

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**

|  |  |  |  |
| --- | --- | --- | --- |
| 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** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Week** | **NO OF PERIODS AVAILABLE** | **Class Day** | **Theory Topics to be covered** | | **Sub Topic with**  **Time management**  **(course delivery schedule)** | **Remarks** |
| 1st | 1 | 1st  16.02.23 | **Generation of electricity**  Elementary idea on generation of electricity from Thermal power station. | | Introduction to generation of electricity |15minuite  different generating stations in India and different types of generating stations in India|10min  introduction to thermal power station with all the parts included with thermal power station |25min  question answer discussion |3min  attendance. | 2min |  |
| **2nd** | 5 | 1st , 2nd  20.02.23  (2 class) | Generation of electricity from Hydel Power station. | | introduction to hydroelectric power station with different stages of this |30min  different hydropower station in India|25min  discuss some important major of hydroelectric power station. |35min  question answer discussion |15min  attendance. |5min |  |
| 3rd , 4th  21.02.23 | Generation of electricity from Nuclear Power station. | | introduction to nuclear power station  different nuclear station |15min  various stage and operation of nuclear power station |13m  discuss some important major issue of nuclear power station. |15min  question discussion |10min  attendance. |2min |  |
| 5th  23.02.23 | Introduction to Solar Power plant and photovoltaic cells | | introduction to solar power station |25min  solar photovoltaic system. |10min  PV array |15min  question answer discussion |3min  attendance. |2min |  |
| **3rd** | 4 | 1st , 2nd  27.02.23  (2 class) | Layout Diagram of generating stations. | | describe the layout diagram of hydroelectric power station|35min  describe the layout diagram of thermal|15min  power station|45min  describe the layout diagram of nuclear|15min  power station|28min  describe  attendance |2min |  |
| 3rd  28.02.23 | **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 |  |
| 4th  02.03.23 | * 1. Voltage regulation and efficiency of transmission. | | Understanding and calculation of voltage regulation in a transmission system. |25min  Calculation of efficiency of a electrical power transmission system |25min  Attendance |5 min |  |
| 4th | 4 | 1st , 2nd  06.03.23  (2 class) | Kelvin’s law for economical size of conductor. | | Kelvins law on power system |40min  important of kelvins law for the economical size of conductor. |45 min  derivation of kelvins law with power graph analysis |10 min  attendance |5min |  |
| 3rd  07.03.23 | 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 min  Various factors of corona and calculation of corona loss derivation |15 min  Problem associated with corona and corona loss in the transmission line |13 min  Attendance |2 min |  |
| 4th  09.03.23 | **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 |30min  Size of conductor in electrical power system |10 min  Spacing of conductor in power system |13min  Attendance | 2min |  |
| 5th | 4 | 1st,2nd  13.03.23  (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 |15min  Attendance |5 min |  |
| 3rd  14.03.23 | Sag in overhead line with support at same level | | Give an idea about sag in overhead line |15 min  Derivation for Calculation of sag with support at same level and different types of climate condition |15 min  Solve some simple problems related to support at same level |23min  Attendance |2 min |  |
| 4th  16.03.23 | 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 min  Solve some simple problems related to support at same level |23min  Attendance |2 min |  |
| 6th | 4 | 1st,2nd  20.03.23(2 class) | approximate formula effect of wind, ice and temperature on sag  And Simple problem on sag. | | Approximate formula derivation of sag for effect of Ice loading, wind loading and temperature on the sag |55 min  Different approaches for different types of climate condition. |25 mins  Simple problems related to all the condition described |20 mins  Attendance |2 mins |  |
| 3rd  21.03.23 | 1ST CLASS TEST | |  |  |
| 4th  23.03.23 | **PERFORMANCE OF SHORT & MEDIUM LINES**  Performance of short transmission lines. | | Introduction to short transmission line |10min  Discuss some parameters related to the short transmission line |20min  Circuit diagram and vectorial representation of the short transmission line |10  Various formula derivation related to short line |13mins  Attendance |2mins |  |
| 7th | 3 | 1st,2nd  27.03.23(2 class) | some Problems related to short lines | | Solve some problem related to short transmission line | 55 mins  Doubt clear of problems |50 mins  Attendance |5mins |  |
| 3rd  28.03.23 | Performance of medium transmission lines and Some Problem related to medium line | | Performance of medium transmission line |20 mins  Various parameters related to medium transmission line |15 mins  Solve some problem related to medium transmission line |18  Attendance |2 mins |  |
| 7th | 4 | 1st,2nd  03.04.23(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 |  |
| 3rd , 4th  04.04.23 | **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. |15  necessity of EHV transmission |10mins  attendance |5 mins |  |
| 8th | 4 | 1st,2nd  10.04.23(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 mins  Problems involved in EHV transmission. |45 mins  Q\A |10mins  Attendance |5 mins |  |
| 3rd  11.04.23 | * 1. HVDC Transmission | | importance of HVDC transmission |33min   * 1. various HVDC system in India |15min   advantages and disadvantages of HVDC system |5 mins  attendance |2 mins |  |
| 4th  13.04.23 | * 1. Revision of EHV AC transmission.   2. Problem practices | | Revision of EHV AC and DC transmission system |30 min  Problem practices |20  Attendance |5min |  |
| 9th | 4 | 1st,2nd  17.04.23(2 class) | Advantages and Limitations of HVDC transmission system  And Revision of EHV transmission. | | Advantages and Limitations of HVDC transmission system |55 mins  Revision of EHV transmission. |50  Attendance |5mins |  |
| 3rd  18.04.23 | **Distribution System**  Introduction to Distribution System. | | Introduction to Distribution System. |35 mins  Factors affecting distribution system |18 mins  Attendance |2 mins |  |
| 4th  21.04.23 | Connection Schemes of Distribution System: (Radial, Ring Main and Inter  connected system) | | Connection Schemes of Distribution System |25 mins  Radial system |10mins  Ring Main |10min  Inter connected system |8 mins  Attendance |2min |  |
| 10th | 4 | 1st,2nd  24.04.23(2 class) | DC distributions.  Distributor fed at one End.  Distributor fed at both the ends.  Ring distributors.  *Revision.* | | DC distributions. |20mins  Distributor fed at one End. |20mins  Distributor fed at both the ends. |30mins  Ring distributors. |20min  Revision. |18mins  Attendance |2mins |  |
| 3rd  25.04.23 | **INTERNAL ASSESMENT** | |  |  |
| 4th  28.04.23 | 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 mins  Three phase four wire star connected system arrangement. |13mins  Attendance |2 mins |  |
| 11th | 4 | 1st,2nd  01.05.23  (2 class) | **UNDERGROUND CABLES**  Cable insulation and classification of cables. | | Discuss about Cable insulation |25 mins  classification of cables. |25 mins  attendance |5mins |  |
| 3rd  02.05.23 | Types of L. T. & H.T. cables with constructional features. | | Types of L. T. with constructional features. |25 mins  H.T. cables with constructional features. |25mins  Attendance |5min |  |
| 4th  04.05.23 | Methods of cable lying. | | Different Methods of cable lying. | 50 mins  Attendance |5 mins |  |
| 12th | 4 | 1st,2nd  08.05.23  (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 mins  Earth fault|25 mins  Attendance |5mins |  |
| 3rd  09.05.23 | **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. |  |
| 4th  11.05.23 | Factors affecting the economics of generation: (Define and explain) | | Discuss about Factors affecting the economics of generation, |50mins  Attendance |5mins |  |
| 13th | 4 | 1st,2nd  15.05.23  (2 class) | Load curves.  Demand factor.  Maximum demand.  Load factor.  Diversity factor.  Plant capacity factor. | | Load curves. |20 min  Demand factor. | 10min  Maximum demand. |10min  Load factor. |15min  Diversity factor. |25min  Plant capacity factor. |25min  Attendance |5 min |  |
| 3rd  16.05.23 | Peak load and Base load on power station.  *Revision.* | | Peak load on power system. |15 mins  Base load on power station. |20mis  Revision. |15mins  Attendance |5mins |  |
| 4th  18.05.23 | 2nd CLASS TEST | |  |  |
| 14th | 4 | 1st,2nd  22.05.23  (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 mins  Explain flat rate tariff |20min  block rate tariff |10min  two-part tariff |25 mins  maximum demand tariff. |8min  attendance |2mins |  |
| 3rd  23.05.23 | Solve  Problems of tariffs. | | Problems related to various types of tariffs |55mins |  |
| 4th  25.05.23 | **SUBSTATION**  Earthing of Substation, transmission and distribution lines. | | Earthing of Substation |25min  Earthing in transmission system |15 min  Earthing in distribution lines |13min  Attendance |2mins |  |
| 15th | 4 | 1st,2nd  29.05.23  (2 class) | Layout of LT, HT and EHT substation. | | Lay out of LT |15min  Layout HT |15min  Layout EHT |20  Attendance |5min |  |
| 3rd  30.05.23 | Doubt clearing Class and Revision | |  |  |
| 4th  01.06.23 | VST | |  |  |
| Total Class 60 |  | | HOD PRINCIPAL | | |