

Email Id:-gpblselectricalengg@gmail.com

**Department of Electrical Engineering**

**Govt. Polytechnic, Balasore**

**LESSON PLAN FOR ACADEMIC SESSION - 2022-23**

**UTILIZATION OF ELECTRICAL ENERGY & TRACTION**

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| **Course Code : Th.4** | **Semester : 5th**  |
| **Total Periods : 60 Periods**  | **Examination : 3 Hours**  |
| **Theory Periods : 4 P/Week**  | **Internal Assessment : 20 Marks** |
| **Tutorial : -** | **End Semester Examination : 80 Marks** |
| **Maximum Marks : 100** |  |
| **Semester From Date : To Date :** |
| **Name of Teaching Faculty : Er. Radha Rani Panda** |

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| WEEK | PERIOD | TOPIC |
| 1st | 1st | **ELECTROLYTIC PROCESS:** Definition and Basic principle of Electro Deposition.  |
| 2nd | Important terms regarding electrolysis. |
| 3rd | Faradays Laws of Electrolysis. |
| 4th | Definitions of current efficiency, Energy efficiency. |
| 2nd | 1st | Principle of Electro Deposition. |
| 2nd | Factors affecting the amount of Electro Deposition. |
| 3rd | Factors governing the electro deposition. |
| 4th | State simple example of extraction of metals.Application of Electrolysis. |
| 3rd | 1st | **ELECTRICAL HEATING:** Advantages of electrical heating.  |
| 2nd | Mode of heat transfer and Stephen’s Law.  |
| 3rd | Principle of Resistance heating. (Direct resistance and indirect resistance heating.)  |
| 4th | Discuss working principle of direct arc furnace and indirect arc furnace.  |
| 4th | 1st | Principle of Induction heating.  Working principle of direct core type, vertical core type and indirect core type Induction furnace.  |
| 2nd | Principle of coreless induction furnace and skin effect.  |
| 3rd | Principle of dielectric heating and its application.  |
| 4th | Principle of Microwave heating and its application.  |
| 5th | 1st | **PRINCIPLES OF ARC WELDING:** Explain principle of arc welding.  |
| 2nd | Discuss D. C. & A. C. Arc phenomena.  |
| 3rd | D.C. & A. C. arc welding plants of single and multi-operation type.  |
| 4th | Types of arc welding.  |
| 6th | 1st | Types of arc welding.  |
| 2nd | Explain principles of resistance welding.  |
| 3rd | Descriptive study of different resistance welding methods.  |
| 4th | Descriptive study of different resistance welding methods.  |
| 7th | 1st | **ILLUMINATION:** Nature of Radiation and its spectrum.  |
| 2nd | Terms used in Illuminations. [Lumen, Luminous intensity, Intensity of illumination, MHCP, MSCP, MHSCP, Solid angle, Brightness, Luminous efficiency.]  |
| 3rd | Explain the inverse square law and the cosine law.  |
| 4th | Explain polar curves.  |
| 8th | 1st | Describe light distribution and control. Explain related definitions like maintenance factor and depreciation factors.  |
|  | 2nd | Design simple lighting schemes and depreciation factor.  |
| 3rd | Constructional feature and working of Filament lamps, effect of variation of voltage on working of filament lamps.  |
| 4th | Explain Discharge lamps. State Basic idea about excitation in gas discharge lamps.  |
| 9th | 1st | State constructional factures and operation of Fluorescent lamp. (PL and PLL Lamps)  |
| 2nd | Sodium vapor lamps. High pressure mercury vapor lamps.  |
| 3rd | Neon sign lamps.  |
| 4th | High lumen output & low consumption fluorescent lamps.  |
| 10th | 1st | **INDUSTRIAL DRIVES:** State group and individual drive.  |
| 2nd | Method of choice of electric drives.  |
| 3rd | Explain starting and running characteristics of DC motor |
| 4th | Explain starting and running characteristics of AC motor.  |
| 11th | 1st | State Application of: DC motor.  |
| 2nd | State Application of: 3-phase induction motor.  |
| 3rd | State Application of: 3 phase synchronous motors.  |
| 4th | State Application of: Single phase induction, series motor  |
| 12th | 1st | State Application of: Universal motor |
| 2nd | State Application of: Repulsion motor. |
| 3rd | **ELECTRIC TRACTION:** Explain system of traction.  |
| 4th | System of Track electrification.  |
| 13th | 1st | Running Characteristics of DC traction motor.  |
| 2nd | Running Characteristics of AC traction motor.  |
| 3rd | Explain control of motors. |
| 4th | Tapped field control.  |
| 14th | 1st | Rheostatic control.  |
| 2nd | Series parallel control.  |
| 3rd | Multi-unit control.  |
| 4th | Metadyne control.  |
| 15th | 1st | Explain Braking of the following types: Regenerative Braking.  |
| 2nd | Braking with 1-phase series motor.  |
| 3rd | Magnetic Braking.  |
| 4th | Magnetic Braking.  |

Lect, Elect Dept.

 G.P, BLS

Teaching Faculty

 Academic Coordinator HOD, Dept of EE

Government Polytechnic, Government Polytechnic,

 Balasore Balasore

 Principal

 Government Polytechnic,

 Balasore