



NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY  
SERGARH-756060, BALASORE (ODISHA)  
(Approved by AICTE& affiliated to SCTE&VT, Odisha)



## LESSON PLAN

**SUBJECT: Th-4 (UTILIZATION OF ELECTRICAL ENERGY & TRACTION )**

### CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of periods actually needed
1	Electrolytic Process	8	8
2	Electrical Heating.	8	10
3	Principles of Arc Welding.	8	5
4	Illumination.	12	18
5	Industrial Drives.	10	5
6	Electric Traction.	14	14
	Total Period:	60	60

Discipline: ELECTRICAL ENGINEERING	Semester: 5th	Name of the Teaching Faculty: Er.PADMALAYA BEHERA
Week	Class Day	Theory / Practical Topics
1 <sup>st</sup>	1 <sup>st</sup>	<b>CHAPTER-01- ELECTROLYTIC PROCESS</b> 1.1. Definition and Basic principle of Electro Deposition.
	2 <sup>nd</sup>	1.2. Important terms regarding electrolysis.
	3 <sup>rd</sup>	1.3. Faradays Laws of Electrolysis
	4 <sup>th</sup>	1.4. Definitions of current efficiency, Energy efficiency.
2 <sup>nd</sup>	1 <sup>st</sup>	1.5. Principle of Electro Deposition.
	2 <sup>nd</sup>	1.6. Factors affecting the amount of Electro Deposition.
	3 <sup>rd</sup>	1.7. Factors governing the electro deposition.
	4 <sup>th</sup>	State simple example of extraction of metals. Application of Electrolysis.
3 <sup>rd</sup>	1 <sup>st</sup>	<b>CHAPTER-2-ELECTRICAL HEATING</b> 2.1. Advantages of electrical heating.
	2 <sup>nd</sup>	2.2. Mode of heat transfer and Stephen's Law.
	3 <sup>rd</sup>	2.2. Mode of heat transfer and Stephen's Law.
	4 <sup>th</sup>	2.3. Principle of Resistance heating. (Direct resistance and indirect resistance heating.)
th	1 <sup>st</sup>	2.3. Principle of Resistance heating. (Direct resistance and indirect resistance heating.)
	2 <sup>nd</sup>	2.4. Discuss working principle of direct arc furnace and indirect arc furnace.

4	3 <sup>rd</sup>	Principle of Induction heating. Working principle of direct core type, vertical core type and indirect core type Induction furnace.
	4 <sup>th</sup>	2.5.2. Principle of coreless induction furnace and skin effect.
5 <sup>th</sup>	1 <sup>st</sup>	2.6. Principle of dielectric heating and its application
	2 <sup>nd</sup>	2.7. Principle of Microwave heating and its application.
	3 <sup>rd</sup>	<b>CHAPTER-3-PRINCIPLES OF ARC WELDING</b> 3.1. Explain principle of arc welding.
	4 <sup>th</sup>	3.2. Discuss D. C. & A. C. Arc phenomena.
6 <sup>th</sup>	1 <sup>st</sup>	3.3. D.C. & A. C. arc welding plants of single and multi-operation type.
	2 <sup>nd</sup>	Types of arc welding. Explain principles of resistance welding.
	3 <sup>rd</sup>	3.6. Descriptive study of different resistance welding methods.
	4 <sup>th</sup>	<b>CHAPTER-4- ILLUMINATION</b> 4.1. Nature of Radiation and its spectrum.
7 <sup>th</sup>	1 <sup>st</sup>	4.2. Terms used in Illuminations. [Lumen, Luminous intensity, Intensity of illumination, MHCP, MSCP, MHSCP, Solid angle, Brightness, Luminous efficiency.]
	2 <sup>nd</sup>	4.2. Terms used in Illuminations. [Lumen, Luminous intensity, Intensity of illumination, MHCP, MSCP, MHSCP, Solid angle, Brightness, Luminous efficiency.]
	3 <sup>rd</sup>	4.3. Explain the inverse square law and the cosine law.
	4 <sup>th</sup>	4.4. Explain polar curves.
	1 <sup>st</sup>	4.5. Describe light distribution and control. Explain related definitions like maintenance factor and depreciation factors.

8 <sup>th</sup>	2 <sup>nd</sup>	4.5. Describe light distribution and control. Explain related definitions like maintenance factor and depreciation factors.
	3 <sup>rd</sup>	4.6. Design simple lighting schemes and depreciation factor.
	4 <sup>th</sup>	4.7. Constructional feature and working of Filament lamps, effect of variation of voltage on working of filament lamps.
9 <sup>th</sup>	1 <sup>st</sup>	4.7. Constructional feature and working of Filament lamps, effect of variation of voltage on working of filament lamps.
	2 <sup>nd</sup>	4.8. Explain Discharge lamps.
	3 <sup>rd</sup>	4.9. State Basic idea about excitation in gas discharge lamps.
	4 <sup>th</sup>	4.10. State constructional features and operation of Fluorescent lamp. (PL and PLL Lamps)
10 <sup>th</sup>	1 <sup>st</sup>	4.10. State constructional features and operation of Fluorescent lamp. (PL and PLL Lamps)
	2 <sup>nd</sup>	4.11. Sodium vapor lamps.
	3 <sup>rd</sup>	4.12. High pressure mercury vapor lamps.
	4 <sup>th</sup>	4.13. Neon sign lamps.
11 <sup>th</sup>	1 <sup>st</sup>	4.14. High lumen output & low consumption fluorescent lamps.
	2 <sup>nd</sup>	<b>CHAPTER-5- INDUSTRIAL DRIVES</b> 5.1. State group and individual drive.
	3 <sup>rd</sup>	5.2. Method of choice of electric drives.
	4 <sup>th</sup>	5.3. Explain starting and running characteristics of DC and AC motor.

12 <sup>th</sup>	1 <sup>st</sup>	State Application of: DC motor.
	2 <sup>nd</sup>	3-phase induction motor. 3 phase synchronous motors. Single phase induction, series motor, universal motor and repulsion motor.
	3 <sup>rd</sup>	<b>CHAPTER-6 ELECTRIC TRACTION:</b> 6.1. Explain system of traction.
	4 <sup>th</sup>	6.2. System of Track electrification
13 <sup>th</sup>	1 <sup>st</sup>	6.3. Running Characteristics of DC and AC traction motor.
	2 <sup>nd</sup>	Explain control of motor: Tapped field contro
	3 <sup>rd</sup>	6.4.2. Rheostatic control.
	4 <sup>th</sup>	6.4.3. Series parallel control.
14 <sup>th</sup>	1 <sup>st</sup>	6.4.4. Multi-unit control.
	2 <sup>nd</sup>	6.4.5. Metadyne control.
	3 <sup>rd</sup>	Explain Braking of the following types: Regenerative Braking.
	4 <sup>th</sup>	6.5.2. Braking with 1-phase series motor.
15 <sup>th</sup>	1 <sup>st</sup>	6.5.3. Magnetic Braking.
	2 <sup>nd</sup>	CLASS TEST
	3 <sup>rd</sup>	CLASS TEST

	4 <sup>th</sup>	CLASS TEST
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