

| <p align="center"><b>GOVERNMENT POLYTECHNIC JAJPUR</b><br/> At/ Po: Ragadi, Block: Korei, Dist.: Jajpur, Odisha- 755019<br/> Website: <a href="https://www.gpjajpur.org">https://www.gpjajpur.org</a> E-mail: <a href="mailto:principalgpjajpur@yahoo.co.in">principalgpjajpur@yahoo.co.in</a> Contact: 9437155107</p> |                                          |                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DEPARTMENT OF MECHANICAL ENGG.</b>                                                                                                                                                                                                                                                                                  |                                          |                                                                                                                                                                                                                                |
| <b>LESSON PLAN (2026-27)</b>                                                                                                                                                                                                                                                                                           |                                          |                                                                                                                                                                                                                                |
| <b>Discipline:</b><br><b>MECHANICAL</b>                                                                                                                                                                                                                                                                                | <b>SEMESTER: 3rd</b>                     | <b>Name of the Teaching faculty: Sushanta Kumar Mohanta</b>                                                                                                                                                                    |
| <b>SUBJECT: TE-I (TH-5)</b>                                                                                                                                                                                                                                                                                            | <b>No of Days/Week class allotted: 3</b> | <b>Semester starts from Date: 1.07.2026 To 5.11.2026</b><br><b>No of weeks: 15</b>                                                                                                                                             |
| 1st                                                                                                                                                                                                                                                                                                                    | 1st                                      | <b>UNIT-I Introduction to Thermodynamics</b>                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                        |                                          | Thermodynamic Systems (closed, open, isolated), system (pressure, volume, temperature, entropy,                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Thermodynamic properties of a system (pressure, volume, temperature, entropy,                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | <b>enthalpy, Internal energy and units of measurement) ;Intensive and extensive properties</b>                                                                                                                                 |
| 2nd                                                                                                                                                                                                                                                                                                                    | 1st                                      | Define thermodynamic processes, path, cycle, state, path function, point function;                                                                                                                                             |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Thermodynamic Equilibrium ; Quasi-static Process ; Laws of thermodynamics (statements only)                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | <b>Sources of Energy:</b> Brief description of energy Sources: Classification of energy sources: Renewable,                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                        | 1st                                      | Non-Renewable; Fossil fuels (CNG & LPG) ; Solar Energy: Flat plate and concentrating collectors & its applications .                                                                                                           |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | (working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation)                                                                                                                                              |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Definitions of Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy;                                                                                                                                             |
| 4th                                                                                                                                                                                                                                                                                                                    | 1st                                      | Biomass, Biodiesel; Hydraulic Energy, Nuclear Energy; Fuel cell.                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | <b>UNIT-II Internal Combustion Engines</b> Assumptions made in air standard cycle analysis                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Brief description of Carnot, Otto and Diesel cycles with P-V and T-S diagrams                                                                                                                                                  |
| 5th                                                                                                                                                                                                                                                                                                                    | 1st                                      | Internal and external combustion engines; advantages of I.C. engines over external                                                                                                                                             |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | combustion engines; classification of I.C. engines; neat sketch of I.C. engine indicating                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | component parts; Function of each part and materials used for the component parts                                                                                                                                              |
| 6th                                                                                                                                                                                                                                                                                                                    | 1st                                      | Cylinder, crank case, crank pin, crank, crank shaft, connecting rod, wrist pin, piston                                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | cooling pins cylinder heads, exhaust valve, inlet valve; Working of four-stroke                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | two stroke petrol and diesel engines; Comparison of two stroke and four stroke engines;                                                                                                                                        |
| 7th                                                                                                                                                                                                                                                                                                                    | 1st                                      | Comparison of C.I. and S.I. engines; Valve timing and port timing diagrams for four stroke and two stroke engines.                                                                                                             |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | <b>UNIT:III I.C. Engine Systems:</b> Fuel system of Petrol engines; Principle of operation of simple and Zenith carburettors;                                                                                                  |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Fuel system of Diesel engines; Types of injectors and fuel pumps; Cooling system:                                                                                                                                              |
| 8th                                                                                                                                                                                                                                                                                                                    | 1st                                      | air cooling, water cooling system with thermo siphon method of circulation                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | water cooling system with radiator and forced circulation (description with line diagram).                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Comparison of air cooling and water cooling system; Ignition systems – Battery coil ignition and magneto ignition                                                                                                              |
| 9th                                                                                                                                                                                                                                                                                                                    | 1st                                      | Comparison of two systems; Types of lubricating systems used in I.C. engines with line diagram;                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Types of governing of I.C. engines – hit and miss method, quantitative method,                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | qualitative method and combination methods of governing; their applications                                                                                                                                                    |
| 10th                                                                                                                                                                                                                                                                                                                   | 1st                                      | Objective of super charging.                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | <b>UNIT-IV Performance of I.C. Engines:</b> Brake power; Indicated power; Frictional power;                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Brake and Indicated mean effective pressures                                                                                                                                                                                   |
| 11th                                                                                                                                                                                                                                                                                                                   | 1st                                      | Brake and Indicated thermal efficiencies;                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Mechanical efficiency;Relative efficiency; Performance test; Morse test                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Heat balance sheet                                                                                                                                                                                                             |
| 12th                                                                                                                                                                                                                                                                                                                   | 1st                                      | Methods of determination of B,P., I.P. and F.P                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Simple numerical problems on performance of I.C. engines.                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Simple numerical problems on performance of I.C. engines.                                                                                                                                                                      |
| 13th                                                                                                                                                                                                                                                                                                                   | 1st                                      | <b>Unit-V Air Compressors:</b> Functions of air compressor; Uses of compressed air                                                                                                                                             |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Types of air compressors; Single stage reciprocating air compressor                                                                                                                                                            |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | its construction and working (with line diagram) using P-V diagram; Multi stage compressors                                                                                                                                    |
| 14th                                                                                                                                                                                                                                                                                                                   | 1st                                      | Advantages over single stage compressors; Rotary compressors:Centrifugal compressor, axial flow type compressor and vane type compressors.                                                                                     |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | <b>Refrigeration &amp; Air-conditioning:</b> Refrigeration; Refrigerant; COP; Air Refrigeration system                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | components, working & applications; Vapour Compression system: components, working & applications; Air conditioning; Classification of Airconditioning systems; Comfort and Industrial Air-Conditioning; Window AirConditioner |
| 15th                                                                                                                                                                                                                                                                                                                   | 1st                                      | Summer Air-Conditioning system,                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                        | 2nd                                      | Winter Air-Conditioning system, Year-round Air-Conditioning system.                                                                                                                                                            |
|                                                                                                                                                                                                                                                                                                                        | 3rd                                      | Revisions                                                                                                                                                                                                                      |

*Sushanta Kumar Mohanta*

Signature of Faculty

#### REFERENCES:

1. Introduction to Renewable Energy – Vaughn Nelson, CRC Press
2. Thermal Engineering – P. L. Ballaney, Khanna Publishers, 2002
3. A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai.
4. Thermal Engineering – R. S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, New Delhi.
5. Thermal Engineering – R. K. Rajput, 8th Edition, Laxmi publications Pvt Ltd, New Delhi.