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**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. |

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