

**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**



**Name of the Faculty: Science & Technology**

**CHOICE BASED CREDIT SYSTEM**

**Syllabus: ELECTRICAL ENGINEERING**

**Name of the Course: S.Y. B.Tech  
(Syllabus to be implemented from w.e.f. June 2019)**

**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**  
**S. Y. B. Tech. Electrical Engineering Semester-I**  
**POWER SYSTEM-I**

<b>Teaching Scheme</b>	<b>Examination Scheme</b>
<b>Theory:</b> - 3Hrs/Week,1 Credits	<b>ESE – 70 Marks</b>
<b>Tutorial:</b> - 1Hrs/Week, 1 Credit	<b>ICA-25Marks</b>
	<b>ISE- 30Marks</b>

This course introduces power plant which deals with generation of electrical energy The course also introduces economic aspects of different power plants

**Course Prerequisite:**

Knowledge of Basic Electrical Engineering, simple mathematical calculations Student shall have knowledge of energy conversion Student shall also have basic knowledge types of energy sources

**Course Objectives:**

- To develop conceptual understanding of operation of different power plants
  - To learn economic aspects of power system.
  - To study necessity and types of non-conventional energy sources
  - To make students understand overhead structure of power system.
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**Course Outcomes:**

After successful completion of this course,

- Student will be able to understand operation of different power plants
  - Student will be able to analyze economic aspects of power system
  - Student will be able to investigate need and areas of application for non-conventional energy sources
  - Students will be able to understand overhead structure of power system.
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**SECTION-I**

**Unit 1 Economic Aspects of Power Generation**

**No of lectures-08**

• **Prerequisite:**

Knowledge of Basic Electrical Engineering, simple mathematical calculations

• **Objectives:**

- To introduce to student basic terms used in power system operation
- To make student understand load curve
- To introduce student to types of loads
- To familiarize the students with the tariff methods for electrical energy consumptions

- **Outcomes:**  
After completing this unit, students –
  - Can define different terms in power system operation
  - Can analyze selection of generating units
  - Can calculate usage of electrical power & tariff
- **Unit Content:**  
Review of terms commonly used in system operations, Variable load on power station, Peak load, Base load, Diversity factor, Plant utility factor, Maximum demand, Load curves, load duration curves, Types of loads, Selection of generation units, Interconnected grid systems, Cost of electrical energy, Tariff & different types of tariff
- **Content Delivery Methods:**  
Chalk and talk, power point presentation
- **Assessment Methods:**  
Numerical problems related to cost of electrical energy and tariff, Theory questions related to above content

## **Unit 2 Base Load Power Plants**

**No of lectures-08**

- **Prerequisite:**  
Energy sources, Energy conversion methods
- **Objectives:**
  - Revision of Energy Sources.
  - To introduce student to different Conventional & non-Conventional Energy sources.
  - To make student understand different base load power plants.
- **Outcomes:**  
After completing this unit, students -
  - Can define conventional & non-conventional sources
  - Can compare different base load power plants
- **Unit Content:**  
Different types of conventional and non-conventional energy sources, Structure of power industry,  
**Hydro Power Plant:** Typical layout, Site selection, Classification, Hydrograph, Flow duration curves, Hydrology, Types of turbines.  
**Thermal Power Plant:** Typical layout, Site selection, Fuels & their handling, Combustion process, Ash handling, Dust collection.  
**Nuclear Power Plant:** Typical layout, Site selection, Nuclear reaction, Classification of nuclear reactor (AGR,PWR,BWR), Nuclear waste disposal, Environmental Aspects
- **Content Delivery Methods:**  
Chalk and talk, Power point presentations on Energy Sources
- **Assessment Methods:**

Theory questions related to above content.

### **Unit 3 Peak Load Power Plants**

**No of lectures-5**

- **Prerequisite:**  
Knowledge of Basic Electrical Engineering & nuclear reaction
- **Objectives:**
  - 1) To introduce student to Diesel & Gas Turbine Power Plants
  - 2) To introduce student to solar & Wind Power Plants
  - 3) To make student analyze typical layout of solar & Wind Power Plants

#### **Outcomes:**

After completing this unit, students –

1. Can apply the operation of Diesel & Gas Turbine Power Plants
2. Can apply the operation of solar & Wind Power Plants

- **Unit Content:**  
Review of Diesel Plants (advantages & disadvantages), Typical layout of power plant, site selection, Review of Gas Turbine Plants (advantages & disadvantages), Typical layout of power plant, Site selection, Review of Solar Energy (advantages & disadvantages), Typical layout of solar thermal power plant, Site selection, Review of wind energy (advantages & disadvantages), Typical layout of wind power plant, Site selection
- **Content Delivery Methods:**  
Chalk and talk, power point presentation
- **Assessment Methods:**  
Theory questions related to above content

## **SECTION II**

### **Unit 4– General structure of power system**

**No of lectures – 08**

- **Prerequisite:**  
DC system, single phase & three phase systems, ohms law
- **Objectives:**
  1. To learn basic structure of power systems
  2. To make student understand different transmission systems
- **Outcomes:**  
After completing this unit, students -
  1. Can distinguish between different supply systems
  2. Can compare between AC and DC transmission System.
  3. Can compare between overhead and underground System.

#### **Unit Content:**

Review of Electrical supply system, typical AC power supply scheme, Comparison DC and AC systems, comparison between overhead and underground system

- **Content Delivery Methods:**

Chalk and talk, power point presentations

- **Assessment Methods:**  
Theory questions related to above content

### **Unit 5– Economic Aspects of Transmission System**

**No of lectures – 08**

- **Prerequisite:**  
DC system, single phase & three phase systems, ohms law
- **Objectives:**
  - 1) To make student understand conductor cost of different AC transmission systems
  - 2) To make student understand Economics of power transmission
- **Outcomes:**  
After completing this unit, students -
  - 1) Can calculate voltage, conductor cost for various transmission systems
  - 2) Can calculate Economic conductor size for given transmission system (Kelvin's law)
- **Unit Content:**  
Comparison of conductor cost for various Overhead AC transmission systems, comparison of conductor cost for various Underground AC transmission systems, Economic choice of conductor size by kelvins law
- **Content Delivery Methods:**  
Chalk and talk, power point presentations
- **Assessment Methods:**  
Numerical problems and derivation related to conductor cost for different transmission systems and Kelvin's law Theory questions related to above content

### **Unit 6– Mechanical design of overhead lines**

**No of lectures – 05**

- **Prerequisites:**  
Electrical Materials & their properties, Capacitance
- **Objectives:**
  1. To introduce concept of overhead transmission line
  2. To introduce different conducting material & their application
  3. To introduce different insulators & their application
  4. To make student understand string efficiency & methods to improve it
- **Outcomes:**  
After completing this unit, students -
  1. Can describe construction and use of different insulators, conductor, line supports
  2. Can calculate string efficiency of given string insulators
- **Unit Content:**  
Review of overhead transmission line, main components, conductor materials, line supports, overhead line insulators, types- pin type, suspension type, strain type insulators, string efficiency, methods of improving string efficiency
- **Content Delivery Methods:**

Chalk and talk, power point presentations, videos lectures on insulators, line supports

- **Assessment Methods:**

Numerical problems and derivation related to string efficiency, Theory questions related to above content

- **Internal Continuous Assessment (ICA) :**

ICA shall consist of Minimum **FOUR** drawing Sheetson above syllabus and **report on visit** to any one of the generating power plant

- **Text Books:**

- 1) “A course in Electrical Power”, S K Kataria & Sons, J B Gupta
- 2) “Generation of Electrical Energy”, S Chand Publication, B R Gupta
- 3) “Power System Engineering”, Laxmi Publications, R K Rajput
- 4) “Power Plant Engineering”, New Age International Publication, A K Raja

- **Reference Books:**

- 1) “ Power Plant Technology”, Tata Mc Graw Hill,MMEI-Wakil
  - 2) “Power Plant Engineering”, S Chand Publications, Samsheer Gautam
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