

Orissa School of Mining Engineering Keonjhar

**Department of Electrical Engineering**

 **Lesson Plan**

**The Vision of the Electrical Engineering Department:**

**To provide excellent knowledge and enrich the problem solving skills of the students in the field of Electrical Engineering with a focus to prepare the students for industry need, recognized as innovative leader, responsible citizen and improve the environment**.

# **The Mission of Electrical Engineering Department:**

1. **Prepare the students with strong fundamental concepts, analytical capability, and problem solving skills. Create an ambience of education through faculty training, self-learning, sound academic practices and research endeavors.**
2. **Provide opportunities to promote organizational and leadership skills in students through various extra- curricular and co-curricular events.**
3. **To make the students as far as possible industry ready to enhance their employability in the industries.**
4. **To improve department industry collaboration and to maintain effective operational environment.**

# **Program Educational Objectives :**

**The Program Educational Objectives (PEOs) of the Electrical Engineering Department are given below:**

1. **PEO1- To engage in Design of Systems, tools and applications in the field of electrical Engineering and allied engineering Industries.**
2. **PE02- To apply the knowledge of electrical engineering to solve problems of social relevance and/or pursue higher education**
3. **PE03- To work effectively as individuals and as team members in multidisciplinary projects by exhibit leadership capability, triggering social and economic commitment and inculcate community services and protect environment**
4. **PEO4-  Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.**

**Program Specific Outcome (PSOs)Program Outcome(POs):**

**Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.**

1. **Problem Analysis: Identify and analyze well defined engineering problems using codified standard methods.**
2. **Design/development of solutions: Design solutions for well-defined technical problems and assist with the design of system components or processes to meet specified needs.**
3. **Engineering Tools,Experimentation and Testing : Apply modern engineering tools and appropriate technique to conduct standard tests and measurements .**
4. **Engineering Practices for Society ,Sustainability and Environment : Apply appropriate technology in context of society ,sustainability ,environment and ethical practices.**
5. **Project Management: Use engineering management principles individually ,as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities .**
6. **Life-long Learning : Ability to analyze individual needs and engage in updating in the context of technological changes.**

**Program Specific Outcome(PSOs)**

**PSO1:Apply engineering and laboratory skills for testing operation and maintenance of electrical machine ,power and energy system**

**PSO2:Model and analyze ,realize physical systems ,components or processes related to electrical engineering system**

**PSO3:work professionally in power system engineering ,electrical machine and circuit system**

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| Subject **: Generation Transmission and Distribution** |
| Discipline: **Electrical Engineering** | Name of the Faculty: **Er. Debendu Puhan** |
| Course Code: | **TH- 4** | Semester: |  **4th** |
| Total Periods: | **60** | Examination: | **Summer 2022-23** |
| Theory Periods: | **4P/W** | Class Test: | **20** |
| Maximum Marks: | **100** | End Semester Examination: | **80** |

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| **Week** | **NO OF PERIODS AVAILABLE** | **Class Day** | **Theory Topics to be covered** | **Sub Topic with****Time management****(course delivery schedule)** | **Remarks** |
| 1st | 1 | 1st16.02.23 | **Generation of electricity**Elementary idea on generation of electricity from Thermal power station. | Introduction to generation of electricity |15minuitedifferent generating stations in India and different types of generating stations in India|10minintroduction to thermal power station with all the parts included with thermal power station |25minquestion answer discussion |3minattendance. | 2min |  |
| **2nd** | 5 | 1st , 2nd20.02.23 (2 class) | Generation of electricity from Hydel Power station. | introduction to hydroelectric power station with different stages of this |30mindifferent hydropower station in India|25mindiscuss some important major of hydroelectric power station. |35minquestion answer discussion |15minattendance. |5min |  |
| 3rd , 4th21.02.23 | Generation of electricity from Nuclear Power station. | introduction to nuclear power station different nuclear station |15minvarious stage and operation of nuclear power station |13m discuss some important major issue of nuclear power station. |15minquestion discussion |10minattendance. |2min |  |
| 5th23.02.23 | Introduction to Solar Power plant and photovoltaic cells | introduction to solar power station |25minsolar photovoltaic system. |10minPV array |15minquestion answer discussion |3minattendance. |2min |  |
| **3rd** | 4 | 1st , 2nd27.02.23(2 class) | Layout Diagram of generating stations. | describe the layout diagram of hydroelectric power station|35mindescribe the layout diagram of thermal|15minpower station|45mindescribe the layout diagram of nuclear|15minpower station|28mindescribe attendance |2min |  |
| 3rd28.02.23 | **TRANSMISSION OF ELECTRIC POWER*** 1. Layout of transmission and distribution system.
 | Idea on single line Layout diagram of power transmission in any electrical system with various components related to the transmission system. |25min* 1. Idea on single line Layout diagram of power Distribution in any electrical system with various components related to the transmission system. |25min

Attendance |5min |  |
| 4th02.03.23 | * 1. Voltage regulation and efficiency of transmission.
 | Understanding and calculation of voltage regulation in a transmission system. |25minCalculation of efficiency of a electrical power transmission system |25minAttendance |5 min |  |
| 4th | 4 | 1st , 2nd06.03.23(2 class) | Kelvin’s law for economical size of conductor. | Kelvins law on power system |40minimportant of kelvins law for the economical size of conductor. |45 minderivation of kelvins law with power graph analysis |10 minattendance |5min |  |
| 3rd07.03.23 | Corona and corona loss on transmission lines. | Define corona in transmission lines and how it occurs in the line and the losses due this corona|25 minVarious factors of corona and calculation of corona loss derivation |15 minProblem associated with corona and corona loss in the transmission line |13 minAttendance |2 min |  |
| 4th09.03.23 | **OVER HEAD LINES**Types of supports, size and spacing of conductor. | Illustrate various type of supports i.e.., pole, insulator and other electrical equipment used in overhead lines |30minSize of conductor in electrical power system |10 minSpacing of conductor in power system |13minAttendance | 2min |  |
| 5th | 4 | 1st,2nd13.03.23(2 class) | State types of insulator and cross arms. | State types of insulators and cross arm in the overhead system describe one by one with their construction and working principle |45min String capacity of insulator and cross arm |45min String efficiency |15minAttendance |5 min |  |
| 3rd14.03.23 | Sag in overhead line with support at same level | Give an idea about sag in overhead line |15 minDerivation for Calculation of sag with support at same level and different types of climate condition |15 minSolve some simple problems related to support at same level |23minAttendance |2 min |  |
| 4th16.03.23 | Sag in overhead line with support at different level. | Derivation for Calculation of sag with support at different level and different types of climate condition |30 minSolve some simple problems related to support at same level |23minAttendance |2 min |  |
| 6th | 4 | 1st,2nd20.03.23(2 class) | approximate formula effect of wind, ice and temperature on sagAnd Simple problem on sag. | Approximate formula derivation of sag for effect of Ice loading, wind loading and temperature on the sag |55 minDifferent approaches for different types of climate condition. |25 minsSimple problems related to all the condition described |20 minsAttendance |2 mins |  |
| 3rd21.03.23 | 1ST CLASS TEST |  |  |
| 4th23.03.23 | **PERFORMANCE OF SHORT & MEDIUM LINES**Performance of short transmission lines.  | Introduction to short transmission line |10minDiscuss some parameters related to the short transmission line |20minCircuit diagram and vectorial representation of the short transmission line |10Various formula derivation related to short line |13minsAttendance |2mins |  |
| 7th | 3 | 1st,2nd27.03.23(2 class) | some Problems related to short lines | Solve some problem related to short transmission line | 55 minsDoubt clear of problems |50 minsAttendance |5mins |  |
| 3rd28.03.23 | Performance of medium transmission lines and Some Problem related to medium line | Performance of medium transmission line |20 minsVarious parameters related to medium transmission line |15 minsSolve some problem related to medium transmission line |18Attendance |2 mins |  |
| 7th | 4 | 1st,2nd03.04.23(2 class) | Calculation of regulation and efficiency. | derivation for calculation of regulation and efficiency of short and medium transmission line |55 min* 1. solve some simple problems on the regulation and efficiency |50 mins
	2. attendance |5 mins
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| 3rd , 4th04.04.23 | **EHV TRANSMISSION**Introduction to EHV AC transmission. | * 1. idea behind the EHV transmission in power system. |25 min

the advantages and disadvantages of EHV transmission. |15necessity of EHV transmission |10minsattendance |5 mins |  |
| 8th | 4 | 1st,2nd10.04.23(2 class) | Reasons for adoption of EHV AC transmission.Problems involved in EHV transmission. | Reasons for adoption of EHV AC transmission. Why we choose EHV AC system |50 minsProblems involved in EHV transmission. |45 minsQ\A |10minsAttendance |5 mins |  |
| 3rd11.04.23 | * 1. HVDC Transmission
 | importance of HVDC transmission |33min* 1. various HVDC system in India |15min

advantages and disadvantages of HVDC system |5 minsattendance |2 mins |  |
| 4th13.04.23 | * 1. Revision of EHV AC transmission.
	2. Problem practices
 | Revision of EHV AC and DC transmission system |30 minProblem practices |20Attendance |5min |  |
| 9th | 4 | 1st,2nd17.04.23(2 class) | Advantages and Limitations of HVDC transmission systemAnd Revision of EHV transmission. | Advantages and Limitations of HVDC transmission system |55 minsRevision of EHV transmission. |50Attendance |5mins  |  |
| 3rd18.04.23 | **Distribution System**Introduction to Distribution System. | Introduction to Distribution System. |35 minsFactors affecting distribution system |18 minsAttendance |2 mins |  |
| 4th21.04.23 | Connection Schemes of Distribution System: (Radial, Ring Main and Interconnected system) | Connection Schemes of Distribution System |25 mins Radial system |10minsRing Main |10minInter connected system |8 minsAttendance |2min |  |
| 10th | 4 | 1st,2nd24.04.23(2 class) | DC distributions.Distributor fed at one End.Distributor fed at both the ends.Ring distributors.*Revision.* | DC distributions. |20minsDistributor fed at one End. |20minsDistributor fed at both the ends. |30minsRing distributors. |20minRevision. |18minsAttendance |2mins |  |
| 3rd25.04.23 | **INTERNAL ASSESMENT** |  |  |
| 4th28.04.23 | AC distribution system. Method of solving AC distribution problem.Three phase four wire star connected system arrangement. | AC distribution system. |25 mins Method of solving AC distribution problem. |15 minsThree phase four wire star connected system arrangement. |13minsAttendance |2 mins |  |
| 11th | 4 | 1st,2nd01.05.23(2 class) | **UNDERGROUND CABLES**Cable insulation and classification of cables. | Discuss about Cable insulation |25 minsclassification of cables. |25 minsattendance |5mins |  |
| 3rd02.05.23 | Types of L. T. & H.T. cables with constructional features. | Types of L. T. with constructional features. |25 minsH.T. cables with constructional features. |25minsAttendance |5min |  |
| 4th04.05.23 | Methods of cable lying. | Different Methods of cable lying. | 50 minsAttendance |5 mins |  |
| 12th | 4 | 1st,2nd08.05.23(2 class) | Localization of cable faults: Murray and Varley loop test for short circuit fault /Earth fault | Localization of cable faults |25mins: Murray and Varley loop test for short circuit fault |55 minsEarth fault|25 minsAttendance |5mins |  |
| 3rd09.05.23 | **ECONOMIC ASPECTS**Causes of low power factor and methods of improvement of power factor in power system. | Causes of low power factor and methods of improvement of power factor in power system. |  |
| 4th11.05.23 | Factors affecting the economics of generation: (Define and explain) | Discuss about Factors affecting the economics of generation, |50minsAttendance |5mins |  |
| 13th | 4 | 1st,2nd15.05.23(2 class) |  Load curves.Demand factor.Maximum demand.Load factor.Diversity factor. Plant capacity factor. | Load curves. |20 minDemand factor. | 10minMaximum demand. |10minLoad factor. |15minDiversity factor. |25minPlant capacity factor. |25minAttendance |5 min |  |
| 3rd16.05.23 | Peak load and Base load on power station.*Revision.* | Peak load on power system. |15 minsBase load on power station. |20misRevision. |15minsAttendance |5mins |  |
| 4th18.05.23 | 2nd CLASS TEST |  |  |
| 14th | 4 | 1st,2nd22.05.23(2 class) | **TYPES OF TARIFF**Desirable characteristic of a tariff.Explain flat rate, block rate, two part and maximum demand tariff. | Desirable characteristic of a tariff. |45 minsExplain flat rate tariff |20minblock rate tariff |10mintwo-part tariff |25 minsmaximum demand tariff. |8minattendance |2mins |  |
| 3rd23.05.23 |  SolveProblems of tariffs. | Problems related to various types of tariffs |55mins |  |
| 4th25.05.23 | **SUBSTATION**Earthing of Substation, transmission and distribution lines. | Earthing of Substation |25minEarthing in transmission system |15 minEarthing in distribution lines |13minAttendance |2mins |  |
| 15th | 4 | 1st,2nd29.05.23(2 class) |  Layout of LT, HT and EHT substation. | Lay out of LT |15minLayout HT |15minLayout EHT |20Attendance |5min |  |
| 3rd30.05.23 | Doubt clearing Class and Revision |  |  |
| 4th01.06.23 | VST |  |  |
| Total Class 60 |  | HOD PRINCIPAL |