# GOVERNMENT POLYTECHNIC JAJPUR

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## DEPARTMENT OF METALLURGICAL ENGINEERING

LESSON PLAN

| **Discipline** Metallurgy | **Semester** 4th | Name of teaching faculty: **Biren Kumar Samal** P.T.G.F in metallurgy |
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| **Subject** P.E.M | **No day/ week class: 4** | **No of week:** 15 **Session:** Summer-2023 (14/02/2023 to 23/5/2023) |

| Week | Class Day | Topic |
|---|---|---|
| 1st | 1st | Introduction class of metallurgical terms |
| | 2nd | Ore, mineral with examples |
| | 3rd | Define gangue, flux & slag |
| | 4th | Matte and speciss |
| 2nd | 1st | Define metal and alloys |
| | 2nd | Use of different metal and alloys |
| | 3rd | Introduction principles of pre-treatment of ores |
| | 4th | Short description different agglomeration process |
| 3rd | 1st | Introduction of sintering |
| | 2nd | Principles and process variables of sintering with sketch |
| | 3rd | Advantages and limitation of sintering |
| | 4th | Introduction of Pelletizing |
| 4th | 1st | Theory of bonding in pellets |
| | 2nd | Mechanisim of ball formation |
| | 3rd | Disc pelletizer |
| | 4th | Drum pelletizer, Flowsheet of pelletizing |
| 5th | 1st | Short notes on Briquetting, nodulising |
| | 2nd | Introduction of general method of extraction |
| | 3rd | Inroduction of Pyrometallurgy |
| | 4th | Roasting and differnent roasting methods |
| 6th | 1st | Description of calcination with chemical reaction |
| | 2nd | Smelting and types of smelting |
| | 3rd | Matte smelting, reverberatory furnace sketch |

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| | 3rd | |
| | 4th | Method of distillation and sublimation |
| 7th | 1st | Coverting process of matte and pig iron |
| | 2nd | Hydrometallurgy and different steps |
| | 3rd | Flow diagram of hydrometallurgical extraction |
| | 4th | Leaching and different leaching method |
| 8th | 1st | Bacteria leaching |
| | 2nd | Pressure leaching |
| | 3rd | Electrometallugical process |
| | 4th | Define electrolysis, ionic conductivity |
| 9th | 1st | Electromotive series |
| | 2nd | Introduction of Faradays law of electrolysis |
| | 3rd | First and second law of electrolysis |
| | 4th | Difference between electro-wining and electro- refining |
| 10th | 1st | Zone refining |
| | 2nd | Fire refining |
| | 3rd | Principles of metallugical thermodynamics |
| | 4th | Zeroth law of thermodynamics |
| 11th | 1st | First and second law of thermodynamics |
| | 2nd | Third law of thermodynamics |
| | 3rd | Concept of intrnal energy, Enthalpy |
| | 4th | Concept of entopy change and free energy of a chemical reaction |
| 12th | 1st | Henry's law |
| | 2nd | Sivert's law |
| | 3rd | Explain order of reaction |
| | 4th | Application of first order of reaction |
| 13th | 1st | Introduction of ellingham diagram |
| | 2nd | Contruction of ellingham diagram |
| | 3rd | Use of ellingham diagram |
| | 4th | Objective question discussion |
| 14th | 1st | Introduction Predominance area diagram |
| | 2nd | Method of contruction |
| | 3rd | Utility of predominance area diagram (PAD) |
| | 4th | Objective question discussion |
| 15th | 1st | Revision class of E.M.F series |
| | 2nd | Application of E.M.F series |
| | 3rd | Electrolysis with illustration of diagram |

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| | 3rd | Electro-refining of Cu |
| | 4th | Reaction of electrolysis process, Hearth Smelting |

Biren Ku Samal.

Signature of faculty