating field, synchronous speed, construction and working of alternator, types of alternator, excitation system for synchronous machines, voltage generation, EMF equation of an alternator, armature windings, full pitch windings and short pitch winding, breadth factor – pitch factor, actual voltage generated, simple numerical problems

1.2 Armature resistance, leakage reactance, armature reaction (unity, lagging, leading power factor), synchronous reactance & synchronous impedance, equivalent circuit and phasor diagrams of a synchronous generator, voltage regulation of 3-phase alternator & various methods to find regulation (direct method, synchronous impedance method)

1.3 parallel operation of 3-phase alternators, need of parallel operation & conditions to run alternators in parallel, expressions for power shared by two alternators, concept of synchronizing, synchronizing by lamp method and synchroscope, machine floating on busbars, infinite bus bars.

1.4 Cooling of synchronous alternators, limitations of air cooling, direct water cooling, ventilation of turbo alternators,advantages of hydrogen cooling.

Unit II. Three Phase Synchronous Motors

2.1 Construction of three phase synchronous motor, principle of operation, starting of synchronous motor, various methods of starting.

2.2 Synchronous motor on load with constant excitation, effect of change of excitation on a synchronous motor, Power flow within a synchronous motor, V curve & inverted V curve.

2.3 Hunting in synchronous motors (causes, effect & methods to reduce hunting), comparison between synchronous and induction motors, synchronous condenser, applications of 3-phase synchronous motor.

Unit III. Three Phase Induction Motors

3.1 Introduction, construction, principle of operation of three phase induction motor. Comparison between cage and slip ring induction motors, rotating magnetic field, concept and significance of slip, slip frequency, relationship between rotor copper loss and rotor input, simple numerical problems.

3.2 Torque of an induction motor, Condition for maximum torque, slip torque characteristics, effect of rotor resistance on slip torque characteristics, starter of induction motor – direct on line starter, auto transformer starter, start delta starter, slip ring induction motor starter.

3.3 Determination of efficiency, no load test and blocked rotor test, Simple problems.

3.4 Speed control of induction motors, cogging & crawling of motors, double cage rotor, deep bar cage induction motors, application of induction motors.

Unit IV. Fractional horse power (FHP) Motors.

4.1 Single phase induction motor construction and principle. Double-revolving field theory of single phase induction motors, equivalent circuit of a single phase induction motor.

4.2 Starting methods, Construction and working of single phase motors i.e. Synchronous Reluctance Motor, Switched Reluctance Motor, BLDC, Permanent Magnet Synchronous Motors, stepper motors, AC and DC servomotors. Torque speed characteristics of above motors. Applications of above motors.

4.3 Comparison between Single phase and three phase induction motors.

Learning Approach:

- The theoritical aspect of the subject has to be complemented with practical knowledge. Physical demonstration of each machine should be given to the students and after the end of each chapter practicals must be conducted and students are to be encouraged for on hand practice on each machine.

References/suggested learning resources:

(a) Books

1) Electrical Technology by B. L. Theraja, A. K. Theraja, S Chand & Company Ltd.
2) Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, New Delhi
3) Electrical Machines by Ashfaq Husain, Dhanpat Rai Publications, New Delhi
4) Electrical Machines by Nagrath and Kotari, Tata Mc Graw Hill, New Delhi
5) Electrical Machines –II by Tarlok Singh, SK Kataria and Sons, New Delhi

(b) Open source software and website address:

1. www.udemy.com/course/fundamentals-of-alternators-for-electrical-power-engineering/
2. www.electrical4u.com/
3. www.classcentral.com/course/swayam-electrical-machines-iitd-14030
4. www.nptelvideos.in/electricalengineering/m

Course Name: **Electrical Machines -IILab**	
Semester-IV(Electrical Engineering)	
Course Code:	23-EEPC-252
Course Title:	Electrical Machines –II Lab
Number of Credits:	Total:1(L=0, T=0, P=2)

List of Practical:

1. Determination of the magnetization curve of an alternator at rated speed.
2. Determination of Excitation required maintaining constant voltage in an alternater at varying load.
3. Determination of the relationship between the voltage and load current of a alternator, keeping excitation and speed constant.
4. Parallel operation of alternators
5. Determination of the effect of variation of excitation on a synchronous motor.
6. Determination of efficiency of Induction Motor by Direct Loading.
7. Determination of efficiency by No load test and blocked rotor test on an induction motor.
8. Study of the effect of starting and running of single phase motor with and without capacitor.
9. Reversal of direction of rotation of induction motor.
10. Study and connection of BLDC motor.
11. Control the speed and reverse the direction of stepper motor

Atleast 8 practicals from the above have to be performed

Course Name: **Control System**	
Semester-IV(Electrical Engineering)	
Course Code:	23-EEPC-204
Course Title:	Control System
Number of Credits:	Total:3(L=3, T=0, P=0)

Rationale:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- To analytically perform operation and maintenance of Industrial Control System

Learning Outcome:

After studying this course, students will be able to:

- Identify the type of control systems.
- Demonstrate the general structure and identify the various components of a control system.
- Troubleshoot different components in the control systems.
- Check the stability of the control systems.
- Be capable in designing control system.

Detailed Contents:

UNIT I. An Introduction to Control System

1.1 Brief history of control system, Control System in modern era, Configuration of simple control system: Open Loop and Closed Loop Control system, block diagrams, Signals and basic hardware elements, advantages and disadvantages.
1.2 Types of control systems (definition only): Linear, Non-linear, LTI, LTV, Self-regulating, Non-self-regulating, First-order, second-order systems.
1.3 Concept of feedback, General structure of a feedback control system (single-loop control system).
1.4 Automatic controller and basic control actions – On/off controller, P, PI, PID - definitions, block-diagram and applications.
1.5 Case study of simple Room temperature control system – Room Heating System (Qualitative study only).

UNIT II. Mathematical Methods in Control system

2.1 Review of Complex Number theory: Complex number plane.
2.2 First order and second-order differential equations, Partial fraction expansion.
2.3 Introduction of Laplace Transform: Definition, Laplace transform of standard input signals (functions), Important theorems of Laplace transform, Inverse Laplace transform, Inverse Laplace transform by partial fraction expansion.
2.4 Laplace transform method of solving differential equation.

UNIT III. Mathematical Modeling of Control system

3.1 Differential equation model of control system: Mechanical System (Mass-Spring-Damper system), and Electrical System -1st order system (RL and RC circuit) and 2nd order system (RLC circuit).

3.2 Transfer Function: definition, derivation of transfer function from differential equation model of control system, properties of transfer function. Open-loop and closed-loop transfer function. Poles, Zeros and characteristic equation of transfer function. Pole-Zero plot.

3.3 Transfer function of control system: Mechanical System (Mass-Spring-Damper system), and Electrical System -1st order system (RL and RC circuit) and 2nd order system (RLC circuit). Transfer function model of a general 1st order and a general 2nd order system.

3.4 Block Diagrams, Basic elements of block diagrams, canonical forms of block diagram, Block diagram reduction.

3.5 Case study of simple First order Thermal system – Thermometer (Obtaining Transfer function model).

UNIT IV. Time-domain Analysis of Control system

4.1 Elementary signals as test inputs: impulse, Unit-step, Ramp and Parabolic signals. Order of a control system, Time Response: Transient and steady state response, Natural and forced response.

4.2 Time-response of a unity feedback first order system: - Transient Response - Unit-step response (derivation). Transient response specification of 1st order system – Time constant. Steady state response.

4.3 Time-response of a unity feedback second order system: - Transient Response - Unit-step response, Effect of damping ratio on time response, Transient response specification of 2nd order system – Maximum overshoot, delay time, Rise Time, peak time, settling time. Steady state response.

4.4 Case study of simple First order Thermal system – Thermometer (Time-response for step-input).

UNIT V. Error Analysis and Stability Analysis of Control system

5.1 Error Analysis: - steady-state error for unity feedback system– definition, steady-state error in terms of open-loop transfer function, G(s)H(s). Position, velocity, acceleration constant and their uses to determine the steady-state error for step and ramp input.

5.2 Concept of stability, definition, Effect of location of poles on stability, stable, Unstable and Marginally stable system. Routh-Hurwitz criterion of stability – Necessary and Sufficient conditions. Absolute and Relative stability (definitions only). Simple problems based on above.

5.3 Time domain stability analysis: Root Locus Methods. Frequency Domain Analysis, Frequency Domain Stability Analysis: Bode Plot, Polar Plot, Nyquist Plot.

Learning Approach:

- A brief discussion of the prerequisites, such as writing differential equation of a circuit/system and how to solve linear ordinary differential equations. and frequency-domain analysis of linear systems.
- Learn examples of control system in real world application, in order to bring the practical world closer to you.
- Major stress on solving problems, learning problem solving skills that allow students to test their understanding.

References/suggested learning resources:

(a) Books

1) S. P. Meher – Control System, S. K Kataria & Sons, ISBN: 978-93-5014-584-5.
2) Anand anatarajan, R, Babu, Ramesh, P. – Control System Engineering, SciTech Publication, Chennai, 2007 ISBN: 9788183713603.
3) Saeed Hasan. Syed, - Automatic Control Systems (With MATLAB Programs) S. K Kataria & Sons, ISBN: 8190691929 (ISBN13: 9788190691925).
4) Manke, B. S. - Linear Control Systems with MATLAB Applications, KHANNA PUBLISHERS; Twelfth edition (1 January 1986), ISBN: 978-8174093103.

(b) Open-source software and website address (Indicative Only):

1. https://www.electrical4u.com/control-system-closed-loop-open-loop-control-system/(Control Systems: What Are They? (Open-Loop & Closed-Loop Control System Examples)}.
2. https://www.pearsonhighered.com/assets/samplechapter/0/1/3/6/0136156738.pdf (Mathematical Modelling of Control system).
3. https://www.electrical4u.com/time-domain-analysis-of-control-system/(Time-domain Analysis of Control system).
4. https://www.youtube.com/watch?v=nh8lN4C_0Zk (Error Analysisof Control system).
5. https://www.youtube.com/watch?v=tynvF7kqtJM(Stability Analysis of Control system).

Course Name: **Control System Lab**	
Semester-IV(Electrical Engineering)	
Course Code:	23-EEPC-254
Course Title:	Control System Lab
Number of Credits:	Total 1(L=0, T=0, P=2)

List of Practical :

1. **List of Practical:**

1. To study the simple Engineering system(s) in our surroundings from the perspective of the control system. For example – Bulb-Switch or Fan-Switch as Open-loop Control System.
2. To study the Genesis and Essence of The Feedback Control Theory from a Historical account of view.
3. To get familiarized with the Basic Structure/Configuration of a Feedback Control System and to define the basic types of signals and components necessary for the description of any feedback control system.
4. To develop a mathematical model of given control system(s) taking either of the examples: - a mechanical system or an electrical system or a Process-Control System or a Thermal System both in time-domain and s-domain.
5. To study step-response of a First-order control system through MATLAB simulation.
6. To study step-response of a Second-order control system through MATLAB simulation.
7. To study stability of a control system by solving for poles of a transfer function in MATLAB.
8. To study and evaluate Frequency-response of a given control system(s) e.g., a mechanical system or an electrical system, etc. (a) First-Order System (b) Second-Order System
9. Study of DC Servomotor Position Control closed-loop System on Trainer kit or by model making.
10. Study of DC Servomotor Speed Control closed-loop System on Trainer kit.
11. Study of Synchro as an error detector component of control system on Trainer kit.

Atleast 8 practicals from the above have to be performed

Course Name: **Industrial Electronics**	
Semester-IV(Electrical Engineering)	
Course Code:	23-EEPC-206
Course Title:	Industrial Electronics
Number of Credits:	Total:3(L=3, T=0, P=0)

Rationale:

Power Electronics play a very vital role in the field of control engineering in the modern industries as these industries mostly use electronic control which is more efficient, effective and accurate. The old magnetic and electrical control schemes have become obsolete. Knowledge of components like general purpose integrated circuits, thyristors, power diode, power transistors and microprocessors in the modern control processes are required. Applications of power electronic technology in generation sector, transmission sector and also in day-to-day applications like battery charger, motor drives, power supplies needed. The syllabus of this subject deals with the applied power electronics needed for electrical diploma holders.

Learning Outcome:

After studying this course, students will be able to:

- To draw V-I characteristics of an SCR, DIAC and TRIAC.
- Maintain the performance of thyristors.
- Maintain phase controlled rectifiers.
- Use of Variable Frequency Drive for running a 3 phase Induction motor
- Select relevant DC motor for various electric drive applications.
- Select relevant induction motor for various electric drive applications.

Detailed Contents

UNIT I. Introduction to Thyristor

1.1 Construction, working principles and V-I characteristics of an SCR, DIAC and TRIAC.
1.2 Methods of triggering a thyristor, study of triggering circuits.
1.3 Commutation of thyristors (Concept).
1.4 Construction, working principle of MOSFET and IGBT.

UNIT II.Controlled Rectifiers

2.1 Introduction to rectifiers and its applications.
2.2 Single phase half wave-controlled rectifier with R-L load.
2.3 Single phase full wave-controlled rectifier with R-L load.
2.4 3-phase full wave half-controlled bridge rectifier.
2.5 3-phase full wave fully controlled bridge rectifier.

UNIT III. Inverters

3.1 Introduction and applications of inverter.
3.2 Single and three-phase inverter configurations.
3.3 Voltage and current source inverters and their operating modes.
3.4 Voltage control and harmonic reduction in inverters using PWM strategies.

UNIT IV. Choppers

4.1 Introduction to Choppers, their working principles & applications.
4.2 Types of Choppers.
4.3 Buck converter.
4.4 Boost converter.
4.5 Buck- Boost converter

UNIT V. Cyclo-Converters

5.1 Introduction to cyclo converters, working principle and applications.
5.2 3- phase to 1-phase, 3- phase to 3-phase, 1-phase to 3-phase Cyclo converters.

UNIT VI. Fundamentals of Electric Drives

6.1 Electric drives and its parts, advantages of electric drives, classification of electric drives Speed-torque conventions and multi-quadrant operations.
6.2 DC motor drives: General concept, speed control, breaking and SCR drives.
6.3 Induction motor drives: Stator voltage control, variable frequency control, voltage source inverter control, current source inverter control and rotor resistance control

Learning Approach:

- Small project-based learning should be used for motivating problem centered teaching method that not only places students at the core of teaching and learning activities but also gives them the ability to transfer their acquired scientific knowledge into industrial practice.
- The teacher should bring electronic components and devices in the class while taking lectures and explain and make students familiar with them. Also he may give emphasis on practical applications of these devices and components in the field.

References/suggested learning resources:

(a) Books

1) P.S. Bimbra "Power Electronics" Khanna Publishers.
2) M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications, Pearson Education, PHI Third edition, New Delhi 2004.
3) Fundamental of Power Electronics: Robert Erickson, D. Maksimovic
4) G.K. Dubey, "Fundamentals of Electric Drives", Narosa publishing House.

(b) Open source software and website address:

1. https://www.mepcoeng.ac.in
2. https://www.powerelectronicsnews.com
3. https://ece.ncsu.edu
4. https://www.power-electronics.com

Course Name: **Industrial Electronics Lab**	
Semester-IV(Electrical Engineering)	
Course Code:	23-EEPC-256
Course Title:	Industrial Electronics Lab
Number of Credits:	Total:1(L=0, T=0, P=2)

List of Practicals:

1. Test the proper functioning of power transistor.
2. Test the proper functioning of IGBT.
3. Test the proper functioning of DIAC to determine the break over voltage.
4. Determine the latching current and holding current using V-I characteristics of SCR.
5. Test the variation of R, C in R and RC triggering circuits on firing angle of SCR.
6. Test the effect of variation of R, C in UJT triggering technique.
7. Perform the operation of Class – A, B, C, turn off circuits.
8. Perform the operation of Class –D, E, F turn off circuits.
9. Use CRO to observe the output waveform of half wave controlled rectifier with resistive load and determine the load voltage.
10. Draw the output waveform of Full wave controlled rectifier with R load, RL load, free wheeling diode and determine the load voltage.

Atleast 8 practicals from the above have to be performed

Course Name: **Electric Power Transmission and Distribution**	
Semester-IV (Electrical Engineering)	
Course Code:	23-EEPC-208
Course Title:	Electric Power Transmission and Distribution
Number of Credits:	Total:4(L=4, T=0, P=0)

Rationale:

The majority of the polytechnic pass outs have to perform various activities in the state Electricity Boards in the field of Generation, Transmission and Distribution of Electrical power. The range of these activities vary from simple administrative jobs to public relations, operation and maintenance of equipment's, lines fault location, planning and designing of simple distribution schemes. They may also be placed in executive and supervisory control in power station, transmission and distribution networks. In this subject most of these skills and knowledge are dealt with.

Learning Outcome:

- Demonstrate the types of power generation
- Maintain the optimized working of the power plants &Apply safe practices in power plants
- Explain various transmission and distribution systems.
- Describe the Substation and the Power factor improvement.
- Select the adequate mix of power generation based on economic operation

Detailed Contents:

Unit I. Transmission of Electrical Power

1.1 Layout of transmission system; Effect of increase of voltage on (a) weight of copper(b) Efficiency of line and (c) line drop; practical working voltage for generation, transmission and distribution.

1.2 Comparison between: (a) three phase and single phase system (b) Overhead and underground transmission and distribution.

1.3 Constructional features of transmission lines: Type of supports, type of insulators, Selection of insulators, Conductors, earth wiring and their accessories, Transposition and stringing of lines.

1.4 Mechanical features of line: importance of sag, calculation of sag at level supports, effects of wind and ice, simple problems; Indian electricity rules pertaining to clearance.

1.5 Electrical features of line: concept of resistance, inductance and capacitance in A.C. transmission line (single phase, three phases) simple problems on efficiency and regulation of short lines; physical concept of corona. Effects of corona and remedial measures.

1.6 HVDC transmission lines : salient features, advantages, description of system block diagram, ground return.

Unit II. Distribution of Electrical Power

2.1 Layout of HT and LT distribution system: Constructional feature of distribution lines and their erection. LT feeder, distributor and service mains; Classification of distribution system.
2.2 Connection scheme of distribution system-radial and ring mains system, Design considerations for Feeder fed at one end and determination of size of conductor, Simple problems on AC distributor.
2.3 Construction of LT and HT underground power cable, laying of cables, different methods, comparison of overhead and underground distribution systems.

Unit III. Sub-Stations

3.1 Brief idea of distribution substations; grid sub-station 220/132KV, outdoor power substations, indoor and pole mounted substations, Layout of 33/11 KV distribution substation and various accessories and equipments.
3.2 Common type of faults in lines (i.e. overhead and underground), Location and testing of faults in underground cables, Maintenance schedule of lines.

Unit IV. Economics of Power

4.1 Concept of power factor, Causes and disadvantages of low power factor, Economics of power factor improvements, Methods of improvements using static and synchronous condensers and simple problems.
4.2 Type of Tariffs, Block rate, flat rate, maximum demand and two part tariffs, Simple problems

Learning Approach:

- In order to provide practical exposure to the students, they will be taken to visit power stations, sub – stations.
- Appropriate use of audio-visual aids can help student understand the concepts in a better way.
- Students should also be made aware on recent developments, current practices in the Electricity boards to keep them abreast with modern techniques in Generation, Transmission and Distribution of Electrical Power.

References/suggested learning resources:

(a) Books

1) Elements of Power System, V. K. Mehta and Rohit Mehta, S.ChandandCo. Ltd.
2) Transmission &Distribution, J. B. Gupta , S. K. Khanna
3) Electrical Power System, Dr. S. L. Uppal ,Prof. S. Rao ,Khanna Publisher,New Delhi
4) A course in Electrical Power,Soni, Gupta, Bhatnagar ,Dhanpat Rai & Sons
5) A course in Power plant Engineering, Dr. V. M. Domkundwar, Dhanpat Rai & Sons
6) Electrical Power system Design,M.V.Deshpande ,Tata Mcgraw-Hill

(b) Open Source/Online Resources:

1. https://ndl.iitkgp.ac.in/
2. https://www.electrical4u.com/electrical-engineering
2. articles/transmission,distribution,substation,cables/
3. https://nptel.ac.in (Prof.D.P.Kothari)
4. https://swayam.gov.in

Course Name: **Essence of Indian knowledge and tradition**	
Semester-IV(Electrical Engineering)	
Course Code:	23-AU-250
Course Title:	Essence of Indian knowledge and tradition
Number of Credits:	Total: 1(L=2, T=0, P=0)

Course Objectives:
To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

UNIT-I: Introduction to traditional knowledge

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop,
the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Unit-II: Protection of traditional knowledge

The need for protecting traditional knowledge Significance of TK Protection, the value of TKin the global economy, Role of Government to harness TK.

Unit-III: Legal framework and Traditional Knowledge

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights)Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act);
B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Unit-IV: Traditional knowledge and intellectual property

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Unit-V: Traditional knowledge in different sectors

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Course Outcomes:

1. Understand the concept of Traditional knowledge and its importance.
2. Know the need and importance of protecting traditional knowledge.

3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge.
5. Understand the traditional knowledge in different sectors.

Text Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and
Vipin Kumar Singh, Pratibha Prakashan 2012.

References:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

E-resources:1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003

Course Name: **Minor Project**	
Semester-IV(Electrical Engineering)	
Course Code:	23-EEPR-258
Course Title:	Minor Project
Number of Credits:	Total: 2(L=0, T=0, P=4)

Course objectives:

The objective of the minor project is to provide an opportunity for students to undertake short research training outside the classroom to solve real-world issues.

Minor project work aims at exposing the students to the various industries dealing with electrical components, devices, circuitry and microcontrollers. They are expected to learn about the construction, manufacturing and working environment of different Electrical Engineering field /industry. It is expected from them to get acquitted with industrial environment at the shop floor and acquire desired attitudes. For this purpose, student during middle of course is required to be sent for a designated period in different industries as production/servicing/maintenance/installation of electrical machines/items.

As a minor project activity each student is supposed to study the operations at sight and prepare a detail project report of the observations/processes/activities by him/her. These students should be guided by respective subject teachers. Each teacher may guide a group of students.
The teachers along with field supervisors/engineers will conduct performance assessment of students.
Evaluation of minor project through viva-voce/presentation may comprise of weightage to performance in general behavior, quality of work and report, presentation during viva-voce examination and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.